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Perceptions of Landscape Function within the Field of Landscape Architecture

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Perceptions of Landscape Function within the Field of Landscape Architecture

by

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Dedication

"Looking out into the landscape, I'm able to observe that what moves can appear more graceful, more beautiful, and more noble that what stands firm or is stable" (Robert Walser, 1927 translated by Christopher Middleton).

In memory of Donald Young (1942-2012), whose shadow sat beside me for much of this project and has reminded me to trust in my own process and the significance of that which moves and that which is not stable.

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In addition, loving and exuberant thanks goes to my mother who has always encouraged me to cultivate and honor curiosity and to touch base with humor and perspective when the going gets tough. Finally, my husband and young daughter have certainly endured the brunt of my involvement in this project and I am indebted to them for their steady love and tireless patience.

Abstract

Perceptions of Landscape Function within the Field of Landscape Architecture

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Landscape functions are the processes that support life by rendering ecosystem services and goods. Thus, in a time of profound ecological destabilization, our future well-being depends on our ability to preserve, to enhance, and to avoid degrading landscape functions. Landscape architects have the opportunity to play a significant role in this project, but they cannot design for (or around) that which they do not perceive. Using an interpretive approach, and a sample of Texas landscape architects, this research explores which landscape functions this group of professionals readily perceives and various understandings of the concept of landscape function within the field. Participant authored photography, a written-answer questionnaire, and a photographic observation activity resulted in 539 functions that were coded and categorized using a modified grounded theory approach. Findings from this sample of landscape architects indicate a strong focus on functions related to the human user and to site use and reveal various understandings of landscape function.

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Chapter 1: Introduction

INTRODUCTION

We are in a time of profound ecological destabilization. Our survival and well-being require that land use decisions maintain and improve landscape function, or the capacity of the landscape to provide essential goods and services. Motivated by the seriousness of our environmental troubles, scholars from various landscape disciplines have argued for the explicit integration of ecological concepts into the practices of landscape design, planning, and management (e.g.: Koh, 1982; Van der Ryn & Cowan, 1995; Johnson & Hill, 2002; Ahern, 2012; Calkins, 2012; Steiner, Simmons, Gallagher, Ranganathan, & Robertson, 2013). In this study I have focused on how the ecological concept, *landscape function*, is perceived and understood by a group of design professionals who are regularly charged with co-visioning landscape futures, *landscape architects*.

BACKGROUND

Given the under studied nature of this topic, this work is highly exploratory. I have employed several methods to investigate how landscape architects understand the concept of landscape function, and which landscape functions they most readily perceive. My interest in this topic stems from four personally held convictions about the world. The first two convictions describe my broad worldview and provide general background, while the last two convictions set a more specific scene for framing this research topic. These four convictions are: 1) our world is complex and emergent; 2) our biophysical environment and our socio-cultural systems are mutually constituted; 3) our future well-being (and that of many species) is threatened, and; 4) humans interpret reality, and

because our perceptions guide our behavior and actions, perceptions are a critical topic for study. To begin with, I will elaborate on the first two convictions, and then expand on the last two convictions within the problem statement section.

The belief that our world is profoundly complex and emergent, conflicts with the traditional western paradigm. The traditional western paradigm tends toward conceptual bifurcations, dichotomies, and dualisms. I believe that this inclination toward dualism is indicative of a rational, mechanistic, or reductionist approach. Common dualisms are: man/nature, city/country, art/science, and form/function. There are serious problems associated with a paradigm that favors dualism. Dualistic structures can lead to polarization and polemical orientations, which too easily result in ideologues and processes of consumptive or stagnated conflict. Furthermore, a tendency toward dualism does not adequately reflect the complex, emergent, and mutually constituted nature of systems.

Scholars have offered various explanations of the origin of this tendency toward dualistic, rationalist, or reductionist worldviews. Lynn White (1967) argues that Christian theology has reinforced an exploitive relationship to nature (Lerner & Lerner 2006) and thus reinforced the man versus nature dualism. Donella Meadows (2008) claims that we have been taught to rationalize and trace direct paths from cause to effect. She goes on to argue that long before we were trained in rational analysis, we dealt in complex systems and this talent is, in fact, a traditional wisdom (p. 3). And, Fritjof Capra (1997) tells a version of history based on shifting tensions between mechanism and holism. Whatever the origin of this tendency toward dualistic thinking in western culture, binary constructions, such as, man versus nature, art versus science, and form versus function,

reinforce a worldview of discrete realms and reductionism, rather than a holistic or systems based perspective.

Rene Descartes is well known for having articulated a reductionist view. He is often remembered for his philosophical idea that a system is made up of the sum of its parts. For example, Descartes claimed that a non-human animal could be described as an automaton, or essentially an organic, self-operating machine. The implication of this reductionist theory is that a system or a phenomenon itself may be understood through the examination of each of the various parts that make up the system. In contrast, a systems-based or systems theory approach, posits that a system is actually *more* than the sum of its parts. As such, a system can "exhibit adaptive, dynamic, goal-seeking, self-preserving, and sometimes evolutionary behavior" (Meadows, 2008, p. 12). A systems-based approach allows for a better reflection of the complex and emergent nature of reality.

Systems theorists have focused on describing the many characteristics of a system. Three characteristics that are relevant here are: 1) a system has connections, thus materials, energy, and information flow through it; 2) a system has a function or purpose, and; 3) systems are often complex and emergent. The systems theorists and brothers, Howard and Eugene Odum, are often credited with bringing this approach to biology. They studied ecosystems by focusing on flows of energy and material through a system (Chapin, Matson, Vitousek, & Chapin, 2012). In, *Thinking in Systems: A Primer,* Donella Meadows (2008) writes that the least obvious part of a system is its function or purpose; however, this function or purpose is also "often the most critical determinant of the system's behavior" (p. 188). In addition to flows and function, complexity and emergence are considered important characteristics of a systems-based approach.

System complexity and emergence are related but distinct concepts. System complexity is the idea that there are levels in a system and each level is governed by different rules; properties that can be observed at one level of a system may not appear at other levels of the system (Capra, 1997). An emergent property is a "phenomenon that is not evident in the constituent parts of the system, but appears in the system when the parts interact as a whole" (Alberti, 2008, p. 273). In other words, within a system, certain properties emerge or appear at a certain levels of complexity or in the system as a whole. These same properties may not exist at lower levels in the system or in any one of its constituent parts. These concepts of complexity and emergence clearly diverge from the view of a system as a self-operating machine with rational and discrete parts.

In fact, a complex system is a system that has properties that are *not* fully explained by an understanding of the system's discrete parts. Instead, a complex system is characterized by nonlinear behavior; it exhibits structural and functional characteristics that emerge from the interactions of its parts, and not from an external or centralized organizational process (Alberti, 2008). From a systems perspective, one that rejects dualism and reductionism in favor of complexity and emergence, a series of other intellectual tasks come to the forefront. If we modify, or throw out, a reductionist approach, we rapidly come to question the traditional separations of object and subject, facts and values, and humans and nature (Orr, 2002, p. 206). This brings me to my second conviction: that our biophysical environment, or what we might be inclined to call *nature*, and our sociocultural systems, or the social and cultural systems of humans, are not created separately. Furthermore, they do they operate independently. Rather, they are mutually constituted.

To say that the biophysical and sociocultural aspects of our world are mutually constituted means that the constitution of one relates to, or is dependent on, the other and visa versa. Thus, the biophysical environment in any ecosystem relates to, and is dependent on, human social and cultural factors in the same system. The converse is also true. Another way of saying this is that biophysical and sociocultural aspects in any system are co-constructed, co-created, or co-configured. The implication of this concept is that one cannot and should not separate these two aspects if you are aiming to understand the system as a whole.

The idea that biophysical and sociocultural systems are mutually constituted has become a cornerstone for the field of urban ecology. Driven by an interest in investigating urban ecosystems, scholars in urban ecology have suggested new frameworks that attempt to represent humans as an integral part of ecosystems (e.g.: Grimm, Grove, Pickett, & Redman, 2000; Pickett et al., 2014; Alberti et al., 2003). Although the frameworks presented by the scholars cited above display unique conceptualizations of system organization, causality and linkages, and the precise relationship of humans to the biophysical environment, common to these frameworks is the understanding that the biophysical environment is created along with a combination of human social and cultural factors (and visa versa).

I understand this position to be closely related to an environmental orientation that claims that humans and nature are not separate. There are two ways in which this orientation can be claimed: conceptually and empirically (Wapner, 2010). As a conceptual claim, nature is understood as a social construction and thus we, humans, are interpreting and naming the elements of the systems in which we reside (e.g.: Soule et al., 1995). This idea is often referred to as the 'social construction of nature' and is

predicated on the view that all human knowledge is social and perceived reality is socially produced---not simply given. In modern writing, this philosophical position is considered to be a post-nature worldview. David Demeritt (2002) argues that the meaning of nature varies so much that it throws doubt on the very usefulness of this word. Bruno Latour (2004) claims that the concept of nature is dangerous and has paralyzed democracy, and Richard Weller argued at the recent conference, *Nature and Cities* (Austin, 2014), that nature is everything, and thus nothing. These constructivist perspectives claim that nature never really existed because it is a human construction or a human idea.

As an empirical claim, nature may have been separate from humans in the past, but now global anthropogenic influence has rendered nature and humans inseparable (e.g.: McKibben, 1989). Another related empirical claim posits that humans and nature have never been separate because they are fundamentally bound by flows of energy, materials, and information (e.g.: Cronon, 1996; Marris, 2011). Bill McKibben (1989) argues that the death of nature is the result of anthropocentric climate change. While, perspectives from scholars such as William Cronon (1996) and Emma Marris (2011) contend that humans have changed and managed the landscapes that they inhabit for all of time.

Marris (2011) reasons that our dogged quest to preserve pristine examples of nature has prevented us from appreciating those parts of our environment that are not pristine but still provide a variety of important benefits. She calls for a management principle that celebrates the hybrid processes/results of human, planned intervention and unplanned change. Cronon (1991) demonstrates the interconnectivity between the non-urban and the urban in *Nature's Metropolis*. To express the founding argument of his

book, he uses a quote from Anne Whiston Spirn: "The city is a granite garden, composed of many smaller gardens, set in a garden world… The city is part of nature" (Cronon, 1991, p. 19). Cronon's view asserts that material flows across space and through time, demonstrate that there are no discrete boundaries between man and nature, or city and wilderness. Instead, we are part of a series of nested systems.

Finally, Paul Wapner (2010) has acknowledged *both* the conceptual and the empirical versions of the position that humans and nature are not separate. He argues that our increasing control and transformation of the environment render the traditional environmental project of promoting the 'wildness of nature' impossible. However, he worries that total conceptual eradication of the demarcation between nature and humans may excuse us from culpability for our current environmental transgressions. He concludes that the literal and conceptual death of wild nature presents the environmental community with the opportunity to cultivate new philosophical and political frames. For my part, like Wapner, I support both the conceptual and empirical claims regarding the death of nature.

I believe that nature, separate from humans, never was; we were always a part of the systems in which we lived. I also believe that if, there *were* parts of the globe independent of human influence in the past, we have now so completely affected our biosphere that wild places---untouched by humans---do not exist anymore. In addition, I understand that our interpretation of reality is a human construction; thus, the idea of *nature* is a human-made definition. For me, all these lines of reasoning end in the same place: at this point in time, the environment affects humans and the environment is affected by humans---there is no place completely *away* from human influence and we are dependent on the function of the systems in which we live. The convictions that

ecosystems are complex and emergent and are mutually constituted by biophysical and the sociocultural aspects, are the two convictions that create background for the problem statement that I elaborate below. This problem statement relies on two additional convictions: that our future well-being is threatened and that humans interpret reality.

PROBLEM STATEMENT

As environmental troubles have become more serious, and as the nature of this seriousness has been more precisely articulated, ecological and systems-based perspectives have gained purchase in the design disciplines. Various landscape scholars have argued for the integration of ecological theory and knowledge into landscape design, planning, and management (e.g.: Koh, 1982; Van der Ryn & Cowan, 1995; Johnson & Hill, 2002; Steiner, 2011; Ahern, 2012; Calkins, 2012). Common to these perspectives, is the understanding that we rely on ecosystems to provide us with life-sustaining goods and services. These goods and services are conveyed, directly or indirectly, through landscape processes otherwise known as landscape functions. Without a robust collection of landscape functions, life on earth will be significantly constrained.

Currently, ecological processes are breaking down, and/or are changing, such that survival and well-being is threatened. Anticipated climate change, which is well in motion, is expected to bring drastic biophysical change, social strife, and political upheaval. I will give a three-point characterization of the broadest context in which this study takes place---a characterization of our time, if you will.

1. We are in a time of profound ecological destabilization.
2. Anticipated climate change, which is well in motion, will bring drastic biophysical change, social strife, and political upheaval.

3. Human populations are growing, rapidly urbanizing, and modernizing; this has resulted, and will continue to result, in dramatic changes in land use, land cover, and perceptions of landscape.

This assessment of our current moment is tremendously upsetting. Truth be told, however, concern about the state of the environment is not new. We have been warned of the 'disaster' of modern human impact on the earth since the mid-1960's (for example, in Rachael Carson's, *Silent Spring*, 1962) and perhaps longer. One could argue that the origins of the foretelling of ecological doom exist in the Romantic Movement as a reaction to industrialization (suggested by S. Moore), or in the perceived 'closing of the frontier' in 1890 (suggested by K. Lieberkencht). However, regardless of the true origin of this concern, the flavor of the conversation has changed in recent times. Broadly speaking, and just within my lifetime, this conversation has shifted from talk about protecting our environment ('Reduce, Reuse, Recycle'), to 'green' and sustainable solutions (Low Impact Development, urban agriculture, biofuels, etc.), to mandates for the mitigation of climate change (carbon sinks, carbon credits, carbon sequestration, etc.), to climate refugees and disaster preparedness (Dutch Dialogues, Oyster-techture, climate refugees, etc.). This changing conversation and concern for the environment is mirrored, to various extents, in the fields of landscape design, planning, and management.

Today, the concept of ecosystem services seems to be a commonly accepted frame in many landscape-related disciplines. This frame implies that without ecosystem services, life on earth will be constrained or destroyed. The specific dangers of losing particular ecosystem functions are in the process of being articulated to various actors in various systems. This information often forms the basis for social processes that aim to prioritize the preservation of particular functions. Because this type of prioritization is a social process, it is organized around human perceptions, understandings, and frames.

These human perceptions and understandings are continually changing and being constructed over time and through action. It is important to note that we cannot design or plan for functions that we do not perceive.

In the last few decades, many ecological studies have focused on landscape functions, services, and goods. A major effort has been under way to study various function types, but also to construct typologies of functions, services, and goods. As mentioned already, in urban ecology, humans are considered a part of virtually all ecosystems (Grimm et al., 2000). However, when taking humans into account, one must consider the complex nature of human perceptions and the implications of this complexity. Our perceptions affect our communication, our decisions, and our behavior; therefore, it may be as critical to understand our perceptions of landscape functions, as it is to understand various functions with in a system. To complicate matters further, landscape function and structure themselves affect human perception, cognition, and value (Nassauer, 1995).

Addressing the threats of ecological destabilization through design will require reflection on the perceptions of designers with regard to ecological services, and landscape functions. This self-reflection might include investigations of the various meanings of function, which functions are considered most valuable to design and plan for, which functions are readily perceived, difficult to perceive, and/or how designers perceive particular functions.

PURPOSE STATEMENT AND SIGNIFICANCE

The line of questioning presented above is important because with nearly innumerable possible landscape functions, articulating preferred functions, especially in

highly designed environments, is a human goal-setting activity guided foremost by our ability (or inability) to perceive and detect various functions. Furthermore, various understandings of what functions *are* will affect our communication about function. Thus, an empirical understanding of how landscape professionals understand landscape function and which ones they perceive most readily may be useful for enhanced communication and critical self-reflection.

The purpose of this study is to explore how landscape architects perceive landscape functions or processes. Specifically, I want to know which types of landscape functions are readily perceived by landscape architects. I am also interested in which types of functions are considered the most important to design and plan for, and which types of functions are commonly discussed in typical landscape design processes and in current landscape architecture literature. Lastly, I am interested in the way in which landscape architects understand or interpret the concept of landscape function.

On a theoretical level, a goal of this study is to contribute to an under studied body of knowledge about professional perceptions of ecological function and to the conversation about the relationship of ecology to landscape design practice and education. This topic is generally little-addressed and there are no empirical studies of landscape professionals' perceptions of landscape function. In conducting this study I have drawn on many bodies of literature and many theories. These theories come from the fields of landscape perception (environmental psychology), landscape function (landscape ecology), and landscape architecture. Ideally, this work will contribute to some of these same fields.

On a practical level, a goal of this study is to reflect on communication difficulties that may arise from differing understandings of the term landscape function/s and to offer

information for disciplinary self-reflection. With regard to communication, these difficulties may manifest in cross-disciplinary settings or interdisciplinary settings and is an issue of concern that is further discussed in Chapter 5. Also, the research may illuminate contradictions, synergies, oversights, or successes for the field of landscape architecture. Lastly, and likely to be the most important contribution of this work, this study will provide a host of questions for further contemplation.

OVERVIEW OF METHODOLOGY

For this study I employ an interpretive methodology. An interpretive approach "produces knowledge by identifying, naming, and assigning new significance or meanings to dimensions, themes, or narratives within a data set" (Deming & Swaffield, 2011, p. 51). This approach is considered distinct from, although not mutually exclusive of, other approaches such as a positivist approach or an emancipatory approach (Groat & Wang, 2002). Generally, in an interpretive approach, the researcher must actively make sense of the phenomenon being studied. In this type of approach, value-free objectivity is not the goal, and any insight gained must be interpreted within the corresponding context.

In this study I used two main methods to investigate perceptions of landscape function by landscape architects: participant authored photography and a self-administered written questionnaire. In addition, a critical review of professional literature and participant observation at two conferences provided supplemental insight for examining the topic. The resulting data sets were organized and analyzed using a modified grounded theory approach. Data were coded and sorted, re-coded and re-sorted in subsequent sessions according to themes. These themes emerged from the data itself, the literature review, and my own experiences as a participant observer.

UNITS OF ANALYSIS

The units of analysis for this study are landscape architects. They were chosen as the focus of this study for two reasons. The first reason is that I am familiar with the field of landscape architecture---its language, its training, and its practice. I grew up in a family of architects and landscape designers and my undergraduate education included coursework in both design and architecture. After college, I attended a summer program in landscape architecture at the Graduate School of Design and then worked for a landscape designer. In 2011, I began the Master in Landscape Architecture program in the School of Architecture at the University of Texas at Austin. Although after completing a year of coursework, I moved into the Master of Science in Sustainable Design, I have continued to study landscape design and planning topics. With this experience, as a participant in the discipline, I am able to understand its common frames of interpretation.

The second reason for choosing landscape architects, as a unit of analysis is that landscape architecture has a long history of attempting to integrate ecological concepts into its education and into the profession. In addition, recent high-profile attempts, such as SITES and the Landscape Performance Series, have brought this timely issue a lot of attention. Thus, there is both a historical trail of writing and work that is important to my topic and a plethora of relevant contemporary material, which provides the study with a rich body literature and context on which to draw. In the research questions that follow, landscape architects are understood to be a unique a social group. I give further explanation of what landscape architects do and what landscape architecture is in the methods chapter.

RESEARCH QUESTIONS

1. How do landscape architects perceive landscape functions (sensory perception)?
   a. Which landscape functions do they see/hear/smell/etc. while in the landscape?
   b. What cues trigger the identification of particular functions?

2. How do landscape architects understand the concept of landscape function/s (cognitive perception)?
   a. Which landscape functions are most readily recalled from their minds?
   b. Which landscape functions are considered important to design and plan for?

IDENTIFICATION OF ASSUMPTIONS

In the background section of this chapter I explain some personally held convictions: that the world is complex and emergent, and that sociocultural and biophysical aspects are mutually constituted. In the problem statement section, I explain my convictions that we are in a time of ecological destabilization and our well-being, and maybe our survival, is threatened. I have also made clear my understanding that we (and all living creatures) are dependent on landscape functions, or processes, that provide goods and services and thus sustain life on the planet. In the purpose statement section and significance section, I explain that our perceptions affect our behavior and our actions. Lastly, in Chapter 3 I address the ontological and epistemological approach that is embedded in this study---that of a constructivist orientation. I believe that all these convictions and orientations are the main assumptions that precede my work here.

STUDY'S OBJECTIVES AND AIMS

The purpose of this study is to explore how landscape architects perceive and understand landscape functions at this current moment in time. More precisely, I am interested in how landscape architects understand or interpret the concept of landscape function and which types of functions they perceive. The goal of this work is to be able to reflect on the current relationship between the ecological concept of landscape function and its use and understanding by students and practitioners in the field of landscape architecture; to explore *which* functions landscape architects observe being performed by the landscape and *how* they observe these functions, and; to consider various meanings of the term/concept of landscape function. Lastly, on a very personal level, the study is an attempt to learn about conducting research, to practice written and oral modes of communication, and to enjoy the process of learning and discovery.

ACKNOWLEDGEMENT OF LIMITATIONS

There are at least two important limitations to this work. This first of these limitations originates in the nature of perception and what we know and do not know about perception. The second of these limitations is an imperfection with the research itself. I will only briefly describe these limitations below as they will be addressed more thoroughly in Chapter 3.

Landscape perception is a complicated topic. At its core, environmental perception is multi-modal. In other words, perception of the environment is the result of both a variety of types of physical/sensory inputs and mental/conceptual aspects. Thus, capturing information about landscape perception is an extremely large project. Although I set out to gather information about both sensory perception and conceptual

understanding, this work has provided more information about conceptual understanding than sensory perception. This is due, at least in part, to the above-mentioned imperfection in the research. Specifically, low participant response rates have provided a significant barrier to answering my original questions about sensory perception. Reflection on this limitation has to lead to methodological observations and recommendations for further research in this area.

DEFINITION OF KEY TERMS

Landscape Function: According to the ecology literature, landscape function is the "horizontal and vertical exchanges of organisms, energy, material, and information in a landscape" (Wu, 2013, p. 180), or the capacity of the landscape to provide goods and services through landscape processes (Kienast et al., 2009; de Groot, 1992 cited in Krönert, Steinhardt, & Volk, 2001). Landscape functions are the processes themselves.

Landscape Perception: Perception is the process in which information is derived though the senses, organized, and interpreted. Landscape perception happens when sensory and conceptual information is organized, identified, and interpreted in order to understand and represent the land (Schacter, Gilbert, & Wegner, 2010). It is an active, emergent, dynamic process involving both cognitive and sensory aspects. Perception of landscape, which is quite different than object perception, involves subjective interpretation and encompasses perceptive, artistic, and existential meanings (Antrop, 2000).

Landscape: A landscape is an area, as perceived by humans, whose character is the result of the action and interaction of natural and human patterns and processes. Michael Laurie (1986) writes that land becomes landscape when it is described (p. 1).

Combing this idea with the above definition of perception (Schacter et al., 2010), I offer my own definition of landscape: land becomes landscape when humans perceive it, or when sensory and conceptual information about the land is organized, identified, and interpreted in order to represent and understand this same land.

Landscape Design: I will use this term to refer to the act of implementing a conscious/intentional intervention in the land. This definition includes various landscape disciplines, to name a few: designers, engineers, planners, ecologists, architects, managers, gardeners, etc. However, the specific landscape designers that I am studying here are landscape architects.

CHAPTER SUMMARY

In this Chapter I discuss my understanding that the world is complex and emergent and that a holistic systems-based perspective reflects this reality best. I state that the sociocultural and biophysical realms in ecosystems are mutually constituted. I claim that we are in a time of ecological destabilization, that our well-being is threatened, and that our perceptions affect our behavior and our communication. These assertions provided a framework for me to state my topic of interest---perceptions of landscape function by landscape professionals---and argue for its importance. I briefly give and overview of my methodology, units of analysis, research questions, and key assumptions. This Chapter also includes a statement of the study's aims, an acknowledgement of limitations and delimitations, and a short glossary of key terms. I will now move on to review relevant literature.

Chapter 2: Literature Review

"The landscape, like nature and human society, which together produce it, is not static or fixed. It is constantly in development, growth, change, improving, or retrogressing. This is true even of those wild and pastoral landscapes, which appear to us to be in equilibrium… The landscape is not being, but becoming" (Eckbo, 1969).

INTRODUCTION

Chapter 2 of a thesis is typically where previous research and literature on the topic is reviewed. This generally includes a review and synthesis of both theoretical perspectives and empirical research. Because the topic of this research is under studied, this literature review will focus heavily on theoretical perspectives draw from several related bodies of literature. My review of the empirical research will broadly assess the types of studies that have been done in the field of landscape perception and more closely review only the few studies whose subject matter is nearest to my own topic. The Chapter consists of an acknowledgement of a conceptual framework, an introduction to various theoretical perspectives, an overview of empirical research, and a summary of the Chapter.

CONCEPTUAL FRAMEWORK

Here, I discuss a conceptual framework for this study that describes a general understanding of the nature of the human-landscape relationship. The human-landscape relationship has been deliberated over for a long time and the shear variety of approaches to this topic is exciting and somewhat daunting. Taylor, Zube, and Sell (1987) write, the "representation, design, and understanding of landscapes has been a topic of interest at least since the Renaissance" (p. 361). Approaches to this subject matter come from many

disciplines, among them history (Stilgoe, 1980), geography (Appleton, 1975; Zonn, 1984), environmental psychology (Ittleson, 1973; Kaplan, 1987; Zube, 1987), landscape architecture (Spirn, 1998; Eckbo, 1969), and cultural landscape studies (Jackson, 1994; Groth & Bressi, 1997).

The framework that I adopt for this study mostly originates in environmental psychology, although perspectives from the other disciplines mentioned above are interwoven. In order to introduce this framework, I will first restate an argument introduced in Chapter 1: that the biophysical environment and sociocultural aspects are mutually constituted. The assertion I make is that humans and their biophysical environment cannot be separated and are co-constructed. Thus, the landscape can be understood as clue to, and as a result of, social and cultural aspects. Peirce Lewis (1979) elaborates on this idea by claiming the "…landscape…provides strong evidence of the kind of people we are, and were, and are in the process of becoming" (p. 15). Conversely, social and cultural aspects, such as psychological response and behavior, can be understood as reactions to the landscape in which we reside. Anne Whiston Spirn (1998) eloquently encapsulates this idea when she writes that "the meanings landscapes hold [for humans] are not just metaphorical and metaphysical, but real, their messages practical; understanding may spell survival or extinction" (p. 11). In addition to the fundamental understanding that the biophysical and the sociocultural are not divisible, I understand that these entwined realms are constantly changing and are not static.

Constant change, as a concept, can be framed in two directions. In one direction, the biophysical environment itself is constantly changing: rivers are shifting, soils are developing, and mountains are eroding. Conflicting with the traditional ecological view of the process of succession leading to climax communities and finally, ecosystem

equilibrium, is the contemporary view that ecosystem assemblage is actually ephemeral due to normal frequency of disturbance and change. Thus, the old idea of ecosystems moving toward equilibrium has been traded for the understanding that ecosystems are stochastic (involving a random variable) and probabilistic (as opposed to deterministic).

Similarly, contemporary descriptions of the nature of our sociocultural systems claim that they are not static either. They are also constantly changing as our social institutions, cultural rules, outlooks, and knowledge shift. In other words, we change as we learn and have new experiences. As Garrett Eckbo (1969) writes, human society, including our perceptions, is not static---it is changing and becoming. The word 'becoming' calls to mind, Murray Bookchin (1967), who is remembered for his quote, "Being is becoming, not stasis." Putting these understandings together---that the biophysical and sociocultural are mutually constituted and that constant change is a property of both---we arrive at the foundation for a theory of human-landscape relationship, which I explain below.

THEORETICAL PERSPECTIVES

With regard to the landscape, the theory I am referring to, has been variously called, a theory of transactional process, transactional analysis, a transactional approach, and simply transaction. However, I will refer to it as 'transactional landscape theory.' According to William Ittleson (1973), John Dewey and Arthur Bentley were the first scholars to use the term 'transaction.' It appears in their book, *Knowing the Know*, where it is refers to a philosophical position about the human relationship to the environment. From this philosophical stance, humans are not merely in the world or set against an environment, rather, humans are active participants and thus *of* the world. Dewey and

Bentley (1949) understood "all of [human] behavings, including [man's] most advanced knowings, as activities not of himself alone, nor even as primarily his, but as processes of the full situation of organism-environment" (Dewey & Bentley, 1949 cited in Ittleson, 1973, p. 104). This is a very early articulation of the mutually constituted nature of the human-landscape relationship.

Although Dewey and Bentley communicated this position in 1949, it wasn't until several decades later that the environmental psychologist, William Ittleson, elaborated on this line of thinking and brought the concept to landscape perception research. A reason for this may be because until the seventies, the large majority of empirical perception research had focused on object perception (Ittleson, 1973). The information gained from object perception studies was simply applied to environmental perception (Ittleson, 1973). However, as Ittleson (1973) urgently states, perceiving objects is fundamentally different to perceiving environments. Thus, he claims that environmental perception requires empirical approaches and different theoretical frameworks. Ittleson (1973) suggested transactional landscape theory as a useful theoretical framework for studies of environmental and landscape perception.

According to Ittleson (1973), the word 'transaction' carries two important implications. The first is that all parts of the phenomenon that are being described are considered active participants. For example, in a human-landscape relationship, the human and the landscape are both considered active participants in the relationship. The second is that the parts of the phenomenon are not independent entities. Their active participation with each other, in fact, creates their identity (Ittleson, 1973, p. 153). This implication is related to some of the postmodern philosophical discussions about object and subject. Ittleson (1973) argues that both entities are, in fact, co-constituted and so

they cannot be distinguished as object and subject and cannot be studied as separate entities.

Fourteen years later, Erwin Zube (1987), a particularly well-respected environment-behavior researcher, also champions this transactional landscape theory and gives a helpful explanation of it. Zube (1987) clarifies that there are three common conceptualizations of the human-landscape relationship: 1) the human as an agent of impact on the landscape; 2) the human as a static receiver and processor of information from the landscape, and; 3) the human as an active participant in the landscape---a transactional relationship. He explains that in transactional landscape theory the human is considered a source of impact on the landscape, the human is also considered a receiver of information, as well as an active participant (p. 39). Thus, in transactional landscape theory, the human-landscape relationship is bidirectional.

Elaborating on the basic concept of transactional landscape theory, the geographer, Leo Zonn (1984), incorporates an important additional aspect to the transactional framework that Zube describes. The detail that Zonn (1984) adds is a consideration that is particularly relevant to our media-infused and information rich culture. He proposes a model that incorporates the influence of media depictions on our interpretation of landscape. The most salient point from Zonn's (1984) work is that the information that we receive about the landscape is both direct and indirect. Direct landscape information refers to information that is obtained through physical contact with the landscape, while indirect landscape information refers to information that is acquired or supplied by someone else or some other source (O'Brien, 1982 cited in Zonn, 1984).

Paraphrasing and synthesizing the authors mentioned above, transactional landscape theory makes the following assertions about the human-landscape relationship.

We are active participants in the environment, not observers or processors of mere sensory input. Participation in landscapes is a multi-modal experience of total peripheral stimulation. This participation involves stimulus information that is simultaneously psycho-physiologically perceived and cognitively interpreted. The stimulus information comes from both direct and indirect interaction with landscapes. Landscapes provide more information that can be used or processed; this information is 'simultaneously redundant, inadequate, and contradictory' (Ittleson, 1973, p. 151). Lastly, interpretation of landscapes is influenced by personal utility functions (related to an individuals needs or desires), biological factors, social and cultural context, and biophysical context.

In addition to theories of the human-landscape relationship, it is imperative to address theories of landscape assessment. This is especially true in the context of design, planning, and management where the practical problem is not only how to modify landscapes to optimize desired outcomes, but how to co-define what desired outcomes should be. The concept of a theory of landscape assessment is a highly contested area of deliberation. Generally, theories of landscape assessment provide a framework for the investigation of how well the landscape fulfills some set of criteria (Palmer, 2003). These theories, then, propose what is *good* and/or what is *bad* in terms of the landscape. Most broadly, a theory of landscape assessment is a theory of how to judge landscape quality.

These judgments are made by the public and/or by experts and they often imply or articulate different conceptual approaches, paradigms, and frames. Several scholars from the field of landscape perception claim that the topic of landscape assessment or landscape evaluation lacks a unified theory (Zube, Sell, & Taylor, 1982; Carlson, 1993). Zube, Sell, and Taylor (1982) name three major conceptual approaches to landscape assessment: 1) an objective approach, where qualities of the landscape are quantified or

described objectively; 2) a subjective approach, where response to the landscape is explored as symbolic through meaningful reactions by individuals, and; 3) an experiential approach, where the bi-directional human-landscape interaction is studied mainly through phenomenological exploration (p. 7). This last approach most closely relates to the transactional landscape theory described above. However, this type of experimental approach often results in cataloging a variety of systems of judgment and thus does not necessarily address the most difficult question of landscape assessment: how are we to make decisions about what *should* be preferred or desired?

Allen Carlson (1993) provides another analysis of the 'theoretical vacuum' in landscape perception research and a useful distinction to help in answering the question about what should be preferred and desired with regards to landscape. In his analysis he distinguishes between two types of theory, which are (and he apologizes for his lack of better words) scientific and philosophical. Scientific theory, according to Carlson (1993), is explanatory and identifies the states of things, indicates causes, and aids in the explanation of why things are the way they are (Carlson, 1993, p. 53). For example in habitat theory, proposed by Jay Appleton, the notion of prospect and refuge claims to explain why certain types of landscapes are preferred. This is a type of scientific theory according to Carlson. Habitat theory argues that we are biologically predisposed to prefer landscapes in which we have a view (prospect) and also have a place to hide (refuge). However this theory does not directly address if we *should* design landscapes that supply both prospect and refuge.

Philosophical theory, according to Carlson (1993), is theory aimed at answering the question of what kinds of landscapes we *should* design. It is justificatory and "concentrates on our ideas and concepts…it indicates the reasons why the ideas and

concepts are as they are, and thereby aids in justifying our views about things" (Carlson, 1993, p. 53). Carlson (1993) warns against a narrow and normative understanding of justificatory theory, claiming that its function is to justify *any* position, normative or otherwise. He writes, "we need not only to be able to explain what is preferred and desired by way of landscapes, but also what is preferable and desirable" (p. 55). It is this specific type of theory that he claims is actually lacking from the landscape assessment discussion.

From my own perspective, the scientific theory that I utilize here is transactional landscape theory. This theory guides my understanding of how humans and landscape are related and thus what is preferred with regard to landscape. However, to address my approach to landscape assessment and justificatory theory, I will argue two related points. The first is that landscape architecture, as a profession and as a scholarly discipline, is in the process of pursuing its own justificatory theories. The second point I will argue is that an ecological approach is one attempt at creating this type of justificatory framework for landscape interventions. In other words, I understand an ecological approach as a framework that is supposed to guide the types of interventions that landscape architects engage in and give the discipline an essential purpose or justification by attempting to answer the question: what *should* be preferred with regard to landscape interventions?

As landscape architecture has matured, it has struggled to define its roots, its core principles, its future objectives, and to justify its design and planning intentions (Swaffield, 2013, p. 34). In truth, these are issues that all professions and disciplines likely struggle with, and revisit continually, as critical theory emerges and as societal outlooks change. However, as several speakers at the recent *Nature and Cities* conference (Austin, 2014) noted, in the last decade, landscape architecture has experienced a

particularly fertile period of development. It seems that periods of intellectual growth are often marked by various strongly held positions as ideologues argue for control and pragmatists argue for synthesis. Current commentary about landscape architecture includes new origin stories, scathing criticism, statements of faith in one paradigm or another, and compelling arguments for synthetic, integrative, and multi-paradigm approaches. I believe that the quality and quantity of this commentary is expressive of a profession that is soul searching.

Suggestive of soul searching, there have been several recent attempts to compile, and take stock of, landscape architecture theory (e.g.: Swaffield, 2002; Murphy, 2005) and articulate normative theory (Thompson, 2000). Charles Waldheim, well known for his advocacy of landscape urbanism (see Waldheim, 2006), provides an example of someone who has re-framed the origin story of landscape architecture. At the *Nature and Cities* Conference, he argued that the profession of landscape architecture originates in urban scale and urban problem-solving interventions, rather than in the garden or in landscape painting as is often taught in history and theory classes. Hoffmann and Langhorst (2014) provide an example of scathing criticism when they ask if landscape architecture is dead. In a self-titled manifesto, they write:

> At the start of the 21st century, landscape architecture is a troubled profession, more distinguished by what it lacks than the qualities that is actually processes. It has no historiography, no formal theory, no definition, direction, or focus. A vast schism currently exists between its academics and professional practitioners. In universities across the nation, researchers poach methodologies from other, more vibrant disciplines. Meanwhile, in professional offices, designers yoked to the bottom line crank out pedestrian design.

Beginning with a similarly provocative question, Chris Reed asked at the *Nature and Cities* conference, is *ecology* dead? He suggested that, as a word, ecology is overused, over-hip, and has been co-opted. He concludes that few designers, although espousing a belief in an ecological approach, have successfully gone beyond metaphors and basic mechanics with regard to ecology.

Although at this point in history, landscape ecology and landscape design seem to be a logical pairing, these disciplines have had a tumultuous relationship. This may stem from an early separation of these approaches---one as a scientific, truth-seeking activity and the other as a creative, cultural activity. Some scholars claim that the profession of landscape architecture is simply young and has not yet grown into its relationship with science (Brown & Cory, 2011). In spite of the many authors that call for an integration of science into design, and specifically for ecology into landscape architecture (e.g.: Koh, 1998; Calkins, 2005; Johnson & Hill, 2002;), a narrative of dissonance between the two remains especially evident.

Although environmentally friendly and supportive behavior has been considered a normative value for landscape architects since at least the 1970's (Thompson, 2000), if not well before, there remains some divide between ecological concepts and design practice that many scholars are concerned with and write about (e.g.: Lovell & Johnson, 2009; Nassauer & Opdam, 2008). There has been a proliferation of new terminology and new concepts that aim to bridge this gap, for example, evidence-based design and designed experiments (Brown & Cory, 2011; Felson & Pickett, 2005). As Elizabeth Barlow Rogers (2000) claims, it is only since the 1970's that an "awareness of the need to reconcile human objectives with the operation of natural ecosystems became general and influential upon the practice of landscape design" (p. 482). She, and many others,

point to Ian McHarg as the leading advocate of an ecological approach to landscape planning and design.

According to Ian McHarg, an ecological approach is one in which a "region is understood as a biophysical and social process comprehensible through the operation of laws and time" (McHarg, 1997 cited in Steiner, 2000, p. 10). McHarg suggested looking for opportunities and constraints for any particular human land use through surveys and his famous technique of overlays. Subsequent to McHarg's call for the incorporation of ecological principles into landscape architecture, there are a series of scholars, practitioners, and writers who address the issue of ecology and design: Todd and Todd (1969) publish, *From Eco-Cities to Living Machines: Principles of Ecological Design*; Anne Whiston Spirn (1984) acknowledges the contribution of urban ecology to design and planning and advocates that the city be recognized as a part of nature (Spirn, 1984, p. 5), and; John Tillman Lyle (1985) advocates for designing landscapes that function in sustainable ways using ecological design strategies.

Leading up to the turn of the last century, a series of important works provide both philosophical and strategy-based foundations for an explosion of literature on the topic of ecology and design in the first fifteen years of the 21st century. These foundational works include (but are not limited too): Donna Hall's (1991) important paper, which was specifically directed at landscape planners, but addresses the concept of functionalism from landscape ecology and human ecology as a motivating concept and a basis for an ecological approach; Robert Thayer (1993), who addresses the conflict between technology and nature; Joan Iverson Nassauer (1995), who writes prolifically on this topic and asserts that we must use culture to advance ecological health; Sim Van der Ryn and Stuart Cowan (1996) who argue for ecological design and write the first book of

this title; Thompson and Steiner (1997), who point to the damaging dualisms of art versus science, nature versus culture, design versus planning, and development versus beauty. They suggest that an inclusive and ecological approach is 'vital to landscape architecture's promise and purpose' (p. 5).

Along side of this foundational literature, writers begin to address the relationship of aesthetics to an ecological approach. This topic regularly moves toward an art versus science dualism, although scholars resolve this issue in a variety of ways. Anne Whiston Spirn (1998) suggests a new aesthetic that encompasses nature and culture, embodies function, sensory perception, and symbolic meaning. Gobster, Nassauer, Terry, and Fry (2007) present a conceptual model for an aesthetic-ecology relationship that is based on Gobster's (1999) hotly debated concept of an 'ecological aesthetic.' Parsons and Daniel (2000) take issue with Gobster's proposal for an ecological aesthetic, calling it premature and maybe misguided, and defend scenic landscape aesthetics. Elizabeth Meyer (2013) argues that *real* sustainable solutions---solutions that take into account ecological health, social justice, and economic prosperity---require paying attention to the performance of a landscape's appearance. Thus, the experience of beauty should have equal weight to ecological function in debates about landscape performance. Lastly, Fry, Tveit, Ode, and Velarde (2009) examine the conceptual common ground between visual and ecological indicators.

By the dawn of the new century, there is so much literature addressing design and ecology that it has split into subtopics. Of course, aesthetics and ecology is one of these subtopics. Other sub-groups are organized around sustainable urban issues or urban development issues (e.g.: Waldheim, 2006; Farr, 2008; Wheeler & Beatley, 2008). Some of this literature is organized around changing understandings of nature, and the changing

face of environmentalism (e.g.: Cronon, 2001; Marris, 2011). Generally, however, the literature in this period continues to argue for the integration of ecology into the fields of design and planning and many scholars and authors begin to focus on providing more specific frameworks and models for this task (e.g.: Ahern, 2005; Nassauer & Opdam, 2008; Chen & Wu, 2009; Lovell & Johnston, 2009; Makhzoumi, 2000; McAlpine et al., 2010).

Scholars also begin to articulate various challenges to integrating design and ecology into both practice and education (e.g.: Calkins, 2005; de Groot, 2010; Ahern, 2012). Working with practitioners, Meg Calkins (2004) surveys landscape architects to find that the top challenges to the use of ecological design strategies are cost (real and perceived), client resistance, lack of information about performance (economic, environmental, functional), the time is takes to find and synthesize information, and lack of market interest. While, Bart Johnson and Kristina Hill (2002), working from an educational angle, ask how ecological accountability can be brought to design education while supporting the tradition of innovation and inspiration through art (p. 2).

This literature continues to develop new philosophical approaches, and new practical approaches seem to be appearing all the time. Randolph T. Hester (2006) explicitly addresses the relationship of the social agenda to the ecological agenda in *Design for Ecological Democracy*. Meanwhile a robust discussion about research, and relationship of research to landscape design, is developing (e.g.: Milburn & Brown, 2003; Tress & Tress 2011; van der Brink & Bruns, 2013). Practical approaches include literature that continues to get more specific as it attempts to address coherent strategies and specific technologies. For example the Sustainable Sites Handbook (Calkins, 2012) and the resilience approach to planting design by MaryCarol Hunter (2011) provide

systematized strategies for making ecological design choices. *Living Systems* (Margolis & Robinson, 2007), provides technical construction details and materials information for various ecological landscape interventions.

I believe that the character of this body of literature and the fact of its continued generation is evidence of an attempt to address critical issues of our time, such as climate change, species extinction, population growth, and rising toxicity. However, it is also evidence of an attempt to find an essential purpose, or justification, for the practice of landscape architecture within our time. In this literature, or literatures, the concepts of function and performance are now mentioned regularly (e.g.: Meyer, 2008; Lovell & Johnston, 2009; Leatherbarrow, 2009; Kato & Ahern, 2009; Roncken, Stremke, & Paulissen, 2011; Davis, Stagge, Jamil, & Kim, 2012; Windhager, Steiner & Heyman, 2014), yet very few scholars have addressed what these terms might mean to landscape architects, how these meanings might be different from meanings in other disciplines, or what the (re)emergence of these concepts, especially that of function, might indicate about the profession and its contemporary approach. These are some of the gaps that I perceive in the theoretical literature.

EMPIRICAL RESEARCH IN LANDSCAPE PERCEPTION AND LANDSCAPE FUNCTION

Not surprisingly, I find the same gaps in the empirical literature. The bulk of this Chapter so far has focused on theories of the human-landscape relationship and literature about the relationship of ecology and landscape architecture. In the rest of the Chapter I give an introduction to the empirical research and a broad discussion of the types of empirical research that have been conducted in the area of landscape perception. Also, addressing landscape function research, I discuss the ways in which scholars have

defined the term and tried to organize types of landscape functions. Finally, I conclude by considering the papers that I believe are most closely relevant to my particular topic of study.

The empirical literature reviewed here is the result of literature searches that I made over two semesters in 2013 and 2014. During these searches, I relied heavily on the University of Texas at Austin's library catalogue and search tools, subject databases and indexes, and searches on the Internet. For the most part, this literature is limited to peer reviewed publications although some other literature sources were also consulted. Meta-literature reviews by senior scholars were extremely helpful because the landscape perception literature and the environmental behavior literature is overwhelming robust and very few of these studies address perception of ecological function and/or the perceptions of landscape professionals. Additionally, works that attempted to define and organize terms where helpful because in the landscape function literature many studies are conducted from a biophysical science perspective and are technical enough as to be inaccessible to those who are not familiar with those fields.

After discussing this literature in two major sections I conclude the following points: 1) landscape perception research is still working to gather information about sub-populations, and has not included studies of landscape professionals as a sub-group; 2) landscape perception research has been preoccupied with preferences, particularly aesthetic preferences; 3) landscape function research has mostly adopted the ecosystems services framework; 4) very little landscape functions research has focused on our ability (or lack thereof) to perceive landscape functions during interaction with the landscape.

Landscape Perception

Empirical research about landscape perception is often considered a sub-topic of environment and behavior research. This very large body of literature captures a wide range of topics, including but not limited to: public visioning (e.g.: Altman & Zube, 1989; Scott, 2002; Moore-Colyer & Scott, 2005), aesthetic preferences and management implications (e.g.: Dramstad, Tveit, Fjellstad, & Fry, 2001; Larson & Nassauer, 2004; Ode, Tveit, & Fry, 2008; Ode, Fry, Tveit, Messager, & Miller, 2009), perceptions of public space (e.g.: Brill, Altman, & Zube, 1989; Varna, 2010; Németh, 2012), and levels of place attachment (e.g.: Hayden, 1997; Manzo & Perkins, 2006; Baptist, 2013). Much of the landscape perception literature is associated with the field of environmental psychology, although the fields of design and planning are generally familiar with, and occasionally contribute to, major theories that have are generated from this body of empirical research.

The most well know theories from the field of environmental psychology may be evolutionary theories of landscape perception. These theories are often associated with Jay Appleton and Adnan and Rachel Kaplan and represent a “universal” perspective. In other words, this theory presents a biological, rather than a culturally based, perspective. In this theory, perceptions of landscape stem from biological memories of a human need to survive in the wild. Amita Sinha (1995) describes the Kaplan’s theory as an evolutionary view, where nature is seen through man's struggle to survive. According to Sinha (1995), in this view, natural elements and their configurations serve as archetypes and still elicit preferences, even though they may have lost their primary or original function.

In addition to this ‘evolutionary’ view, Sinha (1995) offers four other views of nature that are typical of approaches within landscape perception research (Table 2.1). They are: a utilitarian view, an idealist-romantic view, a transcendentalist view, and an ecological view. I will repeat her descriptions of each of these views. In a *utilitarian view*, attitudes about nature originate in Judeo-Christian traditions, industrial capitalism, and Marxist materialism. These origins foster an exploitative attitude toward nature in which society uses nature to ensure continued progress. Man's position as a caretaker assumes that nature can be improved upon, taken care of, and/or controlled.

Table 2.1: Five Views of Nature in Landscape Perception Research (Sinha, 1995)

View/Approach:	**Human Orientation Toward Nature:**	**Nature is Seen As:**
Evolutionary	Need to survive	Environment of risks and opportunities
Utilitarian	Exploitive, caretaker	Place of resources that can be improved
Idealist-Romantic	Attracted to natural order, reason, symmetry	Place of inspiration and refuge
Transcendentalist	Veneration	Place of divinity and a divine setting
Ecological	Stewardship	A system

An *idealist-romantic view* has been shaped by the philosophy and art of western cultures and displays an idealistic or classicist origin. This view is characterized by the dialectic between 'inner' and 'outer' nature. Reason, order, and symmetry are thought to be both created in nature and can be imposed on nature. This view is romantic because it focuses on feeling and intuition and external nature as a key source for emotions and as a key source for psychic renewal and refuge from the ills of human civilization. Somewhat related seeming, is a *transcendentalist view*, which characterizes the experiences we might call nature veneration. In this view, landscape is symbolic of the divine and is a

setting for the divine. In the landscape is found both a sense of spiritual amazement, majesty, attraction, and (interestingly) repulsion. In this view, landscape is understood through symbolic associations driven by religious beliefs.

Lastly, as Sinha (1995) claims, that an *ecological view* is the 20th century's attempt to fuse elements of science and religion. In this view, humans engage in (or should engage in) environmental caring or stewardship and there is an implicit concern for equitable distribution of resources. Ethics and science are understood to be in mutual service to each other and humans are but a single element in a vast, mutually regulating system. Destruction in one part of the system is assumed to cause disorder in the system as a whole. Nature is considered to be vastly more than a mere visual amenity.

Sinha's encapsulations of the various views of nature that underpin research on landscape perception are a nice complement to the meta-analysis of Zube, Sell, and Taylor (1982), who identify four common conceptual paradigms in landscape perception research (Table 2.2). These paradigms are: expert, psychophysical, cognitive, and experimental. Again, I will explain each of the paradigms as they define them. In the *expert paradigm*, landscape perception research is one that is carried out by skilled and trained observers who evaluate the quality of the landscape. The quality criteria are often based on resource management issues, but intrinsic aesthetic effects are also considered important. The *psychophysical paradigm* captures landscape assessments that are performed by measuring the responses and evaluations of the general public, or selected sub-populations. These evaluations involve aesthetic qualities and/or specific landscape properties. In this paradigm, external landscape properties are assumed to bear a correlational relationship to observer evaluations and behavior. The *cognitive paradigm* defines studies in which human meaning is associated with landscapes or landscape

properties. In these studies, the human observer receives information, and combines this information with past experience, future expectation, and sociocultural conditioning. Lastly, an *experiential paradigm* considers landscape values to be based on experience of the human-landscape interaction. In this paradigm, both human and landscape are shaping and being shaped in an interactive and reciprocal process (like a transactional landscape theory).

Table 2.2: Four Paradigms in Landscape Perception Research (Zube et al., 1982)

Research Paradigm:	**Type of Research Activity:**
Expert	Take measurements of the quality of landscape
Psychological	Collect responses/evaluations of the general public or specific group
Cognitive	Record human meaning associated with landscape properties
Experimental	Investigate landscape values based on human-landscape interaction

The work that Sinha (1995) and Zube et al. (1982) do to characterize approaches in landscape perception research highlight that there are variety of approaches within this one field. It seems notable that these scholars were writing over twenty years ago and one would wonder what has happened in the field since then. Carlson (1993) claims that there has been a relative lack of contemporary theorizing in the field of landscape perception. This may be a result of the increase in contextually driven and constructivist approaches, which, in contrast to a "universal" or "structuralist" perspectives, understand that there are multiple realties and frames and seek to describe and uncover these.

Taken as a whole, landscape perception research has largely focused on preferences, particularly aesthetic preferences. Preferences are a way of processing the environment in a positive way (Sinha, 1995); however, perception can also be neutral or negative, and focusing on preferences is not the same as gathering information about

what is perceived and how it is perceived. With regard to this focus on aesthesis, since perception is multi-modal, visual information is only part of the story and thus more thorough assessments must take into account smell, sound, temperature, etc. It is not hard to understand why there are not many studies that take on this complicated task for which there are few well-developed methodologies.

Also, within the literature of landscape perception, a large portion of the research focuses on some 'general public' and tends to aim to theorize commonly held perceptions. There is a lack of research that explicitly addresses 'different publics' (Scott, 2009) or specific social groups. I could find no studies that investigate the ways in which landscape professionals perceive the landscape. What's more, there is only one study that has directly addressed perceptions of landscape function; this study is discussed further below. Thus, the research topic that I address here focuses on three specific gaps: the lack of specific research on perceptions of landscape by a specific social group, in this case landscape professionals, the lack of research that has focused on perceptions of landscape function (not preferences, but information about the details of perception).

Landscape Function

The literature that I review in this section comes from the field of ecology. Much of the literature about landscape functions is focused on measuring and describing specific landscape functions, or specific types of landscape processes (e.g.: Willemen, 2008*),* but also within this literature are discussions of how we should prioritize, value, and manage particular functions (e.g.: Goulder & Kennedy, 1997; Costanza et al., 1997; Schaeffer, 1998; de Groot, 2006; Kienast et al., 2009; Bolliger & Kienast, 2010; Gomez-

Baggethun & Perez 2011). More relevant to my topic, however, are discussions of what landscape function is and various typologies of landscape functions.

There seem to be at least two related but slightly different understandings of landscape function with ecology. One definition defines landscape functions as the *flows* of material through an ecosystem (e.g.: Helming et al., 2008; Perez-Soba et al., 2008; Wu & Leemans, 2013). Wu and Leemans (2013) write that landscape function is the "horizontal and vertical exchanges of organisms, energy, material, and information in a landscape" (p 180). Another, more recent, definition clarifies that landscape functions are not the flows themselves, but rather the land's *capacity* (stocks) to provide these flows (goods and services) (Kienast et al., 2009, p. 2). This idea plainly recalls the concept of carrying capacity (Vos et al., 2001 cited in Kienast et al., 2009, p. 2). Implied within this definition is the idea that the land has the ability to dynamically sustain life through interactions among biotic and abiotic components and processes (Alberti, 2003).

For many, the concept of ecosystems goods and services (flows) is likely to be more familiar than the concept of landscape function (capacity) and it seems that these terms are rarely differentiated outside of ecology. I believe that the importance (for some) of this differentiation originates in issues of valuation and the importance of not only maintaining specific services that we recognize now, but also maintaining the potential for the landscape to provide a variety of services, to a variety of actors, in the future.

Influential scholars have warned that the concept of ecosystem services has dangerous implications in a neoclassical paradigm. These warnings claim that the application of a neoclassical paradigm to the concept will lead to the typical four-stage process of: economic framing, monetization, appropriation and commercialization (suggested by S. Dooling). Furthermore, scholars warn that valuation of ecosystem

services may be unidirectional, may mask macro or global realities behind economics (Rees, 1992), and may promote ecosystem goods/services to the detriment of more indirect types of ecological functions or processes (Peterson et al., 2009). As Peterson et al. (2009) point out, framing ecosystem services though economic value does not address the political problem of commodification, it obscures the labor of human workers and the importance of the biota (ecosystem workers), and it hides related abiotic factors that contribute to ecosystem functions. Lastly, the current lack of an acceptable or accepted ethical framework creates serious problems where the just distribution of benefits and fair distribution of burdens is concerned (Ernstson, 2013).

I understand the effort to differentiate landscape functions separate from ecosystem services as an attempt to avoid some of the pitfalls presented above. As a concept, the idea of landscape functions, acknowledges that some processes may not be directly related to a specific service or good and thus leaves room for indirect or macro processes at a variety of scales, and the acknowledgement of labor, workers, and abiotic processes, and a discussion of the distribution of burdens and benefits.

Nevertheless, there are times when it is difficult to differentiate between a function, a service, and a good. Costanza et al. (1997) point out that the function/process in which water infiltrates into watershed soils, is stored in those soils, and is later released downstream, is called 'regulation of hydrological flows.' The regulation of hydrological flows has been named the function, but this function produces a service, which is named 'water regulation' and a good, which is named 'clean water.' This type of specific differentiation may not only be difficult, it may not be useful for all disciplines or in all cases of landscape intervention and design.

What's more, a plethora of landscape functions and their associated services and goods have been recognized and scholars have attempted to provide classification schemes (e.g.: de Groot & Hein, 2007). Building a definitional typology of functions, and their related goods and services, is likely to be an ongoing project in the field of ecology and perhaps in other fields. Despite this continued discussion about which labels and names are appropriate, most scholars in ecology feel that it is important that labels not be allowed to blur the distinction between landscape processes and the benefits that they provide (Sepp, 2012 cited in Rydén, 2012).

Perceptions of Landscape Function

There are only few studies that directly set the stage for my own research here. In landscape architecture, and perhaps also in architecture, a functional and performance-based perspective is gaining significance. David Leatherbarrow (2009) explains this change as a shift in concern 'from what [architecture] is to what [architecture] does.' In the context of landscape, a 'what-it-is approach' might be concerned only with structure or form, while a 'what is does' approach will take into account both structure (form) and process (function). The resulting conceptualization of landscape from a 'what-it-is approach' is that of a static product or object, while the resulting conceptualization of landscape from a 'what-it-does approach' is that of a dynamic, complex, emergent system---or a process-oriented approach.

Simon Bell (1999) provides an early discussion in landscape architecture about the importance of being able to see patterns in the landscape that result from the processes that are happening there. He suggests that designers must become attuned to 'reading' the landscape for the processes that are taking place. Most landscape

professionals can observe a hillside where the process of erosion is taking place by identifying the familiar patterns of erosion. I would call this a type of ecological literacy. However, while some landscape patterns and processes may be easy for landscape professionals to detect, others may be more obscure. So, which landscape functions/processes do landscape architects most readily observe?

It is Joan Iverson Nassauer who has asked questions most similar to this. In, *Messy Ecosystems, Orderly Frames (1995),* she argues that ecological function is not readily apparent. Furthermore, she suggests that it is not readily apparent even to those trained to look for it. However, her research is focused on the public, not professionals or those trained to look for it. My research was designed to address one group of professionals as a small step toward assessing this important point that Nassauer brings up.

I believe that there is, however, a difference in Nassauer and my perspectives. Nassauer seems to approach ecology from a more post-positivist view. If this is the case, from this perspective, landscape function is a "scientific" concept and functions can/should be named and categorized by experts. I understand the concept/s of ecology, to be a social construction. Since ecological concepts are socially produced, the very term 'landscape function' may have a variety of meanings for different groups and naming and categorizing functions is a highly social and changeable project. Lastly, Nassauer often focuses on the 'look' or the appearance of landscape, discussing how look can be misleading and/or function can be invisible (Nassauer, 1992), while I am interested in how we might be engaged in and cultivate a more multi-modal assessment of the landscape. These possible differences aside, Nassauer's lines of questioning inspire me and her work has been a major stimulus for this study.

SUMMARY OF CHAPTER

In this Chapter, I present a conceptual and theoretical approach that explains the human-landscape relationship. The framework that I utilize in this research is a transactional landscape theory. I then introduce and discuss empirical research in three major sections: landscape perception, landscape function, and perceptions of landscape function. In each of these sections I refer to gaps in the literature, making the case for my own research as an attempt to begin to address some of these gaps.

Chapter 3: Methodology

INTRODUCTION

In this Chapter I first describe my ontological and epistemological perspective. The purpose of this description is to provide a foundation for the rest of the Chapter, which includes my research methodology, selected methods, and chosen analysis techniques. In the various sections that follow, I explain the research design, restate the purpose of the study, restate the questions, and explain why this research design is an appropriate attempt to answer these research questions. I also give an explanation of the general and specific context in which the study took place, a discussion of the units of analysis, state my understanding of my role as a researcher, and present some key personal assumptions. Finally, I describe the specific data collection methods and data analysis techniques, assess the quality of the resulting research, and conclude with a summary of the Chapter.

FOUNDATION: ONTOLOGICAL AND EPISTEMOLOGICAL PERSPECTIVE

This study is conducted from a constructivist ontological and epistemological perspective. A constructivist perspective, as an ontological theory or as a theory of the nature of reality, argues that there are multiple, socially constructed realities. This stands in contrast to, for example, a positivist perspective, which argues that there is one reality that is knowable with a certain probability. A constructivist perspective, as an epistemological theory or as a theory of the nature of knowledge, argues that individuals and groups continuously construct these realities (Mertens, 1998 cited in Groat & Wang, 2002). Therefore, from a constructivist perspective, reality is in the process of continually *becoming* and is subject to change as individuals or groups learn or have new experiences

(Guba & Lincoln, 1994). Key to this perspective is the understanding that, although the world itself is not determined by human minds, knowledge of the world, and thus meaning, is a human, social construction resulting from both experience and ideas.

Erving Goffman, a widely known sociologist, wrote at length about how humans possess a 'frame,' or conceptual structure. Our frame allows us to make sense of our experiences and ideas. Goffman's book, *Frame Analysis: An Essay on the Organization of Experience* (1974), seeks to construct a rationale for the empirical analysis of these frames (Gamson, 1975). Put another way, a frame is a set of sense making norms (unconscious concepts and theoretical perspectives) that organize or give meaning to our experiences. It is especially important to state that a frame not only gives meaning to experiences, but also guides the actions and behaviors of individuals, groups, and societies.

In addition, frames or rationalities can be deeply and fundamentally different and thus lead to conflict or communication difficulties (Watson, 2003). Because a frame guides actions, orients decision-making, affects meaning, and modifies communication, the investigation of frames is an important research activity (Kearney & Kaplan, 1997). Knowledge of one's own frame or of a variety of frames held by a social group can facilitate informed group-reflection, particularly with regard to interdisciplinary communication and group values. In general, for my part, I am interested in understanding the various frames that organize human experience or perception of landscape. In particular, and in this study, I attempt to investigate the frames that landscape architects, which I understand to be a specific social group, are using to interpret landscape function, which I understand to be a specific landscape concept.

METHODOLOGY

Given the social nature of this topic and a constructivist ontological and epistemological perspective, I have chosen an interpretive methodology for this research. I am using the word methodology to refer to the general type of process that the research follows. In other words, a methodology is the general approach or the general strategy behind the research (Calabrese, 2009, p. 96). An interpretive approach is considered distinct from, although not necessarily mutually exclusive of, a positivist, a post positivist, or an emancipatory approach (Groat & Wang, 2002). An interpretive approach "produces knowledge by identifying, naming, and assigning new significance or meanings to dimensions, themes, or narratives within a data set" (Deming & Swaffield, 2011, p. 51).

Some important, general assumptions or understandings are common to an interpretive approach: 1) the meanings of things are not self-evident and thus require the researcher to interact with the data and the participants in order to 'make sense' of the phenomena being studied (Deming & Swaffield, 2011); 2) there is an unavoidable link between the researcher and subject of inquiry. Thus, it is neither possible, nor necessarily desirable, to establish value-free objectivity (Greider & Gardovich, 1994 cited in Deming & Swaffield, 2011); 3) there is no single valid method or set of methods for research but rather many possible and useful methods. Thus, interpretation may take a reflexive approach---moving between inductive and deductive activities (Deming & Swaffield, 2011), and; 4) any knowledge or insights gained must be interpreted within a corresponding context that is articulated as part of the study.

PURPOSE OF THE STUDY AND RESEARCH QUESTIONS

The purpose of this study is to explore how landscape architects understand landscape function at this moment in time. I believe that understandings will shift and "become" as landscape architects and the field develop and change; therefore, the findings and conclusions of this study must be interpreted in relationship the temporal context of 2014. In addition, I am interested in which types of functions landscape architects perceive and how they perceive these functions. The goal of this work is to be able to reflect on the current relationship between the ecological concept of landscape function/s and understandings of this concept within the field of landscape architecture. These interests have lead to the following research questions:

1. How do landscape architects perceive (sensory) landscape functions?
    a. Which landscape functions do they see/hear/smell/etc. while in the landscape?
    b. What cues trigger the identification of particular functions?

2. How do landscape architects understand (cognitive) landscape function/s?
    a. Which landscape functions are most readily recalled from their mind?
    b. Which landscape functions are considered important to design and plan for?

RATIONALE FOR METHODOLOGY

With a constructivist foundation and an interpretive and adductive approach, I utilize two specific data collection methods: participant authored photography and a self-administered written questionnaire. The data from these methods was analyzed using a modified grounded theory approach. This type of methodology is appropriate for this under studied topic and the highly exploratory nature of the questions presented above.

I have already described my ontological and epistemological perspective and addressed characteristics common to interpretive research, but I now give some attention

to the relationship of this research to theory. With regard to theory, research is often categorized as deductive, inductive, or adductive. In an adductive approach, the researcher moves back and forth "between deductive and inductive perspectives, modifying theoretical propositions in light of the evidence, revising understanding of the evidence (its categories, its meaning and significance) in light of new theoretical concepts and exploring new possibilities of understanding and new ways of knowing" (Deming & Swaffield, 2011, p. 8). Although theory has been instrumental in framing my questions (more like a deductive approach), because the topic of perception of landscape function is under studied, I rely heavily on an inductive, classification approach in the analysis phase (inductive approach). Therefore, I have moved back and forth between a deductive and an inductive approach at different points in the research process.

As Deming and Swaffield (2011) explain, "classification schemes produce knowledge by sorting and structuring data into a system of organization, using typical properties, patterns, behaviors, or themes (p. 126). These can be emergent or theory-driven themes. Classification strategies are often compounded with other strategies (Deming & Swaffield, 2011) and in this research design, classification is employed as a tool in an overall interpretive strategy. "Interpretive strategies start from the recognition that the meanings of objects, events, words, actions, and images are not always plain and obvious, and they require the investigator to actively engage in 'making sense' of the phenomena that they encounter. (Deming & Swaffield, 2011, p. 152). Interpretive strategies are often used when people---or the meanings or understanding of texts, signs, artifacts, behaviors, or images---are the target of the investigation. This strategy involves reading what people have written and said about a topic, asking questions about 'context, intention, and meanings that people involved place upon the words and phrases' (Deming

& Swaffield, 2011, p. 153). The people at the center of this study are landscape architects.

UNITS OF ANALYSIS

As addressed in the first Chapter, this group of landscape professionals was chosen for two reasons. I am familiar with this field, therefore, I am equipped to read and potentially interpret texts and information about landscape architecture. In addition, landscape architecture has a long history of attempting to integrate ecological concepts into the field; thus, there is both historical and contemporary material that provides a rich context and background for this work.

A lengthy discussion could be had about what landscape architects are and what they do. To state the most obvious, landscape architects are practitioners of landscape architecture. But finding an agreed upon definition of what landscape architecture is proves to be difficult. According to the OED Online, 'landscape architecture *n.*' is "the planning of parks or gardens to form an attractive landscape, often in association with the design of buildings, roads, etc." Michael Laurie (1986), the author of *An Introduction to Landscape Architecture*, writes that "landscape architecture is concerned with the planning and design of land and water for use by society on the basis of an understanding of dynamic, natural, and social systems" (p. 1). Michael Murphy (2005), the author of *Landscape Architecture Theory*, describes landscape architecture as the "discipline devoted to understanding and shaping the landscape and, as a profession, provides site planning, design, and management advice to improve the landscape for human benefit" (p. 2).

I could continue listing definitions; some would vary radically and some would be almost identical, but *I* see landscape architecture as a discipline that is concerned with design and planning environments, especially the biophysical environment, for reasons that range from social and/or environmental improvement to artistic expression to economic wellbeing. The intent, or the reason, for a particular landscape intervention has to do with frames and conceptual structures belonging to those who are making the decisions. A variety of different frames are represented within the field of landscape architecture. Also covering a wide range, are the scales at which landscape architects work (from national to hyper-local), the types of work they do (from urban transportation to wildlife refuge design), and the locations that they work (from wild spaces to urban centers).

In the context of this study, it is important to note, and logical to expect, that concerns and issues expressed with regard to landscape function, are likely to vary according to the scale, landscape type, and location that a practitioner is familiar with or in which a practitioner works. Although, this research would be made more robust and more interesting if I could continue the work and repeat the same methods within other regions in the US, this research has mainly focused on landscape architects within the state of Texas.

SPECIFIC CONTEXT

As noted, the majority of the data has been collected from landscape architects that are practicing in Texas. Texas is a state that is experiencing rapid population growth and various resource scarcities. It is also a state that hosts a wide variety of terrain types

and socio-cultural groups. Like much of the American west, water is a primary issue of concern here.

Texas is the largest state in the contiguous US, covering 268,820 square miles or 696,200 km^2 (wikipedia.com: "*Texas"*). According to citymayors.com, Texas has three of the top ten largest cities in the US: Houston (#4), San Antonio (#7), and Dallas (#9), and five of the top ten fastest growing cities in the US: Houston (#3), San Antonio (#4), Austin (#5), Dallas (#7), and Forth Worth (#10). It encompasses several biomes and variety of bioregions, from desert to pine forest, gulf coast to high plains, and river basins to mountains. The eastern part of the state receives more than 54 inches of rain a year although rainfall drops moving west across the state until, parts of the Chihuahua Dessert, only receive 14 inches of rain a year (texasalmanac.com: "*rainfall"*). Despite popular perception, only 10% of the state is desert. Nevertheless, the climate is hot in many places and the sun is strong. Access to enough fresh water into the future for this growing population is a big concern for many Texans.

In Texas, a concern over water access and management is a galvanizing issue. Various interests compete for water: cities, farms, industry, non-human species and natural systems. Concern about the availability of water has been exacerbated after the major drought that began in 2011 (and continues today). In 2012, the State Water Plan claimed, "the primary message… is a simple one: In serious drought conditions, Texas does not and will not have enough water to meet the needs of its people, its businesses, and its agricultural enterprises" (twdb.state.tx.us). Climate change is likely to exacerbate water shortage, and through general ecological destabilization, pose challenges for the residents of Texas. Particularly vulnerable populations may be people who live along the

coast, farmers, animals that live in tidal estuaries and freshwater systems, birds that live and migrate through Texas, and floral communities.

ROLE OF THE RESEARCHER

In keeping with the characteristics of a constructivist and interpretive approach, knowledge cannot be known independently of the perspective of the researcher or independently of the context of the research. For this reason, I have tried to be very straightforward about my own assumptions and the context in which this research takes place. I claim that there is an unavoidable link between researcher and subject of inquiry and it is neither possible, nor necessarily desirable, to establish value-free objectivity. Although, knowledge claims can exist, to some degree, beyond the *total* subjectivity of the researcher as an individual (Swaffield, 2006). In these types of research designs, knowledge is actively created during a process of interaction between the researcher and the participants (Greider & Gardovich, 1994 cited in Deming & Swaffield, 2011) and this type of approach accepts that the research design may develop, or new facets may emerge, as the research proceeds (Guba, 1981 cited in Groat & Wang, 2002).

RESEARCHER BIAS

A large part of what I consider to be my bias has already been addressed. I have explained my understanding of the environment as a complex, emergent, constantly changing series of nested and interrelated systems that are mutually constituted by both sociocultural and biophysical aspects. I have also discussed my understanding that although the world itself may be independent of human minds, our interpretation of the

world is a social construction that is in constant motion. These social constructions or interpretations guide our behavior and thus, our decisions with regard to the biophysical environments. Lastly, I believe that we, and most forms of life on earth, depend on the function of the land to provide essential services and goods. I believe that solutions to our problems will require a systems-based approach, will require an acknowledgement of the entwined nature of the social and biophysical realms, and must focus on improved function with a long-term view, at a variety of scales. An inclination toward experimentation, observation, and adaptation and a proclivity toward longer-term visions are highly beneficial to us now and essential in addressing our uncertain future.

METHODS

In this study I use two major methods to investigate perceptions of landscape function by landscape architects: participant authored photography (method 1) and a self-administered written questionnaire (method 2). In addition, a critical review of both scholarly and professional literatures and participant observation at two conferences (one scholarly and one professional) has provided supplemental insight for examining this topic. The resulting data sets were organized and analyzed in an inductive fashion using a modified grounded theory approach. Data were sorted and resorted in subsequent sessions according to themes that emerged from the data itself, the literature review, or the participant observation. Below, I will describe each major method separately, explain my sampling strategies, my data analysis technique, and address the limitations of these methods.

Method 1: Participant Authored Photography

Participant authored photography (PAP) is a qualitative visual research method in which subjects are asked to document themselves or their environments with a camera. This method has been used widely in ethnographic research (photo-ethnography) to document visual experiences and perceptions, as a tool for further reflection and conversation with participants, and as a way for the researcher to gain insight into various contexts without intruding physically (Tinkler, 2013). PAP has also been used in landscape perceptions research, although mostly to gather information about landscape preferences (e.g.: Chenoweth, 1984; Hull & Stewart, 1995). For this study, PAP provided me with the opportunity to collect individual perceptual reflections from participants in diverse locations. In addition, it provided a tool to encourage/require the participants to physically interact with a landscape.

Invitations and instructions for the PAP activity were emailed to a purposive sample. The sample included both a student group and a professional group. The professional sample group was made up of individuals who work for firms that won an award from the American Society of Landscape Architecture (ASLA) in 2013. I understand these professional participants to be exemplars in the field of landscape architecture because they received this award and recognition from their peers. Of this professional group, one hundred and forty-three professionals' emails were available publicly and these professionals were invited to participate directly. However, in the case of twenty-five of the firms, individual emails were not publicly available. In these cases, I emailed the firm's published contact person and asked them to forward my invitation to their employees.

Invitations and instructions were also emailed to a student sample group. For this sample, I attempted to contact all students who were enrolled in the eighty accredited and candidacy programs in the US. The Landscape Architectural Accreditation Board (LAAB) oversees the accreditation process for landscape architecture schools and programs in the US. LAAB is responsible for the development of accreditation standards, rules and procedures. The ASLA Board of Trustees supervises the LAAB. In the case of the student sample, individual student emails were not publicly available. Thus, all eighty program directors were contacted and asked to forward my invitation to their landscape architecture student body. These programs included undergraduate and graduate level students. Of the eighty program directors, I heard back from thirteen, all of whom replied that they would happily forward my request to their students. I can assume then, students from thirteen different colleges and universities received my invitation, although I do not know how many students were invited total.

The research design indicated that I would email all participants three times. In actuality, the professional sample group was emailed four times: on Feb 3rd, Feb 6th, Feb 17th, and March 18th, 2013. However, the college and university program directors were only emailed once on Feb 21st, 2013. The decision to only email the directors once was a factor of my growing sensitivity to becoming a nuisance, information that suggested that directly emailing individuals was more effective, and my recognition that my supporting information and my subsequent data collection method was focused on professionals more than students.

These emails included a brief introduction, an explanation of the study, and instructions for participation. The instructions were modified slightly over the course of the project and the final rendition is included below.

1. TAKE A WALK/LOOK OUTSIDE. Take a break, go outside, or look out a window. Can you see/hear/smell/sense the landscape performing a function? Take a photo of this landscape in which you observe a function. This can be any landscape and any function---don't think too much and go with the first function that you observe.

2. RETURN PHOTO WITH SHORT DESCRIPTION. Email the photo to me with the type of function you observed and how you know this function is present. See examples below.

Two examples were given and more information about the study was included at the bottom of the email. Of the 143 three professional individuals who were emailed, eleven chose to participate and I received twelve photographic submissions (7.7% response rate). Of the twenty-five firms that were emailed, two responded, expressing interest in the study and said they would forward my email on to their office. However, I did not receive any submissions from employees in either of these firms (0% response rate). Of the students from the thirteen colleges and universities, eight participants sent in nine photographic submissions (response rate unknown). In total, I received twenty photographs and descriptions to analyze. Although this very low response rate does not render the research invalid, it does present limitations.

Method 2: Self-Administered Questionnaire

A self-administered written questionnaire was handed out to attendees of the 2014 Texas ASLA Conference (Appendix B). The questionnaire itself was designed to be consistent with guidelines about questionnaire design presented by Kidder (1986) and Schaffer and Presser (1995). Five $50 gift certificates to William Stout Architectural Books were raffled off in an effort to increase participation.

The conference took place in San Antonio, TX on April 2nd, 3rd, and 4th. It was held at the Henry B. Gonzales Convention Center in exhibit hall B. The organizer of the conference said that they expected nearly 400 attendees, although I do not know the final attendance number. The huge (and seriously air conditioned) hall was full of vendors who were promoting products and services. Several spaces were cordoned off with black curtains enclosing chairs, a screen, and a small stage for the various speakers that presented at the conference. Attendees could earn continuing education credit hours by attending these presentations. The social atmosphere was kindred with many old friends and colleagues greeting each other and catching up. I approached attendees right after they had registered and collected their entrance packets and very briefly introduced myself and the study. Responses to my request for participation varied from encouraging to distracted to skeptical to annoyed.

As mentioned above, the questionnaire was designed to be consistent with guidelines about questionnaire design by Kidder (1986) and Schaffer and Presser (1995). These guidelines suggested that questions be sequenced from simple/general to complex/detailed; for example, beginning with questions about personal facts and moving toward questions about concepts. They also suggested that questions that are more specific increase validity but one should avoid unnecessary levels of detail. They also argued that terms should be exact and simple and that questions should be short where possible. During the design of the questionnaire, I aimed to make the questionnaire interesting and easy to complete in order to maximize response and to encourage participation.

The resulting questionnaire was eight pages long, although only five of the pages required participant action. The first page was a cover letter explaining the research, the

last page was left blank page for additional comments or questions, and one page was a set of instructions for the photographic activity. Of the pages that required participant action, the first section of the questionnaire contained six basic demographic questions and explained the raffle. The demographic section was followed by two distinct activities: written answer questions and a photographic observation activity. There were four written answer questions---both closed-ended (fixed response) and open-ended (free response). The photographic exercise consisted of nine photographs of various types of landscapes. The participants were asked to observe each photograph and list a function (or several functions) that they observed in the landscape. They were also asked to say what in the photograph made them think that this function was present (a cue).

In the questionnaire, the use of open-ended questions is considered appropriate when the researcher does not know the full range of positions or attitudes present in the sample group (Kidder, 1986) and can be used as a source of insight when hypothesis testing is not the primary goal (Leech, 2002). Disadvantages to open-ended questions are that coding the responses may be difficult because the responses may be self-contradictory or incomprehensible (Leech, 2002). However, open-ended questions generally avoid the respondents feeling constrained by their options and avoid the researchers own frame coming through too strongly. These factors feel important when trying to discover how others might understand a complex concept. Given that landscape function is a complex concept, given that possible function types are innumerable and are likely to depend heavily on a person's attitudes, knowledge, involvement, education, and other factors, there was a high likelihood that the coding responses would be challenging.

I arrived at the conference before registration opened. The conference organizer had set up a table for me, at my request, near the registration booth. It had a bright red

tablecloth and I added candies, a sign, a plant, and a drop box for completed surveys. By the conclusion of the conference, thirty questionnaires had been returned, one was mailed to me a few days later, and one was scanned and emailed to me. Out of the three hundred questionnaires that were passed out, thirty-one questionnaires were returned (10.3% response rate).

DATA ANALYSIS: MODIFIED GROUNDED THEORY

The primary analysis method used in this study is a qualitative method or a modified version of a grounded theory approach. In grounded theory, a researcher attempts to clear their mind of preconceived notions and opinions. They organize and reorganize the data looking for themes, differences, and similarities amongst the data and theory emerges from this concentrated work with the data (Groat & Wang, 2002). Memos are written periodically to aid in the theory building process and to record insights and understandings gained during the process.

The two methods described above resulted in both written (participant responses) and visual data (the photographs). However, due to the low number of photographic submissions, I choose to focus my analysis primarily on the written data. This data mainly consisted of types of landscape functions that participants had listed for me during one of the several data collection exercises. The initial goal was to try to understand which functions landscape architects perceive and to create a typology of functions accompanied by their indicators or the cues that triggered their identification. In addition, however, there was the question of how landscape architects understand the concept of landscape function and for this question ancillary quotes, emails, and conversations were helpful.

The coding process began by writing all the functions down on note cards. The cards were color coded into sets according to their methodological origin. For example, set one came from the PAP, included 23 cards (23 functions), and was recorded on blue note cards. Another set came from the first written answer question in the questionnaire, included 95 cards, and was recorded on yellow note cards. Another set came from the second written answer question in the questionnaire, included 65 cards, and was recorded on pink note cards, etc. Also, the last section of the questionnaire---the photographic prompt activity---generated a set of 274 cards, and was recorded on green note cards. This set was further divided into sub-sets according to the photograph that prompted the answer. For example, photo 1 resulted in 31 cards and photo two resulted in 32 cards, etc.

I sorted each set of cards several times on different days. It felt very important to let some time elapse between card sorts. This allowed for a "fresher" approach to each sort. I also aggregated all the cards and sorted them as a group of 539 functions. Each card sort resulted in meta-categories and subcategories. Following each sorting exercise, I wrote a brief memo to capture impressions and thoughts that occurred during the sort. Some examples of these memos are included below:

> There seems to be a very sophisticated set of words and language for the human user experience. However, with the exception of water-related concerns, it seems that there is a less sophisticated, varied or nuanced, language for "environmental" concerns or uses.

> The functions resulting from the PAP method include more processes (verbs) and not as many things (nouns). 65% percent of the answers are clearly processes. I do not understand why this is the case, only 52% of the responses from the PAP method refer to user experience and use, in contrast to 70% from the written survey questions. Different methods are resulting in different types of answers.

> This set of cards [the photographic observation cards] is much more difficult to work with and feels significantly more confusing. People are naming what they see in the photo (object or type of landscape) and not a process or function.

> Should I have included the instructions on every page? I am also wondering if the variation in the answers demonstrates a lack of consensus about the meaning of the term landscape function or confusion in the part of the participants…

All told, I sorted each individual set two to three times and the aggregated whole four times in order to come up with a final categories. During some sorts, I simply adjusted the categories from a previous sort, although for other sorts I began with completely fresh categories. Each time I came to the table for a sort I tried to clear my head of my own assumptions and really listen to what the participants might mean by the responses that they had written. To this end, I paid a lot of attention to the difference between when a function type was written as a verb, as a noun, as a description of an object, or as a specific activity. I tried to constantly put the functions into sentences and look at the surrounding text for clues to a participants' frame or approach (for example, see figure 4.2).

RESEARCH QUALITY AND VALIDITY

In assessing the quality and validity of this research I rely on a structure that is presented by Groat and Wang (2002), and is in turn adapted from Guba (1981). It displays research quality in terms of four standard types: credibility, transferability, dependability, and conformability (Table 3.1). I address each one of these standard types below.

Groat and Wang (2002) write that, in general, utilizing several methods during research provides checks against the limitations embodied by a single method; it simultaneously promotes a beneficial triangulation and richness of information. A triangulation of methods increases both credibility and conformability. This research

design took this advice to heart by employing two major methods (PAP and a questionnaire), three data generation activities (physical landscape observation, written-answer questions, and landscape photograph observations), and two supporting methods (structured literature review and participant observation).

The transferability of this research is likely to be high within its own context although it may not transfer well to landscape architects as a national group and especially to landscape architects as an international group. Testing the findings of this research with other groups of landscape architects would require further study and complimentary sample groups. Nevertheless, I do believe that the transferability of this research is high within the specific context of this study: landscape architects practicing in the state of Texas, or in some cases in the Southwest at large.

I now turn to dependability. In the table below, dependability is reflected in the traceability of the data, or in other words an audit trail. I have left a detailed audit trail but I am aware that there are various realities and frames existing in the data which make it somewhat difficult to deal with and as a young researcher, I feel humble about and aware of the ways in which I had to adjust my research design during the process. This fact may make an exact repeat of the process difficult. More importantly, however, I do not think an exact repeat of this process is desirable. In my opinion, one of the highest values of this research is that it poses ideas for further research and provides some information about where to start with a fresh research design.

Table 3.1: Measures of Research Quality (Groat & Wang, 2002)

Standard Type:	Truth value/ Credibility	Applicability/ Transferability	Consistency/ Dependability	Neutrality/ Conformability
Measures/ Indications:	Triangulation; multiple data sources	Thick description of context	Traceability of expected instability in data; audit trail	Triangulation; practice of reflexivity by investigator
Self-Rating:	High	Medium	Medium	High

LIMITATIONS

As I mentioned in the introductory Chapter, there are at least two important limitations of this work. This first has to do with the nature of perception and the second has to do with the low response rates in the study.

Landscape perception is a very complex topic. Anyone who reads in this area will quickly realize that perception moves easily through a variety of disciplines. This is because human perception is all at once a physiological issue, a psychological issue, a philosophical issue, a sociological issue, and a cultural issue---to name a few. At its core, perception is multi-modal. In other words, our perception is the result of both physical/sensory aspects and mental/conceptual aspects. We perceive information about the landscape through our senses (visual, auditory, olfactory, tactile, taste) and it is translated through a physiological process into information that is then interpreted by our mind (understanding, preference, relationships, etc.). Lastly, we formulate a response, which might result in action, communication, or the storage of information.

Thus, capturing information about landscape perception is an extremely large project. In order to address this issue, I attempted to segment this research into a method that focused on sensory perception (the PAP) and a method that focused conceptual perception (the questionnaire). However, after a great deal of reading and some critical

hindsight, I believe that sensory and conceptual perception are two halves of the same coin and can be separated only with difficulty, if at all.

In the end, my work as a whole has provided more information about conceptual perceptions than about details of sensory perception. This is, in part, due to low response rates in general and very low response rates from the PAP. Further studies in this area could be very interesting although trouble shooting the research design should be a prerequisite.

SUMMARY OF CHAPTER

In this Chapter I describe my perspective as constructivist, and note that this led me to an interpretive research methodology. In this methodology, I selected participant authored photography and a self-administered written questionnaire as my major data collection methods. I explain how a modified grounded theory approach was the basis for my analysis and explain my coding and card sorting process. I argue that these methods and this analysis were appropriate in my attempt to answer how landscape architects perceive landscape function, as a concept, and how landscape architects perceive landscape functions, as specific processes. In addition, I elaborate on the context in which the study took place, which includes information about how I interpret the state of our world at the moment, information about Texas, and information about the profession of landscape architecture. I conclude by addressing issues of research quality and limitations.

Chapter 4: Findings

INTRODUCTION

In Chapter 4, I first restate the purpose of my study and the theoretical perspectives that guide my approach and my questions. Then, I summarize the research design and methodology and repeat the research questions. Next, I report my findings in four sections according to the origin of the data: 1) participant authored photography, 2) written answer section of the questionnaire, 3) photograph observation section of the questionnaire, and 4) all methods together. To be clear, this Chapter only reports the findings; a discussion of these findings will be given in the final Chapter. I conclude with a summary of the Chapter.

RESTATEMENT OF THE PURPOSE OF THE STUDY

In this study, I focus on a distinct group of design professionals who are regularly charged with co-visioning future scenarios for landscapes: landscape architects. I am interested in understanding how landscape architects interpret a popular word and important ecological concept: landscape function. The purpose of this study was to explore how landscape architects understand landscape function and which landscape functions they most readily perceive. An original goal was to build a typology of landscape functions that landscape architects most readily perceive and to reflect on the current relationship between the concept of landscape function and the field of landscape architecture. This research was conducted predominantly with participants who are practitioners of landscape architecture working in the state of Texas.

RESTATEMENT OF THE THEORETICAL PERSPECTIVES

The theoretical perspectives that guided my approach to this research are discussed in Chapter 1 and also Chapter 2. Additionally, theoretical perspectives pertaining to my choice of methodology are presented in Chapter 3. Here, I will list these theoretical perspectives together, although I do not elaborate on them.

Throughout this paper, I assert that the biophysical and sociocultural aspects of our world are mutually constituted, that our future well-being is threatened, and that we depend on landscape functions for survival. From an ecological frame, landscape functions are understood as the landscape processes that have the capacity to provide goods and services that sustain life. These assertions form a coherent pairing for the human-landscape relationship theory that I engage in this research: the transactional landscape theory. In this theory, the human is not only an agent of impact, and the human is not just a static receiver and processor of landscape information, rather this theory claims that humans and the landscape are in a state of continual change as one affects and interacts with the other.

In addition to transactional landscape theory, in Chapter 2, I claim that the profession of landscape architecture is growing and struggling to mature. I then argue that as part of this process of growth, landscape architecture is searching for justificatory theory. To this end, incorporating ecology and ecological principles is one attempt at this project. Lastly, in Chapter 3, I describe the theoretical perspectives that guide my research design. In keeping with a constructivist approach, I understand that humans interpret reality and that our interpretations and our perceptions guide our actions and behaviors. Broadly speaking then, the meanings of realities are not self-evident. Instead, interpretation requires the researcher to interact with subjects and data and any

knowledge or insight gained must be understood within a corresponding context and with ample explanation of the researcher's own assumptions.

RESTATEMENT OF THE RESEARCH DESIGN AND METHODOLOGY

These assertions, theoretical perspectives, and claims have led me to utilize an interpretive approach and a classification strategy. This interpretive research employs two major methods, participant authored photography (PAP) and a self-administered written questionnaire. The questionnaire has two distinct activities: written answer questions and photograph observation. During the collection of PAP, a large number of practitioners and students where contacted by email and asked to go outside and observe the landscape for functions. When they detected a landscape function, they were asked to take a photograph, name the function, and describe how they knew that the function was present in the landscape (the *cue* that triggered the identification of the function). The photographs were returned to me with the corresponding function and cue. The self-administered paper questionnaire was handed out to attendees of the 2014 Texas ASLA Conference. The survey asked participants to give some basic demographic information, to answer four written answers questions, and to identify landscape functions in a series of nine photographs. Data gathered from these methods included photographs and text.

Participant observation also contributed information to this study as a supporting method. I attended two conferences as a participant observer. The first was an academic conference. It was held in Austin, TX at the end of February, 2014 and was titled *Nature and Cities*. The second conference was held in San Antonio, TX in early April, 2014 and was the aforementioned ASLA conference. This conference was intended for practitioners and was heavily attended by vendors and suppliers. Data gathered from

these conferences included researcher memos, notes from lectures, and quotes from casual conversations with attendees. Consistent with modes of interpretive classification, data analysis in this research was conducted through coding, categorizing, and sorting exercises based on a modified grounded theory approach. Through this approach, I aimed to answer the following questions.

1. How do landscape architects perceive (sensory) landscape functions?
    a. Which landscape functions do they see/hear/smell/etc. while in the landscape?
    b. What cues trigger the identification of particular functions?

2. How do landscape architects understand (cognitive) landscape function?
    a. Which landscape functions are most readily recalled from their mind?
    b. Which landscape functions are considered important to design and plan for?

FINDINGS 1: PARTICIPANT AUTHORED PHOTOGRAPHY (PAP)

Although a very large sample group of both professionals and students was contacted, I only received twenty-four photographs from eighteen participants. About half of the respondents are students and half are professionals. This particular method was selected as a tool that would encourage participants to move physically into a landscape and actively observe, in a multi-modal manner, landscape functions. As a method it was thought to have high potential to compel participation from a group of people who regularly use photography in their work and are generally highly visually inclined. Although photographs themselves do not capture a multimodal experience, the written descriptions where included to help alleviate this bias toward the visual. The low response rate might have been due to a number of factors, although busy-ness is very likely to be one of them. That said, this low response rate does not render the data useless

or invalid. Instead, it has generated opportunities for learning about methodology and is a springboard for further questions, characteristic of a pre-study.

As I mentioned, PAP was chosen as a promising method, in part, because it should be fun and interesting for participants. It is a tool that requires participants to actually to go outside and observe the landscape with their senses. However, several participants used photographs from past experiences (travel photographs) and photographs that they are unlikely to have taken themselves (published photographs). Thus, I suspect that three, and maybe four, of the participants completed the assignment at their desk without going into the landscape or looking out into the landscape as the instructions requested. This method was also chosen to test exploratory questions, such as:

- At what scale are functions most readily perceived?
- Are functions more readily perceived in hardscapes or naturalistic landscapes?
- Does the presence or absence of people change the perception of functions?
- What senses are most often relied on when attempting to perceive functions?

Given a much larger sample size, I believe that it would be possible and informative to look for patterns in these kinds data that would help answer the questions above. In spite of the small sample size, I used these questions to guide my analysis of the data resulting from this exercise. Although none of the participants submitted the exact same function, because some functions where similar, I believe that given a larger sample size, particular functions would start repeating themselves and with this information one could build a typology of readily perceived functions.

All the findings in the following sections are presented as narratives and also as tables or figures. The raw data from the PAP is included in Appendix A. Using the exploratory questions presented above, I analyzed the photographs first (Table 4.1).

Photographs that were received from the PAP activity capture a variety of scales. There are aerial photos, photos that portray vistas and views (25%), human scaled settings and places (46%), and details and close-ups (29%). Most of the photos portray obvious and visible evidence of human intervention or presence (75%). These interventions are generally in the form of some type of hardscape, building, or other built object. In contrast, only a quarter (25%) of the photographs represent a "naturalistic'" setting. By naturalistic I mean a landscape in which there is little noticeable evidence of human intervention. Roughly a third of the photographs include people (29%), although people were never the focal point of a photograph. There were two notable things that seemed to reappear in many of the photographs: hardscapeing, such as, sidewalks, paths, and courtyards (29%), and plants and trees (29%).

Table 4.1: Analysis of the Photographs (PAP)

What scale does the photograph capture?	Large/Vista	Human-Scaled Place	Detail/ Close-up
	6/24	11/24	7/24
Does the photograph portray a built or naturalistic place?	Obvious visible evidence of human design/building	Little (obvious) evidence of human intervention	
	18/24	6/24	
Are there people visible in the photograph?	People Visible	No People	
	7/24	17/24	
Common focuses:	Sidewalk, Path, or Patio	Plant or Trees	Other/Misc.
	7/24	7/24	10/24

I used the coding and sorting techniques described in Chapter 3 to categorize the functions that participants submitted along with their photographs. Four categories emerged: cultural benefits, human habitat/movement, management/mitigation, and

description of a process (Table 4.2). Examples of functions that I categorized as *cultural benefits* are delight, recreation, and reflection. Functions that were categorized as *human habitat/movement* are circulation, transportation, and dwelling. The *human habitat/movement* category may be closely related to the category titled *management/mitigation*, which included functions such as rainfall attenuation and storm water management.

Table 4.2: Categorization of Functions (PAP)

Cultural Benefits	**Human Habitat/ Movement**	**Management/ Mitigation**	**Description of a Process**
6/21	6/21	4/21	6/21

However, the last category, *description of a process*, represents a different approach. This category included functions that do not necessarily imply a service, good, or benefit. Example functions that were put in this category are pollination, plant growth, and nutrient cycling. Many of the functions reported, when considered without their attendant description, do not clearly imply a process. For example 'sidewalk café,' which is a noun and names a thing. It does not express the landscape function although some of the additional text explains the participant's understanding of the function of a sidewalk café.

With careful review of the cues, I found that the participants relied heavily on a combination of visual cues and knowledge/experience to identify functions. However, as a matter of self-reporting, the participants most often claimed to 'see' a function (Table 4.3). For example, one respondent named 'pollination' as their function and they reported that they saw bees gathering pollen from flowers. Pollination is a process during which

pollen is moved from the male part of a flower to the female part of a flower. It is most likely that this participant did not actually see the whole process of pollination rather they saw a pattern (bees buzzing near flowers) that they recognized as indicative of a process (pollination). Thus, they relied on prior knowledge of the linkage between the visible pattern and the invisible or less visible process.

Other participants did not name a sense but simply reported that they 'knew,' 'observed,' or 'found' the function in the landscape. Reading the text that accompanies these responses reveals that participants who said they 'know' and 'observe,' had spent time in the landscape making an assessment. For example, watching how people moved through a space and then claiming that they observed the landscape as a place of physical and spiritual enrichment. Although there were some mentions of sound, no one mentioned texture, taste, or smell as modes of sensory input.

Table 4.3: Sensory Mode Reported (PAP)

Mode/s used to observe function:	See	See & Hear	Observed, Found	Know	See & Know	No data
	10/24	3/24	4/24	3/24	3/24	1/24

FINDINGS 2: WRITTEN ANSWER QUESTIONS FROM QUESTIONNAIRE

I passed out three hundred paper questionnaires at the 2014 Texas ASLA Conference in San Antonio. People who had questions or comments could find me in my prominent location by the entrance to the conference. The conference atmosphere was convivial and boisterous---that of old friends, classmates, and colleagues seeing each other again after a long while. A conference organizer told me that conference attendees

would be busy hanging out and socializing with old classmates and suggested that this fact might negatively impact my survey response rate. I received thirty-two surveys and the survey instrument is included in Appendix B.

This method was selected to help me assess which landscape functions are most readily recalled from mind and how landscape architects understand the concept of landscape function. The questionnaire was designed to prompt the participants to name types of function through two different mental channels: written questions and photographic observation. In addition, there was a small section that asked participants for basic background information.

The data gathered from each of these activities is treated separately below. Through the written answer section of the paper survey, I explored the following questions:

- Which landscape functions are commonly considered in a typical design process?
- Which landscape functions are landscape architects most concerned with?
- Which landscape functions are considered the most important to design and plan for?
- Is a functional approach considered a new?

Participants' Background

The questionnaire participants were mostly male (69%) professionals (94%) in the fields of landscape architecture or landscape design (91%). None of the respondents identified themselves as students and only a small number identified themselves as educators (12%). Some of the other professions represented were landscape and urban planning, landscape management, historic preservation, and forestry although most of these were practiced in addition to landscape architecture. Most of the respondents work in Texas or the Southwest (91%) and a large number of them have been working in their

fields for more than twenty years (66%). Nearly all participants reported having formal training in landscape architecture (97%) and fewer than half reported having formal training in ecology (41%). This information is represented in the table below (Table 4.4).

Table 4.4: Participant Background Information (Questionnaire)

Sex:	Male	Female	No Data		
	22/32	9/32	1/32		
Student, professional, and/or educator?	Student	Professional	Educator		
	0/32	30/32	4/32		
In what field/s?	L.A./ Desg.	L. Plan.	L. Mgmt.	Hist. Preserv.	Forestry
	29/32	4/32	3/32	1/32	1/32
Work takes place primarily in:	Texas	Southwest	National	Other	
	27/32	2/32	2/32	1/32	
Involved in the field for how long:	5-10 yrs	10-20 yrs	20-30 yrs	30-40 yrs	>40 yrs
	5/32	6/32	8/32	9/32	4/32
Formal training in Landscape Arch:	Yes	No			
	31/32	1/32			
Formal training in Ecology:	Yes	No			
	13/32	19/32			

Question One

The instructions to the written answer section of the questionnaire said that one approach to landscape design, planning and management is a 'functional approach.' A functional approach was explained as an approach that is primarily concerned with the landscape's performance of particular functions. The definition was left intentionally

vague, in order to avoid priming the participants and to encourage a freer interpretation the concept. The first question on the survey was: Is landscape function considered during a typical landscape design process? Most respondents (91%) replied 'yes' (Table 4.5).

Table 4.5: Responses to Question #1

Are landscape functions considered during a typical landscape design process?	Yes	No
	29/32	3/32

Only three of the participants felt that functions were *not* considered during a typical design process. These participants each took time to elaborate on why functions are not considered during a typical design process and their answers have some interesting commonalities. Their direct quotes are included below (Table 4.6). All three reported that functions are not considered in a typical design process because of reasons of cost, efficacy, and/or the professional insignificance of landscape architects in the construction trade hierarchy when compared to the power, sway, and influence of engineers, developers, and architects.

Respondents, who answered 'yes' to the first question, were asked to list which functions are most commonly considered. Each participant reported one to six functions for a total of eighty-nine functions. This list of functions included nouns and verbs, adjectives and adverbs, emotions, abstract ideas (such as process, flow, or atmosphere), and concrete constraints (such as economic limitations, city requirements, grading). In spite of this wide variety, certain ideas and themes are repeated. Five categories were established: *users & use* (62%), *context* (17%), *water* (11%), and

construction/maintenance (10%). Sub-categories were named under each category (Table 4.7). The most frequently given answers were related to 'users and use' and focused on 'delight,' 'accessibility/circulation,' and 'safety and comfort.'

Table 4.6: Quotes from Question #1

Selected Quotes:	No, in our practice, landscape is a requirement by ordinance. Engineers/developers want the minimum to meet requirements w/minimal cost.
	No…because landscape architects are overruled a lot by architects and civil engineers…
	[Functions] are typically not a top priority in privately funded projects in which we participate. Our developers are more concerned with maxing out the site as far as building footprint and parking are concerned.

Table 4.7: Categorization of Functions from Question #1

Users (35/89)	**Use (20/89)**	**Context (15/89)**	**Water (10/89)**	**Consrct/Maint(9/89)**
delight: artistic, conceptual, atmospheric, views, view screening, aesthetics (12)	circulation, transportation, connectivity (8)	biophysical preservation: inventory native plants, soils, habitat preservation (6)	drainage, grading (4)	maintenance, sustainability, energy conservation (6)
safety and comfort: safety, shade, wind, natural air condition (8)	proposed land use, projected use, 'program' (6)	plant selection/ suitability (5)	water use and conservation (4)	general: ease of design, flow of project (2)
accessibility (6)	general: purpose, purpose of space, uses, how the site will be utilized, land use (5)	general: surrounding environment (2)	general: hydrology (2)	city requirements(1)
recreational and social opportunities (6)	positive economic impact (1)	built/ architectural environment: extensions of living space, relationship to architecture (2)		

Table 4.7 (cont.): Categorization of Functions from Question #1

general: users, ease of use, way-finding (3)

Question Two

The second question on the survey was: During your landscape related work, are you concerned with landscape function? Again there was an option to indicate 'no' or 'yes' and those who responded 'yes' were asked to list the functions that they were most concerned with. All but one of the participants reported that 'yes' they were concerned with function in their work (Table 4.8). The one participant who answered 'no' gave the following explanation: "No, mostly just meeting ordinance."

Of the participants that responded 'yes,' some did not list functions and instead gave other types of answers. For example, "overall performance [means asking] does the landscape fulfill the objectives [of 'the program']?" I believe that this participant is expressing the feeling that his or her own concerns with particular functions are generally less important than the designated program---perhaps set by the client. The answer does not address *which* functions the participant is most concerned with.

Table 4.8: Responses to Question #2

Are you concerned with landscape function?	Yes	No
	31/32	1/32

Other participants declined to make a list of functions but functions could be extrapolated from their responses. For example, one participant wrote: "Mostly, I work in

residential so the landscape functions as a living space for the family. It also functions as a statement the owners want to present to the world." Although this participant did not list functions, he or she does imply two interesting functions. One is that the landscape has the capacity to support human (family) living. The other is that the landscape has the capacity to communicate a social statement.

In the answers to this question, sixty-five functions were collected and treated through the same coding and categorizing activities. New categories emerged to organize this second set of functions (Table 4.9). The four resulting categories are: *users & use* (51%), *future orientation* (20%), *place/space/context* (18%), and *design constraints* (12%).

Table 4.9: Categorization of Functions from Question #2

Users & Use (33/65)	**Long-term Orientation (13/65)**	**Place/Space/ Context (12/65)**	**Design constraints (8/65)**
delight: views, screening, noise buffer, natural enclosure, scenic, aesthetics (11)	sustainability: long term performance (5)	space definition, place making, form (6)	biophysical conditions: topography, aspect, hydrology (5)
circulation and accessibility (9)	water use/ conservation, drainage (4)	material choice (3)	socio-political/ economic: ordinances, practicality, fanatical (3)
safety and comfort: shade, wind, noise buffer (6)	maintenance, durability, human impact, flexibility (4)	ecological: natural systems, ecology (2)	
program, site/user needs (5)		social communication (1)	
social space (2)			

Concerns about the user and use remain common in these responses along with visual and aesthetic delight. The most frequent responses that appear in these data are 'aesthetics and views,' 'circulation and accessibility,' 'place making and space definition,' and 'safety and comfort.'

Question Three

The third question on the survey was aimed at trying to understand if the sample group considered a 'functional approach' similar or different to past approaches. Respondents were prompted to circle similar, different, or I don't know. A fairly large group of participants reported that they did not know (35%). Of those who answered either similar or different, most (79%) reported that a functional approach was similar to typical past approaches (Table 4.10).

Table 4.10: Responses to Question #3

Is a 'functional approach' different or similar to past approaches?	Similar	Different	Don't know	No Data
	15/32	4/32	12/32	1/32

This particular question drew out a number of interesting reactions and some participants provided strong opinion statements in association with this question, for example "function is primary, aesthetics is secondary" or "function in landscape architecture always trumps form." Some participants replied similar but also noted that there are some differences now, for example "[practice] is now more holistic encompassing a 'systems' way of thinking---that it is important how natural and human systems are interrelated and affected by design" or "quantifying functionality with data in a formal manner is new." Several participants felt strongly that functionality and

sustainability were not new ideas and one participant brought up the familiar architecture challenge: 'form over function' or 'function over form.' Another participant articulated a similar dualism by calling it "a pretty picture over *infrastructure*." Many of these responses are included in the table below (Table 4.11).

Table 4.11: Selected Quotes from Question #3

Selected Quotes:	Design should take into account the end users goal. However, in some cases design trumps function (a pretty picture over 'infrastructure').
	Honey, functionality and sustainability are nothing new.
	We were challenged, 'form over function?' or 'function over form?' It seems to me that the successful designs used both. The balance of these is what the LA finds with their design/composition.
	Similar… I can't imagine practicing design and management and disregarding function→ based on the fundamental and basic definition of the word.
	[Practice] is now more holistic encompassing a 'systems' way of thinking---that it is important how natural and human systems are interrelated and affected by design.
	Quantifying functionality with data in a formal manner is new.
	Elementary landscape architecture design concerns itself with plant materials and their aesthetic value, as the professional has expanded its reach, function now includes the interactive use of space of which plant materials are just one component of a large, more important function.
	Function in landscape architecture always trumps form.
	In the past, landscape was considered 'decoration' and in many ways still is. Thank god for tree pres. Ordinances and landscape ordinances to enforce the *environmental function* [emphasis mine].
	A functional approach is not new, it is an underlying concern in any design.
	Historically, we didn't see sweeping disregard for species suitability, water availability, etc.
	…function is primary, aesthetics is secondary.

Question Four

The fourth question on the survey was: In your opinion, which landscape functions are most important for landscape architects to design and plan for? Participants were asked to provide a list functions in order of their perceived importance. Two participants did not answer the question and two participants replied that the functions that were important depended on the project and differed according to scale, site

constraints, and program requirements. The functions that were listed first are shown in the table below (Table 4.12).

Table 4.12: Functions Considered Most Important from Question #4

In your opinion, which landscape functions are most important for landscape architects to design and plan for?	places to congregate, human activities, rest and recreation, access, accessibility, user and space interaction, use, purpose of use, long-term performance, client goals, needs of client, connectivity, sense of place, define space, space and context, hydrology, micro climate, shade, species suitability, drainage (x2), maintenance, health and safety (x2), comfort, way-finding, aesthetics, city requirements.

Like questions one and two, this question generated a list of functions that included eighty-seven functions. Also like questions one and two, this list of functions was categorized through coding and sorting exercises (Table 4.13). Of the meta-categories that emerged from question four, functions that refer to *users and use* continued to be most frequent (57%), followed by *long-term performance* (23%), *place/space/context* (10%), and just a few mentions of *socio-political/economic design constraints* (5%). The most frequent responses that appear in question four are 'safety and comfort,' 'circulation and access,' 'aesthetics and views,' 'general sustainability,' and 'place making and space definition.'

There was one answer that stood out as very different from the others and I felt it simply didn't fit into any of the categories. Although there were quite a few responses that refer to mitigating microclimates, for example providing shade or buffering the wind for users, this answer proposed that mitigating urban heat island effect was an important function of the landscape. Mitigating urban heat island effect directly implies a scale larger than those mentioned in any of the other data from the written answer questions.

Table 4.13: Categorization of Functions from Question #4

Users & Use (50/88)	**Long-term Performance (20/88)**	**Place/Space/ Context (11/88)**	**Design Constraints (4/88)**	**Other (1/88)**
safety and comfort: shade, wind, noise buffer (14)	general: sustainability, environmental preservation (10)	space definition, place making, zoned areas (9)	socio-political/ economic: city requirements, needs of client, cost/budget (4)	mitigating urban heat-island effect (1)
circulation, transportation, accessibility (11)	water efficiency, drainage, species suitability (6)	hydrology, soils (2)		
delight: aesthetics, enjoyability, views (10)	maintenance (4)			
users/use: usability, user friendly, purpose of use (8)				
social and recreational (7)				

FINDINGS 3: PHOTOGRAPHIC OBSERVATION FROM QUESTIONNAIRE

The data gathered from the photograph observation section of the paper questionnaire requires additional explanation and slightly different treatment. I feel that this is true because although the participants are asked to provide an interpretation of the photograph and although there are myriad interpretations possible, unlike any of the other data collection methods, I have chosen the subject matter. In other words, it is very important to note that although these answers certainly capture individual interpretations, the photographs themselves act as prompts and thus answers are not fully and freely generated from the participant's mind.

The photograph observation exercise was chosen, in part, because of the relationship between a data source that guides and the possibility for myriad interpretations. Thus, exploratory questions to ask of these data are:

- Do all participants give the same responses?
- Do certain photos or types of photos that result in greater answer variety?
- Does the scale of the landscape photographed affect the types of answers given?
- Do the types of functions named during the photographic observation exercise differ from the functions named in the other methods?

In general, participants named the same or very similar functions for some photographs, while other photographs generated more response variety. Photographs 1, 5, 6, and 7, resulted in similar responses. The most extreme examples of this were photograph 1, where most participants (85%) identified the function in this landscape as 'seating/resting/relaxation,' and photograph 5, where most participants (90%) identified the function as 'food production/community gardening.' To be clear, food production and community gardening are not the same function, nevertheless, they are very closely related and it is remarkable that nearly all respondents gave one of the exact same two answers. Other photographs had much more varied interpretations. This was true for photograph 2, 3, 4, and especially, 8 and 9.

Photographs 8 and 9 are the only aerial photographs that were included and this scale seems to have affected responses significantly. The photographs that represent a larger scale generally resulted in fewer answers that are verbs and more answers that are nouns. In other words, at larger scales respondents name *objects* in the picture or name what the picture is *of*. For example, in the smaller scale photograph, such as photo 1, respondents name the function as 'seating,' as opposed to 'bench,' although bench was given as the cue. While in the larger scale photographs, such as photo 8 and 9,

respondents name the function as ‘park,’ ‘city,’ or ‘seaside’ and do not specify what the function of a park, city or seaside landscape might be.

The photograph observation activity generated more specific responses than the written answer questions. These responses often relate to particular benefits, services, or goods that respondents perceive in the photograph. For example, none of the participants named ‘maintenance’ or ‘purpose of use’ as a function for any of the photographs although these were common responses in the written answer portion of the questionnaire. Instead, participants seem to have been looking at the photograph and asking, what does this landscape do for us? Some answers to this type of question were: ‘provide seating,’ ‘shade,’ ‘shopping,’ ‘refuge,’ ‘food,’ and ‘space for recreation.’ The figure below shows the photographs that were used, lists the categories that responses were organized into, and shows the number of responses in each category (Figure 4.1).

PHOTOGRAPH	FUNCTIONS	PHOTOGRAPH	FUNCTIONS
P1 	Seating, rest, relaxation (26/31) Slope control, soil retention (3/31) Other (2/32)	P6 	Erosion control (25/31) Drainage (2/31) Land stewardship (2/31) Other (2/31)
P2 	Shade (11/32) Habitat, ecology, natural area (9/32) Recreation (6/32) Oxygen production (2/32) Other (6/32)	P7 	Trail, recreation (20/30) Nature, wilderness (5/30) Habitat (2/30) Other (3/30)
P3 	Socializing, shopping, eating (15/31) Safety, traffic control (8/31) Defining Space (4/31) Other (4/31)	P8 	Park (9/29) City, urban setting (6/29) Tree canopy, urban forest (4/29) Climate modification (4/29) View (2/29) Other (5/29)
P4 	Meeting, eating, gathering (16/31) Isolation, protection, refuge (9/31) Plaza, open space (3/31) Other (3/31)	P9 	Seaside, wetland, tidal flats (11/29) Wildlife habitat (6/29) Solitude, relaxation, isolation, paradise (5/29) Recreation (2/29) Other (5/29)
P5 	Food Production (17/31) Gardening, community garden (12/31) Other (2/32)		

Figure 4.1: Categorization of Functions (Photograph Observation)

FINDINGS 4: FUNCTIONS COLLECTED FROM ALL THE METHODS

Overall the types of functions collected from these three distinct activities (PAP, written-answer questions, and photograph observation) were widely variable. Five hundred and thirty-nine functions were collected, coded and categorized. The responses given were wildly variable---some were easy to interpret and many were more difficult to understand. Categorizing these answers required considerable creativity and patience and was accomplished during the months of May and June.

Some answers were confusing, for example, one respondent wrote that 'vernacular' was the landscape function they observed, while others wrote that 'landscape planning' was the landscape function that they observed. A large number of respondents named human emotions or feelings as a landscape function (e.g.: 'desperation' or 'tranquility') and some respondents simply named an object or thing (e.g.: 'park,' 'wind,' or 'forest'). My efforts at coding and sorting resulted in the emergence of four meta-categories: category (a) *things/nouns*; category (b) *processes*; category (c) *service/goods*, and; category (d) *general purpose/approach* (Figure 4.2).

Category (a) *things and nouns* contained answers that named an object or thing. These types of answers appear with most frequency in response to the aerial photographs in the photograph observation exercise. They constitute 10% of the total number of answers that were given.

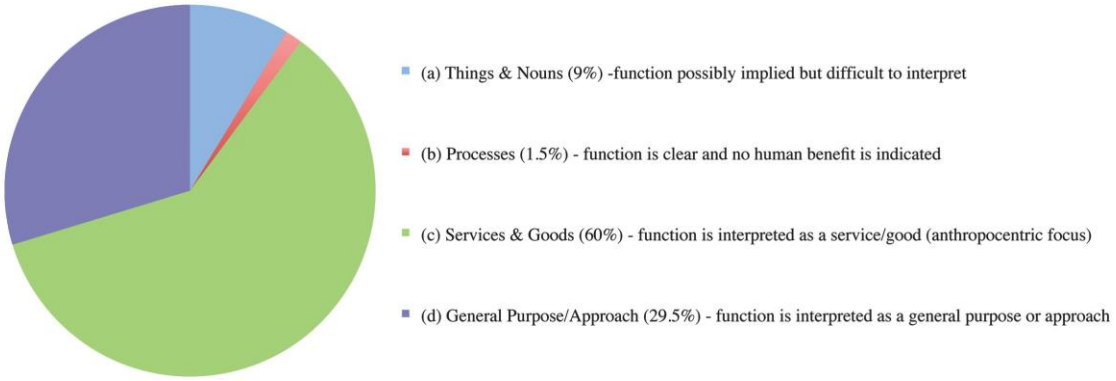


Figure 4.2: Meta-Categories of Functions (All Methods)

Category (b) *processes* was the smallest meta-category, only containing 1.5% of the total responses. In these responses a process was named and no benefit was indicated. These responses gave no indication of a good or service to any living actor. All of the responses in this category resulted from either the PAP or the photograph observation---both methods in which the participant was required to make an observation from a landscape and not from a conceptual idea of landscape. There are so few of these answers that they were not given sub-categories (like the other meta-catagories) but I list them all here: growth (photo of fresh growth on a plant), pollination (photo of a bee on some flowers), evaporation (photo prompt 9), hydration (photo of drips of water on a flower), nutrient cycling (photo of plant in the Fabaceae family), erosion (photo of a river running over rocks), heat transfer (photo of cars and an airstream trailer in a parking lot), and sedimentation (photo prompt 9). It is notable that this category contains so few answers.

Category (c) *services/goods,* and category (d) *general purpose/approach* are the two meta-categories that contained the vast majority of responses (89.5%). These two categories represent two different interpretations of what a function is: 1) a more literal, specific interpretation of the word function that refers to an actual task or activity, and 2)

a conceptual interpretation of the word function that means general purpose or general approach.

Category (c) *services/goods* include responses that interpret landscape functions as a good or service that the landscape provides, or should provide. The vast majority of these answers imply, directly or indirectly, that the service or good is for the benefit of humans. (The one notable exception is the mention of wildlife habitat.) Within this category of responses, 67% originated from the PAP or the photograph observation, while the rest of the responses were generated from the written-answer questions.

The opposite is true in category (d) *general purpose/approach*. In the second major meta-category, only 16% of responses originate from the PAP or the photographic observation. The responses that are categorized in category (d) were generally more difficult to understand given the definition of landscape function that I brought into this research from the ecology literature.

These responses include answers such as, 'sustainability,' 'fanatical,' 'aesthetic,' and 'preservation.' I believe that these words, themselves, do not describe or allude to a specific type of landscape function or process. Thus, although they do not help to understand what specific task the landscape is thought to be performing, in a broader sense, they tell us what the landscape's purpose is perceived to be or how we should approach the landscape. Each approach or purpose is likely to be indicative of a set of values or a set of principles (although these are not explained) that both guide what types interventions should be made and/or describe what types of interventions have been made. For example, the landscape function 'sustainability' could be interpreted as: "the landscapes purpose is to sustain economic, environmental, and equitable processes." Or,

the landscape function ‘fanatical’ could be interpreted as: “the landscape should have a fanatical function or should generate money.”

Although this type of reworking/rewording can render some of the responses more intelligible as answers to my own research questions, it feels dangerously like putting word in others’ mouths. Thus I have simply categorized the answers as responses that refer to a general purpose (e.g.: ‘mitigation of human impact’ or ‘restoration’) or a general approach (e.g.: ‘aesthetic’ or ‘ecological’).

The three largest meta-categories were also given sub-categories. A graphic representation of these subcategories is included below (Figure 4.3). The graphic is colored coded to coordinate with the pie chart above (Figure 4.2) and the x-axis represents the number of responses that were coded in each sub-category. For category (a) *things/nouns*, the largest sub-categories were: wetlands/seaside, park/forest, and urban space. Again, as mentioned above, these responses frequently resulted from observation of the photographs, of which the areal photographs supplied the vast majority of the things, nouns, and objects.

For category (c) *services/goods*, the largest sub-categories were: social enrichment, emotional/mental enrichment, and safety and comfort. Soils and water management and physical enrichment were themes that appeared closely behind these top three. In category (d) *general purpose/approach*, ecological/environmental, maintenance/resource use, and use/program were the largest subcategories. Use/program was followed closely by aesthetics.

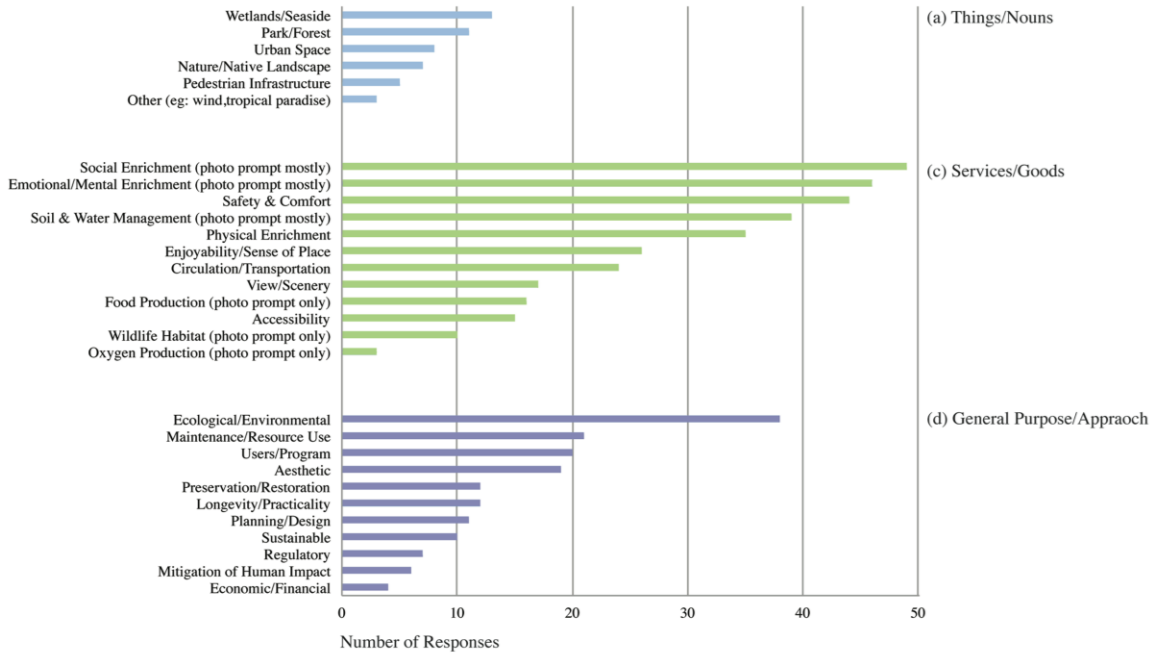


Figure 4.3: Sub-Categories of Functions (All Methods)

CHAPTER SUMMARY

In Chapter 4, I report the findings from this study. The findings are based on analysis techniques that are interpretive and use classification and coding as a major strategy. The findings are organized first according to the methods used to collect the data, and then finally, the data from all the methods is aggregated together and sorted to reveal four meta-categories and corresponding sub-categories. Differences in the types of functions that result from different methods are noted. The written answer questions generated many more answers that were general and vague. Meanwhile, the landscape observation methods generated answers that were 'simple' processes and/or services and

goods. Lastly, the relative abundance of responses that name things or objects is noted. The possible meaning of these findings is further explored in the concluding Chapter.

Chapter 5: Discussion

"Disciplinary knowledge is not static. It progresses in lurches of expanded understanding as theory and practice confront reality and as expanded debate with other disciplines widens comprehension" (Holling, 1994 cited in Johnson & Hill, 2002).

INTRODUCTION

In this final Chapter, I restate the purpose of the study and the research questions and summarize the literature review and methodology. I then discuss my findings and address the relationship of these findings to both theoretical frameworks and practical issues that might affect the profession of landscape architecture. The Chapter closes with recommendations for future research and final conclusions.

RESTATEMENT OF THE PURPOSE OF THE STUDY AND RESEARCH QUESTIONS

During this study I explored how landscape architects perceive and conceptualize landscape function. I did this because I am interested in which types of landscape functions landscape architects readily perceive and which types of functions are less readily perceived. Certain core understandings of the human-landscape relationship and of environmental perception guided the formulation of my research questions. With regard to the human-landscape relationship, I believe that humans are neither simply a source of impact on the landscape, nor merely static receivers and processors of information from the landscape (Ittelson, 1973; Zube, 1987). Rather, they are both, and they are also active participants who process both indirect and direct information about/from the landscape (Zonn, 1984). Furthermore, I understand that cognitive frames mediate the meaning of this information (Goffman, 1974). Thus, following these core understandings, my research questions were aimed at gathering knowledge about which

types of landscape functions are most readily perceived and what frames guide or influence these perceptions.

Separating the concept of perception into two distinct approaches, sensory and cognitive, provided a system around which to organize my research questions. However, I believe that all these questions are fundamentally interconnected. The first group of questions focuses on functions that are perceived during sensory engagement with the landscape and the second group of questions focuses on functions that are 'perceived' during conceptualization of the landscape or during cognitive engagement. The research questions are restated below.

1. Sensory Perception: How do landscape architects perceive landscape functions during interaction with the landscape?
   a. Which landscape functions do they see/hear/smell/etc. in the landscape?
   b. Which cues trigger the identification of particular functions?

2. Cognitive Perception/Understanding: How do landscape architects understand landscape function?
   a. Which landscape functions are most readily recalled from mind?
   b. Which landscape functions are considered most important to design and plan for?

SUMMARY OF THE LITERATURE REVIEW AND METHODOLOGY

This specific topic---the perception of landscape functions---is under studied and because of this, there is little literature that deals directly with the subject. The closest examples are studies by Joan Iverson Nassauer, especially those reported in her article, *Messy Ecosystems, Orderly Frames* (1995). Nassauer (1995) shows that ecological function is not readily recognizable to those who are not educated to look for it. She also posits that ecological function is difficult to observe for those who *are* trained to look for

it. However, I was unable to uncover any empirical study that tests this claim. Thus, this investigation began with a curiosity about whether or not ecological function, or landscape function, is in fact difficult for professionals (those trained to look for it) to identify. This curiousity led to further questions about which landscape functions landscape professionals perceive most readily and how they perceive these functions. From my point of view, this is a timely and important topic given our current situation of profound ecological destabilization and the need to preserve and increase landscape function.

I began this research with an understanding of 'function' and 'functions' developed from the literature of ecology. In this literature, landscape function is the "capacity of the landscape to provide goods and services through landscape processes" (Kienast, et al., 2009; de Groot, 1992 cited in Krönert, 2001). The landscape processes themselves are understood to be the 'functions' and the typology offered by de Groot, Wilson, and Boumans (2002) represents the great variety of function types that can/do exist (although this list is not exhaustive and is socially created so it could be very different in another discipline or according to another social group). My original intention was to assemble a typology of functions that are readily perceived by landscape architects.

This goal was based on the conjecture that some landscape functions are likely to be more readily apparent than others and that certain professionals are more likely to observe a particular set of functions. The professionals that I chose to study are landscape architects. Nassauer (1995), who is a landscape architect herself, suggests that landscape architects can play a critical role in improving ecological quality by translating landscape function that may look unattractive, unfamiliar, or undesirable into 'orderly and

acceptable frames.' In essence, I agree with this goal (as one of many) for landscape designers, but I feel that it is important to know if landscape architects perceive landscape function at all, and if so, how they understand the concept and which landscape functions they perceive most readily. As designers, we cannot design orderly frames, or address various public views about functions if we cannot, or do not, perceive them ourselves.

Furthermore, given the historical and emphatic nature of the advocacy for the integration of ecology into the landscape design professions, it is useful, as a form of self-reflection, to investigate how ecological concepts, such as landscape function, are being understood and used in the field of landscape architecture. It is also important, perhaps even critical, to investigate various understandings of professional terms because different understandings can confuse cross-disciplinary or intra-disciplinary communication, not to mention communication with clients and maintenance staff. In this case, the disciplines most likely to affected by this research are landscape architecture and ecology, although the related fields of landscape planning, environmental engineering, and landscape management may also be interested in, or impacted by, this research.

This study has focused on the field of landscape architecture, which is a field, whose codes and frames I am personally familiar with. However, it is of major significance to clarify that the landscape architects that are the primary units of study in this research, mostly work (and presumably live) in Texas and/or the Southwest. Thus, insofar as regional location may affect the types of functions that landscape architects perceive and the way in which the concept is understood, and to the extent that landscape architects in Texas may be different or similar to landscape architects in other states or regions, this particular sample may or may not be representative of all landscape

architects as a professional group. Further research would have to be conducted to gain more information about the degree of generalizability that the findings from this study have to the profession as a whole.

The methodology chosen for this research was interpretive classification. In an interpretive classification approach, the researcher produces knowledge "by identifying, naming, and assigning new significance or meanings to dimensions, themes, or narratives within a data set" (Deming & Swaffield, 2011, p. 51). General suppositions common to an interpretive approach are: 1) the meanings of things are not self-evident and thus require the researcher to interact with the data and the participants in order to 'make sense' of the phenomena being studied (Deming & Swaffield, 2011); 2) there is an unavoidable link between the researcher and the subject of inquiry and it is neither possible, nor necessarily desirable, to establish value-free objectivity (Greider & Gardovich, 1994 cited in Deming & Swaffield, 2011); 3) any knowledge or insights gained must be interpreted within a corresponding context that is amply articulated as part of the study, and; 4) there is no single valid method or set of methods for research but rather many possible and useful methods. Thus, data analysis and interpretation may take a reflexive approach---moving between inductive and deductive activities (Deming & Swaffield, 2011).

In this study, I utilized two main methods, participant authored photography (PAP) and a questionnaire. However, the questionnaire included two very different activities: a written answer section and a photograph observation section. The resulting data sets were organized, analyzed, and coded using a modified grounded theory approach. The bulk of the data consisted of types of functions that were collected from participants through these three activities. These functions types were sorted and resorted

in subsequent sessions in order to code the functions by theme and place them into categories. The themes and categories emerged over time from the data themselves, from the literature review, and from my own engagement in participant observation.

DISCUSSION OF FINDINGS

Many of the findings that are reported in Chapter 4 are now discussed here. I will use the original research questions as a primary structure for discussing my findings. I will begin with findings that relate to sensory perception of landscape function/s and then move to findings that relate to conceptual understandings of landscape function/s. The relationship of these findings to theoretical frameworks and to landscape architecture practice will be addressed throughout. Additional observations and trends in the findings will provide a scaffold for outstanding questions and suggestions for further research.

Sensory Perception of Landscape Function

Two of the data collection methods, in particular, contribute information about how landscape architects perceive landscape functions during sensory engagement with landscape: the PAP and the photograph observation. Prior to my discussion of these findings, several important caveats about these methods and the data from these methods need to be restated. The PAP is limited by its low response rate. Due to this fact, I understand this part of the study to be highly exploratory and preliminary in nature; its greatest strength has been to generate questions for further study. The photograph observation activity has a methodological peculiarity. It does not require a multi-modal experience of landscape, even though I have stated that environmental perception is

highly multi-modal. Instead, this method presents static visual information in a two-dimensional format, thus favoring sight. In spite of these caveats, there *is* useful information embedded in the data from both of these methods.

Although the data collected are not adequate in quantity to attempt to build a typology of functions or answer my original question about which specific cues trigger the identification of specific functions, the findings from these methods reveal information about how participants perceive landscape functions. Not surprisingly, participants relied heavily on visual sensory information, but the most common mode of observation was a combination of sensory (direct) information and knowledge (indirect).

It is not so surprising that landscape architects relied on visual sensory information to assess landscape function. Using visual analysis to assess landscape has been common in landscape architecture from its early history. For example, Humphry Repton, who was a late-eighteenth century English landscape designer, produced what were called the 'Red Books.' These books contained paintings with a system of paper overlays that showed clients a 'before' and 'after' view of a landscape. As is the case with Repton, visual analysis often leads to a conversation about scenic beauty and to a discussion of the philosophy of aesthetics. However, there are other types of information that can be assessed through visual analysis, for example, some aspects of landscape health or ecological quality.

Looking for landscape health, pathology, or simply landscape processes, is perhaps more common to contemporary landscape architecture training than to traditional training. Currently, visual assessment is often an early part of a designer's process. They may gather a site plan, aerial images or representations, and eventually preform a site visit that results in notes, photographs, and sketches. During this type of site visit,

observations are multi-modal and visual observations may range from scenic or aesthetic judgments to functional assessments about landscape health.

An observation that would lead to a functional assessment might be, for example, a v-shaped groove in the decomposed granite path and a pile of granite near an adjacent storm drain that empties to the creek. The designer will logically conclude from this visual information that the process of erosion is underway---the path is washing away into the creek via the drain. Depending on the designer's approach or frame, this information will lead to the formulation of a problem. Example problems might be: the path now has a tripping hazard and is a safety issue; the granite washing into the creek is likely to clog the aquifer or change downstream ecology; the slope is too steep for the path material, and/or; the runoff in this area should be slowed, caught, or distributed better.

In the example above the strictly visual information consists of the v-groove, the pile of granite, the drain, and perhaps the slope. And this visual information might be meaningless to someone who is not familiar with the visual cues of erosion. In other words, the more you know about how the process of erosion works and what it looks like, the more can 'read' from the cues presented in the landscape. For example, the deeper and the more v-shaped the grove, the faster the water is likely to move; the faster the water is moving, the more quickly the process of erosion will proceed. After the initial visual input, identifying the underlying problem, the problematic implications, and the meaning of an observation involves a cognitive process that implies the application of knowledge, experience, and your own frame.

In this study participants were most likely to report that the mode through which they made an assessment of landscape function was visual, but closer examination of the

data and analysis of the written responses, shows that the most common mode for observation of function was actually a combination of sensory (direct) inputs and cognitive (indirect) inputs**.** This combination of direct and indirect inputs was evident when participants were asked how do they know this function is present. They often described things that can't actually be seen, smelled, heard, etc. They automatically interpolated between a set of direct inputs and a set of indirect inputs. They combined things that they can directly sense in the landscape and knowledge that they had accumulated about landscapes. It seems that this knowledge and experience is key to helping us decide what the sensory information might mean. It also seems that our frame is key to helping us translate the meaning into problem or solution. This finding was true in the data collected from the PAP and the data collected from the photograph observation activity.

This finding supports the theoretical assertion that landscape participation involves stimulus information that is simultaneously psycho-physiologically perceived and cognitively interpreted (Ittleson, 1973). Furthermore, in the case of interpreting stimulus information about landscape function, two things are likely to be instrumental to your interpretation: your prior knowledge/experience of landscape patterns and processes and your approach or frame.

Being able to observe a pattern in the landscape, and identify the processes that the pattern is related to, is a kind of ecological knowledge. A focus on pattern is not new to landscape architecture or landscape design. Landscape patterns have been used to argue the inextricable nature of art and science, for example, in the approaches of permaculture (Mollison, 1988) and bio-mimicry (Benyus, 2002). And the landscape architect and forester, Simon Bell (1957), articulates the importance of patterns when he

writes: “Pattern recognition is important to help us understand and relate to the world around us. We can develop a language of description and analysis to communicate relationships between different patterns, the processes that change the landscape, and our aesthetic and emotional responses to them” (Bell, 1957, p. 3). I am suggesting here, that patterns are one type of evidence of landscape processes and that with this evidence and appropriate knowledge, many landscape functions could be more readily detected.

Given that visual analysis is deeply imbedded in the process of practicing landscape architecture, training practitioners to recognize certain processes through certain visual patterns could be a powerful approach to increasing ecological knowledge in the field. Like Nassauer (1995) suggested, landscape processes or functions may not be easy to observe. One participant said: “In doing this exercise, I'm reminded how hard it is to actually *see* function and think about it in our daily rounds.” If it is hard for landscape architects to see functions, and if designers are particularly attuned to visual stimulus, it is possible that paying attention to function (in one’s daily rounds and otherwise) might take a more concerted effort and a more visual approach. This effort could involve training landscape architects to recognize the particular patterns that belong to valued or important functions.

Deciding which functions are valuable and important is a socio-political undertaking. I can imagine that this process might be resolved by deeming that some functions are important for *all* landscape architects to take heed of. For instance, given the very dire predictions related to global climate change and the contribution of carbon cycles to this phenomenon, perhaps all landscape architects should learn to identify the process of carbon sequestration in the landscape. However, there may be other functions that are deemed more relevant in certain bioregional contexts. For example, in central

Texas where we have a flashy hydrologic régime that leads to runoff and flooding problems, perhaps all landscape architects should learn to identify rainfall interception and storm water infiltration in the landscape. Of course, the prioritization of certain functions not only necessitates presenting a case for their importance, but also requires the ability to name specific functions or specific function types.

Conceptual Understandings of Landscape Function

In order to address the research findings overall and my questions about conceptual understandings of landscape function, the functions types that respondents reported were gathered from each method, aggregated, coded by theme, and sorted in to categories. As was reported in Chapter 4, these data were organized into four meta-categories: (a) *things/nouns*, (b) *processes*, (c) *services/goods*, and (d) *general purpose/approach*.

Given the nature of these categories, I did not find a unified understanding of the concept of landscape functions. Instead, I found various interpretations and one particularly notable bifurcation. With regard to understanding landscape function/s, participants' responses mostly fell into three categories: 1) those who understood a 'landscape function' as a process without direct reference to a benefit, 2) those that understood a 'landscape function' as a specific service or good that was either being performed *by* the landscape or that the landscape was providing an opportunity for, and 3) those that understood a 'landscape's function' as a concept of general purpose or an approach to the landscape. A fourth category of understanding could also be added, although this category is more difficult interpret definitively: those who were either were

confused by concept, who were rushed to respond, or who understood a 'landscape function' as a thing or noun. I discuss these categories of understanding below.

The responses contained in category (a) *things/nouns*, lead me to believe that some respondents may not have understood the concept of landscape function or that they rushed through the answers and just said the first thing that came to mind. It is also possible that these respondents are interpreting a function as a thing or that they feel that naming the thing implies an obvious function. Some examples of responses in this category are: 'bridge,' 'city,' 'park,' 'urban forest,' 'townscape,' 'marsh,' 'seaside,' 'wetlands,' 'prairie,' 'nature,' 'natural area,' 'native landscape,' 'pathway,' 'trail,' 'plaza,' and 'garden.' These answers confounded my efforts at categorizing specific functions because they gave no direct indication of perceived purpose, task preformed, or a process that was being engaged in.

These types of answers constituted a sizable 10% of the total responses. Nearly all of them are from the photograph observation activity and they result with most frequency from observation of the aerial photographs. Because of this nearly unified origin, they will be mentioned again when I discuss scale and physical presence in the landscape. If these types of responses are indicative of participant confusion, it is interesting that when confused, respondents reverted to naming a type of landscape or to naming an object in the landscape. This tenancy may point to a dominant paradigm that is object-oriented as opposed to process-oriented.

A different participant understanding is captured in category (b) *processes* and category (c) *services/goods*. These categories contain answers from participants whose understanding of landscape functions is most closely related to the definitions of function that I synthesized from the ecology literature. Participants whose responses fell into

categories (b) and (c) understood a 'landscape function' as a (more or less) specific service, disservice, good, or process. However, the *processes* category was reserved for landscape processes that the landscape is doing on its own, with or without humans, and without an indication of an associated benefit. In these answers, unlike answers in *services/goods*, there was no mention of benefit, value, good, or service and no mention of humans.

At the onset of this project, I expected these types of process-related responses to occur with more frequency because these answers are most closely related to my definitional understanding of landscape functions. Yet, responses placed in the category (b) *processes* only constitute a tiny portion (1.5%) of the total functions collected. There are so few of them that I will list them again here: 'growth,' 'pollination,' 'evaporation,' 'hydration,' 'nutrient cycling,' 'erosion,' 'heat transfer,' and 'sedimentation.' I believe it is extremely notable that most of these responses resulted from the PAP and, like above, this finding leads to questions that are presented below in the section that addresses areas for future research.

Category (c) *services/goods* contains a majority of the total functions collected (67%). This category was further divided into sub-categories, of which, the top three were: 1) social enrichment/recreation, 2) emotional/mental enrichment, and 3) safety and comfort. Most often, in these responses, the 'function' of the landscape was to offer or provide the opportunity for human physical, emotional, and social betterment. Specific examples of these types of responses are: 'place for gathering,' 'social interaction,' 'socializing,' 'surprise,' 'delight,' 'relaxation,' 'commemoration,' 'safety,' 'health and safety,' 'accessibility,' 'shade from hot sun,' 'capturing cooling winds.'

Of the four types of common ecosystem services (regulation, production, support, cultural/information) the landscape architects in this sample named and reported services that are often categorized as cultural/information services. In other words, most of the responses were very directly related to benefits for humans, specifically cultural benefits, and this anthropocentric focus is prevalent throughout many of the data (except where noted otherwise).

To be clear, the anthropocentric nature of these categories is not necessarily evident in the category titles themselves, but is derived from additional text or the context associated with the data. For example, oxygen production, which is the smallest category, could be a title that does not specify that the benefit is for humans, but the surrounding context in these three answers indicate otherwise.

The anthropocentric nature of the majority of the responses is supported by the sophistication and variety of language used in relationship to human activities, human benefits, and human uses. This sophistication stands in contracts to the relatively vague or general language used for services that are more landscape-centered. For example, the shear variety of types of human emotions (e.g.: tranquility, isolation, reflection, humanization, calming) and human activities (e.g.: dwelling, relaxing, eating, meditation, shopping, dining, visiting) named was impressive. But the words used to describe water management (e.g.: controlling water, catching storm water, storm water management, drainage swale) or climate control (e.g.: climate mitigation, mitigate urban heat island effect, shade, providing shade, shade production, shady habitat) were more repetitive and less precise. The display of a more sophisticated language with regard to human needs and desires is likely to be connected to the prevalence of an anthropocentric approach in

landscape architecture and/or to a natural or biological tendency to focus on our own needs and have more facility with articulating our own desires and activities.

Many of the landscape functions that were listed as the most important for landscape architects to consider and design for are words and issues that are very common (in my experience) in landscape architecture practice and education. For example: access, accessibility, connectivity, sense of place, definition of space, health and safety, comfort, and way-finding. What is more, a majority of these words suggest a strong, primary concern for human users of the site. An exception to this trend is the mention of wildlife and wildlife habitat. Revealing these underlying frames, such as an anthropogenic focus, may encourage open dialogue by illuminating potentially conflicting interests or rationalities (Watson, 2003).

Again, similar to the discussion given above, it may not be surprising that landscape architects, who are service professionals and designers, are displaying a service-oriented and anthropocentric understanding of landscape functions. Traditional views of design, and understandings of designers' objectives, have often focused on modifying the environment for human comfort, human delight, and human utility. This is reflected in statements about the purpose of design, such as, "design of the landscape is our way of guiding change to improve the human condition" (Murphy, 2005, p. 1). Furthermore, as professionals, designers most often have a client and most often these clients are humans.

Returning again to Simon Bell, he claims that the way in which "we perceive and understand patterns also depends very much on what we are looking for and why" (Bell, 1957, p. 3). I believe that the types of functions that are named most readily by landscape architects are a clue to what landscape architects are looking for. Put another way, the

interpretation of landscape function is influenced by 'personal utility functions,' which are related to an individuals needs or desires (Ittleson, 1973; Zube, 1987) and I will add, related to institutional socialization or group frames. Value orientations contribute to the definition of, and potential responses to, landscapes (Zube, 1987) and in this case, *human* users, needs, desires, and uses seem to be a common driving frame of interpretation for landscape architects.

Although there is certainly room for a spectrum of approaches and frames in the felid of landscape architecture, from highly anthropocentric to non-anthropocentric, it may be that a strict focus on human users and human use is clouding the ability of landscape architects to see a larger picture and assess systems as a whole. Van de Ryn and Cowan (1996), advocates of ecological design, describe "design as the intentional shaping of matter, energy, and process to meet a perceived need or desire" (p. 8). This type of definition does not mention humans specifically and leaves room for less-anthropocentric frames. In a less anthropocentric frame, humans are not the only designers, humans are not the only living creatures with needs and desires, and humans need not be the only beneficiaries of design interventions.

Furthermore, I believe that it is highly possible that a strictly anthropocentric frame may be hindering a broader approach to landscape design---one that deals with landscape functions that provide benefits to both humans and non-humans and benefits to both site users and non-site users. So-called regulation functions and their attendant services may have the most potential to achieve this type of goal by providing benefits to non-site users. Some examples of regulation functions are gas regulation, water regulation, climate regulation, disturbance prevention, soil formation, etc. (de Groot et al., 2002). One process involved in gas regulation is carbon sequestration and one process

related to water regulation is rainfall interception. These types of functions, and their attendant processes and services, potentially have much wider reaching benefits than just for those who visit or occupy the designed site. Providing benefits to larger systems could be an important additional focus to the traditional focus on human users and site use for human benefit, which is strongly represented in this sample and likely to be an important value for many landscape architects.

After category (c) *services/goods*, the second largest meta-category is category (d) *types of approach*. This category illustrates a very different understanding of the concept of landscape function from that of category (b) or (c). This meta-category contains 'functions' that respondents named in which there was no specific, discernable task, process, or service. As a category it constituted 29% of the total functions collected and the vast majority of these responses (84%) resulted from the written answer portion of the questionnaire and not from activities in which the respondent was asked to find a function in a real landscape (photograph or actual). In other words, these functions are reported when landscape is considered as an abstract concept---when a respondent is asked to think about landscape and function in general.

It is possible then that the general and vague nature of these responses is related to this abstract mode of contemplation. Some examples of these types of responses are: 'stewardship,' 'preservation,' 'maintenance,' 'proposed land use,' 'program,' and 'sustainability.' When listed as a landscape function, the answer 'stewardship' or 'preservation' indicates that the respondent believes that the purpose of the landscape is to steward something or preserve something or that the landscape is stewarding something or preserving something. However, and here in lies the general nature or the vagueness of these answers, there is no indication of what is being stewarded or what is

to be preserved. Of course, in the head of the participant, these answers might imply more specific information, but as stand-alone responses and without further elaboration these words indicate only the most general type of purpose or approach. In these cases, participants are interpreting 'landscape function' as a concept of general utility or naming an approach that they believe is appropriate for landscape in general.

It is tempting to interpret this group of answers as another set of responses in which the participant was confused, but I believe that these answers are actually indicative of a different understanding of the word function. Indeed, defining function is not simple. For starters, it is both a noun and a verb. Common definitions of function frequently include references to 'the action or purpose for which a person or thing is suited,' or a 'thing's proper purpose,' but also to a 'specific, basic, or practical task.' By these definitions, both understandings of landscape function that are represented in these data---a general purpose and a specific task---are well within the common definitional boundaries of the word function. One respondent provided the following definition of function: "Function = what is it for?" While, another participant told me that a landscapes function is "What the landscape does." Again, both of these neat encapsulations/definitions can accommodate the two very different understandings that I find in my data.

The existence of this major bifurcation in understanding, along with the fairly large number of things and nouns reported, indicates a non-unified understanding of landscape function/s. In spite of this confusion, or perhaps because of this flexibly of meaning, the words function and functional are now commonly used in landscape architecture. This is evident in university websites, book titles, and firm websites.

University websites:

[Landscape architecture] focuses on the design, analysis, and planning of outdoor spaces… with the intent of creating places that are both meaningful and functional. (University of Washington Department Overview)

The modern landscape architect must address quality of life issues, achieve the best form and function of a given space… (UCLA Extension)

The expression "functional use of plants" helps to explain that plants can perform other functions in the landscape and still beautify. (Ohio University Extension)

Book Titles:

Detailing for Landscape Architects: Aesthetics, Function, Constructability. (2011)

Visualizing Landscape: Functions, Concepts, Strategies. (2009)

Campus Landscapes: Functions, Forms, Features. (2000)

Quotes from LA firm websites accessed May 2014 (anonymous):

…with the intent of creating places that are both meaningful and functional.

…a successful landscape architect's design turns required site functional elements into site assets.

…designs must reflect function, beauty, and compatibility.

…Landscape architects are licensed design professionals that develop safe, functional, and beautiful transportation corridors.

Now is precisely the time to focus on utility and function.

…landscape architecture to provide unique and stimulating landscape experiences that are both functional and sensitive to…

…not only be functional, but beautiful and compatible with the natural environment as well.

…teach you to imagine and construct landscapes that seem entirely new and, at the same time, to protect irreplaceable aspects of landscape function and history.

…balance between geometry and geomorphology, artifact and nature, form and function.

It is hard to tell in most of the examples above whether the reference to 'function/s' and 'functional' is referring to the general purpose and utility of the landscape or referring to a specific landscape task. Either way, this concept---function---seems to be highly motivating for landscape architects at this moment in time. In the future, because language and understandings are always changing, the use of the words function and functional could increase, or other words, such as performance, might replace these words altogether. Indeed, most of the respondents replied that functions were typically considered during a design process (91%) and they were concerned with function in their own work (97%). However, in addition to its motivational possibility, there seems to be a fair amount of uncertainty about the meaning of this term/concept.

If landscape architects are motivated by, interested in, and committed to the idea of function in the landscape, terminological confusion may pose communication difficulties. Articulating what function/s are to clients, constituents, and collaborators may require a more unified understanding of landscape function. Furthermore, if landscape architects are intent on working with ecologists and incorporating a less superficial version of ecology into their work, then a reconciliation of the different understandings of landscape function in ecology and in landscape architecture might be helpful. The risk of not making your terms clear is, at best, one of imprecise communication, but at worst, one of misunderstanding that leads to mistakes, the waste of time, money, and energy, or projects that degrade landscape function.

If landscape architects are earnest about their desire to respond to the most serious and important environmental and social issues of our time, one good way to contribute is to (re)focus landscape interventions on a set or sets of priorities that address social and

environmental problems by mitigating very specific disservices or providing very specific services. In addition, macro or global scale functions and processes that support services indirectly should be taken into account. We need to be able to name specific functions, specific processes, and specific services in order to prioritize them (or deprioritize them), in order to design for them (or around them), and in order to train professionals to observe them (or recognize them) in the landscape. This may be an educational project that could yield a less superficial incorporation of ecology into landscape architecture training. We also need to know which functions and services are readily perceived, not readily perceived, and how designers can most readily observe these functions.

AREAS FOR FUTURE RESEARCH

At this point in time, there are not enough data to search for a relationship between particular patterns (cues) and particular processes (functions) in order to answer how landscape architects perceive specific functions. Nevertheless, patterns that clue landscape designers into the presence of a particular process, especially a process that might otherwise be hard (soil formation) or impossible to see (carbon sequestration), are an important topic for further research. Were I to pursue such research, I propose that the ability to link a pattern with a process is a type of ecological knowledge. Knowing how to teach such patterns of perception to various groups and within various environments, such as an urban environment, would be a very interesting topic to address. In addition, there are other trends in the data that suggest related lines of questioning.

I believe that these areas would be productive and beneficial areas for future research and mostly have to do with sensory perception of function in the landscape. Pursuing them might lead to a better understanding of the factors that affect our ability to

observe and detect functions. Comparisons could be made between types of landscape professionals, between professionals who live in different bioregions, or between landscape professionals and other social groups. Aside from the one mentioned above, two other areas for future research are: 1) the relationship between variation in scale and the apprehension of landscape functions/processes, and 2) the relationship between the quality of 'naturalization' and the apprehension of landscape functions/processes.

The data I gathered show that the more zoomed out the scale, the more difficult it was for participants to identify a landscape function. This was especially true in the photograph observation activity. In this activity, the photographs ranged in scale from an intimate human setting (a single bench) to a true aerial photograph (taken from a plane). These aerial photographs resulted in the greatest number of no answers and nouns, which were interpreted as a sign of confusion, frustration, or struggle on the part of the participant. Of the nouns, only two were generated by the written answer questions, the majority (60%) resulted from the two aerial photographs 8 and 9, and the rest were prompted by other photographs.

With regard to scale, the PAP submissions represented a variety of scales, from large vistas taken from a tall place or high up in a building, to relatively small details such as a plant. None of the submissions were true aerial photographs (with the exception of one that has been published and was likely not taken by the participant) and none of the photographs were zoomed into a very small detail. This could be the result of the photographic equipment readily available (likely to be a smart phone), however, it is notable that most of the photographs were of a landscape that was at a human scale. By this I mean that the scale of the photograph fit humans within the frame as visible and discernable elements. This same scale---a human scale---in the photograph observation

activity returned the most number of 'logical' responses or responses that were mostly easily understood as processes.

One participant expressed that the farther away from a landscape one is, the harder it is to see function. This same participant also noted that landscape architects often use aerial photography and remote imaging to assess landscapes and this might inhibit the apprehension of function. I would guess that certain functions are more readily apparent at certain scales and research that investigated this topic would allow landscape architects to be aware of what functions they might not be able to observe at one scale or another. The trends in the data indicate that landscape at a human scale might be where landscape architects most readily perceive functions.

Trends in the data also suggests that our physical presence in a landscape (or lack there of) affects our ability to detect landscape processes, or at least changes the kinds of functions that we are likely to report. This is indicated by the differences in the types of functions that were gathered from conceptual/thinking methods and perceptual/sensing methods. The majority (84%) of the functions in category (d) *general purpose/approach* came from the written answer section of the questionnaire and this activity required no physical interaction with a landscape. In contrast, within the category (c) *services/goods*, the majority (67%) of responses came from the PAP and the photograph observation exercise. Meanwhile, there were *no* responses in the category (b) *processes* that resulted from the written answer section of the questionnaire.

These results provoke me to wonder what the relationship of physical presence in and observation of a 'real' landscape is to the types of functions that one is likely to detect or name. The trend in the data suggests that processes are easiest to apprehend when we are physically observing a landscape and that participants are more likely to be

specific when observing an actual landscape. In the future, I believe that walking interviews with a researcher may be a fruitful data collection method. This method would capture the multi-modal nature of perception but it also allows the researcher to clarify how the participant is detecting functions, what cues they are using, and what knowledge they are incorporating. You could even attach a recording camera, such as a Go Pro, to a participant to see what they are looking at and record what they are saying about what they are sensing and thinking. As an accompanying researcher, you would be able to prompt them to explain concepts or statements further, or probe them for more information as you walk together through different kinds of landscapes. In addition, small focus groups might complement this method. The structure of the focus group could encourage participants to grapple with definitions and address unique perceptions.

CONCLUSIONS

The goals of this study were to further investigate Nassauer's (1995) assertion that landscape function is difficult to observe. In this case landscape professionals, specifically landscape architects, were delimited as a sub-group. I also wanted to develop a better understanding of the current relationship of ecology to landscape architecture. Additionally, and on a more practical level, I hoped to build a typology of the types of functions that are most readily apprehended by landscape architects so that landscape architects would have a better idea of which functions they were likely to notice and which ones they might have to search for in another way. Finally, I hoped to reveal potential communication issues that may arise from differing understandings of the term landscape function.

Of these goals, this research has been successful in identifying a non-unified understanding of landscape function/s. In this sample, the largest categories of understanding are those who understand landscape function as a concept that refers to the landscape's general utility or purpose and those who understand landscape functions as a specific task or service that the landscape is providing. I have argued that preserving and increasing landscape function is vital to a healthy future and that this process is likely to require the prioritization of certain functions and certain services. However, prioritization may require the ability to name specific functions and the ability to perceive them. If the field landscape architecture engages in this project, new definitions and understandings of landscape function are likely to emerge and be constructed through the continued use of this term.

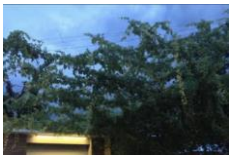
As Woodhouse and Patton (2004) suggest "the constructive nature of design… [encourages] a problem-oriented scholarship that contributes not merely to refined understanding of the past, but to improved practice in the future." Improved landscape architecture practice in the future is likely to continue to focus on a systems approach and ecological health. Saffield (2002) claims that "one of the most significant shifts in the theoretical orientation of the discipline [of landscape architecture] over the past fifty years has been the development of concepts of 'ecological' and 'sustainable' design" (p. 171). I believe that ecological design, and some of its concepts, can ensure that the profession of landscape architecture is not rendered superfluous in the future and makes a meaningful contribution to our problems by preserving and increasing various landscape functions.

Appendices

APPENDIX A: RESULTS FROM PARTICIPANT AUTHORED PHOTOGRAPHY

ID	ORIGIN	PHOTOGRAPH	FUNCTION	CUE
P1	Alexandria, VA		Commemoration	Inscriptions in stone, Sculpture, Adult explaining history to children
P1			Commemoration	Stelae, signage, other-ness (starkly different from surrounding city), visitors meandering quietly
P1			Commemoration	Signage, nature over-growing industrial infrastructure, other-ness
P1			Commemoration	Signage, historic artifacts, other-ness, visitors slowly meandering
P1			Commemoration	Sculpture, inscriptions in stone, other-ness, visitors interacting with sculpture and text elements
S1	Seattle, WA		Multi modal transportation landscape	I observe cyclist, pedestrians, buses, cars, and skateboarders all
S2	Unknown		An obstacle to overcome	I see people climbing it
S3	Pullman, WA		Dynamic function	These plants look significantly different during the summer, thus seasonal interest must be considered in design.

ID	ORIGIN	PHOTOGRAPH	FUNCTION	CUE
S4	Los Angeles, CA		Dwelling- the landscape provides the infrastructure for living	I see single family homes, infrastructure and can hear movement of people, of industry. Evidence of living.
S5	Austin, TX		A place for outdoor enrichment via physical activity, relaxation, or quiet contemplation.	I found this demonstrated through multiple joggers and bikers making their way along the gravel and paved trail, by an old man quietly walking his dog while deep in thought, and by a young gentleman sitting at one of the benches, enjoying the shade.
S6	San Juan, Puerto Rico		Hydration	The flower is giving drops of water to the leaf below
S7	Austin, TX		Growth	I see leaves budding on the trees
P2	Unknown		Heat transfer	I know all the metal surfaces are reflecting heat into the air and the vegetation is cooling the air through evapotranspiration.
P3	Beijing, China		Catching rainwater	No response
P4	Vancover, BC		Circulation	I feel this function is present here because I see a road with cars (moving and parked) and an unobstructed sidewalk to move along.
P5	Vancouver, BC		Cultural service	I think this function is present because the cherry trees that line this street are just budding out and about to bloom. It is a very exciting time of year when the Cherry blossoms finally come out in Vancouver and our office is even planning a Happy-hour party in honour of the impending blossoms.

ID	ORIGIN	PHOTOGRAPH	FUNCTION	CUE
P6	Vancouver, BC		Surprise, delight	This is actually a city site, however, when I raised my camera, it is completely a natural view. I like the surprise when you see something which is not normally what you think it's meant to be.
P7	Shanghai, China		Transportation, linkage, activating urban activities, street life, commercial value, jogging (maybe without smog), creating jobs, shopping, proving public facilities	Different activities along the street
P8	Shanghai, China		Sidewalk cafe	People drinking coffee on a sunny Shanghai Sunday morning
S8	Temple, TX		Erosion	I can see where the rock has eroded to let the water through
S8			Pollination	I can see the bees gathering the pollen from the flowers
P9	Austin, TX		Nutrient cycling	The flower looks like a lupine which is a legume (Fabaceae) and legumes fix nitrogen.
P9			Mitigating hot urban climate & Attenuating rainfall	It provides shade thus cooling the impervious cover and it appears that the leaves can slow down stormwater.
P10	Baton Rouge, LA		Storm water management	An unnatural and unaesthetic approach

Appendix B: Survey Instrument

INFORMATION ABOUT THIS STUDY

The purpose of this study is to explore perceptions of landscape function within the field of landscape architecture; both cognitive and sensory perception are being considered through the use of several different research methods. This survey is *one* of these research methods.

My **research objectives** are to contribute to an under-theorized body of knowledge about how landscape professionals apprehend processes in the landscape and to describe terminological and conceptual understandings of landscape function within the field of landscape architecture. I hope that this research will result in useful information for the field of landscape architecture by identifying which functions are most readily perceived by landscape architects, and by assessing current levels of terminological clarity with regard to contemporary ideas of landscape function and performance.

If you choose to participate in this research, you will be asked to fill out the following written survey. Your **participation will be keep confidential** and the surveys will be shredded after they are transcribed. Data will be stored on the researcher's password protected laptop hard drive and on an external hard drive, which remains in the researcher's locked office. There are no foreseeable risks to participating in this study. Your **participation is voluntary** and you may decide not to participate at all. Refusing to participate will not affect your relationship with The University of Texas at Austin in any way.

I hope you will decide to take this survey and contribute to this important and timely research. As a thank you gesture, all participants will be entered in a **raffle to win one of four $50 gift certificates to William Stout Architectural Books.**

Thank you very much for your time,
Julia Weese-Young

Master of Science in Sustainable Design | Candidate
School of Architecture, University of Texas at Austin

Prior, during or after the study, you may contact me with any questions: Julia Weese-Young at juliaweeseyoung@gmail.com. Also, for questions about your rights or to report dissatisfaction with this study, you can contact the Institutional Review Board by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu.

THIS SURVEY SHOULD TAKE ABOUT 15 MINUTES.
PLEASE RETURN THE SURVEY TO THE DROP BOX BEFORE FRIDAY AT 4 PM.

SECTION 1: PERSONAL INFORMATION

1. All survey participants will be entered in a raffle to win one of four $50 gift certificates to William Stout Architectural Books.

I will not use your contact information for any other reason. Please provide your name and your preferred contact so that you may be entered to win one of these prizes.

Name:

Contact:

2. Below, please circle all the descriptors that apply, or fill in the blank, in order to best describe you.

a. I am a male / female.

b. I am a student / professional / educator / _____ in the field of landscape architecture / landscape design / landscape planning / landscape management / _____ .

c. My landscape-related activities mostly take place in Texas / the Southwest / _____.

d. I have been involved in this field for ____ number of years.

e. I do / do not have formal training in landscape architecture.

f. I do / do not have formal training in ecology.

Please proceed to the next page.

SECTION 2: WRITTEN ANSWER QUESTIONS

One approach to landscape design, planning and management is a 'functional' approach. This approach is primarily concerned with the landscape's performance of particular functions.

1. In your experience, during a typical landscape design process, are landscape functions considered?
   a. If no, why do you think landscape functions are not considered?
   b. If yes, which landscape functions are most commonly considered?

2. During your landscape related work, are you concerned with landscape function?
   a. If no, what are you generally more concerned with?
   b. If yes, which landscape functions are you most concerned with?

3. In your opinion, is a 'functional' approach (one that is primarily concerned with the landscape's performance of particular functions) different or similar to the way landscape architecture was typically approached in the past?
   a. If different, please describe how a 'functional' approach is different or new.
   b. If similar, please describe how a 'functional' approach is similar or not new.
   c. I don't know.

4. In your opinion, which landscape functions are most important for landscape architects to design and plan for? Please list the most important functions in order of importance:

SECTION 3: PHOTOGRAPH ACTIVITY

Following, you will find nine photographs of landscapes. Observe each photograph briefly and record a short answer to the following two questions:

1. What is one function that this landscape is performing?
In other words, what is one landscape process that you detect in this photograph?

2. What cue triggered the identification of this function?
In other words, why do you think that this process is present in this photograph?

EXAMPLES:

FUNCTION/PROCESS:

Pollination

CUE:

I think this function is present in this photo because I see bees on flowers and I know bees pollinate flowers.

FUNCTION/PROCESS:

Recreation

CUE:

I think this function is present in this photo because I see people resting and playing in this park-like landscape.

PLEASE NOTE!!

This is an interpretive exercise - it should be interesting, if not fun.

There are no 'right' answers and there are countless possible answers. Don't think too much, go with your initial interpretation/observation.

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

FUNCTION/PROCESS:

CUE:

(over)

Please feel free to add additional comments, thoughts, or reflections below.

THANK YOU SO MUCH FOR YOUR PARTICIPATION!
DON'T FORGET TO RETURN THE SURVEY TO THE DROP BOX
AT MY TABLE BEFORE FRIDAY AT 4 PM.

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