Feeling the Landscape:
Six Psychological Studies into Landscape Experience

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Dit onderzoek is uitgevoerd binnen de Mansholt Graduate School.

Feeling the Landscape:
Six Psychological Studies into Landscape Experience

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Proefschrift
ter verkrijging van de graad van doctor
op gezag van de rector magnificus
van Wageningen Universiteit
Prof. dr. M. J. Kropff
in het openbaar te verdedigen
op vrijdag 15 mei 2009
des namiddags te vier uur in de Aula

Feeling the Landscape: Six Psychological Studies into Landscape Experience.
D. Karmanov, 2009. PhD thesis Wageningen University

ISBN: 978-90-8585-303-9

Voorwoord

In de zes studies van deze dissertatie zijn een aantal zowel praktische als theoretische vraagstukken met betrekking tot de beleving van landschap onderzocht. Landschapsbeleving wordt gedefinieerd als een dynamisch proces, als het resultaat van interacties tussen cultureel en biologisch bepaalde, algemene determinanten van de ervaring. In de studies wordt een aantal verschillende psychologische theoriën getoetst, en samen tonen deze het belang aan van psychologisch onderzoek naar landschapsbeleving. Het is de toepassing van methodologiën en theoretische perspectieven uit de psychologie, die het mogelijk heeft gemaakt tot de inzichten te komen over de interactie tussen mens en landschap, die het resultaat zijn van deze studies.

Terugkijkend op de vier jaar waarin ik aan dit project heb gewerkt, zie ik het grote belang van de mensen zonder wie dit proefschrift niet tot stand zou zijn gekomen. Een aantal mensen ben ik bijzonder dankbaar. Allereerst dank ik mijn promotor Jaap Lengkeek, dat hij me de mogelijkheid heeft gegeven mijn kennis van psychologisch onderzoek te verdiepen en te verbreden. Daarnaast ben ik hem dankbaar voor zijn begeleiding, zijn ondersteuning bij alle facetten van mijn project en voor het lezen en becommentariëren van de hoofdstukken.

Ik ben mijn co-promotor Ronald Hamel zeer dankbaar voor zijn inzet en continue belangstelling voor mijn onderzoek. Zonder hem was mijn onderzoek simpelweg onmogelijk geweest. De prettige werksfeer die Ronald weet te creëren heeft enorm bijgedragen aan de succesvolle afronding van mijn dissertatie. Daarnaast gaat mijn dank uit naar Jeroen Raaijmakers voor zijn hulp bij lastige vragen en bij de statistische analyses. Mijn kamergenoot aan de UvA Emoke Jakab ben ik dankbaar voor haar zinvolle suggesties, haar gezelligheid en humor. Mark Rotteveel en Suzanne Oosterwijk wil ik bedanken voor de prettige en leerzame samenwerking.

Verder wil ik graag al mijn collega's van de leerstoelgroep Sociaal Ruimtelijke Analyse aan Wageningen Universiteit bedanken voor mijn prettige en gezellige werkplek. Ik heb me altijd deel van de groep gevoeld en veel van hen opgestoken. Daarvoor mijn dank aan Martijn, Maarten, Henk, Agnes, René, Marleen, Karin, Irena, Ramona, Valentina, Leo en Jelle. Carla en Barbara, bedankt voor jullie hulp en ondersteuning bij praktische zaken. Carla, bedankt voor de tijd die je vrijmaakte als ik eens weer een 'vraagje' had. Marlies, bedankt voor het kletsen en luisteren, voor je zinvolle adviezen en voor het oppeppen dat je deed. En als laatste, Chris Iles, je steun is van onschatbare waarde geweest, ook bij het redigeren van de Engelse tekst.

Tenslotte wil ik graag de leden van de promotiecommissie bedanken voor het lezen van mijn dissertatie en voor hun positieve oordeel.

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Chapter 1

General Introduction

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General Introduction

Landscape is a human habitat and it has many dimensions. To begin with it has a physical presence, it is a set of observable material entities. Yet it is imaginary, finding its place in stories and myths, in paintings and in films. It is a depository of cultural meanings, carefully recorded in images, texts and discourse. Landscape is in transition constantly: political, economic and environmental pressures are brought to bear on it; changes in the thinking about human beings, nature and culture, accumulated knowledge, societal change, changes in agricultural practices, they all find their material expression in landscape. The meanings of landscape are flexible and dynamic and composed of many interchanging and even competing storylines: landscape as free from change, landscape as outside the reach of modern technology or as its victim, landscape as a refuge from the daily worries associated with wealth and high culture. Landscape is a culturally shared environment, it is where we grow up and live, it is our woods, mountains, waters, and fields.

Broadly speaking, in the field of landscape studies in human and cultural geography two different, yet complementary approaches can be distinguished. One is known as the critical-constructivist paradigm (Wylie, 2007: 95); the other conceives of landscape in terms of human practices, perception and lived experience.

From the perspective of the critical-constructivist paradigm, landscape is thought to be first and foremost a cultural phenomenon, the sum total of its representations in texts, images, signs, and discourses (Matless, 1992). The physical materiality of landscape as well as the human-landscape relationship are thought to acquire meaning only in the process of their cultural construction. Therefore it is as a result of changes in a culture's cognitive and symbolic representations of the environment that these meanings are created and changed.

An alternative to the critical-constructivist paradigm is found in phenomenological approaches that consider landscape to be a lived-in environment, a place where people experience the material world and are involved with it, both perceptually and bodily. The academic community has shown a growing interest in the everyday practices of human-landscape interaction and the ways in which they shape both the self and the landscape. From an earlier emphasis on the cultural construction of the environment, interest has shifted towards a phenomenological understanding of our engagement with landscape and of the corporeal nature of this involvement.

Ordinary practices such as walking, cycling, gardening, climbing, involve a perceptual immersion into the landscape. It is this embodied experience, knowledge and perception that have been the object of inquiry of many recent studies (Spinney, 2006; Merriman, 2005).

The critical-constructivist paradigm's centre of attention is the external determinants of experience, which originate in cultural beliefs, ideologies, and symbolic representations. A phenomenological perspective concentrates on subjective accounts of the experience of landscape, on '…an active, practical and perceptual engagement with constituents of the dwelt-in world' (Ingold, 2000: 42; Lorimer, 2005).

Neither of these paradigms takes into account psychological aspects of human-landscape interaction. It seems impossible to understand human-landscape interaction, specifically the experience of landscape, without knowledge of its psychological foundations. Experience is first and foremost a psychological phenomenon. Experience is at the very centre of the human-landscape relationship. It is fundamental and precedes the personal connotations, which characterise phenomenological experience. It is both a prelude to and a necessary condition for culturally constructed representations. Psychological studies have generated insights into experience, which have not yet entered the academic discourse on landscape.

It is slightly surprising that in landscape studies within cultural and human geography psychological inquiry into the human-landscape interaction has been so insignificant. It is the more remarkable, when one considers the many psychological studies into different aspects of human-landscape interaction, which have been conducted, especially in the field of environmental psychology. It seems reasonable to assume that this is because the theoretical foundations, epistemologies and methodologies of landscape studies and environmental psychology are too different. Environmental psychology is taken to be a scientific discipline; its theories and hypotheses about the nature of human-landscape interaction derive from empirical evidence. The purpose of its inquiry is to find generalizations about people and their environment. Psychological studies into human-landscape interaction are generally of a quantitative nature.

The research methods favoured by geographical landscape studies are of a qualitative nature. Phenomenological studies of landscape take as its point of departure the individual experience of landscape, its unicity. Subjective accounts of human-landscape interaction are therefore the subject of inquiry. Critical-constructivist landscape studies take into account cultural and ideological

determinants of the experience of landscape insofar as they provide plausible explanations for the specificity of experiences. These determinants are not themselves subjects of inquiry in any systematic way. It is difficult to find common ground between the studies of subjective accounts of human-landscape relationships of both phenomenological and critical-constructivist landscape studies and the findings of psychological quantitative research. The quantitative and qualitative paradigms have very different ontological and epistemological foundations. Quantitative research is only possible if one presupposes an objective reality, in which the researcher is independent of the subject of inquiry. The assumption behind qualitative research is that reality is subjective and that the researcher and the subject of inquiry interact with each other (Groat & Wang, 2002: 27-28). This difference is expressed in the methodologies of both approaches. Quantitative research is a 'deductive process of inquiry that seeks cause-and-effect explanations'; qualitative research is an 'inductive process that seeks clarification of multiple critical factors affecting the phenomenon' (ibid). In quantitative research the emphasis is on internal and external validity, reliability and objectivity; qualitative research highlights the historical and social context of research, its political, gender, ethnic, and racial connotations.

The apparent divide between quantitative and qualitative methods of research has certainly contributed to the neglect of the psychological perspective in landscape studies. The representation of qualitative and quantitative methods as innately opposite approaches may be an oversimplification, however. In research practice qualitative and quantitative methods can be applied complementarily, as they focus on different aspects of reality. Qualitative methods are useful when describing a phenomenon, its nature and its development in time, where quantitative methods are useful in describing the frequency of the phenomenon's occurrence, the range of its distribution etcetera. Some methods of research can even be used within the context of both approaches: '…participant observation in the hands of a positivist may be used to document the number and length of interactions within a setting, but in the hands of an action theorist the technique may be used to explore the realms of subjective meaning of those interactions' (Morgan and Smircich, cited in Groat and Wang, 2002: 31).

Although landscape studies in cultural and human geography and the psychological research into landscape seem to depart from different theoretical and practical assumptions, it is important to try to find common ground from which the various aspects and dimensions of human-landscape interaction can be investigated. As both landscape studies and environmental psychology share the common goal of coming to an understanding of human-landscape relationships, researchers from both fields would mutually benefit from sharing each other's work. The

incorporation of the psychological perspective provides access to a whole spectrum of knowledge about the psychological dimensions of human-landscape interaction: about attitudes, perceptual, cognitive and emotional processes, personality traits, and unconscious processes.

Quantitative psychological research into human-landscape interaction could provide elucidation of aspects of the phenomenon, which are not accessible to qualitative inquiry, of, for instance, unconscious perceptions and physiological responses. The rigour and precision of empirical research in environmental psychology may provide evidence for the support or rejection of theoretical insights generated within the constructivist and phenomenological paradigms. Psychological research is particularly strong at finding regularities and general principles in human-landscape interaction, beyond its subjective and individual aspects.

Similarly, knowledge of human-landscape relationship generated by landscape studies would benefit researchers in environmental psychology in the development of their theories and methods as well as providing them with new research questions. Within psychology, the emphasis lies on finding generalizations and regularities, which has often met with the criticism that it seems to be a quest for fundamental principles, an attempt at understanding experience independent of its linguistic and cultural contexts. In quantitative research the complexity of a phenomenon tends to be reduced to measurable parameters. Research hypotheses are required to be precisely formulated and tend to be narrow. Quantitative research then runs the danger of losing sight of the complexity of experience and the interdependencies of its qualities. This significantly limits the capacity of research findings to provide insights into human-landscape relationships and underlines the need for sharing ideas with more holistically oriented studies.

In this dissertation an attempt has been made to conduct psychological research from a theoretical and methodological perspective, which, to a certain extent, differs from the quantitative research procedures common to so much psychological research into landscape. This was achieved by adopting some of the theoretical and methodological perspectives on human-landscape relationships characteristic of geographical landscape studies. The next section, which is a concise history of the research into landscape perception and experience, provides a framework within which to appreciate the theoretical and methodological foundations of this dissertation.

1.1 History of landscape perception and experience research

The 1970-80s was a period of rapid growth in both the quantity and quality of landscape perception and experience research. At the time a growing awareness of the degradation of the natural environment motivated an emerging concern with the quality of landscape as well as a search for scientific instruments for monitoring its quality. The U.S. National Environmental Policy Act of 1969 was part of a body of legislation, which was to 'assure for all Americans esthetically pleasing surroundings' (Daniel & Vining, 1983). The involvement of a steadily increasing number of scholars transformed the hitherto somewhat marginal topic of landscape perception into a booming field of scientific inquiry. The driving force behind this major shift was a 'body of legislation in the U.S.A and Great Britain that directed attention to the identification and management of scenic resources … (and)…addressed the subjects of wild and scenic rivers, scenic and recreational trails, scenic highways, environmental impacts of major development projects including aesthetic impacts, coastal zone management and natural resources planning' (Zube et al., 1982). The field of landscape perception developed its character through defining new concepts (e.g. scenic quality, landscape preferences, and visual attractiveness), discovering new methods, and accumulating a body of research data to support its claims.

Most of the scholarly effort was put into empirical research aimed at establishing reliable and valid assessment methods for landscape perception. This undertaking required the involvement of professionals from different academic backgrounds and research traditions: environmental psychology, landscape architecture and planning, cultural and human geography, and recreational studies. Landscape quality, scenic beauty etc. have been investigated using a heterogeneous array of research methods from conceptually different perspectives on the nature of human-environment interaction. This variety of approaches has never merged into a single general approach to landscape perception research. However, by the early 1980s 'the field has matured to a point where underlying conceptual models could be identified' (Daniel & Vining, 1983). Subsequently, the first comprehensive accounts of landscape perception research were published (Daniel & Vining, 1983, Zube et al., 1982).

In their influential review Zube, Sell and Taylor (1982) categorized the main trends in landscape perception research as falling under four paradigms: the expert, the psychophysical, the cognitive, and the experiential paradigm. In a rather similar way Daniel and Vining (1983) distinguished five conceptual models: the ecological, the formal aesthetic, the psychophysical, the psychological, and the phenomenological model. The (minor) difference between the two reviews is that

Zube, Sell and Taylor (1982) combine the ecological and the formal aesthetic method into one expert judgment category and describe Daniel and Vining's (1983) psychological and phenomenological models as the cognitive and the experiential paradigms. The categorization of landscape perception research in four research traditions is still considered valid today (Jacobsen, 2007).

In providing an overview of the different research traditions, authors explicitly attempt to go beyond disciplinary divisions, assessing the merits of different approaches, their underlying concepts and theoretical constructs. The expert and psychophysical paradigms are centered on applied research. They are usually applied to specific and practical design and planning issues. In the expert paradigm an expert evaluates a landscape, analyzing it according to formal design criteria (e.g. lines, textures, colours, shapes). Thus the physical features of a landscape are translated into formal parameters and relationships among them (unity, variety, harmony). Then, following a number of predetermined guidelines, landscapes are ordered on a number of dimensions (e.g. landscape quality, scenic beauty) from high to low. This method of landscape assessment has been particularly popular within the design tradition of landscape architecture. There is an implicit assumption that a landscape's quality, scenic beauty or other experiential qualities reside in the landscape's formal and physical properties and can be determined through a competent inspection of landscape. This assumption derives from the objective tradition within the philosophy of aesthetics (Lothian, 1999), which has increasingly been rejected, as it does not consider the individual, cultural, and contextual factors which modify the perception of a landscape's formal and physical properties.

The ecological model is a variation on the expert method (Daniel & Vining, 1983). Landscape assessments are usually carried out by experts with a background in ecology. The qualities of landscape are defined in biological terms and any human impact on landscape is considered to be negative. The highest quality landscapes are considered to be intact ecosystems. There is a strong reluctance against considering human-landscape interaction within a context of trade-offs between ecology and other values such as recreation, security, aesthetics. Consider for instance the finding that managed forest areas are judged more scenically attractive than forests in ecologically higher quality wilderness areas (Daniel et al., 1973). The value of this approach is difficult to judge by empirical tests of reliability or validity as it derives its value from environmental ethics rather than from empirical research.

The expert approach has been criticized for having inadequate precision, reliability, validity, and sensitivity (the capacity to detect small changes in the properties

measured), which are the general criteria traditionally applied to measurement systems of all kinds (Daniel & Vining, 1983). The expert's approach has not been tested sufficiently on any of these general criteria. For instance, it has been found that the judgments of landscape quality may significantly vary between different experts assessing the same landscape. Despite its theoretical and methodological shortcomings, the expert method offers some distinct advantages. It isn't very costly, so in practical contexts it remains an important and much applied method.

In the psychophysical approach the perceived qualities of a landscape are derived from perceptual responses of different groups of respondents. Such responses, for instance judgments of preference or of scenic beauty, are systematically related to physical properties, sometimes in precise mathematical terms. Physical properties may vary from general attributes (topography, water, the presence of vegetation) to specific features such as number of trees per acre less than 20 inches in diameter, numbers of different species, and volumes of shrubs (Daniel et al., 1977). The perceived qualities of a landscape are assessed by multiple observers whose ratings are usually combined into average responses. Statistical tests are applied to provide accurate and reliable measures of landscape qualities. Many studies have confirmed the reliability and sensitivity of the psychophysical approach to landscape perception. Discussion of the validity of the method usually concentrates on questions such as the use of photos of landscapes as substitutes for real landscapes and the suitability of public judgments for landscape assessment.

The psychophysical approach emerged in the context of practical design and planning issues. Therefore it is usually considered to be unidimensional. Landscape evaluations such as preference or scenic beauty are related to physical properties of landscapes. As a rule, neither the multiplicity of individual, cultural or contextual factors explaining evaluations nor the physiological (e.g. stress-reduction) and behavioural outcomes of human-landscape interaction are taken into consideration.

Research conducted within the cognitive (psychological, Daniel & Vining, 1983) paradigm explicitly addresses these concerns. The primary goal of research within the cognitive paradigm is to understand the cognitive, emotional and behavioural responses to landscapes. The focus of the research is on the human aspect of human-landscape interaction. As a result, the studies tend to be concerned only indirectly with practical management and planning issues. Over the years significant effort has been put into the analysis of the impact of a variety of factors on landscape perception and experience: gender, age, occupation, hobbies, academic background, professional experience, familiarity with the area, nationality, and religion (Aoki, 1999). Compared to the psychophysical paradigm, more complex cognitive constructs (complexity, coherence, mystery, legibility

(Kaplan & Kaplan, 1989), prospect-refuge (Appleton, 1984)) have been introduced as mediating the process of scenic evaluation and aesthetic appreciation. Also, more specific perceptual categories, reminiscent of the psychophysical approach, such as visual openness or vegetation density, have been applied in a variety of studies. Considered from the perspective of the cognitive approach, the process of landscape perception becomes a process of interpretation mediated by emotional responses to landscape, perceived meanings, and physiological reactions (e.g. stress-reduction).

A variety of research techniques have been applied with a view of obtaining quantitative measures of perceived landscape qualities. Confirmation of a high internal reliability of such measures has usually been reported in many empirical studies (Daniel, 2001). Evaluating the validity of cognitive constructs has been less straightforward. It has often been suggested that people do not normally evaluate landscapes using cognitive constructs such as coherence, prospect-refuge or mystery (Stamps, 2007; Aoki, 1999). Such constructs appear spurious entities without much empirical content as they are only loosely related to identifiable and measurable physical features of landscapes.

Research conducted within the cognitive paradigm considers human responses to landscapes in terms of a complex stimulus-response relationship, although usually implicitly. The experiential (phenomenological, Daniel & Vining, 1983) approach, on the other hand, focuses in depth on the qualitative aspects of human-landscape interaction. Such interaction is considered in terms of personal and group identity, emotional experiences, spiritual values etc. Zube, Sell and Taylor (1982) characterize the methodologies applied within the experiential paradigm as not passive or judgmental, but as involving an active process of interaction between humans and landscape. Such research methodologies are less concerned with the quantification of landscape and perceptual qualities, than with understanding the nature of the human-landscape relationship. They allow the researcher to gain knowledge, which is inaccessible through other methods. Within the experiential tradition, the landscape is thought of as imbued with feelings, meanings, hidden narratives. It is a vehicle for individual expression and creativity. It inspires and is a source of strong emotional experiences.

The four paradigms of landscape perception and experience research are not in competition with each other, they are complementary as they each explore the same issue of human-landscape interaction, albeit from different angles. Some put a stronger emphasis on the practical applicability of research findings and are based on rather simplistic views of the human component of the human-landscape relationship. Others emphasize aggregate perceptual responses and the experiential

qualities of landscapes, developing more complex models of human perception while remaining sketchy about the perceptual qualities' relation to landscape's physical properties. "Applied planning-related studies typically adhere to the expert and the psychophysical paradigm, aiming to resolve whether landscapes are significant and/or beautiful. Enquiries within the cognitive and the experiential paradigms, more than studies within other paradigms, are concerned with theoretical issues, such as the character of landscapes, why people have preferences for specific landscapes and the meaning people attach to particular landscapes" (Jacobsen 2007).

It is necessary to gain some insight into the limitations and criticism of landscape perception research if one is to understand current and future developments within the field. Many of the methods in landscape perception research and their theoretical underpinnings were developed to provide reliable and objective tools to assist the processes of planning, design and management of landscapes. Therefore, as a rule, they provide a limited view of human-landscape interaction. For instance, it has been observed that landscape assessments primarily address what might best be termed the visual properties of landscapes and neglect the behavioural and experiential aspects of human-landscape interaction. Although for review purposes the different paradigms of landscape perception and experience research are brought together, in practical research they are divided by disciplinary boundaries. Thus, there is a lack of theoretical uniformity between different disciplines (e.g. forest and water management, landscape architecture) in dealing with landscape perception and experience. The research into landscape perception covers such a variety of topics and environments: the location of forest roads and recreation facilities, the impact of tree species composition on aesthetic perception, the visual effects of insect damage, landscape's symbolic meanings and spiritual values, that it would be unrealistic to expect theoretical consensus.

Current developments in the field of landscape perception and experience research in part meet the criticism of earlier studies. For instance, complex research designs which allow considering the combined and simultaneous impact of many variables are becoming more common. Thus, in a study of restorative experiences in favorite places the impact of as many as nineteen independent variables on the restorative quality of environments has been considered (Korpela et al., 2008). The behavioural aspects of human-landscape interaction, tactile, olfactory and auditory impressions are increasingly being studied (Dann & Jacobsen, 2003; Setten, 2004).

Many factors affecting landscape perception and experience, such as knowledge, educational background, personality, professional role, memory, individual history, nationality, membership of some cultural and social group, and religion to mention

but a few, have been considered in research conducted within various paradigms. Such an expanded vision on landscape perception and experience research includes an array of biological, ecological, social, cultural and psychological processes. Integrating so many topics into a comprehensive approach to landscape perception is a challenging task. Its success becomes heavily dependent on methods and theoretical insights borrowed from outside the field of landscape perception research.

The research conducted for this dissertation builds upon a theoretical framework from within psychological theory and environmental psychological theory in particular. This psychological framework allows the application of a variety of approaches from within psychology while it does not preclude drawing on a variety of theoretical and methodological approaches from other disciplines involved in the study of the human-landscape relationship. A theoretical framework for landscape perception research should be modular, capable of integrating a variety of theoretical approaches, including art and design theory, human ecology, phenomenology, philosophy, cultural studies etcetera, while building on its psychological foundations. It should rely on the integration of methods and theoretical insights from qualitative as well as quantitative research traditions.

Although many facets of landscape experience have been the subject of psychological inquiry, the central importance of experience as a psychological phenomenon has never been properly clarified. Experience defines our engagement with things and people. It is a feeling and the quality of this feeling is an indication of the value and significance of our interaction with the world. Experience encompasses emotions, moods, affective states (whether an experience is pleasant or unpleasant) and a myriad of feelings that resist categorization. Experience comes first. It determines how we feel and what we do. It is a guidance system for the establishment of priorities and it is involved in action planning. It governs all aspects of human-landscape interaction and its felt quality is instrumental in motivating, maintaining, changing and terminating our everyday interactions with landscape. Understanding experience as a psychological phenomenon is crucial for understanding the experiential qualities of human-landscape interaction.

1.2 Landscape experience: a psychological perspective

'… the human mind is constantly being split… between the part that stands for the known and the part that stands for the knower.' Damasio (1999: 191)

Experience is a qualitative aspect of consciousness, and is probably described most correctly as feeling. In everyday language the words feeling and emotion are often thought of as synonymous. It is important however to distinguish between them. Emotions are complex coordinated responses of an organism to important, for instance life threatening, situations. Prototypical emotions as fear, anger, disgust, and happiness have a long history of evolutionary development. In organisms with less of a consciousness than human beings, emotions coordinate the most important facets of organism-environment interaction: avoiding danger, seeking shelter or sex. Emotions, as for instance fear, automatically engage and modulate many different psychological and physiological parameters, in order to prepare the organism to deal with an emergency: the focusing of attention, the release of hormones, changes in muscle tension, the redistribution of blood, an increase in respiration. Emotions are accompanied by feelings as, for instance, being afraid. In the psychological literature, feelings are usually discussed within the context of the research into the emotions. This may well be because it seems likely that feelings are generated by the same neural circuits of the brain that are involved in the regulation of emotional states (Berridge, 2003). And, secondly, we are often very much aware of our feelings when we are in an emotional state. An emotion is always accompanied by a feeling, even if at times we are unaware of it. However, if an organism is not experiencing an emotional state, this does not mean that it is free of feelings.

Feelings are not only the accompaniments of emotion. The capacity to have feelings is a biological phenomenon, which we are never without, not while we are awake and not while we are asleep and dreaming. It has been suggested (Panksepp, 2000) that we have two modes of interaction with the environment: cognition and feeling. On this view cognition and feeling refer to subsequent processes involved in object perception (recognition) and the establishment of a feeling-like attitude towards the object. This distinction is not only theoretical. It follows from differences in brain localisation, from selective compromise of either cognitive or feeling faculties in certain neurological diseases, and from the different neurotransmitters involved. Emotions (feelings) are thought to be generated by emotional circuits, which are anatomically, neurochemically, and functionally distinct from those involved in cognitive processing, as in, for instance, propositional thinking (Panksepp, 2000). Emotional and motivational responses and their accompanying feelings permeate our movements, actions, and higher cognitive activities. Emotional and motivational systems have evolved from instinctual behavioural systems, which are capable of generating affective experiences without involvement of higher cognitive mechanisms (Panksepp, 2000).

In everyday life, the faculties of cognition and feeling constitute an experiential unity. Cognitive processes underlie the capacity to categorize objects in classes, to recognize objects and to remember them, to describe objects in words. Processes involved in the generation of feeling provide cognitive output with a marker indicating its significance in terms of the organism's values and priorities. Feelings then can be seen as a constant accompaniment to our thoughts, images of objects, memories, and words. In their pervasiveness, feelings are nonverbal signifiers of the meaning of objects, situations and internal states of the organism's inherent set of values and priorities (Damasio, 1999: 285).

Damasio describes feeling as a simple, biological phenomenon. It is not exclusively human and it is not dependent on either conventional memory, working memory, reasoning, or language. It precedes inferences and interpretation. Feeling is the accompaniment to any kind of image – auditory, visual, tactile, gustatory. In simpler organisms the processing of objects is followed by emotion /feeling, of which the organism may well be unaware. I assume that the cat visiting my garden has feelings. I doubt, however, that she can recognize them as such. Similarly, in the earlier stages of evolution, emotion and feeling states were probably entirely inaccessible to the organisms producing them (Damasio, 1999: 30).

It is important to realize that the faculties of cognition and feeling allow the organism to navigate its way through environmental challenges without much conscious effort. Feelings direct, motivate or urge an organism to take specific action. As you approach the edge of a cliff an increasingly unpleasant feeling warns you to keep away from the edge. In the presence of the 'right' physical properties of an environment this feeling automatically emerges as a guideline for action. Feelings started out as evolutionary pre-programmed responses, as a fear of heights for instance, but through a process of lifelong learning they have become part of all our activities and thoughts.

The intensity and experiential quality of a feeling reflects the momentary specificity of our engagement with the environment. These feelings, these constant accompaniments of our engagements with the environment, vary from neutral and barely perceptible to very intense and highly specific. Cook (2002), considering feelings from the perspective of neuroscience, suggested that the capacity to feel begins at the level of a single neuron, when it opens its cellular membrane in response to an integrated stimulation from other neurons, during an action potential. Cook considers the moment of free diffusion of ions across the membrane during the action potential, as a moment in which the neuron 'feels' the state of the extracellular environment, and adjusts its own internal state in response

(Cook, 2002: 170). It quite literally allows a small part of the external world to rush in.

Such 'proto-feeling' is one of the two modes of contact between the individual neuron and its environment. The other one takes place at the synapse, a junction between neurons, where neurotransmitters are released transmitting a 'message' to connected neurons. Synaptic transmission is of a discrete character. The cross-membrane flow is a constant analogue process peaking at the time of the action potential. Cook sees cognitive processes as an outcome of the complex summation of excitatory and inhibitory synaptic activity and feeling – of the opening of a large number of neurons to their local environments.

According to Cook, the interaction of the whole organism with its environment is similarly characterized by directness of feeling and the subsequent adjustment of the organism. Animal species with a complex nervous system such as our own have an amplified sensitivity; have feeling as we know it. 'It is specifically the simultaneity of a large number or cells opening up to the environment that produces a feeling in the organism as a whole, and it is the specific locations and patterns of connectivity that will determine the psychological content of the feeling' (Cook, 2002: 185). I quoted Cook at length to substantiate the perspective on the organism as possessing cognitive and feeling capacities of its own as opposed to the view in which these capacities are seen as products of some conscious process.

Having a feeling does not necessarily entail being aware of it. We often become aware of a specific feeling, such as anxiety, while simultaneously knowing that the feeling started before the moment we became conscious of it. Feeling as well as cognitive processes, such as object recognition, unfold as biological processes, outside of consciousness. Having a complex nervous system makes us capable not only of possessing an amplified sensitivity, but also makes us capable of being aware of the contents of our own experience, such as feelings and cognitions. In psychological experiments involving object recognition, it is often assumed that it takes some 350-400 milliseconds to become aware of the object presented on a computer screen. It takes this much time to recognize an object and to provide it with a feeling marker. After that time awareness of one's own phenomenological experience becomes possible.

When consciousness arises, the object, the organism, and the cognitions and feelings resulting from their interaction can be re-represented. Having a feeling is not the same as knowing that you have a feeling. Reflection on feeling is yet another step that can only be taken when consciousness begins and the organism

that '… is responding beautifully to its environment begins to discover that it is responding beautifully to its environment' (Damasio, 1999: 284). Knowing that we have feelings 'is the stepping stone for the process of planning specific and nonstereotyped responses which can either complement an emotion or guarantee that the immediate gains brought by emotion can be maintained over time' (ibid).

The moments in which we are aware of our existence can be committed to memory, be categorized or described in words. The ability to learn and to reactivate memories, to hold patterns of activity in the working memory over a substantial length of time and to manipulate them intelligently, to verbalize the experiential properties of human-environment interaction forms the basis for what Damasio calls extended consciousness. The extended consciousness has many levels and gradations and provides the organism with an elaborate sense of self – an identity perceived as continuity in our thoughts, feelings and behaviour. In a similar way Lambie and Marcel (2002) distinguish between what they describe as first-order phenomenology and second-order awareness.

Intuitively we associate the notion of self with the extended consciousness, an identity based on unique modes of perception and interaction with the world, on memories and feelings. The self does not, as a rule, acknowledge the existence of an automatic process of object recognition and evaluation that provides the extended consciousness with an experiential content to elaborate upon. If you would like to give it a try, look at some object in your vicinity and you will notice that during the moment that you are focusing on it, the extended consciousness is absent. In the words of Thomas Eliot 'you are the music while the music lasts'. The extended consciousness disappears for a moment only to re-emerge the next moment to elaborate on what's there. It has the power to shift the focus of attention deliberately and to initiate a stream of thoughts or to move the focus of attention to another object. Only in the case of real emergencies the control function of the extended consciousness is overruled by an uncontrollable urge to run or to stay immobile. It is important to understand that the extended consciousness has the capacity to engage memories, to generate propositional thoughts, and to verbalize experience. Feelings related to these thoughts, memories or words are generated in ways similar to feelings related to external objects; they are automatically manifest. The extended consciousness does not determine the quality of an experience; it can only manipulate or modify it. Thus, the realisation that you are late for an appointment triggers an unpleasant feeling of irritation and frustration. Only afterwards can you try to consciously suppress it or to put it into perspective.

In order to estimate the value of the representation of experience as an automatic process of generation of feelings and cognitions, subsequently modified by the

mechanisms of the extended consciousness for the understanding of landscape experience, certain specifications need to be made. It is necessary to distinguish between cognitions and feelings as directly specified by the process of human-environment interaction from cognitions and feelings derived from the interpretations and verbalizations of experience characteristic of the extended consciousness. It is important to understand that the latter can change the experiential qualities of the former in several ways. The initial cognitions and feelings undergo a veritable metamorphosis when they are recounted through the extended consciousness, as memory, reasoning ability, and language are brought to bear upon them. As a result, the initial experience can be expanded upon, becoming the starting point of a potentially infinite chain of new cognitions and feelings. For instance, Kant's interpretation of the experience of the Sublime is dependent on the capacity of the extended consciousness to transform the initial experience of a scene of nature into a strong experience by connecting to it reflections on the temporality of existence, the meaning of life etcetera. As mentioned above, such thoughts generate a chain of experiential qualities of their own.

The distinction between cognitions and feelings as directly specified by the process of human-environment interaction and cognitions and feelings derived from the interpretations and verbalizations of experience is important. In the research into experience this distinction is reflected in the choice of methodologies, some of which are better suited to gain insight into the properties of the former (e.g. affective priming or physiological measures), while others are better suited gain insights into the latter (e.g. questionnaires). In the next section its importance within the context of landscape design theory shall be described.

This short description of the workings of the mind where experience is concerned serves to introduce some ideas from the psychological perspective to the phenomenon of experience. In the sections below I will consider the significance of this perspective for the theory of landscape design and for the research into the experience of landscape. Landscape experience and the relationship between the physical properties and experiential qualities of landscape are matters of both theoretical interest and practical importance to landscape design. The psychology of landscape experience, however, has not been part of the academic discourse on landscape design and the possible value of a psychological approach to landscape experience has not been considered.

1.3 Landscape experience and landscape design

'Composed of ephemeral, temporal, and spatial qualities, the landscape is difficult to describe, evaluate, or interpret. Yet landscape architecture cannot afford to overlook or neglect the very necessary, though admittedly unsettling, confrontation with these interactive, nonmappable, nonquantifiable, and difficult-to-predict components.' (Krog, 1983)

'The multiple interrelationships among form, meaning, and experience in landscape have been an issue of interest and theoretical debate in landscape architecture since its inception.' (Swaffield, 2002: 73) The creation of meaningful (perceptually and symbolically significant) and experientially rewarding landscapes has always been of great importance in high-quality landscape design. Yet, the relationship between a landscape's physical properties and its meanings and experiential qualities has never been thoroughly investigated. In the mid-twentieth century, the theory of landscape design considered landscape design to be, first and foremost, a problem-solving activity (Swaffield, 2002: 33). There was little or no discussion of the meaning of landscape, let alone the experience of landscape. 'Significance derived from forms and spaces appropriate to their use and times; meaning was a by-product, or so the text implied. In fact very little was written specifically about syntax – that is, the relationship between the elements – much less about semantic production.' (Treib, 1995) Not surprisingly, the analysis of landscape, as a rule, did not consider questions of landscape experience 'privileging vision over experience, appearance over system, product over process, function and program over ecological and cultural relevance' (Koh, 2004). For instance, Tsumi's account of his design for the Parc de la Vilette in Paris is entirely about the ideas that motivated its creation, and has nothing on any qualities of the experience of the park (Baljon, 1992: 40).

In this theoretical context, the issue of landscape experience was in some way considered off-limits to academic discussion. There was an implicit assumption that the physical properties of landscape are in certain ways related to meanings and experiential qualities, but the mechanisms behind these relationships were considered to be possibly too complex to explore in detail. As a result, a landscape's physical and formal properties were analyzed without any attempt at explicit commentary on the landscape's experiential qualities. The analysis of the physical and formal properties of landscape provided a solid enough ground for intersubjective agreement. Landscape analysis derived from descriptions of landscape experience, on the other hand, may well be too imprecise and subjective to serve as the foundation for any theory of landscape design.

That the issue of landscape experience has not been seriously considered within the formalist, 'logo-centric' (Koh, 2004) theory of landscape design may lead one to jump to the conclusion that our experience of landscape has some shared similarity. It seems a reasonable conclusion, as different individuals and groups indeed perceive many of the experiential qualities of landscape in a similar fashion. Consider, for instance, the strong similarities between the evaluation of meanings and aesthetic qualities of design gardens by a group of students of landscape architecture and a lay-group of students (chapter 3 of this dissertation).

Although the formalist and functionalist foundations of landscape design theory do not preclude the creation of experientially rewarding landscapes, the omission of the issue of experience is not without its consequences. It does not do justice to the crucial role of experience in landscape design; it precludes the understanding of differences between groups as to their experience of landscape, which do indeed exist (Jones, 2007), even if they are overshadowed by much stronger differences on use-related issues; it does not stimulate research into the relationships between the physical and experiential qualities of landscapes. A theory of landscape design, which does not address the question of landscape experience, loses part of its authority, as it is our intensely personal experience of landscape in the first place that motivates our involvement with landscape.

Until this day, the issue of landscape experience remains a poorly understood subject within landscape design theory. In recent decades, however, interest in and inquiry into the meanings of landscape have been growing. From the 1980s onwards, '…declarations of meanings began to accompany the published photos and drawings of landscape designs. At conferences, landscape architects would describe their intentions, their sources, and what the designs meant' (Treib, 1995). Attempts were made to systematically categorize the meanings of landscape. For instance, Thayer (2002) proposed a three-dimensional framework for examining the meanings of landscape. This framework included perceptual, functional and symbolic dimensions of meaning. He admitted that it remains unclear how his dimensions of landscape meaning contribute to the experience of landscape. This exposes a typical weakness in the theory of the meanings of landscape. The analysis of the meanings of landscape suffers from deficiencies in the understanding of the phenomenon of experience, which obscures the value and contribution of perceived meanings to the general experience of landscape. From the perspective of landscape experience, the communication of meanings through landscape design is only a means and not an ultimate goal. Such communication is sought after because it derives from the capacity of meanings to strengthen, shape or accentuate specific aspects of the experience of landscape. Thus, the hulking ruins of an industrial complex that used to be the central feature of the Haag's Gas

Works Park in Seattle are imbued with symbolism as '...the reminder of structure haunted by the harm done to earth, air, and water. (They)…redeem this history by recycling the site as a playful place, a *sign* of life and health salvaged… a memento mori.' (Howett, 2002)

Contemporary landscape design theories generally discuss meanings of landscape without considering their related experiential qualities, which is a serious limitation. Grange, realizing the deficiency of landscape design theory with regard to experience, proposed to describe the properties of landscape not as material objects but as meanings and above all as points of *expression* (my emphasis) merged into a field of relationships (quoted in Howett, 2002). Thus, from the perception of physical and formal properties of landscapes a variety of experiences ensue: '…the aroma of material; the feeling of humidity or dampness; the intensity of light, dark, heat and cold. … the greater part of landscape experience belongs to the sensorium of the tactile, the poetries of material and touch … and is best understood through the tactile and bodily perception of things, senses distinct from any form of secondary or objective deduction.' (Corner, 1992)

It goes without saying that the experience of landscape does not depend exclusively on the ability to read a landscape's symbolic content or to analyze the landscape's formal properties. Many of a landscape's experiential qualities do not result from the interpretation of its symbolic meanings but are directly determined by a landscape's physical properties. Perceiving a particular tree may be a rich and rewarding experience without any reference to symbolism. '…(F)orms have significance and content, even if that content itself signals a refusal of meaning. No gesture is unreadable. If this neglects formal analysis in favor of what forms may contain, that is because the importance of the latter approach needs to be reasserted.' (Hunt, 2002) Similarly, Krog (1983) observed that '…landscape teems with factors which heighten one's perceptual awareness and one's artistic experience precisely because it overflows with latent present, is subject to relatively few metaphorical associations, and is largely lacking in museum pretension.'

The experience of landscape is a holistic phenomenon, a flow of experiential qualities, images, thoughts, and meanings. It is a bodily experience and takes place in time and space. Attempting to provide a theoretically sound account of landscape experience, Berleant (2004: 17) argues for the development of a new aesthetics that would do justice to the complexity of the phenomenon. Such aesthetics '…would be iridescent with the fleeting brilliance of sensory qualities and imaginative extrapolations and constructions, with the shadowy resonance of memory and the endlessly varying tones of feeling we so poorly hypostatize into

emotions.' Berleant describes the experience of the environment as an embodied aesthetic, as having an intense focus and a charged meaning. In an embodied aesthetic, meanings are experienced rather than cognized. 'That is to say, we grasp them with our bodies, literally incorporating them so they become part of our flesh.' (Berleant, 2004: 86) From this perspective the value of landscape design strategies is determined by the experiential qualities of its end products, and not by experientially sterile arguments favouring specific design solutions.

The distinction made above between cognitions and feelings as directly specified by the process of human-environment interaction and cognitions and feelings derived from the interpretations and verbalizations of experience is important in this context. The current discourse on landscape experience presents the cognitive strategies of the extended consciousness as a generator of experiences instead of as a mechanism facilitating them. Often complex cognitive constructions of the extended consciousness are presented as experientially valuable in their own right. A description of the design of the Park de la Vilette in Paris as an instance of the deconstruction of landscape is an example of such a cognitive strategy as applied to the design (Baljon, 1992: 40). No account is given of which experiential qualities are to be achieved. Therefore it is impossible to predict how the completed park will be experienced. Consider the perception of taste. While cooking a meal, I've decided to follow some theoretically sound cognitive strategy of choosing ingredients such as similarity in colour or shape. Would such a strategy, however convincing, guarantee a delicious meal?

As another example I would like to describe two influential strategies of experience enhancement in landscape architecture: the figures of speech approach (Spirn, 1998) and the use of narratives in landscape design (Potteiger & Purington, 1998). The former advocates the use of figures of speech (e.g. anachronism, metaphor, synecdoche) and the latter different types of stories for landscape design. The weakness of these two approaches is that a cognitive strategy is presumed to automatically enhance the experiential qualities of experience. Producing a metaphor or a synecdoche is indeed one of the extended consciousness' achievements. However, a metaphor does not determine the direction into which the initial experience will develop: it may strengthen or weaken it, it can have no effect at all or change its initial quality into a quite different quality. The rationale of the addition of figures of speech and narratives is to play with the experiential qualities of experience and not to simply add images and associations. In landscape design the creation of experientially rewarding landscapes addresses the faculty of feeling and not the faculty of cognition. It makes little difference whether the feelings are brought about through symbolism or are manifested directly in response to physical features of a landscape.

Figures of speech, narratives and other strategies of the extended consciousness are instrumental in enhancing the experiential qualities of landscapes. The extended consciousness has the capacity to retrieve ideas, associations, and images, which enhance the experience of landscape. Obviously, landscape architects such as Ann Spirn or those cited in the opening section of this chapter, not only are very much aware of their feelings in response to landscapes, but also make use of them for the purpose of creating experientially rewarding landscape designs. The objects in a landscape - trees, plants, flowers - each contribute their little bit to an experience. Arranging them means orchestrating their experiential qualities, with the purpose of enhancing them. Different strategies may be employed. In Gertrude Jekyll's borders, flowers were brought together according to the feelings they generate rather than by following some cognitive strategy as, for instance, arranging them in alphabetical order. More elaborated cognitive processing, a competence of the extended consciousness, can also be instrumental in enhancing the experiential qualities of objects. Daffodils can be associated with for poetry, with images of meadows, with Englishness.

A problem, which complicates the understanding of landscape experience, is the difficulty of monitoring subtle changes in feeling and describing them in words. Often the quality of feeling is neutral and its intensity weak. Damasio described such feelings as 'background' feelings. In social communication background feelings are elicited by the perception of subtle details of body posture, speed and contour of movements, rapidity of eye movements, subtle contractions of facial muscles etcetera. Feelings of tension, relaxation, stability, imbalance, harmony and discord, fatigue and energy, are the momentary qualities of background feelings (Damasio, 1999: 287). The social psychologist Stern called such feelings 'vitality affects' (Sloboda & Juslin, 2001).

I dispute the view that it is inherently impossible to describe such feelings in words. Consider, for instance, the possibility of using 'emotionally neutral' words to describe the experiential qualities of design: durable, natural materials, a restrained colour palette, an unpretentious design language, clear dimensioning and careful detailing. They are all permeated with connotations of feeling. Obviously it is impossible to describe every single moment of experience in words. Yet, even if every object does elicit feeling, not all of these feelings are worth the trouble of verbalization. When a feeling increases in importance, as a result of, for instance, the atypical properties of an object, of its personal relevance, the richness of the associations it generates, it will be possible to describe the feeling in words with sufficient accuracy.

A revived interest in the meanings of landscape should be complemented with a similar interest in the experience of landscape and by an attempt to clarify some of the properties of landscape experience. The question of the experience of landscape should once again become a legitimate part of landscape discourse. An effort must be made to incorporate the discussion of experiential qualities of landscape into landscape criticism. The expressive qualities of landscape are not just derived from semantic or symbolic interpretations; first and foremost they are directly specified in our interactions with landscape. Methods for the analysis of the experience of landscape should emerge from an effort to correlate the perceived experiential qualities of landscape with their physical and formal counterparts. In landscape design, the evaluation of design solutions should include an account of the dynamics of landscape's experiential qualities, which are produced in the process of design. Such an approach should be less concerned with precision than with the plausibility of expressive reconstruction.

An attempt should also be made, whenever possible, to translate the speculative assumptions about the experiential qualities of landscape experience into research hypotheses. The success of such an attempt depends heavily on the application of research methods that do justice to the complexity of landscape experience by taking into consideration the subtle tones of feeling described above. Application of research methods that circumvent the problem of verbalization of experience by going into the domain of unconscious and physiological processes is a first step in this direction. The application of psychological research would open the possibility to empirically test the validity of landscape architects' assumptions about the perceived experiential qualities of landscape design. In view of the differences in landscape experience between landscape architects and the public discussed in this dissertation (chapter 2 and 3), the clarification of the experiential qualities of design should be an obligatory accompaniment to the discussion of the value of specific design solutions.

The analysis of landscape experience, the development of a taxonomy of experiential qualities and of measures suitable to the research in question is an ongoing process. For measuring the perceived experiential qualities of landscapes, a variety of methods and techniques have been developed. For each particular study methods and techniques should be selected that measure the aspects of experience in question as adequately as possible. A concise review of the methods applied in landscape perception and experience research will precede the discussion of the theoretical and methodological foundations of this dissertation.

1.4 Research methods in landscape perception and experience research

Over the last decades researchers into the experiential qualities of landscape have developed a variety of theoretical perspectives, concepts and research methods. This chapter presents a review of the psychological research into landscape perception and experience with a particular emphasis on the methods and techniques applied, rather than on theories or empirical results. Undoubtedly the ideas, conceptual frameworks and theories that drive research are of primary importance. However, we must not underestimate the importance of the research methods and techniques (questionnaires, tests, physiological measures, observation etc.), as they determine the nature of the data collected in support of these theories.

This emphasis on methods is prompted by the observation that the operationalization of research questions, the translation of ideas into feasible research strategies, may be as difficult as generating the ideas in the first place. This chapter introduces the range of research questions and techniques available to a researcher of landscape experience. It demonstrates their possibilities but also their limitations in terms of gaining insight into the perceived experiential qualities of landscapes. It will help to better understand the rationale behind the choices for the methods applied in this dissertation, which are discussed in the next section. It is not only the strengths and weaknesses of specific methods that is the subject of this review. The emphasis is on providing guidance for the selection of methods. For then the characteristics of the method and the nature of the resulting data can already be considered in terms of their suitability to providing answers to research questions.

The discussion of methodological questions outside of any theoretical framework may be considered to be a rather artificial undertaking. As a rule the nature of the theory sets bounds to the range of research methods, which can be used meaningfully. For example, for a theory explaining the stress-reducing capacity of natural environments it is necessary to estimate stress levels, using some sort of physiological measure. On the other hand, the number of ideas and theories about landscape experience worth investigating is potentially limitless, whereas the number of available methods is restricted.

As most psychological research into landscape experience has been of a quantitative nature and because five out of six studies in this dissertation are based on quantitative research, in this review I will not discuss techniques associated exclusively with qualitative research, such as action research, ethnographical research, or diary techniques. This review of psychological methods is based on

research papers published in two journals that comprehensively cover the spectrum of theories and methods of research into landscape perception and landscape experience. The two journals are *Environment and Behavior* and *Journal of Environmental Psychology*.

In this review I distinguish methods from techniques. Methods will refer to general strategies of data collection and analysis. Techniques will refer to specific measures (skin conductance or heart rate) or strategies of data collection (the choice for specific types of observational techniques). After reviewing the methods and some of the techniques of quantitative research, I will discuss a number of theoretical questions related to the choice of methods and the analysis of research data from the perspective of measurement theory. The choice for a particular method is determined by the nature of the research data generated in the process of measurement. This issue is of importance for this dissertation as attempts to gain insights into the qualities of experience confront a researcher with the problem of monitoring inner states and translating them into measurable parameters.

Five clusters of methods can be distinguished that in recent decades have been consistently applied in the psychological research into landscape experience: questionnaires, psychometric tests, psychophysical and psychophysiological methods, and observation. Theories of landscape perception and experience, as, for instance, the theory of 'restorative environments', usually rely on a combination of different methods. Sometimes different methods are applied within one study, for instance a combination of behavioural and cognitive map analysis (Holahan & Dobrowolny, 1978). In fact, it is wise to test a theory using different methods in order to prove that it is not the application of some specific method itself, which results in the theory being supported or rejected.

Questionnaires

It will hardly come as a surprise that in landscape perception and experience research the questionnaire is the most widely used technique. Although there are many established psychometric tests (see below), researchers often need to create their own measures for investigating their specific research questions. It is their versatility and the possibility of customizing them, which made questionnaires such a popular research technique. As an initial step in gathering information about phenomena in order to formulate specific hypotheses, questionnaires are nearly indispensable. A vast number of research topics have been explored using questionnaires, from the aesthetic and emotional experiences of wilderness hikers (Shafer & Mietz, 1969) to the dimensions of wilderness solitude (Hammitt, 1982), to the analysis of preferences for urban nature (Herzog, 1989) and the determinants of recreation satisfaction in camping (Dorfman, 1979).

Psychometric tests

Psychometric testing is a very common method of data collection in psychological research. Psychometric tests are fully developed questionnaires, with known reliability, validity and population parameters, as for instance the Minnesota Multiphasic Personality Inventory (Graham, 2006). Most psychometric tests are norm referenced, which means that data exist about the range of scores that can be expected from the population under consideration (Hammond, 1995). There are also criterion (performance) referenced psychometric tests with known expected standards of performance. Exact, operationally defined, concepts underlie these tests. Psychometric tests have been developed to measure an extremely broad range of mental characteristics: aptitudes, competences, personality traits, mood states, psychopathologies and attitudes. Researchers into landscape experience have applied a variety of psychometric tests, such as personality tests, the Semantic Differential (Osgood et al., 1957), the Profile of Mood States (POMS) (McNair et al., 1971), the Zuckerman Inventory of Personal Reactions (ZIPERS) (Zuckerman, 1977).

Psychometric tests are usually divided into four categories: projective tests, self-report inventories, objective tests and ideographic measures. Projective tests are primarily used in psychiatry, the Rorschach test for example. Such tests were developed to bring to the surface pathological processes, which may not be accessible to a subject's consciousness. It is unlikely that projective tests can be applied outside the clinical context. Self-report inventories, on the other hand, have been commonly used in landscape perception and experience research to measure environmental attitudes (Milfont & Duckitt, 2004) and personality factors (Stamps & Nasar, 1997). In this dissertation two self-report inventories were used: the Profile of Mood States (POMS) (McNair et al., 1971) and the Semantic Differential (Osgood et al., 1957). The latter has been slightly adapted to make it suitable for research into landscape perception and experience. Using a popular test with known characteristics saves time and, most importantly, facilitates the comparison of results between different studies.

Objective tests include tests of knowledge and performance. For instance, a performance test was applied in a study of affective restoration in which a proofreading task, finding misspellings and errors, was used as a measure of affective restoration (Hartig et al., 1991). Shibata & Suzuki (2002) applied an association task (the generation of words for given items) and a sorting task (the sorting of 180 index cards into Japanese alphabetic order) to the investigation of the effect of the presence of leafy plants in a room on the subjects' task performance. Objective tests have also been applied in studies of unconscious processes. A technique that proved to be effective in the exploration of

unconscious influences on the perceived experiential qualities of natural environments is affective priming. Stimuli that are thought to be of functional importance to the organism may elicit unconscious emotional reactions without a subject becoming aware of them. The presence as well as the type of 'hidden' emotional reactions may be deduced from participants' faster reaction times to affectively similar stimuli, for instance faces expressing specific emotions (Korpela et al., 2002); (Hietanen & Korpela, 2004). I used affective priming in this dissertation (see chapter 6) to study the experience of the Sublime in landscapes. The application of objective tests may reveal experiential states not assessable through use of research techniques that rely on verbalization of experience.

Ideographic tests focus on individual respondents. A widely applied strategy is that of a repertory grid. The technique in its simplest form requires the participants to compare and contrast sets of three elements (people, environments, objects etc.) using their own words and criteria. The method allows the respondents to choose their own concepts for the categorization of perceived experiential qualities of, for instance, built environments (Leff & Deutsch, 1973). The resulting descriptions are further analyzed using multidimensional scaling technique (MDS) in order to discern patterns of relationships between the elements (Gärling, 1976). An advantage of the grid method is that it combines the ideographic assessment of an individual's constructs with the possibility of generalization across groups of people through the use of statistical techniques.

Another ideographic measure is the analysis of cognitive maps, a measure that was initiated by Lynch (Lynch, 1960). Cognitive maps are hypothesized representations of the environment, embodying people's knowledge, beliefs and conceptions/misconceptions about the spatial organization of the environment. Asking people to draw a map of their physical environment reveals the individuals' representations of it, which can subsequently be examined for inaccuracies and distortions (Kitchin, 1994).

Ideographic tests have frequently been used to study preferences for natural scenes, particularly by means of a multiple sorting task (Zube et al., 1983; Kaplan, 1987; Scott & Canter, 1997). Respondents are usually asked to categorize a set of elements (photos of natural scenes) on perceived similarities and differences. For instance, Kaplan (1987), using a multiple sorting task, found a relationship between preferences for natural scenes and specific physical characteristics of these scenes.

Psychophysical methods

Psychophysical methods have been of distinct importance to the research into landscape experience and perception. These methods were developed as techniques for the measurement of the parameters of sensory and perceptual systems. In psychological research these methods are commonly used to find the minimum difference in the physical intensity of a stimulus that is still recognized as a difference in perceived experiential quality (e.g. two frequencies of sound that are still detected as two different sounds). This technique of threshold detection can be applied to determine various types of thresholds: between sounds, colours, or words.

Methods of visual threshold detection have only rarely been used in landscape research. Shang & Bishop's (2000) study is a notable exception. Psychophysical research into landscape perception and experience uses techniques that allow the exploration of the relationship between experiential qualities of landscapes and their physical characteristics. In general, photographs of landscapes are used. The physical features of the depicted scenes are either described minutely or measured. These features are subsequently related to preferences or to judgments of scenic beauty by means of regression analysis (Calvin et al., 1972; Abelló et al., 1986). For instance, Shafer (1969) developed a mathematical model of landscape preferences for use in the assessment of the recreation potential of landscapes. Preferences were determined by means of the combined effect of specific landscape properties, such as the perimeter of vegetation, the presence of water, the area of non-vegetation, the total area covered by clouds. In a similar study, Patsfall & Feimer (1984) examined the physical properties of landscapes that contribute to their perceived scenic quality.

The effect of specific physical characteristics of landscapes on perceived experiential qualities (safety, preference, scenic quality) can also be investigated by manipulating the physical characteristics of landscapes using photographs (e.g. by adding or taking away trees or varying tree size) (Sheets & Manzer, 1991). Variations in specific physical properties can then be related to changes in the experience of landscape. Many landscape perception studies make use of this technique, such as the study of preferred tree shapes in which different shapes and heights of trees were related to preference judgments (Summit & Sommer, 1999); (Herzog & Flynn-Smith, 2001). Another example is a study of the emotional experience of parks in which scenes representing different levels of three physical characteristics: tree spacing, density of understory growth (brush, shrubs and grasses), and presence of paths were correlated with measures of affect: pleasure, beauty, activity, satisfaction etc. (Hull & Harvey, 1989). This technique is very well suited for research in the context of landscape design as it allows correlation

of the perceived experiential qualities of landscape with their physical and formal counterparts. Therefore, it opens up the possibility of empirically testing the validity of landscape architects' assumptions about the perceived experiential qualities of landscape design. This is important both in a practical (creation of rewarding landscapes) as a theoretical sense (development of the theory of landscape experience).

Psychophysiological methods
Research into landscape perception and experience has also been characterized by an interest in the interactions between psychological and physiological phenomena. The field of psychophysiology is concerned with the manipulation of psychological variables while observing the effects of such manipulation on physiological processes (Barrett & Sowden, 1995). The behavioural consequences of physiological states, as for instance the avoidance of stress inducing environments, as well as the effects of behaviour on these physiological states have been investigated.

Much research has been done into the physiology of emotion, stress, cognitive task performance, personality. The vast array of physiological measures includes muscle activity (electromyographic EMG), galvanic skin response (SCR), electro-oculography (EOG) (eye movements), cardiac response (ECG), the electrical/magnetic activity of a mass action of neurons within the cortex (EEG/MEG), functional brain imaging (fMRI), to name but a few. The potential of these techniques has barely been touched upon within landscape perception and experience research. There are limits to their utility, however, as such techniques as a rule were developed in very different research contexts. They may be highly specific in terms of data presentation and format and many are associated with specific psychological parameters. For instance, skin conductance is particularly useful as a measure of arousal, facial electromyography and cardiac response as measures of emotional states, EEG as a measure of attentional focus and cognitive performance. Therefore, finding a physiological measure suitable to the goals of landscape research is a challenge.

Nevertheless, some of the measures have successfully been applied by researchers into landscape perception and experience. For instance Ulrich (1981) used heart rate and EEG (alpha waves) as measures of cortical arousal and found that natural environments have beneficial, stress-reducing effects. In a different study, (Ulrich et al., 1991), stress recovery during exposure to natural and urban environments was measured by a battery of physiological measures: heart period, muscle tension, skin conductance and pulse transit time (a non-invasive measure that correlates with systolic blood pressure). In a study into stress recovery after exposure to

different roadside environments, measures of blood pressure, electrodermal and facial electromyographic activity (EMG) were used (Parsons et al., 1998). In a study of preferred tree shape, preferences for shapes and heights of trees were related to measures of blood pressure and skin temperature (Lohr & Pearson-Mims, 2006). Another example of the application of psychophysiological techniques is the research into the memorization of views seen when driving along a road (Carr & Schissler, 1969). In this study, the car passengers' eye-movements were recorded and compared with the data from free recall of the journey. Finally, a study of the beneficial effects of gardening made use of salivary cortisol as a measure of arousal (Van den Berg et al., 2006).

The physiological impact of environments has been an important complement to subjective psychological data. Therefore physiological measurement has also been part of the research for this dissertation. Skin conductance data were obtained in a study of strong experiences in natural environments (see chapter 7). The rationale behind the use of physiological measures was similar to the rationale behind the use of the affective priming technique described above. The use of physiological measures may reveal experiential states inaccessible to conscious introspection.

Observation
A traditional and still very popular technique is that of observation. It enables a researcher to study behaviour as it takes place in a variety of situations. Sometimes behaviour can be sampled by constructing simulated situations (e.g. role play). However, simply watching and listening in combination with the recording or counting of phenomena generates a rich source of data. Currently, observational techniques have been enriched by the use of covert observation at a distance using GPS or radio-wave tracking devices (Shoval & Isaacson, 2007). The problem generally associated with behaviour observation techniques is the difficulty of explaining the underlying mechanisms of and motivation behind observed behaviour, as these require insights into the cognitive and emotional aspects of human functioning. This limits their value.

1.5 On the measurement of psychological states

As I mentioned in the previous section, one of the grounds for choosing a particular method and technique is the nature of the research data generated in the process of measurement. From the perspective of measurement theory, the various methods and techniques discussed above differ in their capacity to monitor inner states and express them in measurable parameters. Understanding this issue may help explain why the application of some methods may be preferable than others.

Researchers of experience are confronted with the problem that research techniques, which measure properties of experience, only to a certain degree describe the actual quality of the feeling experienced. The motivation behind the following theoretical exposition has been to borrow ideas from the theory of measurement in psychology and consider their consequences in the context of research into landscape experience.

The vast array of methods available to the psychological research into landscape experience allows the exploration of a variety of psychological processes, which are constituents of the experience of landscape. Such exploration requires the quantification and measurement of psychological states. Measurement has been defined as 'an essentially representational activity, i. e., a process of assigning numbers in such a manner as to preserve basic qualitative relations observed in the world' (Narens & Luce, 1986, cited in Borsboom, 2005: 86). The problem with the measurement of psychological states is that there is no direct access to mental characteristics; properties of mind do not lend themselves to simple physical measurement. The quality of experience is not easily expressed in words or categorized; its causes are often not accessible to conscious scrutiny.

Two approaches can be distinguished in the theory of measurement, the realist and the anti-realist approach. These approaches differ fundamentally in how they understand the relationship between abstract scientific concepts – such as intelligence, depression, stress – and concrete observations. (Borsboom, 2005: 6) From the realist perspective, theoretical constructs such as intelligence or extraversion, but also experiential qualities such as attractiveness are described as unobservable but nonetheless real phenomena, which possess causal power. For instance, the experience of a garden's attractiveness is thought to exist irrespective of whether anybody attempts to measure it or express it in words. From the anti-realist perspective, theoretical constructs or experiential qualities have no referents in reality (Borsboom, 2005: 7); they have no existential status independent of observations. From this perspective the experience of attractiveness is not merely estimated by means of numbers or words but it is constructed in the process of its estimation.

In the practice of psychological inquiry the distinctions made in the theory of measurement do not apply. The measurement of experience usually involves a number of steps. To begin with, experiential states must be conceptualized in terms of specific experiential qualities (attractiveness, interestingness). Then the experiential qualities must be made measurable by relating them to an observable entity, such as verbal description or physiological or behavioural records. Finally, the observable entities are measured by means of a technique of measurement, such

as scales, test scores, physiological records. The hypothetical property being assessed (e.g. intelligence) is linked to the measured property (e.g. score on intelligence test) by common sense only. 'Considering the inexactness of denotations of words defining constructs, it is impossible to *prove* that any collection of observables measures a construct.' (Nunnally, 1994: 106). This observation applies both to measurements of theoretical constructs such as intelligence and to the measurement of specific experiential qualities such as attractiveness.

The objectivity of measurement seems to be compromised even more when we attempt to explore people's experience of a garden by asking them to score it on a number of such 'vague' qualities as attractiveness, friendliness, or boringness, than when we attempt to measure their intelligence. In this respect Nunnally (1994: 50) makes a distinction between 'judgments', when a correct response can be given, and 'sentiments' when a preference is pronounced. In both cases, however, it remains fundamentally uncertain whether and to what extent the quality to be measured is actually present in the measurements or whether it is at all possible to express the quality to be measured in numbers. It seems that tests, which have 'correct' and 'incorrect' responses, as tests measuring intelligence have, do not suffer from this problem. By counting the number of correct answers we can differentiate between people on the grounds of an objectively determined score on an intelligence test. Assessing the scoring of a garden's attractiveness or novelty raises the question whether and to what extent the participants' judgments describe similar qualities of experience. Yet, the problem of the relationship between construct and empirical observations is the same, whether it concerns psychological characteristics such as intelligence or experiential qualities such as attractiveness.

Attempts have been made to develop empirical measures that do indeed approximate psychological characteristics. Embertson, for instance, proposes to use a substantial number of distinct cognitive sub-processes as building blocks for psychological constructs that are suitable for direct measurement. (Embertson, 1983, cited in Borsboom, 2005: 81) For the time being, however, it seems unavoidable to accept the imperfection of the relationship between psychological characteristics and their assumed empirical manifestations. A pragmatic solution to the problem is needed. Measures are 'tools' that can be used for specific purposes, such as the prediction of behaviour, differentiation between individuals, or the elucidation of complex psychological phenomena. As a consequence, the data obtained should be judged on their usefulness and not on their capacity to 'truly' represent any underlying psychological characteristics. Such a pragmatic approach

to measurement makes it possible to concentrate on the practical problems of measuring psychological properties.

The categorization of experiential qualities always entails some loss of uniqueness through the reduction of a holistic experience to a number of elementary processes and components. A holistic experience can only be explored through its categorization into sub-processes, as no quantitative methods are available with which to research the holistic experience itself. This state of affairs is not unique to the research into experience: it is just as impossible to measure an object without taking recourse to the measurement of its attributes, its particular features, for instance its length, weight or colour. It is quite legitimate to reduce a holistic experience to specific experiential qualities suitable for empirical inquiry. One needs to take into account, however, that the partition of an experience limits the interpretational and predictive power of experiments or tests. There may be a multitude of determinants of an experience that cannot be accounted for when only a limited number of sub-processes are being explored. The interpretation of results must therefore proceed with caution.

When can we assume that the reduction of experiential states to specific experiential qualities has been successful? The reduction can only be considered valid and good when it encompasses central and essential properties of experience. Only a practical solution can be proposed here, as there are no solid theoretical grounds on which to found the partitioning of a holistic and continuous phenomenon into discrete experiential qualities. It is the conceptual framework within which the research takes place that to a large extent determines the appropriateness and meaningfulness of the specific experiential qualities to be measured. In the absence of rules the choice in the end is made by common sense.

In this dissertation, the multiplicity of experiential qualities of environments was reduced to such manageable categories and basic dimensions as attractiveness and novelty or such state-variables as arousal and pleasure. The terms attractiveness and interestingness refer to real qualities of the experience of landscape. Environments are commonly judged to be attractive and interesting and people seem to be sensitive to differences in attractiveness and interestingness between environments. We can deduce from observation that their judgments are reflected in their behaviour. We can assume consensus as to the interpretation of the terms attractiveness and interestingness. Finally, attractiveness and interestingness refer to distinct, one-dimensional properties of experience.

We must not forget that we cannot measure subjective experience directly, it is usually mediated through language. Some of the research techniques described in

the previous section do not rely on verbal report. If verbal description is to be the instrument for the investigation of experience, then the choice of which descriptions of experience to use is of primary importance. There are many other words to describe a quality of experience such as attractiveness. It is not clear whether semantically associated adjectives: attractive, beautiful, inviting, picturesque, enjoyable refer to the same or slightly different experiential qualities and which of the adjectives should be chosen to represent the quality in question. Again, only a practical solution can be proposed. In this dissertation the attractiveness of an environment is the combined scores of the assessment of an environment on all of the adjectives mentioned above.

As perceptual and experiential qualities are nonverbal by nature, their verbalization may run up against the limits of language. It may well be possible, that the description of an experience of an environment generated by means of a grid method (using participants' own words and criteria) does not represent the qualities of the experience but expresses a network of verbal associations. Surprisingly, very little theoretical or empirical research has been done to elucidate the relationship between language and experience. However, Lowenthal & Riel (1972) found that experiential judgments of an environment reflect real world experiences and not just verbal associations. In their study, in the judgment of an environment (e.g. a garden) its perceived beauty was associated with order, smoothness and richness; whereas the word beauty was associated with natural, open, quiet. More research into this topic is of the utmost importance.

Self-report measures rely on the participants' capacity to consciously access and verbalize their experience, they can only explain a fraction of all that they perceive and of their behaviour. Many aspects of experience are either inaccessible to consciousness or not easily verbalized. Therefore it seems appropriate to supplement self-report data with data obtained by means of non-linguistic methods of research: objective tests of performance, physiological measures, and behavioural observations. Then self-report data on, for instance, the experience of stress, can be correlated to the level of stress-hormones in the blood, or verbal ratings of a landscape's interestingness, to arousal levels measured by means of skin conductance. The effort to elucidate the nature and origins of landscape experience must necessarily begin at the level of conscious reflection, but must then proceed into the domain of unconscious processes.

A major methodological problem that experience studies run up against is that it is difficult to access an individual's perceptual, cognitive and affective representations of their environment. Landscape experience is a holistic and constantly changing phenomenon, it will never be exhaustively accounted for.

Specific properties of experience can be explored in a systematic way. Verbal descriptors must be selected that do justice to the experiential qualities under investigation. We must accept imperfections in the relationship between words and experience as well as imperfections in the relationship between the theoretical conceptualization of experiential qualities and their observed empirical manifestations.

1.6 Six studies into landscape experience

The theoretical and methodological considerations presented above are translated into concrete research proposals in the six studies conducted for this dissertation. The studies are organized around three thematic clusters. In the first cluster (chapters 1, 2 and 3) the relationship between landscape design and landscape experience and the similarities and differences in landscape experience between professional and lay groups are investigated. The second cluster (chapters 4 and 5) considers the stress-reducing capacity of natural versus urban environments and the impact of narratives on experience. The subject of the third cluster (chapters 6 and 7) is the experience of the Sublime and the characteristics of strong positive experiences in nature. The studies were designed to be largely independent of each other. The theoretical backgrounds and research traditions as well as the specific research questions and hypotheses are discussed within the studies. Although the topics of the studies are different, all six of them are related in many ways.

The subject of this dissertation - landscape experience as a psychological phenomenon - connects the studies thematically. Many properties of landscape experience have been the subject of psychological research, yet experience as a psychological phenomenon has not been among them. When experience itself is chosen as a subject for inquiry, a more comprehensive approach to the phenomenon is required than the approaches that characterize the psychological research into the experience of landscape. To be precise, an attempt has been made to bring together the research questions, methodologies and theories from the psychological research into landscape experience and the research traditions of landscape studies.

Psychological research into landscape experience, with its emphasis on generalization, tends to represent experience as an unchanging, stable phenomenon. In landscape discourse, however, experience is taken to be of an interpretative and constructivist nature. A garden and its elements can be experienced in a variety of ways. The garden can be experienced as a romantic garden invoking a mystic sensation of a tranquil and mysterious landscape, an epitome of the romantic

illusion. This same garden can also be described as obscure and enigmatic, as an authoritarian and artificial attempt at the imposition of a certain experience. Psychological research into the experience of landscape should consider the qualities of an experience as dependent on socio-economic and cultural conditions, as time- and place-bound. Experience is a cultural product to its core. This does not necessarily mean that in different cultures different experiences are generated; rather, cultures prescribe which experiences are to be expected under given circumstances.

In the research conducted for this dissertation this constructivist perspective has been implemented in a variety of contexts. In chapter six, for instance, the sublime experience was chosen as the subject of inquiry, because it is a quite important yet unusual subject for psychological research. The culture-specific concept of the Sublime and its hypothetical experiential manifestations have been related to the actual qualities of the experience. Chapter four addresses the research tradition in environmental psychology, which generally presents urban environments as inherently deficient in stress-reducing and mood-enhancing capacities in comparison to natural environments. It was found to be an oversimplification and gross generalization. In chapter five the dependency of experience on its linguistic and cultural contexts is investigated. Two different narratives were provided to test whether they resulted in changes in the nature of an experience. In chapter two a qualitative study was undertaken from a similarly constructivist perspective. It traces the descriptions of the nature of experience in a variety of discourses on landscape meaning, aesthetics, perceptions and evaluations by landscape architects. These studies, taken together, demonstrate the importance of taking into consideration the context-dependent nature of landscape experience.

The research into the flexibility and context-dependent nature of the experience of landscape is complemented with a more conventional study of the psychological characteristics and experiences shared by groups or populations. Chapter three examines the differences between the evaluation of perceived experiential qualities of design gardens between a group of non-experts, and a group of experts, landscape architects. In chapters six and seven fear of heights, brought about by the perception of depth in landscapes, is investigated as a shared heredity, which influences the experience of landscape. In chapter four the innate human preference for nature is the subject of investigation.

The success of the integration of different perspectives into a comprehensive approach to landscape experience in part depends on the integration of quantitative and qualitative research traditions. This is particularly important as the experience of landscape is often considered to be a qualitative phenomenon first and foremost.

Chapter two is a qualitative study about the meanings and experience of landscape design, based on interviews with landscape architects. This provides the starting-point for the otherwise quantitative inquiry in chapter three into the differences and similarities between students of landscape architecture and psychology in their evaluation of design gardens.

It is not only their general approach, which bring the six studies together. A variety of methodologies are combined to research different aspects of the experience of landscape. The psychological research into landscape experience uses mostly self-report measures, which rely on participants' capacity to consciously access and verbalize their experience. However, verbal accounts of experience tend to be incomplete, the reasons for why we have particular experiences tend to be unclear. The quality of an experience is not easily expressed in words or categorized; its causes are inaccessible to conscious scrutiny. It is therefore important to supplement self-report data with data obtained by means of nonlinguistic methods of research: objective tests of performance, physiological measures, and behavioural observations. This strengthens the evidence in support of the ideas and theories under investigation and does justice to the complexity of the phenomenon of landscape experience. This combination of methods is an important principle underlying this dissertation. Verbal methods of data collection by means of interviews (chapter 2), questionnaires (e.g. the semantic differential, POMS, fear of heights) and free commentary (chapter 3) emphasize conscious reflection. They were complemented with behavioural measures (analysis of participants' photos in chapter 3), objective tests (affective priming) and physiological measures of experience (skin conductance) that are independent of the conscious verbalization of experience. This approach was designed to illustrate the benefits of various and complementary research techniques which, in combination, provide a comprehensive account of human-landscape interaction.

In each of the six studies both practical and theoretical questions related to the experience of landscape are investigated, within a general framework of landscape experience, defined as a dynamic process, as the product of interactions between individual and shared, culturally conditioned and biologically established, determinants of experience. These studies into the mixture of both stable and flexible, context-dependent aspects of landscape experience provide glimpses into how the various properties of experience are negotiated or exploited in the process of constructing of experience. The six studies of this dissertation together demonstrate the significance of the phenomenon of experience and of the possibilities of psychological research into its aspects.

1.7 The present study into landscape experience: topics and outline

Chapter 2

Central to the study in chapter 2 is a number of interviews with prominent Dutch landscape architects. The study was conducted to outline a tentative analytical framework for the mapping and understanding of the concept of beauty and related concepts by landscape architects. The interviews with landscape architects took the form of semi-structured interviews. The questions focused on a number of themes: landscape beauty and the relevance of the concept of beauty for landscape architecture, meanings and emotions in the context of landscape experience, and differences between landscape architects and users in the experience of landscape.

Analysis of the interviews provides an insight into the relationship between the concepts of beauty and experience, meaning, and emotions. It demonstrates that the aesthetic experience is an outcome of a complex interaction between the characteristics of both the object of the aesthetic evaluation and the evaluating individual. An aesthetic experience manifests itself as a rewarding feeling that is accompanied by an attribution of value to the object that evoked it. Such a feeling is the outcome of a multitude of experiences that were triggered in the process of the perception and evaluation of landscape design. The aesthetic experience, therefore, begins as a pre-semantic phenomenon that originates from our appreciation of the play of lines, shapes, colours and textures, odours, sounds. It is modified by knowledge, associations and individual preferences.

Chapter 3

Chapter 3 explores the affective and cognitive evaluations of twelve design-gardens by students of landscape architecture and psychology students. The research into the cognitive and affective aspects of architectural meaning as perceived by architects and non-architects was chosen as the theoretical and methodological background for the investigation of the similarities and differences between students of landscape architecture and psychology students in their evaluation of the gardens.

The study expands and elaborates upon the studies of architects and non-architects in three ways. In previous studies representations of built environments, photographs or slides, were used. However, a photograph probably cannot adequately reproduce the qualities of direct experience at a location. Therefore, in

this study the gardens were evaluated by participants who actually visited the gardens and judged them on location.

Design gardens were chosen to assess the differences in the affective and cognitive evaluations of the physical and formal properties of gardens between experts in landscape design and the public. The contamination of affective and cognitive evaluations by use-related properties of gardens was eliminated.

Probably the most remarkable finding of the study is, that in spite of the large variation in the designs of the gardens, no differences in evaluation were found between the professional and lay groups on eight out of twelve gardens. Also remarkable is the agreement between the expert and non-expert groups on the interestingness of the gardens, as most of the twelve gardens of the garden complex are of an unusual or experimental nature. Extrapolating from the results of the study, it seems unlikely that the experts' reliance on their own criteria and preferences should result in a low perceived quality where landscape and garden design are concerned.

Chapter 4

Chapter 4 challenges the representation of urban environments, common in the literature on restorative environments, as inherently deficient in stress-reducing and mood-enhancing capacities as compared to natural environments. Traditional methods of research were applied for measuring the stress-reducing capacity of two existing, contemporary, and inspiring natural and urban environments. The two environments were used to address another issue, currently much debated by those involved in landscape design: the impact of knowledge, of narrative, on the experience of place. The addition of historical and cultural information significantly enriched the experiential qualities of places.

Empirical evidence was found that a well-designed and attractive urban environment can have a stress-reducing and mood-enhancing power equal to that of an attractive natural environment. We also found that the addition of cultural and historical information to a natural and an urban environment resulted in an increase in interestingness and attractiveness ratings. The story behind both natural and urban environments cannot be fully reconstructed from the perception of the physical characteristics of an environment. The story as well as any experiential qualities related to them remain inaccessible to an observer and can only be revealed and appreciated by providing explicit commentary.

Chapter 5

Chapter 5 investigates the impact of narratives on the perceived qualities of the environments in the context of the research into tourist destinations. The study was designed to assess the impact of competitive narrative representations on the perceived attractiveness and interestingness of the environments. The natural and urban environments of Chapter 4 were judged to be very attractive and interesting. The question of this follow-up study is: can impressions be changed through the provision of information about environments, and if so, to what degree?

One of the conclusions of this study is that the experience of natural and urban environments resulting from the perception of the physical characteristics of an environment is not phenomenologically 'closed', but can be significantly altered by providing an explicit commentary.

Chapter 6

The experience of the Sublime in nature is the topic investigated in chapter 6. The concept of the Sublime has been, from the eighteenth century onward, most closely associated with strong experiences in nature. The experience of the Sublime is usually described as a conflicting mixture of positive and negative emotions, as a generally powerful and rewarding experience tinged with unpleasantness. The experience of the Sublime in nature has not been the subject of previous empirical psychological research.

The object was to discover whether the mixture of positive and negative emotions, the central characteristic of the sublime experience, is a real phenomenon or merely a literary fiction. It was assumed that the negative emotions associated with the Sublime result from the presence of a real physical threat in the landscape. Such landscapes, although breathtakingly beautiful, could potentially release the required paradoxical positive-negative mix of emotions.

Particularly remarkable is the finding of the study that the subjects who have a fear of heights seem to have stronger sublime experiences when confronted with landscapes seen from the edge of a cliff.

Chapter 7

The experience of the Sublime need not be the only strong experience in nature. Chapter 7 explores the characteristics of strong positive emotional reactions to exciting and beautiful landscapes in more detail.The primary goal of this study was

to determine whether the emotions that are evoked by photos of sublime landscapes are manifest at the level of the sympathetic nervous system. The results elucidate the way in which the experience of nature calls forth certain psychophysiological phenomena as well as the characteristics of strong positive experiences in nature.

Chapter 8

Chapter 8, the final chapter of this dissertation, presents a summary of the main results and conclusions of the previous chapters which is followed by a general discussion.

Chapter 2

A qualitative study of meanings, feelings and aesthetic evaluations of landscape design by landscape architects

Abstract

Many landscape designers either react with scepticism to or openly resist the representation of their work as an art-form. This may well be the consequence of the fact that landscape architects are often involved in such projects as town expansions, the restructuring of countryside, the design of public spaces and infrastructure etc. Many of these projects involve a variety of practical problems, and are subject to so many programmatic limitations and regulations that aesthetically sound design choices may seem a matter of secondary importance and any discussion of questions of aesthetics meaningless. Still, the design of beautiful and experientially rewarding landscapes remains an important aspect of the work of landscape designers, certainly for the ones involved in park and garden design. Landscape architecture possesses the unique potential of creating rich and rewarding aesthetic experiences. Landscape architects combine the aesthetic properties of natural experience with the designer's skill in creating engaging and expressive landscapes. This study has been undertaken to assess the significance of the concepts of beauty and aesthetic experience to current landscape design.

Chapter 2

A qualitative study of meanings, feelings and aesthetic evaluations of landscape design by landscape architects

Introduction.

This study has been conducted to outline a tentative analytical framework for mapping and understanding the concept of beauty and related concepts by landscape architects. The idea behind it is that the systematic analysis of the contexts within which landscape architects apply the concept of beauty might yield insights into the ways in which beauty and landscape architecture are related.

The study began with a concise search of the literature to determine how the notion of beauty is being conceptualized by landscape architects. From this literature a number of concepts have been selected which occur in the same context as the concept of beauty, such as the experience of landscape, emotions evoked by landscapes and landscape meanings. I wanted to discover how landscape architects apply these concepts when designing landscapes. I expected that the analysis of conversations held with landscape architects might give an insight into the significance of beauty within landscape architecture and would clarify how the concept of beauty is related to the other central concepts. No hypotheses about the possible nature of the relationships between these concepts and the concept of beauty were formulated.

Central to the study is a number of interviews with prominent Dutch landscape architects. The five landscape architects who were interviewed will be referred to as interviewees 1-5. Each head a design firm, while one also lectures at the Department of Landscape Architecture. We randomly assigned a number to each of the interviewees in the report of our findings in order to protect their privacy. They were selected for their eminence and experience, but also because they all design gardens and parks. This was of importance to the present study as, in a next phase, a research into the experience of beauty was to be done for which gardens designed by landscape architects were to be used.

Method

Three of the landscape architects were women and two were men. All were interviewed individually. The interviews, which took about an hour each, were carried out by the researcher at the office of the participants. Before the start of

each interview, the purpose and format of the interview were briefly explained to the interviewee.

The interviews with landscape architects took the form of semi-structured interviews. Open-ended questions were used which were made more specific if required. Such a format would allow further exploration of the relationship between the concept of beauty and other concepts within the theory of landscape architecture while at the same time providing the interviewee with the opportunity to introduce their own topics. A list of questions was prepared beforehand and used to channel the discussion, but the landscape architects were free to explain their views as they would. The interviews were recorded on a tape in view of further analysis. The questions focused on a number of themes: landscape beauty and the relevance of the concept of beauty for landscape architecture, meanings and emotions in the context of landscape experience, and differences between landscape architects and users in the experience of landscape. The range of questions was not limited to these questions, nor was the sequence of questions fixed. According to each participant's responses, the order of the basic questions was adjusted or changed and any necessary new queries were added impromptu. The projects designed by the landscape architects were used to illustrate the concepts under discussion.

Coding and analysis of data.

The interviews were typed out verbatim. During the analysis, the interview transcripts were read a number of times and coded in order to arrive at adequate description of the respondents' understanding of the concepts discussed. As this process of categorization proceeded, a way of ordering of different sub-themes gradually emerged. For each of the interviews an excel-sheet was prepared in which the relationships between the concept of beauty and the other central concepts were mapped out. The excel-sheets were used to compare the interviews with each other. After comparing the interviews and considering the relationships among them, common themes were grouped together into a hierarchical system for the final report. The organizational structure of the final report represents an overarching framework and does not mirror the order of the questions discussed during the interviews. The resulting record presents an overview of the thoughts of landscape architects on landscape beauty, meanings and emotions in the context of landscape architecture.

Analysis of the interviews.

Each of the landscape architects consider the concept of beauty of great importance to landscape architecture. They all add provisos, however.
Interviewee 1. Landscape architecture is about beauty, that is why you do it. Of all the parties involved, you are the only one who is creating beauty.
Interviewee 2. The question of beauty is important within spatial design. We don't often use the word 'beautiful'; we tend to speak of what has been well done and what hasn't. Of course some aspects of the work are about beauty, either directly or indirectly.
Interviewee 3. Of course beauty is important. We are about executing beautiful designs.
Interviewee 4. Beauty is an important but imprecise concept. Beauty is one of the aesthetical principles of landscape architecture, as are the picturesque and the sublime. It is important to distinguish between these three concepts.
Interviewee 5. The concept of beauty is an abstract concept. It depends on how you interpret it.

I did not ask my interviewees to give a definition of beauty. Yet each of the landscape architects spontaneously attempted to clarify aspects of the concept during the course of the interview. A number of striking similarities and differences emerged. Most conspicuous is that each tended to talk about both beauty and the experience of beauty. They describe the experience of beauty as the complex sum total of separate experiential qualities.

Inter. 1. Beauty relates to a comprehensive experience. Not only the visual image is important, but also scents and sounds. Such a comprehensive experience can be described by the word beauty but an alternative is the word atmosphere. You conjure atmosphere, you're a kind of exterior decorator.
Inter. 2. Beauty is what can't be described. The beauty of a place is composed of elements, it's a sum total of parts. You look at this, you look at that, you cycle past, the next day you see something else again. That is what defines the place, you add all your experiences together.
Inter. 5. I think that beauty is something that happens when you feel you merge with what you see. When something is so beautiful that you have no words to describe it. It's ephemeral, it can be gone in an instant.
Inter. 3. I prefer not to use the word beauty. I search for balance, equilibrium, simplicity and poetry. All these components together make beauty.
Inter. 4. I tend to think that beauty is becoming less and less relevant to our profession. Perhaps with the exception of gardens. Beauty implies total control, which is impossible to achieve in landscape architecture. The skies change, seasons

and colours change, the weather and the backdrop change. The word that best describes this entire experience is the sublime. The sublime is a kind of continuum from the splendid and frightening to the plain and simple. The plain not in the sense of modernist severity, but of astounding clarity. The sublime implies that some things cannot be controlled and when you realise this it may be possible to try to design not something beautiful, but something sublime.

Beauty then is a comprehensive experience. It is also associated with smallness of scale. According to the landscape architects beauty emerges from the specific characteristics of a landscape or from specific elements of a design. And personal preferences define them.

Inter. 2. To me, beauty is concrete, demonstrable: 'look at that beautiful corner', and often it emerges from specific, almost technical, solutions: from the way paving has been laid, from smoothness or roughness. As landscape architect you try to understand why something is beautiful and then use it in a design. I like specific materials, I like gravel because it has qualities of sight, sound and touch, it has different hues, its texture is even, it has sophistication. It absorbs sound, yet you hear it underfoot, it's at once hard and soft. It's both chic and informal, it's easy to use and it's colourfast.
Inter. 3. We were designing a garden in Delft and we wanted to detach it from its surroundings. So we planted rhododendrons along the fence and, now they flower magnificently, all the gaps in the fence are filled. To me that is a good solution, it's beautiful.
Inter. 5. Of course I have thought long and hard about how specific elements are experienced because all together they might bring beauty. It isn't particularly necessary to use the most beautiful details, as long as they are effective, like the subtle play of the shadows of the plants on the translucent wall in my Jaza-garden. You should always try to achieve the optimal effect by the least possible means.
Inter. 4. To my mind, beauty isn't the right word to describe the overall effect. The sublime is a better word. It is possible, however, to indicate which elements in your designs can be called beautiful.
Inter. 1. I associate beauty with grandness of scale, with drama, with large open spaces in which the shadows of clouds chase along a polder landscape, with windmills on a dyke with the sun going down. In my own designs beauty emerges from physical characteristics like repetition, rhythm, scale - a row of trees, say. Creating a specific atmosphere depends on the choice of components, proportions. Design and atmosphere go together, although a romantic atmosphere need not imply meandering shapes.

It is striking that according to the interviewees the same word – beauty – applies to both details and the whole. A flower can be beautiful but so can a landscape, which suggests that the dimensions of the experience of beauty are experienced at both ends of a scale of beauty. This shared phenomenology possibly justifies the spontaneous use of the term beauty for the description of both the detail as the whole impression. The phenomenology of the experience of beauty on both the small and the grand scale exhibits sufficient agreement to subsume them under one word: beauty. Noticeably, it is only *Inter. 4* who uses a different word, the sublime, to describe the experience of beauty on the large scale. This would suggest that differences in the phenomenology of the experience of beauty on the small and the grand scale justify the use of two different words: beauty in the case of the small scale and the sublime, which denotes a different feeling, for the grand scale.

In itself it is of secondary importance whether the word beauty or the word sublime is used to describe the experience of beauty. What is important is to understand which characteristics of the experience emerge when one moves from the beauty of a detail towards the experience of the beauty of the whole. It is also important to understand which design strategies landscape architects use to bring about an experience of beauty. The landscape architects equate designing a landscape with inventing and telling a story. It is this story, which ensures that the designed space is experienced in a specific way. It is assumed that the experiential qualities of designs contribute directly to the experience of beauty of the whole. It should be noted that different strategies are used to bring about the desired experience of the design.

Inter. 1. Experience and the experience of beauty are not readily available in a landscape. They are dependent on the things you know or recognise and on your associations. You tell a story, you facilitate experience. It's by the interventions you make that you determine the experience: you bring to view a stream, you allow things to be discovered, you create surprise and thrills, you set free the imagination, you use art to deepen the experience. The experience of landscape and meaning are closely related, and so are experience and emotion, meaning and emotion. The more you know about a place, the more layered your feelings will be. The characteristics of a place are definitive; you move with what you are given: its history, its uses, its cultural history, its fauna and flora.
Inter. 5. I wanted to give the visitors to my Jaza-garden a spatial experience, to allow them to discover my garden. To undergo a spatial experience is to see, to feel, to be aware of emotion. I wanted people to experience many things in a small space, contrasting things. Each element and each use of material has its own story to tell. I also wanted that all through the year some plant would flower or something would attract attention to itself. Not many, just a few things. I choose

elements that go together and together mean more. The sum is more than its constituent parts.
Inter. 3. My designs are guided by intuition and that implies trying to work out how they will feel. I always try to imagine what it would feel like to be in a space I am designing. In what way does this space have an influence on you, is it restful, does it have a calming influence? In Delft I designed the fence to be easy to look through. At first we wanted to use plates of glass, but then we thought it would be nice to be able to touch the plants, to pick a flower if you liked. To be able to relate to the garden. You incorporate elements in your design because they match the image, the atmosphere you are after. A wooden bench fits into a secluded garden. A concrete bench would give it a colder, harsher feel. I wanted to create a sense of gentleness.
Inter. 4. I think it a good thing to discuss the concept of experience. We almost always only talk about economic or political aspects. The concept needs to be clarified.

From these quotes it is clear that attempts are made to deepen the experience of a designed space through landscape-architectural interventions. The intention is not to provide as many experiences as possible, but to strengthen the impact through a careful selection of elements. *Inter. 2* said: 'I use water a lot in my designs, because water is lively and changeable. Water adds experiential quality. But why do I use water? In the final instance to create an experience of beauty.' In what way can the addition of experiential qualities deepen the experience of beauty? "The American Heritage Dictionary of the English language's" definition of beauty: 'Beauty is the quality that gives pleasure to the mind or senses and is associated with such properties as harmony of form or colour, excellence of artistry, truthfulness and originality.'

I consider pleasure or 'aesthetic pleasure' to be a hidden variable, which lies at the heart of the experience of beauty and which manifests itself on both the small and the grand scale. The dictionary definition of beauty is inadequate, however. Beauty is not an objective characteristic of objects. One hundred and fifty years of research in the field of psychological aesthetics has proved as much. 'Aesthetic pleasure' is a quality of experience, brought about by the perception of 'beautiful' objects. Obviously the beauty of a design need not only be described as bringing about the experience of pleasure. Landscape architects describe designs as 'good' when they are both of high quality and beautiful. This may be so because a sense of well-being is associated with each of these concepts.

Inter. 1. I think there is a strong link between the quality of a design and its beauty. The relationship between good and beautiful isn't very clear. I try to bring quality

to all the details of my designs and thus indirectly to make them beautiful: quality is in the detail. Good and beautiful are sometimes used as synonyms. If you want to make something beautiful, all the details must be right, to prevent the attention being drawn by something broken or askew or inexpertly made.
Inter. 2. The word I often use as an alternative for beauty is 'good'. We don't often talk about beauty; we talk about what is right. We work with the environment to achieve a particular effect. I strive not so much for beauty as for something both good and beautiful.
Inter. 3. 'I like it, it's a good design', is how she describes the design of her Delft garden.

A good design probably gives 'pleasure to mind and senses' as much as a beautiful design does. Which are the characteristics of a design, which bring about 'pleasure'? Theories on the experience of beauty that were formulated within the field of psychological aesthetics usually address the visual arts. They distinguish between a number of possible characteristics: 'pleasure' related to the physical properties of objects (symmetry, repetition, etc.) or to the perceived qualities of objects (novelty, surprise) or to semantics, associations and individual preferences. Each of these potential sources of pleasure are utilised by landscape architects. In a number of instances it can be shown that balance, repetition, the use of colour combinations, the creation of surprise and the arousal of interest are all used as conscious design strategies by landscape architects.

Inter. 1. Beauty is the result of repetition, rhythm, dimension. I like to repeat things or create a rhythm with them. There is no rational thought involved in spatial divisions or proportions. As to scale, I like to make the space seem as large as possible. In small projects too we try to stretch the scale in order to make the experience of space as extensive as possible, we try to achieve grandness. At the same time our designs are taut, austere, minimalist, consistent.
Inter. 2. When I design a garden I try to achieve a specific effect, for instance: making a garden look bigger or creating a suggestion that there is more to come around the corner.
Inter. 3. I look for balance, equilibrium. It's funny, you know all the rules, the golden section etc., and you recognise them in your design, even if you work purely by intuition. I must feel good about a design.
Inter. 5. You have to make sure things don't get boring. A design needs to be simple, drawn with a few sharp lines. I wanted to create many contrasts in my garden, from very closed and isolated to open. These different atmospheres determined my design. I wanted some spaces to be empty and others to be crowded or open. I know my trade. I know my plants; I know how to create beautiful combinations. I am always looking for combinations.

It seems farfetched to suggest that looking at a well-executed design or perceiving repetition and consistency has anything to do with pleasure. Even so, it seems likely that it involves pleasant feelings. In modern psychological research into the mechanisms of reward, a distinction is made between two aspects of pleasure: wanting and liking. The perception of repetition or proportion does not result in pleasure directly however; it indicates a preference for objects (wanting) that are organized according to these principles. You prefer such an object, it attracts you in a sense. In your experience this feeling manifests itself as a rewarding quality. One of the main sources of pleasure or preferences which landscape architects tap into for their designs is semantics or meanings. The interviewed landscape architects apparently relate meaningfulness to beauty.

Inter. 1. Meanings are anchors. Talking about beauty, things can be more beautiful when meanings have been attached to them. Yet, meanings can detract from the experience of beauty. A good example is a guilty landscape, the defences that you see in the Netherlands. When you experience these places as such, they no longer are just places rich in birdlife. I did a design for an area that turned out to be the earliest agricultural domain of the Netherlands, where the parcelling patterns could still be seen. The story begins to be told and it becomes the basis of the design.
Inter. 2. Meaning is a concept that has not been articulated, it's a difficult concept. Meaning, more so than beauty, is directly related to your experiences and knowledge. It's true for beauty too, but more so for meanings. Understanding meanings is a necessary prerequisite for judging a design, whether it's good or not good, and indirectly whether it's beautiful or not.
Inter. 5. On my website I give a description of the wall of the Jaza-garden. It stands for shelter and intimacy; it provides protection against the wind and shade. This has something to do with meanings, I think. It refers to things. I think this garden has a lot of hidden meanings. That sets me thinking: what you add and what you take away is very important. Whether you add a new layer to the old or do away with the old. That is what we do, in a sense. We are the ones who change the landscape because houses need to be built or recreation facilities need to be provided. You have to balance things. It is important to consider the value of what gets lost and of what is to replace it.

A variety of strategies can be used to add meaning to a design. A place's history, reflection on its intended use, on the significance of the place to the people and to the town can be used as starting points.

Inter. 2. A design contains meaning as a matter of course. It's possible to play with meaning, to let people discover them for themselves instead of spelling it out. We designed a car park for the Meetkundige Dienst (Office of Surveying). You walk

along a strip of land from the car park to the building. We gave it a pattern of stripes as on a ruler. Not literally, not exactly as a ruler, but when you've walked along it a few times, you think: "Of course, geometry." You could call that meaning.
Inter. 3. Each place has an identity. You want to strengthen this identity. It's far too easy to reach for the pretty materials. It detracts from a place's identity.
Inter. 4. Meanings provide legitimation. The demand of people for meaning, for an identity for a place emerges from a desire for a bond with that place. That interests me. All sorts of reasons, ecological or historical or other reasons can be given to legitimate your intervention. The precise reasons are subject to fashion and are chosen to get the people or the politicians behind the plans.

Finally, the relationship between aesthetic pleasure and the emotions cannot be left aside. The experience of beauty involves the emotions. An experience of beauty is a feeling itself. The relationship between meanings, beauty and the emotions is a complex one. Which can be illustrated by the following quotes.

Inter. 2. One time I designed a garden for a couple with a privet hedge around it. No way! They associated privet hedges with council houses, which in them evoked very negative feelings. To my mind, feelings can also be unconscious or indirect. A feeling of shelter, a feeling of sunshine do not relate to the garden in a direct way, but indirectly. In this way we work with emotions, with feelings. Feelings can be evoked by particular aspects of experience, for instance by the scent of a garden.
Inter. 1. The feeling of space or of being confined, open/closed, dark/light, high/low. You compose using emotions, surprises, moods: you make sure that a park doesn't evoke only one emotion. The more knowledge you have, the more multi-layered your feelings will be. How you bring this about depends on your personal signature. I prefer taut, severe, minimalist design.
Inter. 3. We jumped at the chance to create a quiet place in the centre of Delft. A place, which distinguishes itself from its surroundings and therefore draws people. We added water precisely because it brings a sense of quiet. The sound of streaming water is quiet against the hum of the city. We wanted streaming water, for stagnant water has quite a different impact from the murmuring of a stream. People react to it. I wanted people to feel good because of it. So emotion, taken in this way, is very important to the experience of my designs. My designs are quiet, I try to create balance. Others make things lively and add all sorts of things. I always try to bring poetry to a design.
Inter. 5. One of my objects is to make people happy, to give them the feeling that they are experiencing things. I like that. We have just finished a cemetery among the dunes. There was a place there with beautiful white poplars. They soared

heavenwards; it was such a strong feeling. We said: “We’re going to use this.” So we placed some benches and created a kind of outside auditorium.

From the interviews with landscape architects it becomes clear that the experience of beauty is seen as an important aspect of the experience of designs, particularly of park and garden designs. It is possibly the experience of beauty, which informs the widespread interest for garden design in countries like England. Tens of thousands of people each year visit exhibitions of garden design, such as the Chelsea Flower Show. Both a jury of garden professionals as a visitors’ jury choose the winners of these shows, and their preferences almost always diverge.

When I interviewed landscape architects I asked them about their thoughts on the differences in the experience of beauty between different groups of people, between landscape architects and users in particular. The landscape architects are of the opinion that any differences between experts and non-experts and among experts may arise from any aspect of experience, of which the experience of beauty is one form: semantics, visual perception, associations, personal preferences. All the landscape architects agreed that the real differences between experts and non-experts can be explained not from the designs or from their beauty, but from the use made of the realised designs. Various strategies are used in the design process to accommodate these differences.

Inter. 4. The main difference between the owner and the designer regards its use. As to the design itself, people usually trust your taste.
Inter. 2. It seems to me that there are a number of solutions that are equally beautiful or meaningful. A design, which all concerned parties experience as beautiful can still be rejected. That usually happens when not enough attention has been paid to specific uses or because erroneous assumptions as to the use of the place underlie the design. An example is the design of a line of light across the Museumplein in Amsterdam, which had not been intended as a footpath.
Inter. 1. There are fewer differences about beauty that there are about use.
Inter. 3. When I feel the need to find out about the experience of ordinary people, I try to talk to the users. I try to avoid telling the client I know the solution, I tell the client clearly that I want to know what the inhabitants think, because they will be using the area. I try to really take account of what the area is about, how it really works. I analyse maps and go there a few times. But you only really know when the people who live there tell you. If people experience a place differently from what you intended, it’s a sad thing. I always try to make a design strong, so people will experience what I intended.
Inter. 5. The stories that landscape architects and architects tell about how their designs will be experienced, get prettier and prettier. And then, what finally gets

done, you need a lot of imagination to recognise it from the story. When I was designing the Twiske recreation area I made a diagram to chart the activities different age groups engage in. Then I went to work with the information to determine use-related experience. Differences between landscape architects and users usually concern the use of the area. There are always groups that want things different.

The landscape architects stress that users obviously have the right to experience a design in their own ways. Beauty is in the eye of the beholder, they all agree. There will always be a variety of views. Yet users are tolerant and they seem to have little difficulty in accepting the environment the landscape architect has designed for them. Not one of the landscape architects remembers an instance of the public not understanding the intentions of the architect. The reason being that assumptions about the users' experience remain implicit, while assumptions about use often are explicit. Each of the landscape architects has their own ideas as to what causes the differences in experience between experts and non-experts.

Inter. 1. Differences between experts and non-experts are related to spatial imagination. The story I think up for myself becomes less important in later stages. It's a means, not an end. Everyone has the freedom to see or experience what they will. A visitor needn't subscribe to the landscape architect's interpretation. The experience of beauty can arise from all sorts of things. If the story is not understood, people may come to a negative opinion. Cultural differences can lead a foreigner to dislike a landscape of ditches. On the other hand I doubt that the differences are very large, I'm only human too.
Inter. 3. I can have all sorts of intentions of people feeling this or that, but whether they really do depends on their own emotions. You can put a happy person in a garden or a depressed person. Each will experience the garden differently, be more or less open to the experience.
Inter. 2. Differences as to what is thought beautiful between experts and non-experts usually are the result of differences in knowledge. When I see a garden with a bit of lawn and three conifers and three plants and three bushes, I read it as a design made by a gardener who has been taught that a composition of uneven numbers is more beautiful that one of even numbers and therefore plants three of each: stereotypical, lacking in imagination. For the users of a garden who are involved with the garden things are different. They think the garden is beautiful. But what exactly do they think beautiful? They've lived there ten years and tended the garden and they've seen the trees grow. Meanings can also be a source of conflict. Meanings can be rejected because they give rise to the 'wrong' associations, as with the Meetkundige Dienst (Office of Surveying). They are whiz

kids and that is what they wanted emphasized, not ancient techniques of measurement.
Inter. 5. Everyone can tell their own stories about my garden. If you are open to the world you see a lot and experience a lot. If you are introverted you are also experiencing an emotion, but you see nothing. People are different.
Inter. 2. Personal preferences are very important to the experience of beauty. I associate conifers with... I detest them. It's not that they aren't lovely trees, but they are always used in the wrong way or in really ugly gardens. They have a negative meaning for me, while to other people they mean a nice villa garden. I once designed the grounds of an old people's home. To my mind I had incorporated lots and lots of flowers, only they weren't the flowers old people see as flowers: roses, marigolds, geraniums, that kind of stuff. And they didn't like the lawn that was a sea of ragged robins in spring either. It taught me that the feelings and associations people have can be quite different.

There are also differences among the landscape architects, especially on the question of the choice of design strategy, but also about the right design. I'll let the landscape architects explain.

Inter. 2. There is some consensus among the people at the office about what is and what is not beautiful. Differences between landscape architects usually arise in the context of meanings. One sees a park as green and strongly contrasting to the city: quiet and relaxing, simple and open, grass and trees, the experience of nature the central one. Another sees it as part of the city with different means. Many people go there and all sorts of things are happening and it's a big party and it so happens there are trees too. The differences are not about the interpretation of meanings; there is some consensus there, but about which meanings to choose.
Inter. 3. At one time we investigated whether designers who present their designs with a variety of stories really use these ideas in their designs and keep them in mind. Then you discover that your experience is as the landscape architects expected, but that even so you may not like the design at all.
Inter. 5. When I was designing the Twiske, that was in the seventies, I didn't think that it shouldn't be too straight, for people want to wander and daydream, and that you can't do along straight paths. Al least I didn't think so. So that's how I designed it and many colleagues criticised the design. For it wasn't a strong and clear design, they said. The people who use it however are very pleased, and I designed it for them, not for my colleagues. But when we talk about simplicity and clarity, about meaning, we agree. But what the users will experience only time will tell.

There is one more theme I would like to draw attention to. As I have said before, the theories of psychological aesthetics were developed in the field of the visual arts, of painting particularly. Many of the themes can, as we have seen, be applied equally to the theory of beauty in landscape architecture. Yet there are differences.

Inter. 1. There is one characteristic of beauty in landscape architecture that is different from for instance architecture. Not all aspects of the design can be determined in advance. Bushes may grow in ways different than anticipated in the design. There is always a certain untidiness and unpredictability. My second remark is about the restrictions on your freedom; sometimes you have to adapt your design to a pre-existing situation.
Inter. 3. What is special about designing a garden for instance is that it takes time to develop. You try to tie down in tour design what is fragile. And again, maintenance is of central importance to the experience of beauty. And there are so many parties involved and you have to try to please every one of them.
Inter. 2. The design of gardens provides more opportunities for personal expression by the landscape architect than do other kinds of projects. You have more freedom, there are no programmatic demands and you can pay more attention to creating beauty.
Inter. 5. Maintenance is very important for the experience of my Jaza-garden. And you have to design a garden that will look good in the future too. We adapt ourselves to the place. And to what can't be controlled, for a garden is a foreground to a background.
Inter. 4. In the experience of landscape architecture many different interests coincide. Beauty is only one of them and you need to be aware that beauty is not the priority in many projects. I have received insufficient aesthetical training, particularly from Wageningen. Following the right procedures would always result in a good design, it was said. Whether it was beautiful or not was immaterial. It's legible, clear, comprehensible. We should change the way we design, we should incorporate the aesthetic, but also the uncontrollable.

Conclusion.

The analysis of the interviews provides an insight into the relationship between the concepts beauty and of experience, meaning, and emotions. It demonstrates that the aesthetic experience is an outcome of a complex interaction between the characteristics of both the object of aesthetic evaluation and the evaluating individual. As in the aesthetic experience of art, the aesthetic experience of landscape design involves the perceptual exploration of physical properties of a designed environment: colours, shapes, texture, and formal organization. However, the aesthetic experience of landscape design is more involved and comprehensive

than the experience of other art-forms. It includes the experience of sounds, odours, the play of light and shadow, wind and temperature.

The aesthetic experience of landscape design is enhanced by knowledge, as, for instance, the recognition of plants, the perceived meanings and narratives through which the physical properties of the environment are interpreted and evaluated, evoked associations and memories and emotional reactions.

An aesthetic experience manifests itself as a rewarding feeling that is accompanied by an attribution of value to the object that triggered it. Such a feeling is the outcome of a multitude of experiences that were triggered in the process of perception and evaluation of landscape design. The reward that the experience brings about is the complex sum of rewarding qualities, for instance, the recognition of a favourite flower or the perception of symmetry or repetition. The aesthetic experience of parks and gardens, therefore, begins as a pre-semantic phenomenon that originates from our appreciation of the play of lines, shapes, colours and textures, odours, sounds etc. It is modified by knowledge, associations and individual preferences as well as perceived emotional reactions, for instance: spatial organization can contribute to feelings of uncertainty, comfort or curiosity. It is therefore practically impossible to provide a comprehensive account of all the potential triggers of an aesthetic experience.

One of the outcomes of this study is that the conceptualisation of beauty and aesthetic experience can only be meaningful when its interdependency with the related concepts of meanings, emotions, and experience is taken into consideration. It is only this kind of approach that can do justice to the dynamic character of aesthetic experience. As in Berleant's (1998) call for a new aesthetics that would 'resist the tendency of essentialist thinking, identifying single forces and factors for the illumination of the aesthetic process, such as emotion, expression, or meaning, and looks instead for complexities, for characteristic groupings of influences, interrelationships, contexts etc'.

Finally, the concept of beauty as a description of the rewarding experience brought about by the aesthetic evaluation of landscape design has no adequate synonyms. It can not be replaced by frequently used concepts as 'quality' or 'atmosphere' without loss of meaning. Quality can be achieved in the absence of beauty and the recognition of an atmosphere does not necessarily transform into an aesthetic experience. The concept of beauty describes the pleasure an aesthetic object gives to the mind and senses.

Chapter 3

Evaluations of design gardens by students of landscape architecture and non-design students: a comparative study

Abstract

In our study we explore similarities and differences in the evaluations of twelve design gardens by students of landscape architecture and psychology students. The participants in our study visited the gardens and judged them on location. We used a questionnaire to assess similarities and differences in the evaluations of gardens by the two groups. We also provided the participants with the opportunity to describe their experience of the gardens in their own words, using their own evaluative criteria. We found significant differences between the two groups on the evaluation of four gardens. The analysis of the physical properties of the four gardens gives some clues as to what may have caused the differences, as they were 'minimalist', 'art-like', 'experimental', and 'traditional' gardens. In contrast, in spite of the large variation in the design of the gardens, no differences in evaluation were found on eight out of twelve gardens. The results of our study suggest that a high level of appreciation may be expected from the public for unusual formal designs of gardens while alerting the experts to the physical and formal properties of gardens most likely to raise conflict.

Chapter 3

Evaluations of design gardens by students of landscape architecture and non-design students: a comparative study

1. Introduction

In the present study we explore the affective and cognitive evaluations of design-gardens by students of landscape architecture and psychology students. Traditionally the debate on the public's experience of park and garden design has focused on the use value of parks and gardens (see Smardon, 1988, for a review). Few studies consider the public's appreciation of the physical and formal properties of parks and gardens, a notable exception being Őzguner and Kendle's (2006) study of the attitudes of the public towards 'formal' versus 'naturalistic' park design. There has been little research into or critical interest in the similarities and differences in the aesthetic appreciation of parks and gardens between professionals involved in landscape design and the public. An exception would be the research into differences between landscape designers and the public with regard to the perceived attractiveness of ecologically sustainable environments (Mozingo, 1997). This research shows that the general public perceives designs favouring ecologically sustainable landscapes as unattractive and undesirable (Nassauer, 1995). Anecdotal evidence suggests that the attempts of designers at integrating the aesthetics of users into park and garden design is hampered by the experts' reliance on their own preferences and criteria of excellence (Yu, 1995).

The lack of knowledge about similarities and differences between landscape architects and the public in the evaluation of parks and gardens, or landscape in general, is surprising, considering the wealth of empirical research into the evaluation of architecture by architects and non-architects. This research has, from the end of the 1960s onward, focused on the evaluation of the meaning of architecture. The communication of meaning has been considered instrumental in creating 'physical environments which can be satisfactorily perceived, felt and used' (Hershberger, 1970). The critical discussion of the meaning of architecture was inspired by attempts at integrating the users' perspective into the design process. Consequently, a substantial amount of research was done into the evaluation of use-related properties of buildings and into the attribution of meaning to the built environment by architects and non-architects.

We have taken the research into cognitive and affective aspects of architectural meaning as perceived by architects and non-architects as the theoretical and methodological background for our study of similarities and differences between students of landscape architecture and psychology students in their evaluation of design gardens. We applied the methodology frequently applied in studies of architectural meaning: the semantic differential, as we wanted to be able to compare the results of our study to the findings of the research into the similarities and differences between design professionals and the public in their evaluation of architecture.

The semantic differential is a questionnaire based on a series of seven-point bipolar rating scales (see Table 1). Osgood, Suci, and Tannenbaum (1957) developed the semantic differential as a tool for measuring the connotative meanings that people attribute to concepts. Factor analyses of their data consistently revealed three dimensions of connotative meaning emerge: evaluation, activity, and potency. The description of these three dimensions suggests that connotative meanings include both cognitive and affective components (Osgood *et al*., 1957, p. 72-73). However, Osgood (1969) later regretted the use of the term connotative meanings and described the semantic differential as an instrument measuring only affective components of meaning. We will return to this issue in the discussion section.

We first briefly review the findings from research into the similarities and differences between architects and non-architects in their evaluation of architecture. Then we describe our study in which we compared experts' and non-experts' evaluations of design gardens.

1.1 Experts' and non-experts' evaluations of architecture

A growing and ever more refined body of evidence suggests that architects both conceptualise and evaluate architecture in ways different to the public (Nasar, 1998). According to Rapoport (1982, p.19) 'designers tend to react to environments in perceptual terms, whereas the lay public, the users, react to environments in associational terms'. When asked to evaluate buildings the professional and lay-groups generate differing categories and concepts. For instance, Groat (1982) used a multiple-sorting task to compare the evaluation of Modern and Post-Modern architecture by a group of architects and a group of accountants. She concluded that architects and accountants employ different sets of criteria for evaluating buildings. To accountants building type and preference are important concepts whereas to architects the aesthetic characteristics of the buildings (form, design quality) are central. Devlin (1990), using unstructured interviews, explored the similarities and differences between the concepts generated by architects and non-

architects in their evaluation of two office buildings. Most architects commented on the aesthetic qualities of buildings: form, style, historic significance, design approach, and design quality. To non-architects preference was the most frequently mentioned evaluation criterion. Pennartz and Elsinga (1990) concluded that professional and lay groups assign different values to different concepts. To architects the aesthetic nature of buildings (potency, interest, and excitement) is more important, whereas non-architects are more concerned with the pleasantness of buildings (spaciousness, comfort, cheerfulness).

The differences in conceptualisation found in studies that employed concept-generating methods are corroborated by studies in which the professional and lay groups were compared on a number of pre-specified concepts. In one of the earlier studies Hershberger (1970) compared the evaluation of a wide range of building types, styles and properties by a professional group of architects and a lay group. He reported fewer differences between architects and non-architects on what he described as perceptually related dimensions of architectural meaning (potency, spaciousness, and organization) than on the affective and evaluative dimensions (novelty, excitement, pleasantness). He found that one third of the buildings that architects would judge to be good, pleasing, beautiful, interesting, exciting and novel would be judged by non-architects as bad, annoying, ugly, boring, calming and common. Gifford, Hine, Muller-Clemm, and Shaw (2002) compared a group of architects and a lay group as to their evaluation of perceived complexity, friendliness, ruggedness, originality, clarity, and meaningfulness of buildings. The two groups differed in their evaluation of the overall aesthetic quality of particular buildings as well as in their judgement of which buildings best exemplified the six cognitive and affective properties. Devlin and Nasar (1989) found that to architects, what they describe as 'high' residential architecture was more pleasant, relaxing, exciting and meaningful. Non-architects evaluated 'popular' architecture in exactly the same terms. There was more agreement on two other evaluative criteria: both groups considered 'high' architecture novel and more complex.

It has been suggested (Gifford *et al*., 2002) that differences between architects and the public in the categorization and evaluation of architecture may well indicate that their appreciation of the built environment will differ too. Nasar and Kang (1989) used the criteria formulated by the jury for the selection of the winner of a competition for the design of The Ohio State University Centre for the Visual Arts, to assess the public's evaluation of the competition entries. They found that local residents, students, and faculty of The Ohio State University, after having judged five competition entries by the jury's criteria, came to very different conclusions. The public ranked the winning entry as their third or fourth choice. Brown and Gifford (2001) found that architects do not only evaluate architecture differently

from the public; they seem to be unable to predict the public's evaluation of buildings. When asked to predict non-architects' overall impression of buildings, the architects agreed among themselves in their predictions of what laypersons were expected to prefer but were in fact unable to predict which buildings laypersons would like or dislike.

A number of proposals have been made for the explanation of the differences between experts and non-experts. A greater familiarity with architecture and differences in environmental experience have been suggested (Devlin & Nasar, 1989), as well as familiarity with current values in architecture (Herschberger, 1970). Socialisation during professional education may systematically instill an evaluative system (Wilson, 1996). According to Wilson, over the course of an architectural education, architecture students develop increasingly abstract and differentiated concepts for the organization of their knowledge. Whitfield and Wiltshire (1982) demonstrated that the degree of similarity in judgments between design lecturers and their students increased and between students of mathematics and design students decreased over the training period at the university.

Purcell's (1986) discrepancy model proposes a mechanism behind the inter-group differences in meaning. He links ongoing environmental experience to a matching process between incoming information and a schema formed from past experience. Affective response occurs when there is a mismatch or discrepancy between the attributes of the current instance and of the prototype. Empirical evidence for his theory is derived from a study in which Purcell (1986) asked architecture students and non-architecture students to rank church buildings on prototypicality and relate them to measures of preference, attractiveness, and interestingness. Both groups were similar in their judgments of the goodness of example and preferred moderate discrepancy from their good examples. However, what is attractive, preferred, and interesting to the architecture students was found to be more discrepant from the underlying schema than for the general student group.

This short summary of findings of the research into similarities and differences between architects and non-architects would be incomplete without referring to intra-group differences in the evaluation of architecture. Architects as well as laypersons vary as to their opinions (Hubbard, 1996). Wilson (1996) found that differences between evaluative judgments of architecture students depended on which architectural school they attended. The public's responses to architecture may also vary in accordance with differences in age and education - the desirability of contemporary building styles increases with education and decreases with age (Nasar, 1989), status - the occupants of office buildings have less favourable opinions about their buildings' qualities than viewers (Marans and Spreckelmeyer,

1982), and economic status - clients of architects, who are mostly male and wealthy, have similar preferences for building styles as the architects (Nasar, 1989).

In conclusion, the differences between architects and the public primarily concern the affective component of meaning. This has been confirmed in a number of studies employing diverse samples of subjects, stimuli, and response items. The differences between expert and non-expert evaluations have also been the subject of research in fields other than architecture, such as paintings (Winston and Cupchik, 1992), chairs (Whitfield and Wiltshire, 1982) and person-built and natural settings (Kaplan, 1973). Experts and non-experts in these fields tend to conceptualise and to evaluate differently, in ways similar to those found in architectural studies.

1.2 The present study

For our study we adapted the framework applied to the investigation of similarities and differences between architects and non-architects to the domain of landscape architecture. We assume that the creation of experientially rewarding landscapes is as important as the creation of attractive built environments. We also assume that landscape architects are interested in improving their ability to predict how people evaluate the landscapes they design. Landscape architects must then be provided with reliable and valid information about the relationship between the formal and physical properties of landscape design and the public's thoughts, feelings and behaviour. We consider the current study to be a step in this direction.

Our study expands and elaborates upon the studies of the similarities and differences between architects and non-architects in three ways. In previous studies representations of built environments, photographs or slides, were usually used for assessing the differences between experts and non-experts. However, a photograph probably can not adequately reproduce the qualities of direct experience at a location. Therefore, in our study the gardens were evaluated by participants who actually visited the gardens and judged them on location.

As was done in the studies of built environments, we used a questionnaire based on the items of the semantic differential (Osgood et al., 1957). In addition to evaluating the gardens on the predetermined items of the questionnaire, we asked the participants to describe their experience of the gardens in their own words and concepts. This qualitative method of data collection allowed us to investigate in greater detail the relationship between the affective and cognitive evaluations and the appearance of particular gardens.

Finally, our choice of design gardens allowed us to concentrate on the differences in affective and cognitive evaluations of physical and formal properties of gardens between experts in landscape design and the public. The interference of use-related properties of gardens on the affective and cognitive evaluations is eliminated, which strengthens validity.

As our questionnaire consisted of items of the semantic differential, we expected that a dimensional structure similar to the three-factor solution found in previous studies would emerge. Extrapolating from research in the field of built environments, we expected differences between the students of landscape architecture and psychology in the evaluation of design gardens on two of the three factors (evaluation and activity) but not on the third factor (potency). Finally, we expected that the similarities and differences between the two groups in their evaluation of design gardens assessed by means of the semantic differential would be confirmed in the analysis of the qualitative data.

2. Method

2.1 Research setting

The research was conducted at one location, the garden complex Makeblijde in Houten in the province of Utrecht (the Netherlands). The complex is a three hectares large park where individual gardens have been laid out. The garden complex, which opened in 2000, aims to provide an opportunity for people to become acquainted with garden design. In 2006 the garden complex consisted of twelve gardens designed by prominent Dutch landscape architects. All gardens are unique, varying in style from the experimental to the traditional. A short description of the features of the gardens together with some photos can be found in Appendix 1.

Makeblijde is integrated into the green town edges of Houten and is separated from the surrounding landscape by a beech hedge. A central axis connects the information pavilion at the entrance with the gardens. Two open areas within the garden complex have been set aside for an orchard and a cornfield. A small stream runs through the centre of the complex. The gardens have not been laid out in strict order, some are clustered together, others set apart. Makeblijde presents itself as an experimental stage; the designers' creativity has not been confined by the numerous programmatic limitations and regulations that ordinarily constrain the freedom of making aesthetically sound design choices. All the gardens have comparable maintenance levels, usage, and surroundings and have been allocated

similar budgets. The size of the gardens varies from 120 to 600 square meters. The exact size may be of only relative importance as the smallest garden is situated within the surrounding park whereas one of the larger gardens has been virtually separated from it by a wooden fence.

2.2 Participants

The participants, who took part in the study on a voluntary basis, were 14 psychology students at the University of Amsterdam and 12 students of landscape architecture at the University of Wageningen. The average age of the psychology students was 20.2 years (*SD* = 2.05). They were six women and eight men. Psychology students have an obligation to take part in experiments and were given course credits for their participation in this study. The average age of the students of landscape architecture was 21.9 years (*SD* = 1.12). They were six women and six men. All were finishing their bachelor programme and had had three years of professional training at the university. The students of landscape architecture were rewarded with a 15-euro book voucher.

The use of students as respondents may appear to be a potential limitation of the study. However, the literature suggests that this factor is unlikely to compromise the findings. In a review on the demographic effects on environmental preference with more than 19,000 respondents from 21 countries and 3,281 environment, the correlation of environmental preference obtained from students as compared to all other demographic groups (country, ethic affiliation, political affiliation, gender, design experts, members of special interest groups, children) was $r = .83$. This is more or less the same as the average correlation between all demographic groups ($r = .82$) (Stamps, 2007).

2.3 Procedure

The study was conducted in June 2006 over four days. Both groups could choose one of two dates to visit the garden complex. The participants were asked to bring a digital photo camera to the location. Upon arrival, each of the participants was issued a folder with three pages of instructions, a map of the garden complex and a randomly generated personal sequence in which the twelve gardens were to be visited. The folder also contained questionnaires that were to be filled out in each of the gardens. The participants were asked, before filling out the questionnaires, to take a number of photos of elements in the garden that had affected their experience of it. For each photo participants completed a sentence, which began ‘I took this photo because’. By means of this procedure we wanted to prompt the

participants to have a careful look at the gardens as well as to provide them with the opportunity of commenting on their experience of the gardens in their own words. After taking the photos of a garden the participants filled out a twenty-two item questionnaire and answered two open-ended questions on how they would describe the atmosphere in the garden and whether there were any properties of the garden, which had affected their experience of it but could not be recorded on a photo. It was not obligatory to answer the questions. After judging the gardens the folders were returned to the researcher.

2.4 Measures

The questionnaire we used was a shortened version of the original 76-item semantic differential developed by Osgood *et al*., (1957) in an attempt to subject connotative meaning to quantitative measurement. The semantic differential consists of seven-point bipolar rating scales ('ugly-beautiful', 'good-bad', 'strong-weak', 'fast-slow' etc.) on which the subject could indicate to what degree the scale applies to a concept. Our shortened version of the semantic differential was based on an adaptation of the original items for the Dutch language and culture-space by Jansen and Smolenaars (1966). It consists of 22 seven-point rating scales suitable to the scoring of gardens (Table 1).

All except three of the items used in this study can be found in the original 76-item version of Osgood *et al*., (1957). For some of the 22 items, synonyms suggested by Osgood *et al*., (1957) were used instead of original items because these were considered better suited to the judgment of gardens (e.g. 'still-lively' instead of 'dead-alive'). In his original study Osgood described these synonyms which were not selected for the 76-item version of the semantic differential as 'scales that would have clustered closely about the one selected, in the factor space, had they been used' (Osgood *et al*., 1957, p. 48). Three of the 22 items we used in our questionnaire were added to the semantic differential after it was adapted by Jansen and Smolenaars (1966) for use in the Netherlands. Two of the three items do not have exact equivalents in the English language and can be translated as 'cheerless-cosy', 'sombre-cheerful'. The third item was 'even-varied'.

Table 1. The Semantic Differential.

1	ugly	1 2 3 4 5 6 7	beautiful
2	quiet	1 2 3 4 5 6 7	busy
3	dull	1 2 3 4 5 6 7	exciting
4	cluttered	1 2 3 4 5 6 7	ordered
5	simple	1 2 3 4 5 6 7	complex
6	cheerless	1 2 3 4 5 6 7	cosy
7	even	1 2 3 4 5 6 7	varied
8	average	1 2 3 4 5 6 7	exceptional
9	unpersonal	1 2 3 4 5 6 7	personal
10	unfriendly	1 2 3 4 5 6 7	friendly
11	shabby	1 2 3 4 5 6 7	chic
12	sombre	1 2 3 4 5 6 7	cheerful
13	closed	1 2 3 4 5 6 7	open
14	hard	1 2 3 4 5 6 7	soft
15	still	1 2 3 4 5 6 7	lively
16	repulsive	1 2 3 4 5 6 7	inviting
17	uninteresting	1 2 3 4 5 6 7	interesting
18	restful	1 2 3 4 5 6 7	restless
19	unbalanced	1 2 3 4 5 6 7	balanced
20	uncomfortable	1 2 3 4 5 6 7	comfortable
21	unpleasant	1 2 3 4 5 6 7	pleasant
22	unenjoyable	1 2 3 4 5 6 7	enjoyable

3. Results

The data from the questionnaires obtained from each respondent group were first subjected to separate factor analyses and then the sets of factors obtained were compared. Major differences in the distribution of items on factors between landscape architects and psychology students would suggest disagreement in evaluative dimensions between the two groups. In this event further comparison between the groups would be spurious since the groups, in effect, would not share common evaluations.

For each group, judgments on the 22 items were submitted to principal components factor analysis with Varimax rotation (SPSS 12.0.1). The participants' ratings of gardens per person and per garden were inserted as cases and the 22 items as variables. A three-factor solution emerged for both groups. The three factors that were found for each of the groups consisted of virtually the same items. Only one of the 22 items, 'simple-complex', loaded on one factor for one respondent group and on another factor for another respondent group. The factors are therefore

considered stable between the two groups. The ratings of the gardens by the two groups were pooled together with a view to further investigation of the dimensionality of the experience of gardens as well as to comparisons between the groups.

As a next step in the analysis, factor analysis was applied to the data of all 22 items and all 26 participants (14 psychology students and 12 landscape architecture students). The matrix generated consists of 22 variables by 312 cases. Factor analysis with Varimax rotation produced three factors with a total amount of explained variance of 66.42 percent (Eigenvalue ≥ 1.0). Factorial composition was determined by including all items with a factor loading greater than .40 on a given factor. In an ideal case we expected a single significant loading on only one factor for each item. Four of the 22 items, however, had split-loadings. The variables 'restful-restless', 'even-varied', and 'simple-complex' had high loadings on factor 2 as well as factor 3. The variable 'unpersonal-personal' had high loadings on factor 1 as well as factor 2.

Therefore we decided to derive a new factor solution after eliminating these four variables. Factor analysis with Varimax rotation, applied to the reduced data of 18 items and 26 participants, produced three factors with a total amount of explained variance of 69.2 percent (Eigenvalue ≥ 1.0; see Table 2). The internal consistency (Standardized Cronbach's alpha) of the items falling under each factor was as follows: factor 1 = .94, factor 2 = .85, factor 3 = .72.

Table 2. Factor Analysis of the Data of Both Groups on 18 Scales, Total Variance Explained.

Factor	% of Variance
1	41.134
2	15.197
3	12.855
Total % of Explained Variance	69.186

The three factors are easy to interpret. Factor 1 includes 12 of 18 items. The items with the highest loadings are: 'unfriendly-friendly', 'unpleasant-pleasant', 'somber-cheerful', 'cheerless-cosy', 'unenjoyable-enjoyable' etc. (Table 3). This factor was called 'attractiveness'.

Table 3. Factor Loadings of Both Groups on 18 Scales.

	Factor		
	Attractiveness	Novelty	Organization
Unfriendly-Friendly	**.883**	-.035	.167
Unpleasant-Pleasant	**.871**	.121	.145
Sombre-Cheerful	**.845**	.007	-.068
Cheerless-Cosy	**.827**	.191	.108
Unenjoyable-Enjoyable	**.827**	.196	.190
Still-Lively	**.799**	.192	-.153
Repulsive-Inviting	**.782**	.209	.178
Uncomfortable-Comfortable	**.763**	-.215	.241
Hard-Soft	**.740**	-.096	.043
Ugly-Beautiful	**.725**	.386	.245
Shabby-Chic	**.592**	.112	.372
Closed-Open	**.548**	-.327	.250
Uninteresting-Interesting	.257	**.877**	-.026
Average-Exceptional	-.181	**.849**	-.120
Dull-Exciting	.228	**.844**	-.133
Cluttered-Ordered	.171	-.013	**.806**
Quiet-Busy	.031	.179	**-.784**
Unbalanced-Balanced	.214	-.078	**.734**

Factor 2 contains three items: ‘uninteresting-interesting’, ‘average-exceptional’, and ‘dull-exciting’. It was called ‘novelty’. The remaining three items contributed to factor 3: ‘cluttered-ordered’, ‘quiet-busy’, and ‘unbalanced-balanced’. This factor was called ‘organization’. We concluded that the reduction of 18 items to three factors generated a comprehensible structure. In Table 4 we compare the judgments of the twelve gardens by psychology students and students of landscape architecture. The table includes the mean scores per garden on items belonging to each of the three factors.

The results of the factor analysis were used to express the judgment of each person per garden in factor scores on each of the three factors. The factor scores of subjects of both groups per garden were used to analyse on which gardens and on which factor the experiences of the two groups differ. Three SPSS-files were generated corresponding to the three sets of factor scores on ‘attractiveness’, ‘novelty’ and ‘organization’. Each file consists of 312 cases (12 gardens by 26 participants).

Table 4. The mean scores and standard deviations per garden on scales belonging to each of the three factors.

Garden	Attractiveness		Novelty		Organization	
	St. Psy.	St. L. A.	St. Psy.	St. L. A.	St. Psy.	St. L. A.
1	2.40/1.54	2.13/1.23	4.83/1.54	4.81/1.82	4.38/1.83	4.56/1.63
2	5.98/0.98	5.29/0.98	4.95/1.64	3.08/1.32	4.33/1.84	4.53/1.63
3	5.03/1.56	4.87/1.41	6.12/1.06	5.78/0.83	4.55/2.13	4.69/1.60
4	4.45/1.68	4.36/1.45	5.48/1.31	6.14/0.90	3.98/1.93	4.28/1.28
5	5.22/1.32	4.51/1.21	4.36/1.51	3.78/1.46	4.81/2.02	4.44/1.52
6	5.29/1.16	4.95/1.04	4.31/1.83	3.5/1.34	4.36/1.54	4.39/1.42
7	2.90/1.60	3.12/1.19	3.60/1.90	3.83/1.23	3.60/1.78	3.61/1.46
8	4.11/1.66	5.09/1.17	2.60/1.73	3.17/1.48	4.67/2.35	4.47/2.30
9	3.72/2.0	3.40/1.71	6.31/0.72	6.17/0.91	3.52/1.99	3.56/1.65
10	4.64/1.53	4.95/1.16	5.07/1.33	4.94/1.07	4.38/1.99	4.28/1.60
11	4.92/1.20	5.08/0.97	3.55/1.27	3.72/1.30	4.17/1.53	4.39/1.32
12	4.19/1.52	5.02/1.16	5.5/1.25	5.17/1.08	4.29/1.53	4.75/1.5

Note: all entries M(SD).

A mixed between-within subjects ANOVA (Tabachnik and Fidel, 2001) was performed to investigate the effect of group membership on the evaluations of gardens' attractiveness, novelty, and organization. Group membership 'group' is a between-subject variable and factor scores on twelve gardens 'garden' is a within-subjects variable. For all statistical tests an alpha level of .05 was maintained.

There is a statistically significant main effect for garden on the first factor 'attractiveness' [$F(11, 264) = 14.9$, $p < .0005$]. It suggests that the twelve gardens are evaluated differently on attractiveness factor. The main effect for group is not significant [$F(1, 264) = .06$, $p = .80$]. It suggests that there is no overall difference between the two groups in their evaluations of the twelve gardens. There is a significant interaction effect garden*group on the attractiveness factor [$F(11, 264) = 2.2$, $p = .016$]. The significant interaction effect suggests that the two groups evaluated the attractiveness of some of the gardens differently. The difference between the two groups is most manifest in the experience of three gardens: 2, 8, and 12 (see Table 5).

Pairwise comparisons indicate that garden 8 is significantly more attractive for students of landscape architecture than it is for psychology students [$F(1, 264) = 5.9$, $p = .016$]. Similarly, garden 12 is judged by students of landscape architecture as being attractive, whereas psychology students find it significantly less attractive [$F(1, 264) = 4.3$, $p = .038$]. Garden 2, on the other hand, is judged as more

attractive [$F(1, 264) = 4.2$, $p = .040$] by psychology students than by students of landscape architecture.

Table 5. A mixed between-within ANOVA. The difference between the two groups per garden on Factor 1 'Attractiveness'.

Attractiveness	F	*p*
Garden 1	.879	.349
Garden 2	4.241	**.040**
Garden 3	.415	.520
Garden 4	.310	.578
Garden 5	2.481	.116
Garden 6	1.635	.202
Garden 7	.492	.484
Garden 8	5.863	**.016**
Garden 9	1.617	.205
Garden 10	1.398	.238
Garden 11	.396	.530
Garden 12	4.339	**.038**

Note: significant differences are typeset in boldface, $p < .05$.

There is a statistically significant main effect for garden on the second factor 'novelty' [$F(11, 264) = 10.3$, $p < .0005$]. The main effect for group is not significant [$F(1, 264) = .30$, $p = .58$]. There is a significant interaction effect garden*group on the novelty factor [$F(11, 264) = 2.7$, $p = .003$]. The significant interaction effect suggests that the two groups evaluated the novelty of some of the gardens differently. The difference between the two groups is most manifest in the experience of two gardens: 2, and 4 (see Table 6).

Garden 2 is judged by students of psychology as being more interesting and exciting [$F(1, 264) = 12.5$, $p < .0005$] than it is to students of landscape architecture. Garden 4, on the other hand, is judged by students of landscape architecture as being significantly more interesting, [$F(1, 264) = 7.2$, $p = .008$], than it is to psychology students.

There is a statistically significant main effect for garden on the third factor 'organization' [$F(11, 264) = 12.5$, $p < .0005$]. The main effect for group is not significant [$F(1, 264) = .07$, $p = .80$]. There is no significant interaction effect garden*group on the organization factor [$F(11, 264) = 1.3$, $p = .22$].

Table 6. A mixed between-within ANOVA. The difference between the two groups per garden on Factor 2 'Novelty'.

Novelty	F	*p*
Garden 1	.217	.641
Garden 2	12.489	**.000**
Garden 3	.428	.514
Garden 4	7.234	**.008**
Garden 5	2.213	.138
Garden 6	3.617	.058
Garden 7	.663	.416
Garden 8	2.224	.137
Garden 9	.001	.980
Garden 10	1.354	.246
Garden 11	.015	.903
Garden 12	.362	.548

Note: significant differences are typeset in boldface, $p < .05$.

In conclusion: the difference in the evaluations of twelve gardens between students of landscape architecture and psychology students is manifested in judgements of gardens' attractiveness and novelty. Specifically, group membership results in different evaluations of four out of twelve gardens.

The participants of our study, in addition to filling out a questionnaire, took a number of photos of the gardens. They were asked to comment upon the photos. We limited the analysis of the commentary by students of landscape architecture and psychology to the four gardens, 2, 4, 8, and 12, on which we found disagreement between the two groups. In an exploratory vein, we wanted to discover whether the difference between the two groups in their evaluation of the four gardens as found in the analysis of the questionnaire could also be found in the participants' commentary on these gardens.

The psychology students and the students of landscape architecture wrote 542 comments about the four gardens. The majority of the comments are simple observations about some feature of a garden (beautiful borders, romantic tea-house etc.). Sometimes more elaborate statements were made: 'unfriendly looking shrub conflicting with the rest of the garden' or 'iron railings of the fence echo the wavy line of the elevated flowerbed'. In general, the commentary by psychology

students is rather straightforward: ‘I took this photo to convey the luxuriousness of the flowerbed’ or ‘I took the photo because the tree is very beautiful’. The commentary by students of landscape architecture, as a rule, is more elaborate and subtle. They comment on things like colour contrasts of elements and plants, contrasts of shadow and light, ‘a well-chosen height of a garden’s hedge that gives you privacy, but doesn’t separate you from the surroundings’.

We also found that in the majority of cases descriptions by psychology students of garden features are linked directly to their experiential qualities e.g. ‘rust is ugly’, ‘the bench is uncomfortable’, ‘the lawn is cosy and reminds me of holiday’, ‘the entrance is funny and beautiful’ etc. Students of landscape architecture, however, tend to purely describe physical properties, and, as a rule, avoid value judgments. These descriptions of physical properties are, as mentioned above, much more detailed and include commentary on how things are made: ‘I took the photo because the gradual curve of the path unexpectedly leads you to the folly which you can’t see from the path because it is concealed by a hedge’ or ‘I took the photo because when you look from inside the folly the garden looks very closed, however, when you stand in the garden it is open’ or ‘I took the photo because it shows you the colour contrast that is predominantly used in the garden: purple and green’ or ‘I think that the red-painted tree is a symbol of a lost love’. Interestingly, the comments by the two groups, although they differ in sophistication, concern virtually the same features of the gardens that somehow attract attention.

We submitted the comments on the four gardens to content analysis. We decided to cluster the commentary into three categories, corresponding to the three factors derived from the factor analysis of the questionnaire. It allowed us to discover whether the statistically significant differences between the two groups found after the analysis of the questionnaire data are reflected in the number of statements on the attractiveness, novelty, and organization of the two gardens. The three categories were: judgments related to gardens’ perceived attractiveness; novelty (an original solution, a dull contrast); and organization (the formal and structural properties of the gardens e.g. an asymmetrically planted tree, a curving path).

The two authors independently selected the statements about the attractiveness, novelty, and organization from the comments on the four gardens. We calculated the interrater reliability in order to determine the level of agreement between the two raters using the percent agreement statistic. This method allows the calculation of interrater reliability by comparing the number of agreements per total number of selection decisions. Holsti’s (1969) coefficient of reliability (C.R.) provides a formula to calculating percent agreement: C.R. = 2M/N1 + N2, where M = the number of selecting decisions upon which the two coders agree, N1 = the number

decisions made by rater 1 and N2 = the number of decisions made by rater 2. Interrater reliability for the attractiveness category was C.R. = .97; for the novelty category C.R. = .95, and for the organization category C.R. = .91.

We discarded statements in categories attractiveness, novelty, and organization on which there was a disagreement between the two authors (28 statements in total). We also discarded the statements falling outside of the three categories (35 statements in total). Therefore in total 63 statements were discarded. From the remaining 479 statements on attractiveness, novelty, and organization 257 were written by psychology students and 222 by students of landscape architecture.

We divided the statements related to the attractiveness of the gardens into positive and negative statements. We performed four non-parametric Mann-Whitney tests to determine whether the two groups differed in the number of comments on the attractiveness of the gardens. The independent variable was group membership and the dependent variable was the number of comments made by each participant on the garden's attractiveness. If a participant wrote negative comments on attractiveness, it was subtracted from the number of positive comments.

There was a significant difference between the two groups in the number of statements on the attractiveness of garden 2 (U = 28.000, N1 = 14, N2 = 12, p = .003, two-tailed). Significantly more positive evaluative statements on attractiveness were given by psychology students than by students of landscape architecture. The difference between the two groups in the number of comments on attractiveness approached significance for garden 8 (U = 50.000, N1 = 14, N2 = 12, p = .085, two-tailed) and was not significant for gardens 4 and 12.

The difference between the two groups in the number of comments on novelty approached significance for garden 4 (U = 48.000, N1 = 14, N2 = 12, p = .067, two-tailed) and was not significant for gardens 2, 8, and 12. Finally, there was a significant difference between the two groups in the evaluation of the organization of garden 2 (U = 32.000, N1 = 14, N2 = 12, p = .006, two-tailed). Significantly more evaluative statements on organization were given by by students of landscape architecture than by student of psychology. There was no significant differences between the number of comments on the organization of the remaining three gardens, 4, 8, and 12 by the two groups.

4. Discussion.

In our study the evaluations of design gardens by students of landscape architecture and psychology students were compared using the semantic differential format. It allowed us to relate our research into the differences between experts and non-experts in the field of landscape architecture to the findings of research into the similarities and differences between architects and non-architects. In line with our expectations, a dimensional structure similar to a three-factor solution of the semantic differential emerged (attractiveness, novelty, and organization).

Extrapolating from previous research into the experience of built and other types of environments we expected that the differences between the two groups would be greater on the first two factors (attractiveness and novelty) than on the third factor (organization). These expectations were confirmed, as we found significant differences between the two groups' evaluations of four gardens and on the first two factors. We found no significant differences between the two groups on the organization factor. Whether the third factor, organization, should be taken into account in research into the evaluation of physical environments remains an open question. Russell (1979), for instance, considered the third factor, ('dominance' c.q. 'potency') to be a cognitive dimension. Therefore, in studies focusing specifically on the affective quality of physical environments, a two-dimensional solution with an evaluative (pleasant, pleasing, and attractive) and an activity (interesting) dimension would probably be more appropriate (Russell, 1979; Oosterdorp and Berlyne, 1978).

The analysis of the physical features of the four gardens (see Appendix 1) allows some speculation as to what may have caused the differences between the two groups in the evaluation of the gardens. Garden 2 is a beautiful and traditional garden with flower borders, a meandering path, a small lawn and a folly. Garden 4 is very unusual as it incorporates a small terrace with a kitchen as an integrated part of the garden, blurring the distinction between inside and outside. Garden 8 is a 'minimalist' garden, surrounded by a low hedge, with one tree in the middle of the garden, and almost completely tiled with grey tiles. It is empty, bold and open. Finally, garden 12 is strikingly unusual because of a big 'art object' in the middle (a red-painted dead tree trunk) and reddish gravel.

It is both symptomatic and reminiscent of what has been found in studies of the built environment, (Devlin and Nasar, 1989; Nasar, 1989), that 'minimalist' (garden 2), 'art-like' (garden 12), and 'experimental' (garden 4) gardens are more attractive and exciting to experts, while non-experts find 'traditional' gardens (garden 2) more attractive and interesting. Devlin and Nasar (1989) suggested that

the architects' habit of spending a great amount of time observing architecture and criticizing designs, makes them more aware of their physical environment and influences their affective responses to the built environment. Purcell (1986) asked architecture students and non-architecture students to rank church buildings on prototypicality and relate them to measures of preference, attractiveness, and interestingness. He found that both expert and non-expert groups prefer a moderate discrepancy from good examples (prototypes) of specific environments. However, what is attractive, preferred, and interesting was found to be more discrepant from prototypical examples for the architecture students than for the general student group. He suggested that the higher attractiveness of prototype-deviant stimuli to experts is probably due to experience, the acquisition of knowledge, and socialization during their professional education. This may also explain the differences between experts and non-experts in the field of landscape architecture.

It has been found that in the field of architecture differences in evaluation between experts and the public may lead to a profound disagreement in the appreciation of the built environment, impeding attempts at integrating the users' perspective into the design process (Marans and Spreckelmeyer, 1982). It seems unlikely, however, that the experts' reliance on their own criteria and preferences should result in a low perceived quality where landscape and garden design are concerned. The probably most remarkable finding of this study is, that in spite of the large variation in the designs of the gardens, no differences in evaluation were found between the professional and lay groups on eight out of twelve gardens. Some gardens were highly appreciated and others disliked by both groups. Also remarkable is the agreement between the expert and non-expert groups on the 'novelty'- factor. Most of the twelve gardens of the garden complex are of an unusual or experimental nature. The participants of both groups apparently found these gardens engaging, as they were given high scores on 'excitement' and 'interestingness' by both groups.

The differences in the evaluation of gardens by both the expert and non-expert groups seem small as compared to the differences found with relation to the built environment. Kaplan (1973) also reported smaller inter-group differences for natural as compared to built environments. Although not a natural environment, a garden may still be experienced in ways similar to the way nature is experienced. The increase in consensus between expert and non-expert groups derives then from shared preferences found in responses to natural settings (Kaplan and Kaplan, 1989). Only in the case of profoundly a-typical designs the consensus in response collapses. This suggests that a high level of appreciation may be expected from the public for unusual formal design of gardens.

We limited the analysis of the commentary to the four gardens on which we found disagreement between the two groups. We found some similarities between the results derived from the analysis of the participants' commentary on the gardens and the results obtained through the analysis of the questionnaire data. The two groups differed in the number of comments they wrote on gardens 2, 4, and 8, which is evocative of a stronger difference between the two groups on these three gardens as found in the questionnaire data. This combined evidence increases our confidence that the differences in the evaluation of design gardens by expert and non-expert groups we found, although they are not very detailed in character, do reflect a real difference between the two groups and are not an artefact of the method used. We also found a difference between the two groups in the number of comments on garden 2 on the organization factor, which was not found in the questionnaire data. The comments on organization can not be compared to the questionnaire data as the content of the organization factor of the semantic differential is quite different.

In our study we provided the participants with the opportunity to describe their experience of the gardens in their own words, using their own evaluative criteria. However, the comments the participants wrote were not elaborate enough to allow detailed understanding of how the participants analysed the gardens, the associations that were evoked by the gardens, the nature of their aesthetic and affective reactions. Our strategy of inviting commentary proved not subtle enough for generating such detailed information. It was up to the students themselves to determine the extent and complexity of their comments about the gardens. Furthermore, we combined open questions and a questionnaire in the same research format. As a result, less conscientious participants tended to give superficial comments or to describe their experience in words derived from the questionnaire. In addition, the abundance of repetitive comments and the frequent use of simple labels (beautiful/ugly) precluded a deeper understanding of how exactly the two groups differ in their evaluation of the gardens.

It has been suggested (Jones, 2007) that public participation in the planning and design of landscapes is essential to the implementation of the ideas of the European Landscape Convention. Systematic research into the qualities of landscape experience therefore is required. In our research, the measurement of the perceived attractiveness and novelty of the gardens proved to be instrumental in discovering differences between groups of experts and non-experts. Other evaluative criteria should be considered in future research into the similarities and differences between these two groups. For instance, the four dimensions of environmental preference identified by Kaplan and Kaplan (Kaplan & Kaplan, 1989; Kaplan, Kaplan and Ryan, 1998): coherence, legibility, complexity, and mystery, which

determine preference judgments of landscapes, deserve consideration. It would be interesting to discover whether and to what extent the groups of experts and non-experts differ in their evaluation of the gardens on these four dimensions. The resulting knowledge may be instrumental in creating valued landscapes and in preventing conflict arising between those involved in their planning and design and the public. Our choice for design gardens allowed us to concentrate on the evaluation of gardens by experts and non-experts without having to consider the complex issue of the use value of gardens. From the findings of our research we cautiously conclude that the landscape architects' reliance on their own values and criteria of excellence may not have a detrimental effect on the public's evaluation of their work. The researchers are well aware, however, of the critical importance of taking into consideration the wide variety of use-related issues, in order to secure the public's full appreciation of park and garden design.

Chapter 4

Assessing the restorative potential of contemporary urban environment(s); beyond the nature versus urban dichotomy

Abstract

The current literature on restorative environments generally leads to the conclusion that urban environments are inherently deficient in stress-reducing and mood-enhancing capacities. We challenge this view in our study. The participants we asked to take part were naturally stressed after taking an exam. We provide empirical evidence, making use of an abbreviated version of the Profile of Mood States (POMS) questionnaire, that a well-designed and attractive urban environment can have a stress-reducing and mood-enhancing power equal to that of an attractive natural environment. We attempt to identify the physical characteristics that contribute to the perceived restorative effect of the urban environment we selected for our study.

Another issue we explored was the impact of a narrative on the attractiveness and interestingness of the natural and urban environments. We wrote a story to go with each of our environments, describing some of the meanings embedded in their physical properties. The addition of cultural and historical information about our natural and urban environments resulted into a 25 percent increase in their perceived interestingness and a 14 percent increase in their perceived attractiveness. We conclude that significant parts of the story behind an environment as well as any experiential qualities related to them remain inaccessible to an observer and can only be appreciated by providing some explicit commentary.

Chapter 4

Assessing the restorative potential of contemporary urban environment(s); beyond the nature versus urban dichotomy

1. Introduction

1.1 Restorative environments

Environmental psychology has a long tradition of research into the benefits of natural environments (Ulrich, 1983; Kaplan and Kaplan, 1989). Exposure to a natural environment is expected to lead to psychological well-being, improved mood, pleasure, and even better health (Ulrich, 1984; Hartig et al., 2003; Laumann et al., 2003). These positive effects prompted the representation of natural environments as possessing restorative qualities (Ulrich et al., 1991; Kaplan, 1995). In an attempt to provide empirical evidence for such restorative effects, natural environments have traditionally been contrasted with urban environments. Urban environments were found to lack the beneficial restorative properties of nature. This attitude towards urban environments fits well into the tradition of criticism of urbanism in general. Rousseau's 'Emile' is brought up in the countryside, where 'humans are most naturally suited, rather than in a city, where we only learn bad habits, both physical and intellectual' (Rousseau, 1966). Frederick Law Olmsted's city parks were designed in the 19th century to introduce 'nature' into the city and so to provide a counterweight to at least some of the urban ills (Kaplan, 1995). This integration of nature into city landscapes significantly improved urban living conditions by providing opportunities for leisure, sports, aesthetic enjoyment etc. Consequently, the public's acclaim of the parks was and remains overwhelming with some quarter of a million people visiting New York's Central Park on a spring weekend (The Official Website for Central Park). From those days onwards the appearance and visual quality of cities kept improving. As a result the attention of policy makers, urban planners and architects as well as the public gradually shifted from the improvement of urban living conditions to issues of environmental quality and quality of life. For many of us, and at least in economically developed countries, a modern metropolis is the preferred living environment and a habitat perfectly suited to the enjoyment of life. The restorative potential of urban environments, however, is still considered inferior compared to natural environments. This attitude, although supported by empirical evidence, may meet with scepticism and is usually not shared by the residents of at least some of the better city neighbourhoods.

1.2 Two theoretical perspectives

The investigation of the beneficial effects of nature departs from one of two theoretical perspectives. One approach centres on natural and urban environments' capacity to influence affective states (Ulrich, 1983; Ulrich et al., 1991). From this perspective, positive changes in mood states, which may result from exposure to different environments, are directly related to the stress-reducing capacities of these environments. Empirical evidence suggests a much stronger stress-reductive capacity of natural compared to urban environments (Hartig et al., 2003; Ulrich et al., 2003; Van den Berg et al., 2003). Improved negative mood states, stronger positive affect as well as physiological indicators of stress reduction e.g. lower heart rates and muscle tension are some of the outcomes of exposure to nature. It is important to underline that these results do not suggest the impossibility of restoration through urban environments per se, but indicate a clear-cut advantage of natural environments.

The relative restorative advantage of natural environments may also be explained from a second theoretical perspective. In this case it results from the greater attention restoration potential of natural compared to urban environments (Kaplan and Kaplan, 1989; Kaplan, 1995). Everyday life and the huge demands on attentional resources it makes, may, according to this approach, lead to 'attention fatigue'. Nature has the capacity to provide an alternative mode of attending: involuntary attention. Involuntary attention is intrinsically compelling and, as it requires no effort, allows directed attention to rest. The term usually used as a substitute for involuntary attention is 'fascination'. Fascination is inherent to many natural settings. Such settings also provide an opportunity for reflection, thereby enhancing the process of recovery from attention fatigue even more.

Nature's capacity to restore depleted attentional resources is typically established by demonstrating an improvement in cognitive tasks performed after exposure to natural environments (Laumann et al., 2003; Hartig et al., 2003). The improvement of cognitive functioning is specifically attributed to natural environments, but is not necessarily limited to them. Potentially all environments that possess certain qualities may have similar restorative effects. Usually four qualities are specified: being away, fascination, extent, and compatibility with human needs (Kaplan, 1995). Urban environments that embody these qualities would meet the requirements of a restorative environment and could theoretically have a beneficial effect similar to that of nature. The studies conducted so far suggest, however, that as a rule this is not the case. The beneficial impact of natural environments is found to be much stronger than that of urban ones, which corroborates the findings from the stress-reduction perspective. Once again one wonders whether it is at all

possible for urban environments to possess a restorative power equal to natural environments.

1.3 The selection of the environments for the study

It is a common characteristic of city life that the urban environmental quality of neighbourhoods varies. In an attempt to demonstrate the benefits of natural versus urban environment, one might select city locations that possess little or no restorative potential or that are simply stressful. For instance, mostly commercial urban landscapes and industrial areas were chosen by Ulrich to contrast the restorative potential of urban versus natural environments (Ulrich, 1991). More recently (Korpela et al., 2002) 'the bottom floor of a large concrete parking garage photographed in the early morning hours to avoid traffic' was selected to represent urban environments in a study of comparative restorative effects of urban versus natural environments. Comparing such locations to natural environments would be a rather artificial way of demonstrating nature's restorative power, which we indeed take for granted. Additionally, the representation of natural and urban environments as opposites of each other is not in line with the realities of, for instance, contemporary Dutch landscape and urban planning, which exploits and puts into practice the advantages of an integrative approach. In an attempt to improve the environmental quality of urban environments the inhabitants of at least the better neighbourhoods are provided with ample access to natural elements such as parks and gardens, water, natural light etc. The resulting spatial solutions therefore have different degrees of 'naturalness' or 'urbanity'. Does it mean that such integrated environments are inherently deficient in terms of stress-reduction and attention restoration?

We were intrigued by this question and tried to find answers by applying traditional methods of research for measuring the stress-reducing power of different environments to real, contemporary, and equally inspiring natural and urban environments. The natural environment that we chose for our study, Amstelland, is located in the vicinity of Amsterdam and is partly nature-reserve and partly agrarian landscape. It is an archetypal landscape of the lowlands: huge in scale, open, traversed by creeks and rivers. It is not 'wild' nature and it features an occasional footbridge, small dams, narrow roads, scattered farms, and church steeples on the horizon. We chose Amstelland because it's a spectacular natural environment that we thought would make the difference in restorative potential between the natural and urban environments even bigger. On the other hand it allowed us to select an equally spectacular urban environment without favouring it, which would have been the case if we had chosen a simple natural environment.

The urban environment we chose for our study is as spectacular as the natural one. It is part of a recent urban development at the location of the former eastern docks of Amsterdam. The neighbourhood consists of mainly one family semi-detached houses and is of excellent architectural quality. Although public greenery in the area is limited to a strip of front gardens, there is a lot of water, canals of different lengths and widths, some quiet and intimate and others busy and used by shipping.

1.4 The addition of verbal narratives

When designing our study we didn't want to limit its scope to the possible demonstration of an urban environment's restorative potential. We also wanted to use both environments to address a different issue currently much debated by those involved in landscape design: the impact of knowledge, of narrative, on the experience of places. We assumed that the addition of historical and cultural information could significantly enrich the experiential qualities of places. Urban and landscape development projects have traditionally been endorsed by narratives appealing to the imagination of potential clients as well as the professionals involved in the process of landscape and urban planning. Such narratives are expected to strengthen the visual experience of physical environments. They may play a significant role in the acceptance of planned spatial transformations as well as in the choice of specific design proposals. Little is known about the potential effects of narrative interventions (however, see Sternberg, 1997 for the impact of narratives on the experiential qualities of tourist destinations).

Physical environments, both natural and urban, accumulate meanings. Some meanings are easily retrieved; others require a historic and contemporary context before they can be fully experienced. Story telling is a way of revealing 'silent' meanings, thereby enhancing people's experience of places. But can a story enhance the experience of a spectacular visual narrative of forms, functions and meanings, which can be deduced directly from seeing our selected environments? We wrote a story to go with each of our environments in an attempt to make explicit some of the meanings already embedded in the physical properties of both landscapes by drawing attention to the distinctive features of the environment. We wanted to discover whether the addition of historical and cultural information about the environments would significantly enrich their experiential qualities as measured by attractiveness and interestingness ratings. The two stories can be found in appendix 2.

1.5 The objectives of the study

In summary, in our study we intended to challenge the idea that the restorative potential of urban environments is inherently inferior compared to that of natural ones. We explored the possibility that attractive and interesting urban environments possess a stress-reducing and mood-enhancing potential similar to the one as yet exclusively associated with exposure to natural environments. In a more exploratory vein, we investigated the possibility of enhancing the perceived attractiveness and interestingness of both the natural and the urban environment by making explicit comments on some of the environments' distinguished characteristics.

2. Method

2.1 Stress-induction

It is customary in studies on affective restoration to make use of stress-induction to make participants experience negative feelings and stress before comparing any restorative benefits of natural and urban environments. Stress-induction is usually achieved by showing participants some kind of emotionally disturbing video of e.g. a workplace or road accident. However, stress-induction was not a part of this study's design. Instead, we recruited subjects who we thought were already mildly stressed and experiencing negative affect as a result of their participation in a resit of a previously failed exam. We considered having to resit an exam to be a natural stressor and taking a virtual tour through a natural or urban environment could represent plausible behaviour for people who have experienced mild stress. Subjects, naturally stressed after sitting an exam, have previously been used in a similarly designed study (Ulrich 1991) on affective restoration.

2.2 The participants

First and second year psychology students at the University of Amsterdam with re-examinations in August 2006 participated in the study. The list of students having to sit re-examinations was obtained from the education office of the psychology department. The potential candidates (around 350) were approached by e-mail. Eighty-six psychology students participated in the study. The data of one of the participants were removed from the sample because he/she marked positive as well as negative mood states on a questionnaire indiscriminately with 'very much applicable'. The remaining 85 participants (63.5% females and 36.5% males) had an average age of 21.8 years (SD = 5.1). They were randomly assigned to one of

four conditions: a video of a natural environment with or without complementary narrative and a video of an urban environment with or without complementary narrative. The distribution of the participants over the four groups was as follows: 26 participants were assigned to a natural environment condition with and 21 without complementary narrative and 19 participants were assigned to an urban condition with and 19 without complementary narrative. The variation in the numbers of participants assigned to each condition is due to the impossibility of calculating the exact number of participants in advance. The participants chose one of the nine days of re-examinations to take part in the study, specifically the day they had their resits. All participants received 15 euros (approximately $18 US) for their participation.

2.3 The environments

Amstelland is the natural environment we chose for our study. It is a protected polder-landscape located approximately 20 kilometres southwest of the city of Amsterdam (Figure 1).

Figure 1. Amstelland: the location where the natural video was filmed.

The area is of outstanding beauty. Part of it is used for agriculture (mainly dairy production) and part is a nature-reserve. The scenery of the nature-reserve is a large area of peat land with islands of dense vegetation: plants, bushes and small trees, which approximates the physical characteristics of the landscape before the land

had been reclaimed. The former Amstelland used to be traversed by many small peat-rivers draining into larger ones, like the Amstel, flowing into the sea. Water is still an essential feature of the landscape. A dike alongside one of the small rivers that cross the area provides a spectacular view of the surroundings. The flat open land, two to three meters below the level of the dike, stretches for kilometres. The agrarian landscape is mostly grassland, with clumps of trees and farms spread around the area. Grazing cows, sheep, and horses complete idyllic scenery. Amstelland, with its rich history of human intervention and its physical characteristics, exemplifies a typically Dutch man-made landscape. It is not an archetypal example of 'nature'. It is a realistic and complex blend of natural, agrarian, and 'arcadian' landscapes: idyllic and beautiful, ordered and chaotic, bearing obvious as well as hidden traces of human interference. We wondered whether the participants in our study would consider such a landscape a good example of 'nature'. Therefore we asked them to judge both the urban and natural environments of our study on naturalness on a ten-point scale. Finally, our choice for Amstelland, apart from having been being determined by the need to select equally inspiring urban and natural environments, was also determined by the need to find a natural environment rich enough in history, natural beauty and cultural significance to allow a substantial narrative to be written about it.

The urban environment we selected for our study is a recent urban development at the site of the former eastern docks in Amsterdam (Figure 2).

Figure 2. Eastern Docklands: the location where the urban video was filmed.

Although the Eastern Docklands have undergone renovation from the 1980s onward, the location we chose is the most recent addition: Sporenburg-Borneo. It was developed and built between 1995 and 2000. The neighbourhood is a high-density development, with 100 houses per hectare, which is a typical density for the whole of the Eastern Docklands. The city authorities wanted a neighbourhood attractive to families with children with low rise, semi-detached one-family homes.

In order to combine high-density development with low-rise housing, an extraordinary type of house was designed. Each has a roof-terrace and a mini-patio to compensate for the lack of space-consuming public green areas. This design-strategy has resulted in 1550 one family semi-detached houses. In addition, two massive apartment buildings, with 600 apartments, were added to the low-rise housing to attain the desired high density and to enhance the neighbourhood's 'urban' feel.

Sporenburg-Borneo was developed by the renowned Dutch landscape architect Adriaan Geuze of West 8 Urban Design and Landscape Architecture. The project won international acclaim for its ingenious architecture and unorthodox urban design (information about the project can be found on the website of West 8 Urban Design and Landscape Architecture). Strict design guidelines were formulated, therefore the area is experienced as a skilfully integrated whole. A definite highlight of the neighbourhood is a row of houses facing a small canal. The future inhabitants of the houses were given free parcels of land and were allowed to choose their own architects and design and build their own homes. As a result, sixty unique houses were built.

Sporenburg-Borneo is near to Amsterdam's city centre and is an attractive and fashionable place to live. Although public greenery is scarce, there are a lot of canals of different lengths and widths, which give this densely built area a sense of spaciousness. Sporenburg-Borneo is a cosmopolitan living quarter with a creative and innovative atmosphere. As a well designed, coherent, and beautiful urban environment it possesses qualities associated with restorative environments and its restorative potential possibly equals the restorative potential of natural environments.

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2.4 Films

Two 10-minute films were made by the experimenters to recreate the experience of the selected natural and urban environments. The films were made using a Sony Handycam camera. While shooting, the camera has always been put on a tripod to stabilize the image. Panoramic views were filmed by turning the camera. Zooming

in an out helped to avoid the images becoming overly static. The most attractive and characteristic features of both environments were selected for shooting. Using Microsoft Movie Maker, we tried out various arrangements of the filmed material until a smooth and cogent transition from one scene to another was achieved. We filmed both environments in the summer of 2006, early in the morning, and under perfect weather conditions. By filming early in the morning we managed to eliminate practically all visible human activity. We thought that the presence of cars or people at both the urban and natural locations might adversely influence the perceived qualities of the environments. Finally, no environmental sounds are audible on any of the tapes. Therefore, one version of both the natural and urban videos has a voice-over and the other is silent.

2.5 The procedure

The study was conducted in August 2006, over a period of nine days. The students who agreed to participate were asked, after having finished their resits, to come to a room in the same building, where the study took place. Two sessions were held on each of the nine days. The first session began 25 minutes before the end of the resit and was meant for students who had finished their exam early. The second session began five to ten minutes after the end of the examination. There was no possibility to exactly control for the time between the moment a student left the examination room and the beginning of the session. Therefore some of the students were able to participate in the study immediately after their resits and others had to wait for the start of their sessions. Upon arrival, each of the participants was issued with a file with a title page on which they reported their age, gender and name (not obligatory), a page of instructions and questionnaires that were to be filled out before and after watching the video.

The fact that the study took place directly after the resits was explained as due to the difficulty of finding participants during the summer months. None of the students explicitly stated that their mood-state after sitting their examinations might have been a requirement for their participation in the study. At the start of each session the experimenter gave information about the tasks the participants were to fulfil during the session and explained the layout of the questionnaires. After giving their age and gender the participants filled out the first part of the POMS-questionnaire. Then they watched one of the videos. Participants were asked to watch the video attentively and to try to place themselves within the environment of the film. After watching the video they rated the environment on a number of scales measuring attractiveness, interestingness, and naturalness of the environment. Then they went on to complete the second part of the POMS-

questionnaire. After filling out the questionnaires the participants were paid and dismissed. Every session lasted between 25 and 30 minutes.

2.6 Measures

The questionnaire we used was a Dutch translation of the Abbreviated Profile of Mood States (POMS) (Van der Ark et al., 1995). This is a shortened version of the original developed by McNair (McNair et al., 1971) for assessing affective states and feelings. It consists of 30 five-point scales (adjectives) measuring five dimensions: depression, anger, tiredness, power, and tension. Each dimension is formed by the responses on six scales. Responses on each scale range from 0 to 4 according to how well the scale describes current emotional state (0 = not at all; 1 = a little; 2 = somewhat; 3 = quite a bit; 4 = very much). The total score on a dimension is derived from an aggregated score on its six subscales. Three of the six scales on a tension dimension are formulated in positive terms and must first be rescored and then aggregated.

The version of the POMS we used consists of two parts and is specifically designed to be used as a pre-test and post-test measure. Each part consists of 30 adjectives that measure the five dimensions as described above. The adjectives of the first and the second parts are not the same words, but synonyms. The scores on both parts of the POMS are found to be highly correlated $r = 0.9$ (Van der Ark et al., 1995). The participants in our study filled in the first half of the POMS before, and the second part of the POMS after watching the video.

The second questionnaire we used in our study was designed to rate the environment in the video on a number of scales. It consists of eleven bipolar ten-point scales and was filled out by the participants immediately after they watched the video and before they filled out the second part of the POMS. Each scale ranged from 1 to 10 (e.g. 1 = dull to 10 = exciting) and the participants were asked to rate the environments by circling one of the numbers. Verbal labels were provided only for the extreme points on the scale. One of the scales is a ‘naturalness’ scale. The participants were asked to evaluate the environment on a ten-point scale varying from ‘not natural at all’ to ‘cannot be more natural’. The remaining ten scales were included to rate the participants’ impression of the ‘attractiveness’ and ‘novelty’ of the environments in the video. Attractiveness and novelty (interestingness) are considered to be the two fundamental dimensions of aesthetic evaluation (Oostendorp and Berlyne, 1978). Six of the ten scales (ugly-beautiful, unfriendly-friendly, unpleasant-pleasant, unenjoyable-enjoyable, repulsive-inviting, unpersonal-personal) measure the attractiveness of an environment. The scales are highly correlated and in our previous study were found

to form one attractiveness dimension. The six scales measure slightly different aspects of attractiveness and their aggregated score provides a better measure of attractiveness than the score derived from a single scale e.g. ugly-beautiful. For the same reason we used four scales (uninteresting-interesting, average-exceptional, dull-exciting, and simple-complex), instead of one, to measure the 'novelty' of the environments.

3. Results

3.1 Manipulation checks

First, we conducted a one-way MANOVA on the ratings of five affective dimensions – depression, anger, tiredness, power and tension – to discover whether the urban and natural groups differed in any respect prior to watching the environmental video. No difference was found between the two groups on any of the measures of mood states: $F(5.79) = 0.61$, $p = 0.69$. This indicates that both the nature and urban groups were similar with respect to their mood prior to watching the videos.

Before comparing the restorative capacities of natural and urban environments we wanted to discover whether the naturalness ratings of the environments were consistent with our categorization of the environments into natural and urban. An independent-samples t-test was conducted to compare the naturalness of the two environments. There was a significant difference, $t(83) = 9.88$, $p < 0.0005$), in ratings of naturalness between the natural (M = 7.92, SD = 1.72) and urban environments (M = 4.1, SD = 1.82). The natural environment was rated as much more natural than the urban one. A high rating on the naturalness of the natural environment in our study justifies our claim that the landscape we chose, although not free of traces of human involvement, is still perceived as a genuine example of nature by the participants in our study.
Next, we wanted to discover whether commentary added to the videos in any way affected the restorative capacity of both natural and urban environments. A mixed between-within subjects ANOVA (Tabachnik and Fidell, 2001) yielded no significant differences on affective dimensions between the two (with and without commentary) natural and the two urban environments. Therefore, we decided to further test the restorative potential of natural versus urban environments by merging the data of the two natural and the two urban groups to form one natural and one urban condition. The resulting two groups had 47 participants in the natural and 38 participants in the urban conditions.

3.2 Tests for the effect of environment (natural vs. urban) on affective restoration

A series of mixed between-within ANOVAs was conducted with nature versus urban conditions as a between factor and ratings on five POMS-dimensions before (t1) and after (t2) watching the video as a within factor. No significant environment by dimension interaction effects were found on any of the five POMS dimensions suggesting no overall difference in affective restoration between the natural and urban environments, see Table 1.

Table 1. The effects of natural and urban environments on dimensions of affective restoration.

Dimension	Environment by dimension interaction	Main effect environment	Main effect Nature	Main effect Urban
Depression	$F(1,83) = 1.79$; $p = 0.19$	$F(1,83) = 0.92$; $p = 0.34$	$F(1,46) = 11.38$; $p = 0.002$	$F(1,37) = 1.62$; $p = 0.21$
Anger	$F(1,83) = 0.42$; $p = 0.52$	$F(1,83) = 0.64$; $p = 0.43$	$F(1,46) = 39.74$; $p < 0.0005$	$F(1,37) = 10.92$; $p = 0.002$
Tension	$F(1,83) = 0.044$; $p = 0.84$	$F(1,83) = 0.025$; $p = 0.87$	$F(1,46) = 18.03$; $p < 0.0005$	$F(1,37) = 3.91$; $p < 0.0005$
Tiredness	$F(1,83) = 0.51$; $p = 0.48$	$F(1,83) = 0.058$; $p = 0.81$	$F(1,46) = 2.04$; $p = 0.16$	$F(1,37) = 0.43$; $p = 0.51$
Power	$F(1,83) = 2.82$; $p = 0.097$	$F(1,83) = 0.13$; $p = 0.72$	$F(1,46) = 22.89$; $p < 0.0005$	$F(1,37) = 4.22$; $p = 0.047$
Restoration Combined (DAT)	$F(1,83) = 0.86$; $p = 0.36$	$F(1,83) = 0.53$; $p = 0.47$	$F(1,46) = 37.37$; $p < 0.0005$	$F(1,37) = 19.04$; $p < 0.0005$

Testing the effect of restoration (ANOVAs with repeated measures) within the natural and the urban conditions revealed that participants who viewed natural environments experienced restoration on three affective dimensions (depression, anger, tension), whereas participants who viewed urban environments experienced restoration on two of the affective dimensions (anger, tension) (Table1; Figure 3). No significant difference was found between the t1 and t2 measurements of tiredness in both the natural and the urban conditions. However, a significant difference was found between the t1 and t2 measurements of power. Participants felt more powerful at t1 (M = 13.66, SD = 4.26) than at t2 (M = 10.89, SD = 4.11) in both natural and urban conditions (M = 12.63, SD = 4.54) and (M = 11.32, SD = 4.42).

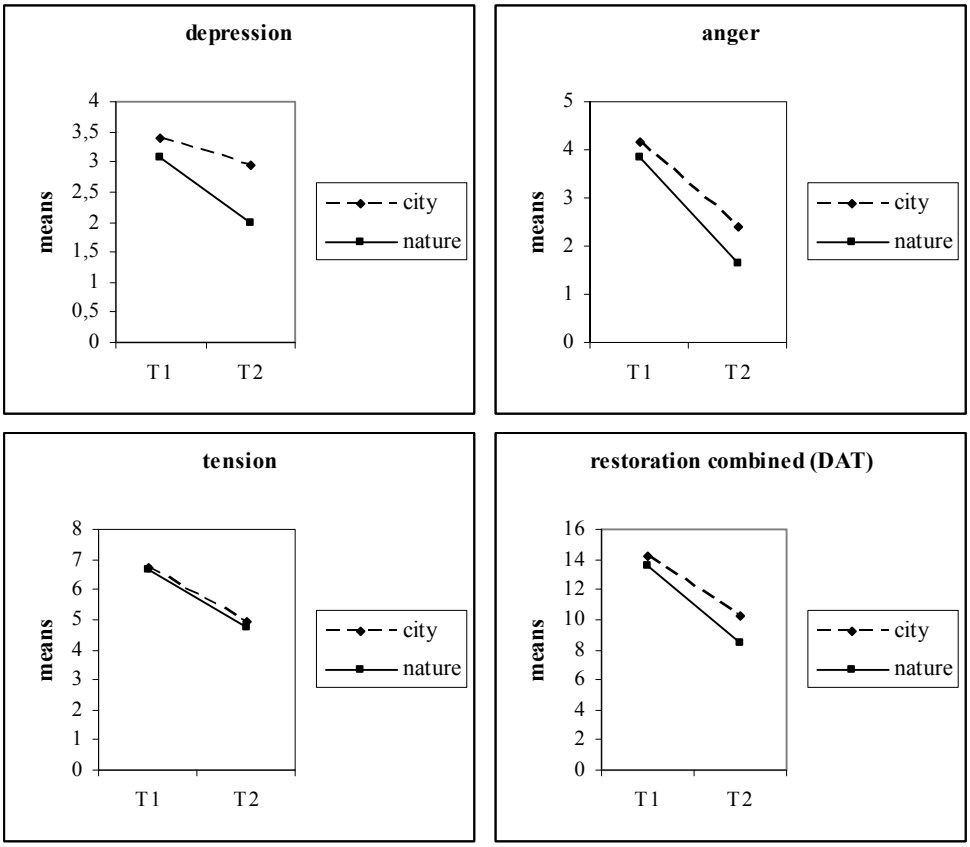

Figure 3. Plots of affective restoration in natural and urban conditions. Mean scores before (T1) and after (T2) watching the video.

3.3 Tests of restoration effects on three stress-related POMS scales

We combined the three stress-related dimensions of restoration - depression, anger, and tension - to form one Dimension of Affective Restoration (DAT) by adding together the scores on the three restorative dimensions at t1 and at t2. A mixed between-within ANOVA was conducted to discover whether a difference would be found between the natural and urban environments on this combined dimension of restoration. The combined main effect of restoration (DAT) was highly significant in both the natural (M(t1) = 13.62; SD = 9.24 / M(t2) = 8.43; SD = 7.43) and the urban (M(t1) = 14.29; SD = 9.79 / M(t2) = 10.26; SD = 6.66) conditions. However, again no significant environment by DAT interaction effect was found (Table 1;

Figure 3), which leads to the conclusion that both the natural and the urban environment selected for the study were equal in their affective restoration potential.

Some difference in the strength of the restorative effect between the natural and urban environments is still perceptible as expressed in differences in the proportion of the variance in affective restoration explained by exposure to either the natural or urban environments. The value of partial *eta* squared in the natural condition was η^2=0.45 and in the urban condition η^2=0.34, suggesting a somewhat stronger restorative effect of the natural environment. This difference in restorative potential was also manifested in the lack of restorative effect on one of the three dimensions of affective restoration (depression) in the urban condition.

3.4 Ratings of attractiveness and interestingness of the environments

The participants in our study rated the environments on attractiveness and novelty on ten ten-point scales. Factor analysis with Varimax rotation applied to the data of all 86 participants produced two factors with a total amount of explained variance of 64.34 percent (Eigenvalue ≥ 1.0). Since one of the 10 scales, 'ugly-beautiful', had high loadings on factor 1 as well as factor 2 we decided to exclude the beauty scale from further analyses and derive a new factor solution. Factor analysis with Varimax rotation, applied to the reduced data of 9 scales produced two factors with a total amount of explained variance of 66.52 percent (see Table 2).

Table 2. Factor analysis of nine scales: variance explained by the two factors.

Factor	% of Variance
1	38.102
2	28.425
Percentage of Explained Variance	66.528

The internal consistency (Standardized Cronbach's alpha) of the items on each factor was as follows: factor 1 = 0.86, factor 2 = 0.80. The two factors can be interpreted easily. Factor 1 includes 5 scales: 'unpleasant-pleasant', 'repulsive-inviting', 'unfriendly-friendly', 'unenjoyable-enjoyable', and 'unpersonal-personal' (Table 3). This factor was called 'attractiveness'. Factor 2 contains four scales: 'simple-complex', 'dull-exciting', 'uninteresting-interesting', and 'average-exceptional'. It was called 'novelty'.

Table 3. Factor loadings on nine scales: 1=attractiveness; 2= novelty.

	Component	
	1	2
Unpleasant-Pleasant	0.904	0.059
Repulsive-Inviting	0.843	0.182
Unfriendly-Friendly	0.756	0.093
Unenjoyable-Enjoyable	0.700	0.309
Unpersonal-Personal	0.610	0.374
Simple-Complex	-0.224	0.835
Dull-Exciting	0.438	0.772
Uninteresting-Interesting	0.342	0.751
Average-Exceptional	0.330	0.648

For further analysis, the ratings of environments on scales falling under each of the two factors were taken together to form two variables: attractiveness and novelty. An independent-samples t-test was conducted to compare the attractiveness and novelty of the natural and urban environments. There was a significant difference in attractiveness between the two environments (M(nature) = 6.81, SD = 2.15; M(urban)=5.49, SD = 2.07; $t(423) = 6.37$, $p < 0.0005$) and novelty (M(nature) = 5.57, SD = 2.25; M (urban) = 6.27, SD = 2.38; $t(338) = 2.76$, $p = 0.006$). Therefore, the natural environment was rated as significantly more attractive than the urban environment, while the urban environment was rated as significantly more interesting.

3.5 The impact of narratives on attractiveness and interestingness ratings

An independent-samples t-test was conducted to compare the attractiveness and novelty of the natural and urban environments with and without narrative. A significant difference in attractiveness was found between the natural environment with and without a story: (M(story) = 7.22, SD = 1.64; M(no story)=6.30, SD = 2.57; $t(233) = 3.14$, $p = 0.002$) and novelty (M(story) = 6.22, SD = 2.0; M(no story) = 4.77, SD = 2.29; $t(186) = 4.61$, $p < 0.0005$). Therefore, the addition of a story to the video of the natural environment led to it being rated as significantly more interesting and also as significantly more attractive. Similarly, participants who viewed the urban video with commentary experienced the environment as significantly more interesting (M(story) = 7.05, SD = 2.22; M(no story)=5.49, SD = 2.28; $t(150) = 4.28$, $p < 0.0005$) and attractive (M(story) = 5.92, SD = 1.96; M(no story) = 5.06, SD = 2.11; $t(188) = 2.88$, $p = 0.004$).

4. Discussion

4.1 Reconsidering the restorative effects of urban environments

Frederick Law Olmsted strongly believed that experiencing or simply viewing nature reduces stress and brings tranquillity to the mind (Ulrich, 1979). Improved negative mood states, improved cognitive functioning, physiological signs of stress reduction e.g. lower heart rate and muscle tension are some of the reported restorative effects following exposure to natural environments (Ulrich, 1983; Ulrich, 1991; Kaplan, 1995). A strong affiliation with nature is considered to be of evolutionary origin in humans and it is manifested in a human being's innate preferences for natural settings containing cues for water, food, and shelter (Wilson, 1984; Kaplan and Kaplan, 1989). Thus, window views of green vegetation or water, rather than of other buildings or a brick wall are found to be associated with improved attention capacity in adults (Tennessen and Cimprich, 1995) and increased cognitive functioning in children (Wells, 2000). Ulrich (1984) has shown that patients in hospital rooms with natural views requested less pain medication and recuperated faster following surgery than did patients whose room windows faced either other buildings or a brick wall.

The restorative potential of natural environments has traditionally been contrasted with the restorative potential of urban environments. The latter was consistently found to be inferior compared to the restorative potential of natural environments. Affective restoration and stress-reduction, however, does not need to be associated exclusively with nature, as potentially any environment that possesses restorative qualities may be a restorative one (Kaplan 1995). We have provided empirical evidence that this is indeed the case for the urban environment we selected for our study. Considering the steadily improving appearance and visual quality of cities, the depiction of urban environments as inherently inferior in terms of stress-reduction, mood enhancement or attention restoration seems a gross generalization. We found that a well-designed and attractive urban environment may have a stress-reducing and mood-enhancing power equal to that of an attractive natural environment.

The urban environment we selected for the study is an ingeniously designed, internationally acclaimed, well-maintained, and fashionable neighbourhood. In contrast, the urban environments of earlier studies seem often to have been chosen so as to emphasize the difference in restorative potential between nature and city. Not surprisingly, such urban environments were found to have little or no restorative potential. The presentation of such urban environments does not do justice to the efforts of policy makers, urban planners, and architects as well as the

public to improve urban environmental quality, and the quality of life in cities in general. Stress-related aspects of the environment that were investigated in this study are an important environmental quality factor, as they have previously been indirectly related to human health (Grahn and Stigsdotter, 2003). Mood-enhancing and stress-reducing effects resulting from our participants' exposure to an urban environment suggest that an urban environment does not need to be inherently associated with stress and stress-related problems.

4.2 Characteristics of urban settings with high restorative potential

It will be interesting and important to consider which physical characteristics contribute to the enhancement of the restorative effect of urban environments. Identifying such characteristics may potentially be useful to policy makers, architects, urban planners, and environmental experts, who could use this information for promoting an 'ecological approach' (Jackson, 2003) to the design of new or the improvement of deprived urban areas as well as for obtaining the public's approval for plans and decisions.

The provision of green spaces within a city probably is one of the primary means of enhancing the city's restorative potential. There is some evidence that the availability of green spaces is an important predictor of self-reported health (de Vries et al., 2003). The availability of green spaces in a neighbourhood has also been found to have an impact on self-reported stress-levels (Grahn and Stigsdotter, 2003). However, laying out parks and gardens is not the only way of enhancing the urban environment's restorative potential. The restorative power of the urban environment we selected for our study equalled that of a natural environment despite a limited amount of greenery.

We expect that the presence of water, which is a special feature of the urban environment of our study, may be partly responsible for its restorative effects. The preference that human beings express for natural environments containing greenery as well as water has been considered of evolutionary origin (Kaplan and Kaplan, 1989). The reported effects of the presence of water on restoration have been inconclusive, however. Ulrich (1993) considered the presence of water to be an indicator of an environment's high restorative potential. Others (Van den Berg et al., 2003) have found no effect of the presence of water on affective restoration. The impact of the presence of water on restoration in our study could have been more pronounced, as water is such an important and distinctive component of the urban environment we chose.

It seems unlikely that the perceived restorative effect of the urban environment can be explained entirely as resulting from the presence of water and green spaces. We think the design of the urban environment is a crucial factor in prompting the participants in our study to judge it as highly attractive and interesting and could also have influenced the degree of their affective restoration. A significant positive correlation between affective restoration and beauty ratings of an environment has been reported before (Van den Berg et al., 2003).

Although it is difficult to distinguish which physical characteristics of an urban environment are the determinants of its perceived attractiveness and interestingness, two of them, the intricate spatial layout of the area and the presence of landmarks (two high-rise apartment buildings), should be considered important. It has been suggested that visual landmarks facilitate orientation and therefore provide a sense of ease and rest (Kaplan et al., 1998). An intricate spatial layout may induce a sense of mystery and suggest an opportunity for exploration (Kaplan and Kaplan, 1989). Not surprisingly, the interestingness ratings of the urban environment significantly exceeded those of the natural environment.

From the available research on affective restoration and environmental quality and from the results of our study the conlusion can be drawn that a health-promoting urban environment provides the inhabitants access to natural elements such as water and greenery, natural light, and is spacious, distinctive, and visually attractive. Exceptional urban design is required to integrate the aesthetic, cultural, and ecological characteristics of an environment into a unified whole. The design of our study as well as the research questions we attempted to investigate allow us to only sketch the physical characteristics that possibly contribute to the perceived restorative effect of the urban environment. Disentangling the contribution of the various physical features of the environment to the environment's stress-reducing potential requires other methods of investigation (see Zube et al., 1982 for a review).

4.3 Strengthening the visual impact of environments

Before considering the limitations of this study we would like to discuss another issue we explored: the impact of a narrative on the perceived restorative qualities, attractiveness, and beauty of the environments. The addition of a story to the videos changed their experiential qualities as manifested in significantly higher ratings of the attractiveness and interestingness of the environments. The participants' ratings of attractiveness and interestingness of environments were significantly influenced by the provision of information about the environments. We expected that the addition of a story would make both the natural and the urban

environments more interesting, but we were surprised to discover that the addition of a story significantly heightened the perceived attractiveness of both the natural and the urban environments. The effect of a story on perceived interestingness, however, is stronger than its effect on perceived attractiveness. In our study the addition of cultural and historical information to a natural and an urban environment resulted in a 25 percent increase in interestingness and a 14 percent increase in attractiveness ratings. Therefore, we can conclude that the story behind natural and urban environments cannot be fully reconstructed from the perception of the physical characteristics of an environment. Significant parts of this story as well as any experiential qualities related to them remain inaccessible to an observer and can only be revealed and appreciated by providing some kind of explicit commentary. These results, similar to the findings of the overall stress-reducing effect of urban environments, could be taken as inspiration for the search for the specific characteristics of texts that bring about such a significant change in the experience of physical environments.

5. Limitations of the study and suggestions for future research

5.1 The use of visual simulation

A visual simulation of a site visit as against an actual visit of the selected locations necessarily limits the amount of information participants can extract. An integrated representation of any physical environment combines various sensory modalities, the visual, tactile, olfactory, and kinaesthetic (Downs and Stea, 1973). The implementation difficulties of organizing site visits, however, (e.g. it would have been impossible to get the participants in our study to visit the locations as early in the morning as when they were filmed) often necessitate the use of some visual simulation technique.

We have no reason to believe that taking the participants to the locations would change their judgements of the perceived restorative potential, attractiveness, and interestingness of the environments. First, it has previously been demonstrated that responses to video simulations sufficiently match the responses of participants who actually visited the environments (Bosselmann and Craik, 1987). Second, we wanted to use similar simulation methods to those applied in studies in affective restoration in which the restorative disadvantage of urban environments has consistently been found. Third, and most important, an actual visit to the environments does not automatically provide an ‘objective’ or more valid representation of them, as the physical characteristics of environments depend very much on the weather, time of the day, season, contingencies etc. For instance, our

natural environment, being an agrarian landscape in part, occasionally smells of manure, which might dramatically affect the participants' judgements. Self-evidently such problems are eliminated when visual simulation techniques are used and some 'generalized' version of the environment is presented. It is important, however, to be aware of the validity trade-offs associated with the use of video to approximate the experience of physical environments (see Marans and Stokols, 1993 for a review of environmental simulation research). We are not aware of any permanent features of either environment that were absent from the videotape that could have had a negative influence on the participants' judgments (noise, unpleasant odours etc). We think that the use of a visual simulation method appropriately matched the objectives of our study while allowing us to disregard the potential danger of paradoxically misrepresenting the environments through the participants' first-hand experience of them.

5.2 Stress-induction

Although it is plausible that having to resit an exam will induce stress and negative mood states we cannot be sure of the degree to which our participants were stressed or negatively minded at the beginning of the experiment. A comparison of our data with the data reported by the developers of the Dutch version of POMS suggests that the participants in our study were on average mildly stressed and negatively tuned. This is similar to Ulrich's (1991) observation about the levels of stress and negative affect experienced by the participants in his study. Others (Deinzer et. al., 2000) report the participation in a major medical examination to be a potent stressor as judged by psychological self-report as well as by physiological measures (reduction in salivary immunoglobulin concentration). Low participation rates, some 25 percent of all the students who were asked to participate actually took part in our study, as well as comments about post-exam fatigue and stress by students who refused to participate, suggest that the participants' mood state after their resits allowed for some improvement.

The time required for affective restoration after sitting an exam is another important issue. It is possible that the participants in our study had already been affectively restored before they took part in the study. However, this issue is relevant to all studies into the restorative benefits of natural and urban environments that use self-report for measuring affective restoration, whether stress-induction is applied to make participants experience negative feelings and stress or not – when participants are naturally stressed after sitting an exam.

Very little is known about stress-recovery time after the elimination of a stressor. For instance, it has been reported that the participants in a major medical examination needed three days to recover to control values of self-reported stress and as long as two weeks if stress recovery was judged by physiological measures (Deinzer et al., 2000). A similar discrepancy between self-report and physiological measures indicating similar short and more prolonged stress recovery times was also found by Spangler (Spangler, 1997). Others report that the time required for recovery from exam-related stress depends on the difficulty of the exam and the student's preparation for it as well as on personal characteristics (Stowell, 2003). As the restorative advantage of natural compared to urban environments is determined by comparing the strength of affective restoration, uncertainty about the speed of stress-recovery may appear of less importance. However, in view of the discrepancy between self-report and physiological measures of stress-recovery, physiological measures of affective restoration, e.g. salivary cortisol and not self-report measures appear to be a better choice for future research as they unambiguously reveal the time-consuming nature of the restorative process.

Chapter 5

The impact of narratives on the experience of urban and natural environments

Abstract

I designed this follow-up study to assess the impact of contrasting narrative representations on the perceived attractiveness and interestingness of the natural and urban environments I used in the previous study. Both environments were judged as very attractive and interesting. I wondered, however, whether this impression may be changed through the provision of information about the environments, and if so, to what degree. I wrote two neutral/negative versions of the commentary to the videos of the natural and urban environments to complement the positive versions of the two stories I used in the previous study. Comparing the effect of positive and neutral/negative versions of the story would allow me to estimate the potential effect of narrative framing on the representation of physical environments. The addition of a positive story significantly heightened the perceived attractiveness of both environments, while a neutral/negative story significantly lowered it. The effect of a story on perceived interestingness, however, is stronger than its effect on perceived attractiveness. One of the conclusions of this study is that the experience of natural and urban environments resulting from the perception of the physical characteristics of an environment is not phenomenologically 'closed', but can be significantly altered by providing some kind of explicit commentary.

Chapter 5

The impact of narratives on the experience of urban and natural environments

1. Introduction

In the previous study on restorative environments it was discovered that a well-designed and attractive urban environment may have a stress-reducing and mood-enhancing power equal to that of an attractive natural environment. Another issue I considered in the previous study was the impact of a narrative on the perceived attractiveness and interestingness of an environment. I wrote a story as commentary to the video of natural and urban environments to make explicit some of the meanings embedded in the environments' physical properties. The provision of cultural and historical information resulted into a 25 percent increase in interestingness and a 14 percent increase in attractiveness ratings of both the natural and urban environments. Intrigued by the strength of the effect I decided to further investigate the impact of narratives on the perceived qualities of the environments in the context of the research into tourist destinations. The natural and urban environments I used in the previous study are popular tourist attractions. Both were judged by the participants of the previous study as very attractive and interesting in themselves, even when not accompanied by any complementary narrative. I wondered, however, whether this impression may be changed through the provision of information about the environments, and if so, to what degree.

I designed this follow-up study to assess the impact of contrasting narrative representations on the perceived attractiveness and interestingness of the environments. Specifically, I wrote two neutral versions of the commentary to the videos of the natural and urban environments to complement the positive versions of the two stories I used in the previous study. Comparing the effect of positive and neutral versions of the story would allow me to estimate the potential effect of narrative framing on the representation of physical environments.

The impact of knowledge, of narrative, on the experience of places is an issue currently much debated by those involved in planning and designing physical environments. It is assumed that the addition of historical and cultural information could significantly alter the experiential qualities of places. The issue is particularly relevant for those involved in urban and landscape design aimed at the creation of environments attractive to tourists. Not surprisingly, the impact of narratives on the experiential qualities of tourist destinations is an important theme in tourism

research as tourist destinations have traditionally been endorsed by narratives to appeal to the tourists' imagination. These narratives draw on cultural myths, universal and local histories, fantasies etc. to intensify the experiential qualities of places (Sternberg, 1997).

It has been taken for granted that in order to enjoy popularity a tourist destination requires some image, a theme. According to Sternberg (1997), tourism manifests two phases of touristic composition: *staging*, which consists of setting up, arranging, and contextualizing the attraction; and *thematizing*, which meaningfully situates the attraction through themes such as picturesqueness, freakishness, technological wondrousness, and sensuous romance. Thematizing can potentially be realized through a variety of media formats. For instance, Urry (1990, p. 3) described the tourist gaze as 'constructed and sustained through a variety of non-tourist practices, such as film, TV, literature, magazines, records and videos'.

Most research on how different representations shape images of tourist destinations has focused on either discoursive practices (the portrayal of tourist destinations in various media) or tourist perceptions (Mercille, 2005). Only rarely both phenomena together are the subject of an empirical study (e.g. Mercille 2005) and even more rarely of quasi-experimental research. I attempted such a study by constructing competitive narrative representations for both natural and urban environments and assessing their impact on the perception of the environments. Story-telling has been characterized as an efficient way of revealing 'silent' meanings, thereby enhancing people's experience of places (Bendix, 2002). But can an experience of attractiveness and interestingness derived from a spectacular display of forms, functions and meanings characteristic of the environments of this study be altered through the addition of historical and cultural information about the environments?

2. Method

2.1 Participants

In total, one hundred and five psychology students participated in the study. They were 62% female and 38% male and had an average age of 21.3 years (*SD* = 4.9). Eighty-five of the participants rated the natural and urban environments on attractiveness and interestingness as part of the study of affective restoration (chapter 4). The participants were assigned to one of four conditions: two groups judging the video of a *natural* environment without a narrative and with a 'positive' version of the narrative and two groups judging the video of an *urban* environment without a narrative and with a 'positive' version of the narrative. The

distribution of the participants over the four groups was as follows: 26 participants were assigned to a natural environment condition with and 21 without complementary narrative and 19 participants were assigned to an urban condition with and 19 without complementary narrative.

To investigate the impact of a 'neutral' version of the narrative 20 additional participants were recruited. This group did not participate in the study of affective restoration. The 20 participants watched the video of the natural and urban environments accompanied by a neutral/negative version of the story and judged the interestingness and attractiveness of the environments. Finally, to discover whether the narratives I wrote were actually perceived as a positive and a neutral version of the story, I asked 10 students who hadn't seen the videos of the environments to evaluate the two versions of the narratives. They were asked to estimate the degree to which their impression of the environments depicted in the stories were positive or negative. From the group of 10 participants five were asked to judge the two neutral versions of the narrative (on the urban and the natural environment) and five to judge the two positive version of the narrative.

2.2 Environments

The natural environment, Amstelland, that we chose to video is located in the vicinity of Amsterdam and is partly nature reserve and partly agrarian landscape. It is an archetypal landscape of the lowlands: huge in scale, open, traversed by creeks and rivers. It is not 'wild' nature and it features an occasional footbridge, small dams, narrow roads, scattered farms, and church steeples on the horizon. Our choice of Amstelland was determined by the need to find a natural environment rich enough in history, natural beauty and cultural significance to comment upon. The natural landscape of Amstelland is a popular destination for an ever growing number of visitors, particularly from Amsterdam and from neighbouring small towns, and can be explored on foot, by bike and boat.

The urban environment we chose for our study is as spectacular as the natural one. It is part of a recent urban development at the location of the former eastern docks of Amsterdam. The neighbourhood consists of mainly one family semi-detached houses and is of excellent architectural quality. Although public greenery in the area is limited to a strip of front gardens, there is a lot of water, canals of different lengths and widths, some quiet and intimate and others busy and used by shipping. It is a well-designed, coherent and beautiful urban environment. Being an internationally acclaimed and award winning urban development project, the area attracts a significant number of visitors, some of them investigating the area on

their own and some in groups. Many come from abroad, often specifically to look at the architecture of the neighbourhood.

2.3 Films

Two 10-minute videos were made to recreate the experience of the selected natural and urban environments. The films were made using a Sony Handycam camera. While shooting, the camera was always on a tripod in order to stabilize the image. Panoramic views were filmed by turning the camera. Zooming in an out helped to avoid static images. The most attractive and characteristic features of both environments were selected for filming. Using Microsoft Movie Maker, I tried different arrangements of the filmed material until a smooth and cogent transition from one scene to another was achieved. Both environments were filmed in the summer of 2006, early in the morning, and under perfect weather conditions. Because of the early hours of filming I managed to practically eliminate all visible human activity while shooting both videos. I thought that the presence of cars or people might influence the perceived qualities of the environments. The voice-over of both the positive and neutral/negative versions of the story that were to accompany the videos was read by the researcher and the audio-track was incorporated in the video. No environmental sounds are audible on either of the tapes.

2.4 Stories

Both Amstelland and Sporenburg-Borneo have a rich history of human intervention, the former exemplifying Dutch man-made landscape and the latter epitomizing creative and modern urban development. The environments are rich in history, beauty and cultural significance. I wrote two narratives telling the story of the landscapes' development and gradual change, accentuating the resulting mixture of old and new elements. I wrote two versions of the narratives for each of the environments a neutral and positive one, which each were of equal length. Both versions were almost exactly the same in terms of content, the one having positive and the other neutral/negative overtones. By manipulating the linguistic features of the narratives I attempted to alter the students' perception of the environments. By changing the wording of the stories I changed the presentation style from high-sounding, grandiloquent and inspiring to that of a purely informative and sometimes boring factual report. I either replaced superlatives by neutral adjectives or eliminated them, for instance replacing "The exceptional history of Amstelland…" with "The history of Amstelland…". In addition the connotative meanings of sentences were sometimes changed by replacing positive allusions with negative ones through a slight change in the wording of the text, for instance

when describing the high-density development at Sporenburg-Borneo. Finally, it is worth mentioning that in the stories about the environments I tried to avoid direct comments on the environments' attractiveness or interestingness. Instead, I wrote interesting and attractive stories about the environments. Both positive and neutral versions of the story can be found in appendices 2 and 3.

2.5 Procedure

Upon arrival, each of the participants was issued with a file with a title page on which they reported their age, gender and name, followed by a page of instructions and the questionnaires that were to be filled out. At the start of the session the experimenter provided information about the tasks the participants were to fulfill during the session and explained the layout of the questionnaires. After reporting their age and gender the participants who participated in the study of affective restoration filled out the first part of the POMS-questionnaire to measure the initial level of stress and fatigue. Then they watched the video. Participants were asked to watch the video attentively and to try to imagine themselves present in its environment. After watching the video they rated the environment on a number of scales measuring its attractiveness and interestingness. Then they went on to complete the second part of the POMS-questionnaire. After filling out the questionnaires the participants were paid and dismissed. The sessions lasted between 25 and 30 minutes. For the group of 20 students who didn't participate in the study of affective restoration a different procedure was followed. This group watched the videos of both the natural and urban environments accompanied by a 'neutral' version of the story and then judged the attractiveness and interestingness of the environments. The participants didn't fill out the POMS-questionnaire. Finally, the ten participants who judged the positive and the neutral versions of the natural and urban narratives were asked to read the stories attentively and rate their impression of the environments depicted in the stories to the degree of positivity or negativity.

2.6 Measures

As the POMS-questionnaire is not relevant to this study it won't be further discussed. The questionnaire I used to measure interestingness and attractiveness of the environments consisted of ten bipolar ten-point scales and was filled out directly after the participants watched the video. Attractiveness and novelty (interestingness) are considered the two fundamental dimensions of aesthetic evaluation (Oostendorp and Berlyne, 1978). These ten scales were used in a previous study (chapter 3) to evaluate the aesthetic experience of design gardens by landscape architects and users. Six of the ten scales (ugly-beautiful, unfriendly-

friendly, unpleasant-pleasant, unenjoyable-enjoyable, repulsive-inviting, unpersonal-personal) measure the attractiveness of an environment. The scales are highly correlated and were found in the previous study to form one attractiveness dimension. The six scales measure slightly different aspects of the attractiveness and their aggregated score provides a better measure of attractiveness than the scores derived from a single scale e.g. ugly-beautiful. For the same reason I used four scales (uninteresting-interesting, average-exceptional, dull-exciting, and simple-complex), instead of one, to measure the perceived interestingness of the environments. Finally, the 10 participants who judged the positive or the neutral/negative versions of the story were asked to give their impression of how the environment was described in the story by rating it on a 10-point scale. The scale ranged from 1 to 10 (1 = very negativly to 10 = very positively) and the participants were asked to give their impression by circling one of the numbers.

3. Results

The participants in the study rated the environments on attractiveness and interestingness on ten ten-point scales. In the previous study of the aesthetic experience of design gardens by landscape architects and users I found that factor analysis of these scales generates two factors which were called attractiveness and interestingness. First I applied factor analysis to the data of the 85 participants to discover whether it would generate a two-factor solution. Factor analysis with Varimax rotation produced two factors with a total amount of explained variance of 64.34 percent (Eigenvalue $\geq$ 1.0).

As an ideal case I expected a single significant loading on only one factor for each scale. One of the 10 scales, 'ugly-beautiful', however, showed split-loadings. It had high loadings on factor 1 as well as factor 2. Therefore I decided to exclude the beauty scale from further analyses. After eliminating the beauty scale a new factor solution was derived. Factor analysis with Varimax rotation, applied to the reduced data of 9 scales produced two factors with a total amount of explained variance of 66.52 percent.

The internal consistency (Standardized Cronbach's alpha) of the items on each factor was as follows: factor 1 = .86, factor 2 = .80. The two factors can easily be interpreted (Table 1). Factor 1 includes 5 scales: 'unpleasant-pleasant', 'repulsive-inviting', 'unfriendly-friendly', 'unenjoyable-enjoyable', and 'unpersonal-personal'. This factor was called 'attractiveness'. Factor 2 contains four scales: 'simple-complex', 'dull-exciting', 'uninteresting-interesting', and 'average-exceptional'. It was called 'interestingness'.

Table 1. Factor Loadings on 9 Scales.

	Component	
	1	2
UnpleasantPleasant	**.904**	.059
RepulsiveInviting	**.843**	.182
UnfriendlyFriendly	**.756**	.093
UnenjoyableEnjoyable	**.700**	.309
UnpersonalPersonal	**.610**	**.374**
SimpleComplex	-.224	**.835**
DullExciting	.438	**.772**
UninterestingInteresting	.342	**.751**
AverageExceptional	.330	**.648**

For further analysis, the ratings of environments on scales falling under each of the two factors were taken together to form two variables: attractiveness and interestingness.
An independent-samples t-test was conducted to compare the attractiveness and novelty of the natural and urban environments without a narrative and with a 'positive' narrative. A significant difference in attractiveness was found between the natural environment with a 'positive' story and without a story: (M(story) = 7.22, SD = 1.64; M(no story)=6.30, SD = 2.57; t(233) = 3.14, p = .002) and interestingness (M(story) = 6.22, SD = 2.0; M(no story) = 4.77, SD = 2.29; t(186) = 4.61, p < . 0005). Therefore, the addition of a 'positive' story to the video of the natural environment led to it being rated as significantly more interesting and also as significantly more attractive. Similarly, participants who viewed the urban video with a 'positive' commentary experienced the environment as significantly more interesting (M(story) = 7.05, SD = 2.22; M(no story)=5.49, SD = 2.28; t(150) = 4.28, p < .0005) and attractive (M(story) = 5.92, SD = 1.96; M(no story) = 5.06, SD = 2.11; t(188) = 2.88, p = .004).

I proceeded with the analysis of the remaining data of 20 participants who did not participate in the study of affective restoration but judged the attractiveness and interestingness of natural and urban videos accompanied by a neutral version of the narrative. I wanted to discover whether a neutral version of the same narrative would reduce the perceived attractiveness and interestingness of the environments. First I applied factor analysis with Varimax rotation to the data of the twenty participants derived from the ratings of the environments on nine scales. The tenth scale 'ugly-beautiful' was eliminated from the analysis as I eliminated it earlier

from the factor analysis of the data of participants who watched the videos without a narrative or with a positive narrative. Factor analysis produced two factors with a total amount of explained variance of 67.4 percent.

Factor 1 (attractiveness) includes 5 scales: 'unpleasant-pleasant', 'repulsive-inviting', 'unfriendly-friendly', 'unenjoyable-enjoyable', and 'unpersonal-personal'. Factor 2 (interestingness) contains four scales: 'simple-complex', 'dull-exciting', 'uninteresting-interesting', and 'average-exceptional' (Table 2).

Table 2. Factor Loadings of 20 Participants on 9 Scales.

	Component	
	1	2
UnpleasantPleasant	**.899**	.069
RepulsiveInviting	**.831**	.176
UnfriendlyFriendly	**.757**	.127
UnenjoyableEnjoyable	**.703**	.335
UnpersonalPersonal	**.630**	.386
SimpleComplex	-.246	**.823**
UninterestingInteresting	.329	**.775**
DullExciting	.415	**.787**
AverageExceptional	.308	**.645**

For further analysis, the ratings of environments on scales falling under each of the two factors were taken together to determine a combined score on two variables: attractiveness and interestingness.

This time I wanted to discover whether the addition of a neutral narrative would make the natural and urban environments less attractive and less interesting. Therefore I compared the scores on attractiveness and novelty of the natural and urban environments by participants who watched the videos without a narrative with the scores of the participants who watched a video with a neutral version of the narrative. An independent-samples t-test was conducted to compare the two conditions. A significant difference in attractiveness was found between the natural environment with a neutral version of the story and without a story: (M(story) = 5.34, SD = 1.9; M(no story)=6.30, SD = 2.57; t(203) = 3.05, p = .003) and in interestingness (M(story) = 4.12, SD = 1.9; M(no story) = 4.77, SD = 2.29; t(162) = 1.94, p = .055). Therefore, the addition of the neutral version of the narrative to the video of the natural environment led to it being rated as significantly less

interesting and also as significantly less attractive. Similarly, participants who viewed the urban video accompanied by the neutral commentary experienced the environment as significantly less interesting (M(story) = 4.54, SD = 2.7; M(no story)=5.49, SD = 2.28; t(154) = 2.34, p = .02) and less attractive (M(story) = 4.43, SD = 1.87; M(no story) = 5.06, SD = 2.11; t(193) = 2.21, p = .028).

Before discussing the potential implications of the results I wanted to discover whether the description of the stories as a positive and a neutral ones was consistent with the participants' categorization of the two versions of the narrative. The Mann-Whitney test was conducted to compare the ratings of the two versions of the story on a negative-positive scale. There was a significant (t = 0.016) difference in ratings between the positive (M = 7.4) and the neutral versions of the story (M = 5) of the urban environment. There was also a significant difference (t = 0.032) in ratings between the positive (M = 7.2) and the neutral story versions of the story of the natural environments (M = 5.4). The participants who judged the positive versions of the stories indicated that their impression of the environment was more positive compared to the judgements of the participants who read the neutral/negative versions.

4. Discussion and Conclusions

A higher rating of positiveness of the positive versions of the narratives supports my claim that the stories I wrote, although they were essentially two versions of the same story, differed in terms of their representation of the environments. However, it is difficult to estimate the strength of the difference between the positive and neutral/negative versions because of the small number (n=10) of participants who judged the two versions of the narratives.

When designing our study I wanted to discover whether the addition of historical and cultural information about the environments would significantly alter their experiential qualities as measured by attractiveness and interestingness ratings. Specifically, I addressed the question whether the natural and urban environments differed in terms of their perceived *attractiveness* and *interestingness* as a consequence of the addition of either a positive or a neutral version of the narrative.

Summarizing the results of the study I conclude that participants' ratings of attractiveness and interestingness of environments may be significantly influenced by the provision of information about the environments. I had expected that the addition of a story would make both the natural and the urban environments more

or less interesting, but I was surprised to discover that the addition of a 'positive' story significantly heightened the perceived attractiveness of both environments, while a 'neutral' story significantly lowered it. The effect of a story on perceived interestingness, however, is stronger than its effect on perceived attractiveness. In this study the addition of a positive version of the narrative to a natural and an urban environment resulted in a 25 percent increase in interestingness and a 14 percent increase in attractiveness ratings, while the addition of a neutral version of the narrative resulted in a 15 percent decrease in interestingness and a 17 percent decrease in attractiveness ratings. These figures are calculated against the ratings of the version of the videos without commentary. Direct comparison of the ratings of the positive and the neutral versions of the narrative reveals a much stronger difference: 29 percent in attractiveness and 34 percent in interestingness ratings over both of the environments. Such a strong effect of narrative framing may appear surprising as the two versions of the story differed only moderately in terms of perceived positiveness of the representation. However this moderate effect may be the result of the small number of participants who judged the two versions of the story as compared to the huge number of participants (n=105) who watched the video and judged the attractiveness and interestingness of the environments.

Interestingly, for the participants of the study of affective restoration, the addition of a positive story didn't improve the participants' mood as there was no difference in mood states between the participants who watched the video without a commentary and those who watched the video accompanied by a positive version of the narrative. This, I think, reinforces the idea that the participants who watched the video while listening to a positive story genuinely experienced the environments as more attractive and interesting and did not merely experience a general increase in positive affect.

One of the conclusions of this study is that the experience of natural and urban environments resulting from the perception of the physical characteristics of an environment is not phenomenologically 'closed', but can be significantly altered by providing some kind of explicit commentary. The perceived qualities of environments changed to a significant extent, depending on the choice of narrative, suggesting that the narratives I composed for the study were capable of engaging the participants' imagination in the direction that I had expected.

The themes or concepts through which I framed the narratives in the study were neither given nor obvious. Indeed, both environments are amenable to several compatible or contrasting local or global themes, including the ecology of the environment, the picturesque or the sublime, technology (e.g. water management), romance, history, mythology, etc.

In my choice of verbal representations of the environments I simply selected two plausible but contrasting interpretations. The stories I provided are no more 'real' than any other of many possible narrative framings of the environments. Gitlin (1980, p. 7) described such a framing as 'persistent patterns of cognition, interpretation, and presentation, of selection, emphasis, and exclusion by which symbol-handlers routinely organize discourse' (see also Entman, 1993). The narrative framing of the environments in this study pragmatically emphasized some of the themes while neglecting other possible interpretations.

The application of deliberate narrative strategies in an attempt to manipulate the impact of the story on the experience may appear rather artificial and unauthentic, bringing to mind Disneyland-like practices of thematization. Not surprisingly, such strategies of staging and thematization have traditionally met with criticism in the face of 'threatening transformations of the world into imagineered inauthenticity (which) raises questions of genuineness, fakery, verisimilitude, and delusion, authentic and inauthentic, the real and the false' (Sternberg, 1997).

However, it would be naïve to think that something like a thematically unproblematic essence exists to be narrated upon, in relation to both environments in this study (Harkin, 1995; Uriely, 2005). Some sort of interpretation and thus necessarily 'distortion' of reality in the representation of the environment is unavoidable. My narrative strategy did not substantially differ from existing narrative practices, for instance, those promoting tourist destinations (Santos, 2004; Chronis, 2005). Additionally, concern about representations' authenticity has been undercut by the analysis of the role of makebelieve in the creation of touristic images (Cohen, 1995).

Furthermore, the problem of authenticity of representations was not of concern for this study. I deliberately limited my inquiry to a demonstration of the impact of a narrative on experience. Capitalizing on the strength of the findings I can speculate about the potential impact of narrative framing in terms of the power it extends or takes away in the process of the narrative construction of spaces. Narrative becomes a vehicle through which contesting representations of reality can potentially be fought out (Kane, 2000).

By manipulating linguistic features of the narratives I changed the perception of reality, empirically confirming Hall's (1981) remark that reality exists outside language, but it is constantly mediated by and through it. In particular, connotative meanings of a narrative are considered more open and subject to more active transformations.

Urbain (1989) observed that a tourist resides in a *network of narrative possibilities*, choosing one program or another. Research on tourism semiotics and narrative practices could potentially elucidate the dynamics of touristic experiences through understanding how subjects constantly reinterpret narrative events in terms of their own experiences, engaging their imagination, their perceptual, cognitive, and emotional abilities and their ideological preferences. One of the aims of such research would be to understand the various decoding strategies audiences apply to adapt or oppose tourist messages. Finally, at the end of this discussion of the impact of narrative practices on experience, I would like to emphasize the importance of conjoint research on semiotic and syntactic features of representations and their impact on experience.

Chapter 6

The experience of ‘sublime’ landscapes: a psychological perspective

Abstract

The experience of the Sublime in nature has been a source of inspiration for generations of philosophers. Although a fascinating phenomenon, the Sublime has never been a topic of empirical research. A variety of interpretations of the experience of the Sublime converge into one common factor: the Sublime is thought to be characterized by a conflicting mixture of positive and negative emotions. We hypothesized that the experience of very beautiful landscapes may involve a negative aspect when they contain some physical threat. We consider the perception of vertical depth to be a potential source of perceived threat. The two groups of photographs we selected for the study consisted of landscapes with and without height/depth cues. We applied the affective priming paradigm to search for the presence of negative emotion that supposedly constitutes the experience of the Sublime. In addition, the participants in our study evaluated the attractiveness and interestingness of landscapes. We conclude that a conflicting mixture of positive and negative emotions is a real characteristic of the sublime experience and not a mere literary fiction.

Chapter 6

The experience of 'sublime' landscapes: a psychological perspective

1. Introduction

The experience of nature has been the subject of research from a variety of theoretical perspectives. Much empirical research has been done into landscape preferences (see Ribe, 1989 for a review) and into the restorative (stress-reducing and mood-enhancing) properties of natural environments (Ulrich *et al*., 1991; Kaplan, 1995; Karmanov & Hamel, 2008). More recently, we find a growing interest in negative experiences in nature, in people's reactions to natural threats for instance. An encounter with a wild animal (Ulrich, 1993) or the perception of certain physical properties of natural environments, such as dark forests (Herzog & Kropscott, 2004), can be experienced as threatening. Generally speaking, researchers sought to provide a comprehensive account of people's cognitive and emotional responses to nature (Kaplan & Kaplan, 1989). Surprisingly, very little research has been done into strong positive experiences. Some researchers address the question indirectly, in research into the spiritual dimension of wilderness experiences (Fredrickson & Anderson, 1999) or into the emotional response to natural threats (Van den Berg & Heijne, 2005). It has been observed (Van den Berg & Heijne, 2005) that a confrontation with natural threats may, paradoxically, be a source of strong positive feelings such as fascination and awe.

In her comprehensive study of strong positive experiences Laski (1961, p. 188) found that nature was the most often mentioned source of such experiences. In empirical research, strong positive experiences are known under different names: 'peak experiences' (Panzarella, 1980), 'flow' (Csikszentmihalyi, 1990), 'strong experiences' (Gabrielsson, 2001). It is the concept of the Sublime, however, that, from the eighteenth century onward, has been most closely associated with strong experiences in nature. The origins of the sublime experience and its experiential quality were and remain a major topic of interest for generations of philosophers (Shaw, 2006). The experience of the Sublime is usually described as a conflicting mixture of positive and negative emotions, as a generally powerful and rewarding experience tinged with unpleasantness. To our knowledge, the experience of the Sublime in nature has never been the subject of empirical psychological research. We aim to rectify this situation. We first briefly review the theoretical background of the concept of the Sublime and then describe our research.

1.1 The Sublime in nature

In the eighteenth century the concept of the Sublime established itself in a new way, as an exciting, but somehow frightening experience that could be induced in us by nature (Eco, 2004, p. 296). The experience of the Sublime was considered to be overpowering. 'It is breathtaking and fearful and in the first moment it cripples us only to fill us with an unbridled vitality and ecstatic joy some moments later' (Van den Braembussche, 1996, p. 168). Described as 'an astonishment… with some degree of horror' (Burke, 1757, quoted in Bullard, 2005); a 'delightful horror' (Dennis, quoted in Hope Nicolson, 1959, p. 279), 'a negative pleasure' (Kant, quoted in Wilson, 2001), 'a mixed feeling …a composition of melancholy …and joyousness' (Shiller, quoted in Shaw, 2006, p. 90) - the experience of the Sublime in nature was considered to be an intense and overall rewarding experience that nevertheless had some kind of negativity or unpleasantness about it. This felt unpleasantness was supposedly brought about by negative emotions of sadness, unease, anxiety and even terror that were thought to be part of the experience of the Sublime.

A variety of landscape types and natural phenomena were thought capable of inducing the experience of the Sublime. For instance, Joseph Addison's (1672-1719) list of sublime landscapes includes 'Deserts, mountains, rocks and precipices, wide expanses of waters… where we are not struck with the Novelty or Beauty of the Sight but with that rude kind of Magnificence' (Addison, 1712, quoted in Shaw, 2006, p. 35). Immanuel Kant gives examples of a starry sky and a tempest while for Edmund Burke the idea of the Sublime implies vastness of dimensions, but also ruggedness and negligence, solidity, even massiveness, and darkness (Eco, 2004, pp. 290-297). In the end, all things overwhelming that make one feel vulnerable and small, but exert a fascination and attraction at the same time have become associated with the sublime experience.

The growing interest in and appreciation of sublime landscapes signals a dramatic change in the experience of nature that took place in Europe during the 17th and 18th centuries. The result was a complete re-evaluation of the conventional 17th century attitude to nature which '…celebrated the serene, charming, and lovely rather than the majestic, wild and irregular' (Hope Nicolson, 1959, p. 37). 'A smooth, well-ordered garden, offering ease and delight to the spectator, was preferable to the brooding intensity of the mountain crag' (Shaw, 2006, p. 29). Archetypical sublime landscapes such as mountains were, in the description of the 17th century poet Andrew Marvell, nothing more than 'unjust, hook-shouldered excrescences, frightening the heaven and deforming the earth' (Upon the Hill and Grove at Billborow, lines 9-12). By the end of the 17th century this hostile attitude

towards uncultivated nature has gradually begun to be replaced by admiration and enthusiasm as expressed in Thomas Burnet's (Burnet 1681, quoted in Ogden, 1947) declaration that '…there is nothing that I look upon with more pleasure than the wide sea and the mountains of the earth. There is something august and stately in the air of these things, that inspires the mind with great thoughts and passions'. Similarly, Anthony Ashley Cooper (1671-1713) in his *Characteristics of Men, Manners, Opinions*, observed '…that even the rugged crags, the mossy caves, the caverns and the waterfalls, adorned with all the graces of the wilderness, struck him as all the more fascinating for they represented nature in a more genuine manner and were enveloped in a magnificence far superior to what he described as the "ridiculous counterfeits" of princely gardens' (Cooper, 1711, quoted in Eco, 2004, p. 282).

Considering nature as a source of sublime experiences fits well into an appreciation of the exotic and the unusual typical of 18th century culture (Grout & Palisca, 1996, p. 401). The appreciation of sublime landscapes grows with an increasing opportunity for travel and for the exploration of previously inaccessible landscapes. From the 18th century onward there were a growing number of adventure-seeking travelers who traveled to the Alps, the Lake District and the Scottish Highlands. 'The traveler bold to venture to cross the Alps was fascinated by impervious cliffs, endless glaciers, bottomless chasms, and boundless stretches of land' (Eco, 2004, p. 282).

The deformity, disorder and roughness of sublime landscapes was difficult to reconcile with the assumption of late 17th century aesthetics' that nature's beauty was related to such qualities as order, composition, balance, proportion and restraint (Shaw, 2006, p. 30). The representation of the experience of beauty and delight in nature as having been brought about by the rational and comprehensive arrangement of its forms and properties didn't do justice to the emotional intensity and unusual quality of the sublime experience. The centrality of affect and emotion in the experience of the Sublime put into question the role of reason and rational judgment in the generation of such an experience. While the concept of nature's beauty stressed the intelligibility of nature brought about by the mind's imposition of forms and concepts on it, the concept of the Sublime undermined the unity of experience by the '…decentring of the harmony between mind, beauty, virtue and God' (Shaw, 2006, p. 43). The experience of the Sublime, since we are unable to understand its origins, intensity and experiential qualities, confronts us with the mind's inability to comprehend the immensity and boundlessness of nature.

1.2 Kant's and Burke's analyses of the Sublime experience

In his 'Critique of Judgement' Immanuel Kant attempted to integrate the experience of the Sublime into an essentially rationalistic account of the aesthetic experience (Scruton, 2001, pp. 97-101). His argument followed the general assumption that '…objects must conform to our cognitions, rather than our cognitions to objects' (Monk 1960, pp. 4-5). The Sublime for Kant is not a property of nature and '…cannot be contained in any sensible form' (Kant, 1790, quoted in Shaw, 2006, p. 80). 'A Sublime object may be terrifying, but the fact that I derive pleasure in the contemplation of this object and not pain suggests that my feeling is radically subjective' (Shaw, 2006, p. 79-80). The experience of the Sublime is 'essentially transcendent to (that is, free from) all determinations of nature, inner and outer' (Burnham, 2000, p. 99). It is dependent on the mind's capacity to submit the chaos of a storm or the sight of a starry sky to the rational idea of totality or freedom. For Kant, in the experience of the Sublime the initial negative reaction is followed 'by a powerful sense of relief (even elation) in so far as the formless phenomenon can be grasped as a totality in terms of a rational idea' (Crowther, 1989, p. 81). The experience of the Sublime is therefore thought to depend on our intellectual capacities, on rationalistic attempts to submit the mighty, rugged and dangerous in nature to the authority of reason.

Such a rationalistic interpretation of the sublime experience may however overestimate the role of conscious thought and rational judgment in the experience of the Sublime. It was challenged in an important eighteenth' century work on the Sublime: Edmund Burke's 'A Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful' (1757; 1990). Adopting the language of empiricism, Burke insists that sense impressions are 'the great originals of all our ideas' (Burke, 1990, quoted in Shaw, 2006, p. 49). Our knowledge of the world is derived entirely from the evidence of the senses whereby the affective objects 'seize upon senses and imagination captivating the soul before the understanding is ready either to join with them or to oppose them' (Bullard, 2005). Burke interprets the experience of the Sublime as '…a painful anxiety arising out of a confrontation with one's own mortality. This anxiety is subsequently moderated in the awareness of one's own safety from any real mortal danger.' (Burke, 1990, quoted in Brillenburg-Wurth, 2002, p. XI). For Burke the sublime experience is a direct consequence of sense impressions of natural phenomena, not the end result of some process of rationalization.

Burke's claim about the sensory origins of the sublime experience, '… a new psycho-physiological twist' (Shaw, 2006, p. 49), could not be subjected to scientific inquiry and therefore remained a hypothesis. In contrast, Kant's

rationalistic view of the sublime experience has been highly influential. Rationalistic interpretation and conceptualization of sensory impressions was considered to be the single source behind the generation of sublime experiences. For instance, Samuel Taylor Coleridge (1772-1834) wrote that: 'No object of Sense is sublime in itself; but only so far as I make it a symbol of some Idea. The circle is a beautiful figure in itself; it becomes sublime, when I contemplate eternity under that figure. …. Nothing not shapely…can be called beautiful: nothing that has a shape can be Sublime except by metaphor' (Coleridge, 1995, quoted in Shaw, 2006, p. 95). Thus, the idea of the sublime experience as contingent upon symbolic transformation of perceptual qualities of objects, figured prominently as part of the post-Kantian tradition of the interpretation of the Sublime experience.

Even a brief historical overview of the theories of the Sublime demonstrates that many sources of a sublime experience in nature are recognized and many different qualities are attributed to it. Although the qualities of an experience of the Sublime may vary as to context, according to the canonic interpretation they converge into at least one common factor. The Sublime is characterized by a paradoxical negative pleasure, by a conflicting mixture of positive and negative emotions. When confronted with the Sublime, the mind is both attracted to the object and repelled by it.

In theoretical accounts of the experience of the Sublime Kant's rationalistic view is contrasted with Burke's empiricist interpretation. Kant sees the negative pleasure as being brought about by the conscious interpretation of the greatness and immensity of Sublime landscapes. If an experience of the Sublime involves negative emotions, and there is doubt as to whether this is the case, these emotions will be the consequence of the deliberate contemplation of the physical properties of a landscape.

From Burke's perspective, however, negative emotions evoked in the presence of Sublime landscapes are directly specified by the physical properties of landscapes, by the perception of danger for instance. In Burke's words: 'When danger or pain press too nearly, they are incapable of giving any delight, and are simply terrible; but at certain distances, and with certain modifications, they may be, and they are delightful' (Burke, 1990, quoted in Shaw, 2006, p. 54). The resulting negative feeling may therefore manifest itself directly, without any conscious effort or elaboration.

1.3 The objectives of the study

In our research we wanted to discover whether a mixture of positive and negative emotions, the central characteristic of the sublime experience, is a real phenomenon or merely a literary fiction. In particular we were looking for evidence of the presence of negative emotions as part of the automatic response to sublime landscapes containing some physical threat. Such an approach accords well with the Burkean interpretation of the experiential qualities and the perceptual mechanisms of the experience of the Sublime. Burke assumes that a person, confronted with a Sublime landscape, experiences a negative emotion that subsequently turns into a feeling of pleasure, joy etc. There are doubts as to the reality of such a conversion. If it does take place, then under which conditions, is the next question. For example, in a real environment, if one stands on the edge of a cliff and one is in real danger of falling over the edge, one will probably experience only negative feelings. On the other hand, when one contemplates the same sublime landscape from a safe distance one will probably experience elation, joy etc. There is no danger, no fear, so why would one experience negative emotions? As our research was conducted in a laboratory setting using simulated environments (photographs of sublime landscapes) we considered the possibility of the participants experiencing negative emotions even more unlikely. For an experience to fall into the category of the sublime experience, it must contain both positive and negative emotional qualities at the same time.

We assumed that negative emotions associated with the Sublime result from the presence of a real physical threat in the landscape. Although there are various sources of perceived danger in natural scenes (a dense forest may appear threatening), we hypothesized that landscapes photographed from a high vantage point (the edge of the cliff) could make participants aware of its height/depth and experience them as physically threatening. Such landscapes, although breathtakingly beautiful, could potentially release the required paradoxical positive-negative mix of emotions. If the photos of these landscapes elicited a negative emotional reaction it might possibly be caused by the perception and automatic evaluation of height/depth cues. We did not expect the presence of negative emotion to be accompanied by consciously perceived fear, as we assumed that participants sitting in a laboratory and looking at photos of beautiful landscapes would not feel frightened in any way.

Our second set of photos contained natural scenes providing similar panoramic views of landscapes, but with no difference in height between fore- and background. These landscapes also fall into the category of Sublime landscapes (open, panoramic, far views, high skies). Such landscapes may well also trigger

sublime experience. Kant, for instance, thought that perceived negative emotion could well be brought about by the conscious interpretation of the greatness and immensity of Sublime landscapes. However, in our study we were considering rapid and unconscious affective evaluations as a potential source of negative emotions.

We used the sequential affective priming paradigm (Neely, 1977) to search for the presence of rapid affective evaluation processes that take place outside the subjects' awareness. This method allows the detection of a negative emotional reaction even when this perceived negativity cannot be deduced from subjects' verbal reports. The perceived negativity may, however, bias subsequent cognitive and emotional processes (Fazio *et al*., 1986). If an automatic evaluation of a landscape's physical properties involves a negative emotional reaction, its presence can be deduced from, for instance, faster recognition of a negative expression of subsequently presented emotional faces (Hietanen & Korpela, 2004). For our study we assumed that the faster recognition of faces expressing fear after the presentation of landscapes with height/depth cues than after the presentation of level landscapes would justify the conclusion that the affective evaluation of the former landscapes triggers an automatic negative emotional reaction. The participants who took part in our study, in addition to the affective priming task, evaluated the landscapes on a number of bipolar scales measuring the landscapes' attractiveness and interestingness. Finally, the participants' fear of heights was measured by the fear of heights questionnaire (Cohen, 1977).

As to the affective priming task, we hypothesized that negative emotions typical for the experience of Sublime landscapes result from the direct (unconscious) perception of a physical threat in landscapes. Unconscious negative emotions, however, should not be part of the emotional response to physically non-threatening Sublime landscapes. We further wanted to discover whether there is a difference in perceived attractiveness and interestingness between Sublime landscapes with height/depth cues and level landscapes. Finally, we wanted to explore the correlations between the perceived attractiveness and interestingness of landscapes, a negative emotional reaction (if present) and a fear of heights as measured by a fear of heights questionnaire.

2. Method

2.1 Participants

Thirty-five first and second year psychology students at the University of Amsterdam participated in the study. They were 21 women (60%) and 14 men (40%). The participants had an average age of 21.3 years (*SD* = 1.25). There visual acuity was normal or corrected to normal. The students signed informed consent forms and were given course credits for their participation.

2.2 Stimuli

The intrinsic characteristic of sublime landscapes is their boundlessness and immensity. Therefore the sixty photographs of natural scenes we selected for the study provide panoramic, distant views of landscapes. The photos represent a variety of landscapes: fields with forests in the background, hills and mountains, valleys with either little or lush vegetation. Many of the photos are of rivers, lakes and seashores. All the photos were taken during the day and in sunny weather conditions. The photos represent different seasons, although no winter photos were selected. There are no visible signs of human activity or any animals in the photos.

We divided this heterogeneous set of photos into two. One half of the photographs are of sublime landscapes taken from a high vantage point, giving the clear impression of having been taken either standing on the edge of a cliff or from a steep slope. The second half of photos are of similar landscapes (open, panoramic, far views, high skies), but with no difference in height/depth between fore- and background (Figures 1 and 2).

Figure 1. A landscape with height/depth cues.

Figure 2. A level landscape.

For the affective priming task we also selected sixty colour photographs of faces with expressions of either happiness or fear. The set of photos are of thirty women's and thirty men's faces, each of fifteen happy and fifteen frightened faces. Each of the sixty faces is of a different model. The faces were obtained from a standardized set of faces (matched for age and attractiveness) showing different emotions (Lundqvist & Litton, 1998).

2.3 The experimental design

The study consisted of two parts. The first part was the affective priming task and in the second part the participants evaluated each of the photos of landscapes by filling out a questionnaire. At the end of the session, the participants' fear of heights was measured by means of a fear of heights questionnaire.

The participants were tested individually, while the experimenter sat with each participant. The experiment was run in a dimly lit room. During the priming task, photographs were presented at a viewing distance of about 70 cm. Stimuli were generated on a PC and presented on a 19" monitor, with a refreshment rate of 100 Hz and resolution of 1024 by 768 pixels. The E-Prime program was used to determine the onset and duration of the presentation of the stimuli.

A within-subject design was applied to the affective priming task. The within-subjects factor was created by pairing two primes (landscapes with height/depth cues or level landscapes) and two targets (frightened or happy faces). In this way four prime-target combinations were created. The primes were randomly assigned

to the targets with the restriction that they should contain equally large sets of affectively congruent and affectively incongruent pairings. As to the congruency of primes and targets, it was assumed that level sublime landscapes and happy faces are affectively congruent. Similarly, sublime landscapes with height/depth cues and frightened faces are assumed to be affectively congruent. Therefore, there were two congruent and two incongruent groupings of landscapes and emotional faces. Fifteen happy faces were primed by fifteen level landscapes and fifteen frightened faces were primed by fifteen landscapes with height/depth cues in the affectively congruent condition. Similarly, fifteen happy faces were primed by fifteen landscapes with height/depth cues and fifteen frightened faces were primed by fifteen level landscapes in the affectively incongruent condition.

We divided the sixty photos of landscapes and the sixty photos of emotional faces in two groups. One group contained twelve landscapes (six flat and six with height/depth cues) and twelve emotional faces (six happy and six frightened). These twelve primes and targets were presented to the participants as practice trials. The remaining forty-eight primes and targets were used for the experimental trials. The randomization of prime-target combinations was done separately for the twelve practice trials and the forty-eight experimental trials. Prime and target stimuli were linked to each other at random for each of the thirty-five participants. Each of the sixty landscapes was shown only once as a prime and each of the sixty emotional faces only once as a target.

2.4 The procedure

The priming task consisted of 12 practice trials and 48 experimental trials. It was explained to the participants that the experiment concerned the speed at which people are able to affectively categorize photos of emotional faces. Participants were told that they would be looking at pictures of different landscapes followed by a face. They were asked to fixate in the middle of the computer screen where a fixation cross would signal that the trial was about to begin. The participants were instructed to look at the prime but to ignore it and to indicate the emotion of the target face by hitting the response button as quickly as possible without compromising accuracy. The participants were asked to keep their index fingers on the response buttons throughout the experiment. Two response boxes were used to record the responses. Each had a button labeled either happy or frightened. The left-right placement of the two response boxes was counterbalanced across the participants.

The computer was programmed to produce the same sequence for each trial. Each trial started with the presentation of a fixation cross for 1000 ms. The fixation cross

was followed by the presentation of the prime for a duration of 250 ms. Thereafter and without delay the target was presented resulting in a stimulus onset asynchrony (SOA) of 250 ms. The target either remained on the screen until the participant responded by pressing one of the buttons or disappeared after 1000 ms if no response was given. The interval between the trials was 3000 ms.

2.5 Questionnaires

After finishing the affective priming task, the participants evaluated each of the forty-eight landscapes by filling out a questionnaire. The twelve landscapes used in the practice trials were not included in the evaluation. The questionnaire we used was derived from the adaptation for the Dutch language by Jansen and Smolenaars (1966) of the semantic differential (Osgood *et al*., 1957). It includes nine scales suited to the evaluation of a landscape's attractiveness and novelty (interestingness). Attractiveness and novelty are considered to be the two fundamental dimensions of an aesthetic evaluation (Oostendorp & Berlyne, 1978). Each scale ranged from 1 to 7 (1 = dull to 7 = exciting) and the participants were asked to rate the landscapes by circling one of the numbers. Descriptive labels were provided for the extreme points on the scale only. Five of the nine scales (ugly-beautiful, unfriendly-friendly, unpleasant-pleasant, repulsive-inviting, not picturesque-picturesque) measure the attractiveness of an environment. The scales are strongly correlated and were previously found to form one attractiveness dimension (Karmanov & Hamel, 2008). The five scales measure slightly different aspects of attractiveness and their aggregated scores provide a better measure of attractiveness than the scores derived from a single scale (e.g. ugly-beautiful). For the same reason we used four scales (uninteresting-interesting, average-exceptional, dull-exciting, and simple-complex) to measure the novelty of the environments.

At the end of the session, the participants' fear of heights was measured by means of the Cohen Acrophobia Questionnaire (CAQ), which was designed specifically to assess a person's fear of heights (Cohen, 1977). The twenty-item questionnaire measures the degree of anxiety on a 0 to 6 point scale (0 = not afraid at all to 6 = extremely afraid) in twenty common height-related situations. The sum of the points given on the twenty items yields the aggregate fear of heights score.

3. Results

3.1 The affective priming task

None of the participants discovered that the photos of landscapes we used in our experiment fall into one of two categories: natural scenes with and without height/depth cues. We began the analysis of reaction times by discarding incorrect responses (happy face button pressed instead of frightened and vice versa) from the affective priming data as well as responses on which reaction times exceeded the individual mean reaction time +/- two standard deviations. The remaining data amounted to 94 % of the original data in the level landscape – happy face condition; 93 % in the landscape with height/depth cues – happy face condition; 95 % in the level landscape – frightened face condition and 95 % in the landscape with height/depth cues – frightened face condition. The reaction times were further analysed by a repeated measures ANOVA with two prime categories (level landscapes and landscapes with height/depth cues) and two target categories (happy and frightened faces) as within-subject factors.

The main effect of the target (type of landscape) was not statistically significant $F(1,34) = 1.06$, $p = .31$. The type of landscape (level landscape or landscape with height/depth cues) does not in itself have an effect on the overall reaction times with which emotional faces are recognized. The main effect of the target (happy or frightened faces) was statistically significant $F(1,34) = 5.33$, $p = .027$. In general happy faces were recognized faster than frightened faces. Most importantly, there was a significant interaction effect between the prime and target categories $F(1,34) = 17.75$, $p \leq .0005$ (see Figure 1). The statistically significant interaction effect suggests that the reaction times with which happy and frightened faces were recognized depends on the type of the preceding prime category (level landscapes as opposed to landscapes with height/depth cues).

Paired comparison showed that the recognition of frightened faces was faster after the presentation of landscapes with height/depth cues than after the presentation of level landscapes as primes (mean reaction times 516 vs. 533 ms respectively; $F(1,34) = 4.36$, $p = .044$). Similarly, the recognition of happy faces was faster after the presentation of level landscapes compared to landscapes with height/depth cues (mean reaction times 497 vs. 523 ms respectively; $F(1,34) = 18.9$, $p \leq .0005$). Therefore facial expressions of fear and happiness are recognized faster when they are preceded by an affectively congruent prime stimulus.

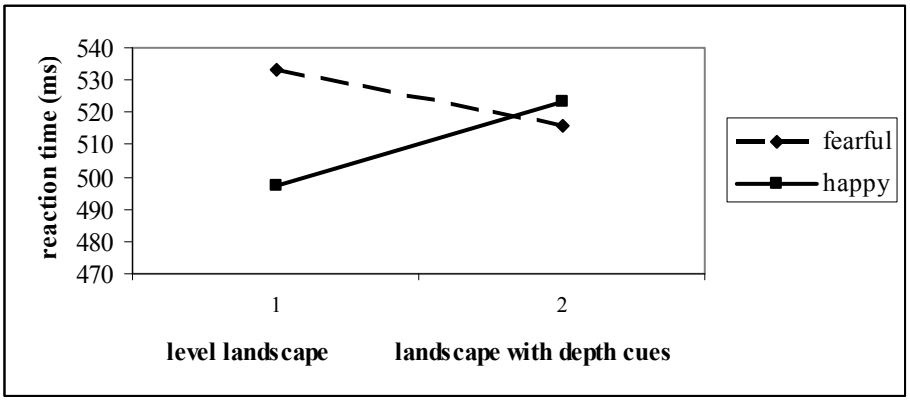

Figure 3. The mean reaction times to facial expressions of happiness and fear after the presentation of level landscapes and landscapes with height/depth cues.

3.2 The analysis of the questionnaires

After the priming task, thirtyfour out of the thirtyfive participants in our study filled out two questionnaires. The participants evaluated the attractiveness and interestingness of each of the forty-eight landscapes on nine scales and the participants' fear of heights was measured by means of the Cohen Acrophobia Questionnaire (CAQ).

First we wanted to find out whether there is any relationship between the strength of affective priming as demonstrated by the faster reaction times to frightened faces after the presentation of landscapes with height/depth cues and the participants' scores on the fear of heights questionnaire. For each participant we subtracted the mean reaction time in the affectively incongruent condition (level landscape – frightened face) from the mean reaction time in the affectively congruent condition (landscape with height/depth cues – frightened face). The resulting difference scores were correlated with the participants' scores on the fear of heights questionnaire. We found a significant positive correlation between the participants' fear of heights scores and the strength of the affective priming effect (r = .38, n = 35, p = .026, two-tailed). Participants who are afraid of heights recognize frightened faces faster than participants who are less afraid of heights when the faces are preceded by a landscape with height/depth cues. We also calculated difference scores between the two conditions with happy faces as targets (level landscape – happy face and landscape with height/depth cues – happy face). There

was no correlation between the participants' fear of heights score and the strength of affective priming with happy faces as targets.

As a next step, we analysed the data from the questionnaire in which the participants judged the attractiveness and interestingness of landscapes. The participants' judgments on the 9 scales were submitted to a principal components factor analysis with Varimax rotation (SPSS 15.0.1). The participants' ratings of landscapes per person and per landscape were inserted as cases and the 9 scales as variables. The matrix generated consists of 9 variables by 1632 cases (34 participants by 48 landscapes). Factor analysis with Varimax rotation produced two factors with a total amount of explained variance of 73.74 percent (Eigenvalue ≥ 1.0). The factorial composition was determined by including all items with a factor loading greater than .40 on a given factor. In the ideal case we expected a single significant loading on only one factor for each scale. One of the 9 scales (ugly-beautiful), however, had high loadings on factor 1 as well as on factor 2.

Therefore we decided to derive a new factor solution after eliminating this variable. Factor analysis with Varimax rotation, applied to the reduced data of 8 scales produced two factors with a total amount of explained variance of 74.39 percent (Eigenvalue ≥ 1.0; see Table 1). The internal consistency (Standardized Cronbach's alpha) of the items falling under each factor was as follows: factor 1 = .91, factor 2 = .87.

Table 1. Factor Analysis of the Data on 8 Scales, Total Variance Explained.

Factor	% of Variance
1	40.12
2	34.27
Total % of Explained Variance	74.39

The two factors are easy to interpret (see Table 2). Factor 1 includes four of the eight scales. The scales with the highest loadings are: 'average-exceptional', 'simple-complex', 'dull-exciting', and 'uninteresting-interesting'. This factor was called 'novelty'.

Factor 2 contains the four remaining scales: 'unpleasant-pleasant', 'unfriendly-friendly', 'repulsive-inviting', and 'not picturesque-picturesque'. It was called 'attractiveness'.

Table 2. Factor Loadings of Landscapes Judgments.

	Factor	
	Novelty	Attractiveness
Average-Exceptional	**.897**	.051
Simple-Complex	**.860**	-.008
Dull-Exciting	**.859**	.233
Uninteresting-Interesting	**.858**	.226
Unpleasant-Pleasant	.152	**.891**
Unfriendly-Friendly	-.165	**.874**
Repulsive-Inviting	.207	**.862**
NotPuctur.-Picturesque	.311	**.577**

For further analysis, the ratings of environments on the scales falling under either of the two factors were taken together to form two variables: novelty and attractiveness. Mean scores on novelty and attractiveness of level landscapes and landscapes with height/depth cues were calculated for each participant. Paired t-tests were conducted to compare the attractiveness and novelty of the two types of landscape. There was a significant difference in attractiveness between the level landscapes and landscapes with height/depth cues (respectively M = 5.46, SD = .53 and M = 5.73, SD = .48; $t = 2.28$, df = 33, $p = .029$, two-tailed). Landscapes with height/depth cues were rated as significantly more attractive than level landscapes. There is not much difference between the two means however. There was a stronger difference in novelty between level landscapes and landscapes with height/depth cues (respectively M = 5.27, SD = .42 and M = 5.94, SD = .35; $t = 8.21$, $p \leq .0005$, two-tailed). Therefore, landscapes with height/depth cues were rated as significantly more interesting and exciting than level landscapes. Finally, there was a significant positive correlation ($r = .37$, n = 34, $p = .028$, two-tailed) between the strength of affective priming (the difference scores between level landscape – frightened faces and landscape with height/depth cues – frightened faces) and the novelty ratings of landscapes with height/depth cues. Participants who recognize frightened faces faster when they are preceded by a landscape with height/depth cues (i.e. show stronger affective priming) judge landscapes with height/depth cues as more exciting and interesting than participants who show a weaker priming effect. There was no significant correlation between the strength of affective priming (the difference scores between level landscape – frightened faces and landscape with height/depth cues – frightened faces) and the attractiveness ratings of landscapes with height/depth cues. Finally, the difference scores between the two conditions with happy faces as targets (level landscape – happy face and

landscape with height/depth cues – happy face) were not correlated with either the attractiveness or novelty ratings of level landscapes.

4. Discussion.

The presentation of photographs of natural scenes with and without height/depth cues had opposite effects on the evaluation of facial expressions of happiness and fear. The evaluation of facial expressions was faster when it was preceded by an affectively congruent prime. The results indicate that the presentation of a scene of nature may automatically trigger an affective evaluation, which modifies the subsequent affective evaluation of a target stimulus (cf. Fazio, 2001).

The affective priming paradigm has been widely applied to study the impact of precognitive affective evaluation processes on the subsequent cognitive and emotional evaluation of stimuli. In earlier research, positive and negative words were used as primes and targets (Fazio *et al*., 1986) and so were pictures (Giner-Sorolla *et al*., 1999) and even odours (Hermans *et al*., 1998). Only recently has the affective priming paradigm been applied to study the affective evaluation processes in response to environmental scenes (Korpela *et al*., 2002; Hietanen & Korpela, 2004). These two studies provide evidence for the rapid and automatic affective evaluation of natural and urban environments. The authors used photographs of urban and natural environments associated with low and high restorativeness as primes and vocal expressions of emotions (anger and joy) (Korpela *et al*., 2002) or facial expressions (anger and happiness) (Hietanen & Korpela, 2004) as targets. Expressions of joy and happiness were recognized faster after the presentation of highly restorative natural scenes than after less restorative urban scenes.

The probability of a rapid affective evaluation of natural scenes had been predicted in evolutionary models of environmental perception (see Hartig & Evans, 1993). For instance, Ulrich's (Ulrich, 1983; Ulrich *et al*., 1991) psychoevolutionary model of environmental perception and aesthetics assumes the existence of evolutionary determined rapid and automatic affective responses to natural scenes. Presumably these responses are triggered by a crude appraisal by the organism of the survival properties of environments (preferenda). The availability of vegetation and water, as well as certain physical properties of environments such as openness or depth have been presumed to contain preferenda. The recognition of preferenda may then automatically trigger positive and negative affective reactions.

The results of our study provide support for evolutionary models of environmental perception as do the findings of earlier research (Korpela *et al*., 2002; Hietanen &

Korpela, 2004). Specifically, our study provides evidence for the existence of rapid and automatic affective evaluation of height/depth cues in natural scenes, which facilitates the related emotional reaction - fear. In addition, in our experiment affectively congruent prime-target pairs also resulted in a faster evaluation of the happiness of the target faces than affectively incongruent prime-target pairs. This suggests that sets of photos of sublime landscapes both with and without height/depth cues can elicit positive and negative rapid affective evaluations respectively.

One of the aims of our study was to discover whether the mixture of positive and negative emotions, which is supposed to be the central characteristic of the sublime experience, does in reality occur or must be taken to be a mere literary fiction. In particular we were looking for evidence of the presence of negative emotions, as such emotions do not intuitively appear to be part of the experience of (very) beautiful landscapes. From the data of our study we conclude that the sublime experience may indeed involve a paradoxical mixture of positive and negative emotions. In our research the presence of negative emotion is the result of the automatic evaluation of sublime landscapes with height/depth cues. The perceived negativity emerges even in the absence of any real danger. Our results accord well with the Burkean interpretation of the experiential qualities and perceptual mechanisms of the experience of the Sublime.

The physical characteristics of sublime landscapes that can be deduced from different accounts of sublime experiences in nature as described in the introduction include boundlessness and immensity. All the landscapes we selected for the study provide panoramic views of landscapes (open, high skies). Extrapolating from the findings of our study we conclude that only landscapes with height/depth cues can be considered to be 'proper' sublime landscapes as only the experience of these landscapes elicited the required mixture of positive and negative emotions. However, the experience of a mixture of positive and negative emotions does not need to be exclusively linked to the perception of depth. There may be other sources. Level open landscapes may trigger sublime experiences, the source of perceived danger being, for instance, the sight of an approaching storm.

The presence of a negative emotion has an influence on the conscious judgment of landscapes. Sublime landscapes containing height/depth cues are judged as slightly more beautiful, but especially as much more exciting than sublime landscapes without height/depth cues. The correlation between the strength of the affective priming effect (landscapes with height/depth cues as primes) and novelty ratings suggests that the increased excitingness of landscapes with height/depth cues is related to the perception of height/depth. We assume that the increased

excitingness of sublime landscapes containing height/depth cues is the result of unconsciously perceived physical danger and unconsciously felt anxiety.

The correlation between fear of heights, novelty ratings and the strength of the affective priming effect after the presentation of landscapes with height/depth cues as primes, suggests that negative emotions associated with the Sublime result from the perception of an actual physical threat contained in the landscape. Particularly remarkable is the finding that the subjects who have a fear of heights seem to have stronger sublime experiences when confronted with landscapes containing height/depth cues. As remarked before, future research may lead to the discovery of other sources of perceived danger and negative emotion in natural scenes that trigger similar rapid affective evaluations.

Parsons (1991) suggests that the rapid evaluation of danger in environments might be a mechanism ensuring an organism's survival. However, there is disagreement among experts on evolutionary models of environmental perception about the presence or absence of rapid affective evaluation of positive characteristics of natural scenes. Ulrich (1983) suggests that rapid affective evaluation of both positive and negative features of natural scenes takes place. Parsons (1991), on the other hand, is of the opinion that only negative features of natural scenes induce rapid affective evaluations. He considers the evaluation of positive characteristics of natural scenes to be a conscious process.

In our experiment we found that landscapes both with and without height/depth cues automatically induce both positive and negative affective evaluations in the participants in our study. In the absence of a neutral condition, however, the degree of facilitation of positive and negative responses remains unclear. In particular, we cannot be sure that the presentation of level sublime landscapes facilitates the evaluation of positive targets (happy faces) compared to neutral targets. It also remains unclear which physical properties of level landscapes in particular induced the priming effect.

Finally, our study unites two slightly different perspectives on the experience of landscapes containing height/depth cues. The evolutionary model of environmental perception considers rapidly triggered negative emotions such as fear, to be an automatic reaction to landscapes with height/depth cues. On the other hand, it has earlier been suggested (Appleton, 1984) that the emotional reaction to such landscapes may be far from negative. Appleton describes immediate environmental hazards (standing on the edge of a cliff) as sources of fear and avoidance and mild hazards (experienced from a distance) as sources of fascination and awe. Although the perception of vertical depths has rarely been the subject of empirical inquiry, at

least one study (Herzog & Smith, 1988) found that the perception of vertical depth is a significant positive predictor of preference. The experience of the Sublime includes both negative and positive emotions, so it allows the combination of the qualities of experience, as suggested by these two perspectives, into a single comprehensive experience.

Chapter 7

Beneath the skin. Peak - experiences in natural environments: an event-related skin conductance study

Abstract

From the previous study we concluded that sublime landscapes are experientially rewarding and highly appreciated partly due to the presence of a physical threat (height/depth cues) in landscapes. In this study we explore the characteristics of strong positive emotional reactions to exciting and beautiful landscapes in more detail.

In our experiment skin conductance response was measured while subjects looked at photos of sublime landscapes. Each of the landscapes was subsequently rated on two dimensions of affect: perceived valence (unpleasant – pleasant) and arousal (dull – exciting).

The present study demonstrates that event related skin conductance responses are a sensitive measure of a landscape's perceived excitingness and pleasantness. For level landscapes we found a positive correlation between the ratings of a landscape's excitingness and the magnitude of the skin conductance response. This was, however, not the case for landscapes with height/depth cues. The landscapes with height/depth cues, as a rule, trigger skin conductance responses independently of whether they are judged exciting or not. This corroborates the findings of our previous study, which demonstrated a correlation between the rapid affective evaluation of danger in natural scenes and a heightened excitingness and attractiveness of sublime landscapes with height/depth cues.

Chapter 7

Beneath the skin. Peak - experiences in natural environments: an event-related skin conductance study

1. Introduction

In chapter 6 we used a selection of photographs of landscapes to investigate the experience of the Sublime in nature. The photographs were expected to be instrumental in eliciting the strong emotional experiences associated with sublime landscapes. The experience of the Sublime is characterized by a paradoxical negative pleasure, by a conflicting mixture of positive and negative emotions. We found that the experience of the Sublime was triggered by the presence of height/depth cues in natural scenes, which facilitate a negative emotional reaction – fear. We concluded that sublime landscapes are experientially rewarding and highly appreciated partly due to the presence of a physical threat (height/depth cues) in landscapes.

However, this experience of a paradoxical mixture of positive and negative emotions need not be the only strong experience in nature. Neither does the excitingness and attractiveness of sublime landscapes need to be exclusively linked to the presence of height/depth cues. The selection of photos of sublime landscapes provides us with an opportunity of exploring the characteristics of strong positive emotional reactions to exciting and beautiful landscapes in more detail.

It is believed that nature can invoke a wide range of powerful and highly rewarding emotional states (Laski, 1960). We assume that the photos of beautiful and exciting landscapes we used for the study of sublime experiences are not merely judged to be exciting and attractive, but do indeed elicit strong positive emotional experiences. If this is the case, then it should be possible to corroborate the strength of the emotional experience as expressed in self-report by more direct measures. To begin with we wanted to discover whether such direct measures of a landscape's excitingness exist and whether it would help us to better understand the characteristics of strong positive experiences in nature.

It has long been established, that looking at emotionally loaded pictures causes reliable and specific patterns of physiological activity. When looking at unpleasant pictures, for example, there is clear evidence of heart rate deceleration, an increase of facial electromyographic activity (EMG) (frowning), a large skin conductance response, a larger scalp recorded positivity, as well as potentiation of the startle

reflex (Bradley & Lang, 2000). In the past two decades, a set of calibrated picture stimuli has been used to study physiological correlates of emotions. There are currently over 600 pictures in the International Affective Picture System (IAPS; 1995). Research has demonstrated that these photographic images are instrumental in inducing a whole range of emotional reactions, varying in intensity and involving both pleasant and unpleasant affect (Lang et al., 1998). The pictures used in the International Affective Picture System are of facial expressions or of a variety of scenes. For instance, one of the fear-inducing pictures depicts a man attacking a woman with a knife; one of the happiness-inducing pictures shows laughing children playing on the beach; and one of the sadness-inducing pictures depicts a crying little boy standing in front of a destroyed house.

Different studies, in which picture stimuli from the International Affective Picture System were used (Bradley & Lang, 1994; Gomez, Stahel, & Danuser, 2004), provide evidence that most of the variance in physiological activity and self-reported emotions is explained by two factors: valence and arousal. The circumplex model of emotion defined by the dimensions of valence (pleasantness) and arousal (activation) had previously been endorsed by Russell (Russell, 1980; Russell & FeldmanBarrett, 1999). It has been convincingly demonstrated (Cacioppo and Bernston, 1994) that a variety of emotional states reflect the coordinated activity of two basic motivational systems in the brain: appetitive and defensive. The involvement of each of the two systems is expressed in the ratings on the dimension of valence. Different levels of activation of the two systems have been described as differences in the level of arousal. While a variety of emotional reactions is determined by the specific demands of a context, they are organized fundamentally by their motivational determinants and can be represented by the dimensions of affective valence (pleasant - unpleasant) and arousal (dull - exciting) (Lang et al., 1998). This two-dimensional structure of emotional reactions to affectively loaded pictures has been found both at the level of subjective responses and of physiological activity.

Previous research into the physiological correlates of emotion has demonstrated that variations in physiological parameters correlate with the ratings of affective valence and arousal as judged in self-report. For instance, facial muscle activity during picture viewing strongly correlates with judgments of affective valence. Skin conductance activity correlates positively with judgments of arousal, increasing monotonically with increases in self-reported arousal. In particular the correlation of skin conductance responses with self-report judgments of arousal is a well-established fact. For example, in both visual (affectively loaded pictures) and auditory (affectively loaded stimuli such as the crying of a baby) modalities, skin conductance responses proved to be a reliable correlate of reported arousal.

Measuring electrodermal activity is a technique that provides readily accessible indices of the functioning of the sympathetic nervous system. The sympathetic branch of the nervous system is specifically involved in the preparation of the organism's initial response to emotionally loaded stimuli. One of the specific parameters of electrodermal activity is the skin conductance response (SCR). The skin conductance response measures fluctuations in eccrine sweat gland activity, which result from the release of acetylcholin by the sympathetic nervous system (Boucsein, 1992, p.442). SCR is a measure of rapid changes in electrodermal activity that take place within 1 to 6 seconds after the initial presentation of an emotive stimulus. SCR has been used in studies of emotional reactions to affectively loaded pictures and sounds and was found to be the most informative index of the excitingness of emotionally laden stimuli.

In research into landscape perception and experience it is mostly self-report judgments of emotional reactions to landscapes that has been used. Other constituents of emotional reactions and physiological markers of emotions in particular remain largely unexplored. There are some notable exceptions to this rule, however. Many of these studies were concerned with the affective restoration experienced in natural environments. In a representative study of stress recovery in natural environments, nature's beneficial, stress-reducing effects were demonstrated by using different physiological measures: heart period, muscle tension, skin conductance (Ulrich et al., 1991). A number of specific measures of electrodermal activity were applied in this one and other studies, however, the parameters of electrodermal activity measured were different from the ones assessed in studies of affective responses to emotionally loaded pictures and sounds. In the former studies skin conductance was recorded over a longer time (e.g. 3 minutes), after the cessation of a stressor (Ulrich et al., 1991) and subsequently scrutinized for signs of stress recovery, for *reduction* in skin conductance activity. The latter studies measure the magnitude of the initial rapid skin conductance response to affectively loaded pictures.

We are unaware of any studies in which skin conductance response magnitude was used to measure the emotional response to pictures of natural environments. The question remains whether physiological correlates of the perceived emotional intensity and emotional quality of the experience of nature do indeed occur and whether they correlate with self-report judgments. If natural scenes do induce intense emotions, they should be detectable in measures of electrodermal activity assessed by means of skin conductance response magnitude.

For this study we used the set of photos of sublime landscapes previously used for the study of sublime experiences in nature. For our previous study the set of

sublime landscapes was divided into two groups according to the presence of one specific feature: height/depth cues. This division into two groups provided us with the opportunity to consider another interesting question: which of the physical features of landscapes cause the observed physiological changes that characterize strong emotional experiences in nature? So, in addition to the investigation of the relationship between self-report judgments and physiological responses to sublime landscapes we attempt to correlate the perception of specific physical features of natural scenes (height/depth cues) with physiological changes characteristic of strong emotional experiences in nature.

In conclusion: the research on emotion has shown that autonomic physiological responses can offer reliable indices of emotional experience. In our experiment skin conductance response was measured while subjects looked at photos of sublime landscapes. Each of the landscapes was subsequently rated on two dimensions of affect: perceived valence (unpleasant – pleasant) and arousal (dull – exciting).

The objectives of the study

To begin with we wanted to discover whether a set of landscapes as emotional stimuli, rather than emotional pictures (mutilated bodies, victims of road incidents, close-ups of spiders and snakes etc.) would elicit similar physiological responses as indicators of the emotional parameters of pleasure and arousal.

The primary goal of the present study, however, was to determine whether the emotions that are evoked by photos of sublime landscapes are manifest at the level of event-related responses of the sympathetic nervous system. The skin conductance response was selected as a potential marker of a landscape's excitingness. A second goal was to assess the covariation between individual subjects' self reports of pleasure and arousal and their physiological responses. We expected to find a positive correlation between the ratings of a landscape's excitingness and the magnitude of the skin conductance response similar to those found in studies of affectively loaded pictures and sounds.

In addition it was expected that SCRs would differ according to whether or not the natural scenes contained depth cues, in accordance with the differences in the strength of the emotional experience of the two types of sublime landscapes found in our study of the experience of the Sublime in nature. This would corroborate the findings of our previous study, which demonstrated a correlation between the rapid affective evaluation of danger in natural scenes and a heightened excitingness and attractiveness of sublime landscapes with height/depth cues.

2. Method

2.1 Participants

Twenty-seven psychology students at the University of Amsterdam participated in the study. Only subjects who showed detectable electrodermal responses (a minimum of 0.1 microSiemens (μS)) to any stimuli were included in the study. One out of the 27 participants was excluded for this reason. The remaining 26 participants were 15 women (58%) and 11 men (42%). The participants had an average age of 23.7 years (*SD* = 3.85). There visual acuity was normal or corrected to normal. The participants signed informed consent forms and were given either course credits or received 7 euros for their participation.

2.2 Stimuli

For this study we used the set of photos of sublime landscapes previously used for the study of sublime experiences in nature. Intrinsic characteristics of sublime landscapes are their boundlessness and immensity. For this reason, the forty-eight photographs of natural scenes we selected for the study provide panoramic, distant views of landscapes. The photos represent a variety of landscapes: fields with forests in the background, hills and mountains, valleys with either little or lush vegetation. Many of the photos are of rivers, lakes and seashores. All the photos were taken during the day and in sunny weather conditions. The photos represent different seasons, although no winter photos were selected. There are no visible signs of human activity or any animals in the photos.

The set of sublime landscapes was selected in such a way as to allow us to divide it in two categories based on the presence or absence of one specific feature – height/depth cues. One half of the photographs are of sublime landscapes taken from a high vantage point, giving the clear impression of having been taken either standing on the edge of a cliff or from a steep slope. The second half of the photos are of similar landscapes (open, panoramic, far views, high skies), but with no difference in height/depth between fore- and background.

2.3 The procedure

The participants were tested individually, while the experimenter sat in the room adjacent to the room where the participants were sitting. The room was dimly lit. The photographs were presented at a viewing distance of about 70 cm. Stimuli were generated on a PC and presented on a 19” monitor, with a refreshment rate of 100 Hz and a resolution of 1024 by 768 pixels.

The participants were sitting comfortably and asked to remain as still as possible. They were told that they would be looking at pictures of different landscapes. They were asked to fixate on the middle of the computer screen where a fixation cross would signal that the trial was about to begin. The participants were instructed to look at the photos of landscapes and to try to experience the same emotion they would experience in the real environment depicted on the photo (similar mood induction methods were used by Kimbrell et al., 1999; Esslen et al., 2004).

Skin conductance was recorded with a pair of Ag-AgCl electrodes attached to the palmar surface of the medial phalange of the index and middle fingers of the left hand. Data acquisition and quantification was performed using a Coulbourn S71-23 Coupler. Skin conductance was sampled at 20Hz and recorded throughout the task. All recording procedures followed the recommendations set forth by Fowles (Fowles et al., 1981). The conductance response magnitude was scored as the largest value (in μSiemens) recorded between 0.9 and 4.0 s after picture onset (Lang et al., 1993). Log transformation (log[SCR +1] normalized the distribution of the responses. The timing of the presentation of the photos and the collection of physiological and self-report data were under the control of the presentation software called ‘‘Presentation’’ (Neurobehavioral Systems, Version 0.70, 2003).

After having had the sensors attached, the subject was familiarized with the procedure. All sessions began with the presentation of instructions on the monitor. The participant could then strike any key of the keyboard to start the presentation of the landscapes. Each session included forty-eight trials and took some 30 minutes to complete. Each of the forty-eight landscapes was shown only once. The sequence in which the photos were presented was randomised across subjects.

The arousal and valence values of each landscape were rated on 10-point scales, from ‘very dull’ to ‘very exciting’ on the arousal scale and from ‘very unpleasant’ to ‘very pleasant’ on the valence scale. The two scales were presented one after another on the computer monitor after each of the photos of landscapes. The photo of a landscape remained on the computer monitor, while the scales appeared on the bottom of the screen. Only the poles of the scales were marked with words and the scale was a line divided in 10 equal intervals by vertical markings. The markings were not numbered. The cursor appeared in the middle of the scale and the participant rated the perceived level of arousal and valence by shifting the mouse with the right hand and clicking on a point on the scale. The actually recorded ratings of arousal and valence were made on a 1000-point scale which varied between -500 (very unpleasant or very dull) to +500 (very pleasant or very exciting).

The computer was programmed to produce the same sequence for each trial. Each trial started with the presentation of a fixation cross for 500 ms. The fixation cross was followed by the presentation of a photo of a landscape for a duration of 6 sec. Then, without delay, the arousal and valence scales appeared in sequence. Each scale remained on the screen for 8 sec with a 1 sec interval between scales. The interval between the trials was varied randomly and was either 14, 15 or 16 sec.

3. Results

The data of the twenty-four landscapes with height/depth cues and of the twenty-four level landscapes were analysed separately. The data analysis follows Lang et al., 1993. For each subject, the photos of the landscapes were ranked along each of the two dimensions of affect (valence and arousal) from low (1) to high (24), according to this subject's ratings of the photos. If two or more landscapes were rated identically on a dimension, the mean ratings for these pictures were used. This procedure yielded a set of 24 ranked ratings for each subject on each dimension. The ranking of landscapes on ratings of valence and arousal for each participant is necessary because the participants differ in which landscapes they find pleasant/exciting and unpleasant/boring. After the judgments of valence and arousal are ranked for each participant they can be taken together and related to their skin conductance responses.

To begin with, we wanted to discover whether an overall difference in the magnitude of the skin conductance response existed between landscapes with height/depth cues and level landscapes. The skin conductance responses were analysed by a repeated measures ANOVA with two prime categories (level landscapes and landscapes with height/depth cues) and twenty-four target categories as within-subject factor (twenty-four ranked ratings of arousal).

The main effect of the type of landscape was statistically significant $F(1,25) = 9.71$, $p = .005$. The type of landscape (level landscape or landscape with height/depth cues) has an effect on the magnitude of the skin conductance response. The mean magnitude of the skin conductance response for landscapes with height/depth cues was twice stronger than the mean magnitude of skin conductance response for level landscapes (.42 micro Siemens (μS) and .21 micro Siemens (μS) respectively).

Next, we wanted to analyse the nature of the relationship between the magnitude of the skin conductance response and the participants' ratings of the landscapes' excitingness (arousal) and pleasure (valence). To determine the strength of the

dimensional correlations we conducted four separate repeated measures ANOVA's (arousal and valence ranked ratings both for landscapes with height/depth cues and level landscapes), with the twenty-four ranked ratings of arousal or valence as the within-subject factor.

The main effect of the ranking of the skin conductance responses on the self-reported ratings of arousal for landscapes with height/depth cues was not statistically significant $F(1,25) = 1,38$, $p = .222$. There is no statistically significant overall difference in the magnitude of the skin conductance response between the twenty-four ranked ratings of arousal for landscapes with height/depth cues.

In contrast, the main effect of the ranking of the skin conductance responses on the self-reported ratings of arousal for level landscapes was statistically significant $F(1,25) = 2,62$, $p = .023$. There is a statistically significant overall difference in the magnitude of the skin conductance response between the twenty-four ranked ratings of arousal for level landscapes.

The main effect of the ranking of the skin conductance responses on the self-reported ratings of valence for landscapes with height/depth cues was not statistically significant $F(1,25) = 1,03$, $p = .40$. There is no statistically significant overall difference in the magnitude of the skin conductance response between the twenty-four ranked ratings of valence for landscapes with height/depth cues.

Finally, the main effect of the ranking of the skin conductance responses on the self-reported ratings of valence for level landscapes was not statistically significant $F(1,25) = 1,86$, $p = .09$. There is no statistically significant overall difference in the magnitude of the skin conductance response between the twenty-four ranked ratings of valence for level landscapes.

At the next stage of the analysis we assessed the correlation between the self-report judgments of arousal and valence and the skin conductance responses using a method in which the sample means of arousal or valence at each rank were correlated with each skin conductance response at that rank (24 pairs of observations across subjects).

Figures 1 to 4 show the covariation between the self-report judgments and the skin conductance responses and plot mean affective ratings of arousal and valence against the mean skin conductance response at each judgment rank for landscapes with height/depth cues and level landscapes. These plots represent the skin conductance responses as a function of the differences in arousal or pleasantness and are not responses to particular pictures.

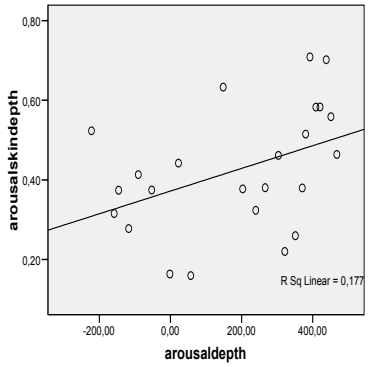

Figure 1.

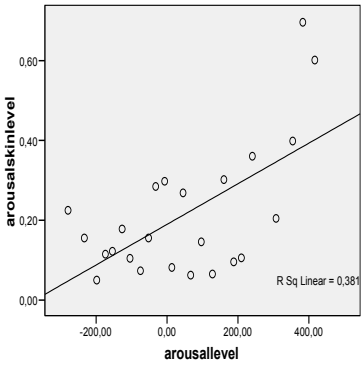

Figure 2.

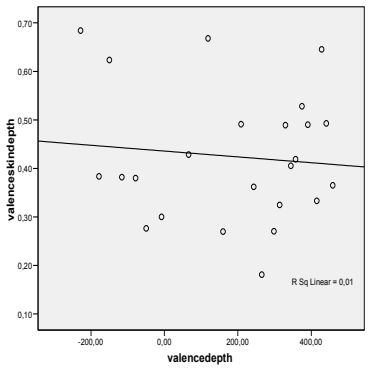

Figure 3.

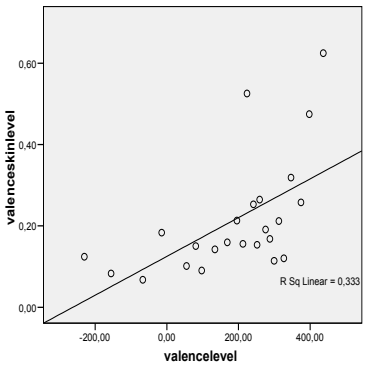

Figure 4.

Figure 1 presents the covariation of the skin conductance response with the arousal judgments for landscapes with height/depth cues. We found a weak but significant positive correlation between the magnitude of the participants' skin conductance responses and the arousal judgments (r = .42, n = 24, p = .041, two-tailed). The skin conductance response increased monotonically with the ranked arousal for landscapes with height/depth cues.

Figure 2 presents the covariation of the skin conductance response with the arousal judgments for level landscapes. We found a significant and much stronger positive correlation between the magnitude of the participants' skin conductance responses and the arousal judgments (r = .62, n = 24, p = .001, two-tailed). The skin conductance response increased monotonically with the ranked arousal for level landscapes.

Figure 3 presents the covariation of the skin conductance response with the valence judgments for landscapes with height/depth cues. We found no significant correlation between the magnitude of the participants' skin conductance responses and the valence judgments (r = -.10, n = 24, p = .65, two-tailed).

Figure 4 presents the covariation of the skin conductance response with the valence judgments for level landscapes. We found a significant positive correlation between the magnitude of the participants' skin conductance responses and the valence judgments (r = .58, n = 24, p = .003, two-tailed). The skin conductance response increased monotonically with the ranked valence for level landscapes.

At the final stage of the analysis we assessed the correlation between the two dimensions of affect: the judgments of arousal and the judgments of valence for landscapes with height/depth cues and level landscapes. We correlated the mean arousal ratings of the twenty-four landscapes with height/depth cues and the mean valence ratings of the twenty-four landscapes with height/depth cues. We also correlated the mean arousal ratings of the twenty-four level landscapes and the mean valence ratings of the twenty-four level landscapes.

We found no significant correlation between the mean arousal ratings of the twenty-four landscapes with height/depth cues and the mean valence ratings of the twenty-four landscapes with height/depth cues (r = .30, n = 24, p = .15, two-tailed). However, a significant positive correlation was found between the mean arousal ratings of the twenty-four level landscapes and the mean valence ratings of the twenty-four level landscapes (r = .83, n = 24, $p \leq .0005$, two-tailed).

4. Discussion

The present study demonstrates that event related SCRs are a sensitive measure of a landscape's perceived excitingness and pleasantness. We conclude that a set of photographs of landscapes as emotional stimuli, rather than emotional pictures (mutilated bodies, victims of road incidents, close-ups of spiders and snakes etc.), do indeed elicit physiological responses similar to those obtained previously for pictures.

One of the goals of our study was to assess the covariation between an individual subjects' self reports of pleasure and arousal and the subject's physiological responses. For level landscapes we found a positive correlation between the ratings of a landscape's excitingness and the magnitude of the skin conductance response similar to those found in studies of affectively loaded pictures and sounds. The

positive correlation between the ratings of a landscape's pleasantness and the magnitude of the skin conductance response was, however, stronger than is usually reported in the literature. We explain this result as flowing from the specific experiential qualities of level landscapes. There are no level landscapes in our set that were unpleasant yet exciting. Yet, this kind of a combination of experiential qualities is very common where affective pictures are concerned (mutilated bodies, victims of road incidents, close-ups of spiders and snakes etc.). The strong positive correlation between valence and skin conductance responses in our study is probably determined by the nature of the stimuli used.

Although the correlations between the affective self-report judgments and the skin conductance responses for level landscapes reflect findings reported in the literature, this is not true for landscapes with height/depth cues. We found no correlation between ratings of pleasantness and skin conductance responses and a weak correlation between ratings of excitingness and skin conductance responses for landscapes with height/depth cues. There was also no overall difference between the twenty-four ranked ratings of arousal and skin conductance responses for landscapes with height/depth cues. These findings suggest that landscapes with height/depth cues, as a rule, trigger skin conductance responses independently of whether they are judged exciting or not. Similarly, in a study of the physiological correlates of musical emotions the magnitude of the skin conductance responses did not reflect the self-report judgments of arousal for frightening stimuli (Baumgartner et al., 2006). Frightening excerpts eliciting the greatest SCRs were not rated as the most intense. This underlines the discrepancy between physiological measures of excitingness and self-report measures.

Another point raised by this study is that specific physical properties of landscapes (presence of height/depth cues) seem to be responsible for skin conductance responses characteristic of strong emotional experiences. This corroborates the findings of our previous study, which demonstrated a correlation between the rapid affective evaluation of danger in natural scenes and a heightened excitingness and attractiveness of sublime landscapes with height/depth cues. We conclude that it is the specific structural aspects of nature, which are the major determinants of both experienced pleasantness and arousal, and of the physiological parameters. It seems likely that the experience of the Sublime in nature originates in the perception and automatic emotional evaluation of a landscape's properties, and not from a conscious process of landscape evaluation.

Finally, we are convinced that the combined evidence of self-report judgments and skin conductance responses demonstrates that the photos of beautiful and exciting landscapes we used for our study of sublime experiences are not merely judged to

be exciting and attractive, but do indeed elicit strong positive emotional experiences. The intensity of the subjective and physiological arousal can be interpreted to be strong indicators of strong emotional feelings. This position is supported by the idea that the subjective process of feeling emotions is partly grounded in neural maps which represent aspects of the organism's internal state (Damasio et al., 2000; Craig, 2002; Baumgartner et al., 2006).

In conclusion: measures from the autonomic nervous system can aid in the discrimination between the cognitive evaluation of emotions and the feeling and the experience of emotions. The excitingness of sublime landscapes as measured by means of skin conductance responses provides corroboration of the strength of the emotional experience as expressed in self-report judgments. We believe that our results elucidate the way in which the experience of nature calls forth certain psychophysiological phenomena as well as the characteristics of strong positive experiences in nature. Self-report measures do not always reflect the reality of emotional experience. The discrepancy between the results obtained by physiological measures of excitingness and those obtained by self-report measures suggests that self-report can be unreliable as a measure of the reality of emotional experience and should be complemented with other methods in the research into landscape experience.

Chapter 8

General Discussion

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General Discussion

Although landscape studies in cultural and human geography and the psychological research into landscape seem to depart from different theoretical and practical assumptions, it is important to try to find common ground from which the various aspects and dimensions of human-landscape interaction can be investigated. It seems impossible to gain an understanding of human-landscape interaction, specifically the experience of landscape, without any knowledge of its psychological foundations. In this dissertation an attempt has been made to adopt some of the theoretical and methodological perspectives on human-landscape relationships characteristic of geographical landscape studies. When experience itself is chosen as a subject for inquiry, such a comprehensive approach is required to do justice to the phenomenon.

A variety of topics was chosen for the studies conducted for this dissertation, to which different research methods and techniques were applied. Each of the six studies was conducted as an independent inquiry, of value in its own right. This 'modular' approach does justice to the many-sidedness of the phenomenon of landscape experience and allows its coordinated investigation from different theoretical perspectives. Landscape experience is a complex phenomenon, reflecting cultural practices, beliefs, and values; it is not a simple response to a landscape's physical properties. The same landscape seen through a different cultural filter is experienced in a different way. Consequently, in this dissertation an attempt was made to conduct research into the experience of landscape, while taking into account its flexible and context-dependent nature.

A distinction needs to be made between experience as directly specified by the perceptual and bodily involvement with landscape and experience derived from the interpretations of landscape in texts, images and discourses. The experience of a landscape begins as a pre-semantic phenomenon, free from social and cultural influences, as an evaluation of its physical characteristics: spatial and structural configurations, proportions, shapes, textures, coherence, balance of visual forces. The presence of height/depth cues in a landscape may automatically trigger a negative affective reaction, which subsequently modifies the conscious evaluation of the landscape.

This initial experience of landscape is then mediated by a multitude of factors: knowledge, education, personality, state of arousal, learning history, cultural and social influences, and unique personal histories. Many examples of the impact of

differences in age, education and income on the experience of landscapes are described by landscape architects in chapter 2. A potentially infinite chain of experiential qualities is generated in the process of interaction between the evaluating individual and the physical landscape.

Many aspects of the experience of landscape are personal and unique. Even the initial experience of a landscape's physical characteristics (e.g. the experience of height/depth cues) is not the same for everyone. For some people, especially those with a fear of heights, the presence of height/depth cues in a landscape makes the landscape more exciting and attractive than it is to others. The quality of the experience can never be predicted with certainty from a landscape's physical characteristics. Nevertheless, experiences of landscape are quite similar between people, as we all possess the same sensory faculties, we share our heredity and we share a culture. This common experience finds expression in a broad consensus on which landscapes are considered beautiful as well as in an inter-group consensus on the evaluation of the experiential qualities of design gardens (see chapter 3).

Psychological research into landscape experience should be able to account for the dynamics of the interaction of a landscape's experiential qualities, particularly the interaction between inherited and culture-specific preferences. In the studies conducted for this dissertation, a variety of factors that mediate the experience of landscape have been considered. The conceivably innate preferences for some of the physical properties of design gardens that were found are mediated by the inter-group differences in preferences, which resulted from training in landscape design (see chapter 3). The mood-enhancement and stress-reduction experienced in restorative environments finds its origin in the evolution of the species, whereas the narrative framing of these environments shows that it is nevertheless possible to influence the quality of the experience (see chapters 4 and 5). A fear of heights is a genetic predisposition, yet it enhances the experience of a landscape with height/depth cues. Such an experience finds its cultural reinterpretation in the concept of the sublime experience (see chapter 6).

The methodological contributions of this dissertation

Psychological studies into experience are confronted with the major methodological problem of how to access an individual's perceptual, cognitive and affective representations of an environment. A further problem that complicates the understanding of landscape experience is the difficulty of monitoring subtle changes in the quality of experience and their description in words. The application of a combination of different methods and techniques seems to be the best way

forward and it is the strategy applied in this dissertation. This approach was designed to illustrate the benefits of various and complementary research techniques, which, in combination, provide a comprehensive account of human-landscape interaction.

In the study of the experience of landscape by landscape architects the semi-structured interview was used, which allows the participants to freely express their ideas. A similar approach, open commentary, was chosen for the study of the evaluation of design gardens. These techniques, which allow respondents to describe their experiences in their own words, were complemented with the semantic differential and the profile of mood states questionnaires, which use pre-specified concepts. These verbal methods of data collection were supplemented with the technique of affective priming, which allows the exploration of unconscious processes, and by physiological measures of experience (skin conductance).

Suggestions for the improvement of the methodology of landscape experience research have been made. For instance, the participants of the study into the evaluation of design gardens actually visited and judged the gardens on location instead of judging photographs of the gardens. This same study benefited from the combination of different techniques of data collection: in addition to the evaluation of the gardens on the predetermined scales of the questionnaire, the participants were asked to describe their experience in their own words and concepts as well as to take photos of the gardens.

For the study of the stress-reducing and mood-enhancing qualities of environments, rather unusually, subjects were recruited who were already naturally stressed and experiencing negative affect as a result of their participation in a resit of a previously failed exam, instead of using the traditional method of stress-induction in which the participants are shown an emotionally disturbing video. In a study into the impact of narrative on the experiential qualities of environments, two approaches were brought together: a qualitative inquiry into landscape representations in discourse and quantitative research into the experience of landscape. Such a combination is only rarely found in empirical research and even more rarely in quasi-experimental research.

Finally, in the study of the experience of the Sublime, an array of methods and techniques were employed: self-report measures of affect, psychometric tests for the measurement of the attractiveness and interestingness of landscapes and of fear of heights, the affective priming technique and skin conductance measurements. This coordinated investigation of the experience of landscape, which replaces the

consideration of isolated properties of experience will hopefully become common practice.

The theoretical contribution of this dissertation

The studies presented in this dissertation deal with different psychological theories. In the previous chapters they were discussed in detail. In this section I want to briefly recapitulate some of the general theoretical issues that have been considered. The theoretical significance of chapter 2 springs from the fact that experts who are involved in landscape design, landscape architects, discuss the subject of landscape experience and its application in a variety of discourses on the meaning, aesthetics and perceptions of landscape. It provides a very different perspective on experience, compared to its representation in psychological research literature.

Traditionally, psychological research into landscape experience focuses on the identification of single causes of the experience of landscape, such as arousal, innate preference or cognitive factors. In contrast, landscape architects describe landscape experience as being about practices, ways of seeing, of the perceptual exploration of colours, shapes, sounds, and odours; as an ongoing process of the perceptual, bodily, emotional, and cognitive engagement with landscape. The discussion by landscape architects of different aspects of landscape experience may be of value to psychological inquiry, as the case of the experience of the Sublime was to this dissertation. It is quite a challenge to psychological research to do justice to the complexities and interrelationships of the factors, which mediate landscape experience.

Chapter 3 describes how a group of students of landscape architecture and a group of psychology students evaluate the perceived experiential qualities of design gardens. The study contributes to the development of a theoretical framework for the understanding of the similarities and differences between experts and non-experts in the domain of landscape architecture. In landscape experience research this subject has barely been considered. The findings of the study were compared to the knowledge available about differences between experts and non-experts in the domain of architecture. The similarities and differences between the two areas of design were discussed. An important finding of the study is, that the differences between the expert and non-expert groups are smaller where the evaluation of gardens is concerned than where the built environment is concerned. The greater consensus between expert and non-expert groups with regard to the gardens probably derives from shared preferences in responses to natural settings. The

results of the study make manifest the contextual nature of theoretical issues. The evaluation of both landscape and architectural design is mediated by education and expertise, yet innate preferences for specific natural features, modulate the impact of education and expertise where landscape design is concerned.

Urban environments are often presumed to be inherently deficient in stress-reducing and mood-enhancing capacities as compared to natural environments. In chapter 4 this presumption was challenged and it was found to be an oversimplification. It is not only natural environments that can effect affective restoration and stress-reduction. The therapeutic impact of an environment should be conceived of as relational, as the result of the interaction between an individual and the environment that brings about the restorative effect. The theory on restorative environments would benefit from the identification of the properties of environments and the psychological, situational, and behavioural factors mediating the experience of restoration. The urban environment chosen for the study is unusual. It offers an opportunity for exploration. It's an open and visually attractive environment, it gives the visitor a sense of ease, and there are landmarks, which facilitate orientation. There is abundant water and there's greenery. All these qualities influence the degree of affective restoration this environment provides.

The experience of landscape, resulting from the perception of the physical characteristics of an environment, proved open to significant alteration through narrative framing (chapter 5). Manipulation of the linguistic features of narratives proved to effect a transformation of the perception of reality. The provision of a story about an environment changes its perceived attractiveness to a lesser degree than its perceived interestingness and has no effect on reported mood. The finding that the addition of a narrative can change some aspects of experience, while having no impact on other aspects, is of theoretical importance. The provision of information through narratives, symbols, references can therefore not be expected to automatically enhance the experiential qualities of landscapes. The interviews with landscape architects in chapter 2 demonstrate that the actual experience of landscape often does not match the experience as expected from its verbal description.

The experience of the Sublime in nature is investigated in chapters 6 and 7. I have found no empirical psychological research into this subject. The experience of the Sublime is a very strong positive experience in nature. The sublime experience was chosen because it provided an opportunity at incorporating psychological research into the broader perspective of the human-landscape relationship. The subject was borrowed from the theory of aesthetics and it is also widely discussed in the discourse on landscape.

There are a number of aspects to this study's contribution to the theory of the sublime experience. The mixture of positive and negative emotions, which is thought to be the deciding factor defining the sublime experience, was found to be a real phenomenon and not a mere literary fiction. The finding that the experience of the Sublime is an actual quality of feeling changes a fuzzy concept of the sublime experience into a legitimate subject for psychological research. The entire mechanism of the generation of the sublime experience was investigated, from the automatic evaluation of height/depth cues and the generation of an unconscious negative emotion to the consciously perceived enhanced attractiveness and excitingness of sublime landscapes. The study demonstrates that it is important to consider the combined effect of both conscious and unconscious processes on the experience of landscape. The correlation between fear of heights, novelty and attractiveness ratings and the strength of the unconscious negative emotion elucidates the relationship between the physical properties of landscape, personal characteristics, and evolutionary predispositions that contribute to the sublime experience.

The research into the sublime experience provided the opportunity of exploring whether the event-related SCR is a sensitive measure of a landscape's perceived excitingness and pleasantness. A covariation was found between an individual subjects' self-reports of pleasure and arousal and the subject's physiological responses. This is an important finding, as it demonstrates that physiological measures can be applied in the research into the experiential qualities of landscapes. In the case of landscapes with height/depth cues, the discrepancy found between the results obtained by physiological measures of excitingness and those obtained by self-report measures is also important. It suggests that in the research into landscape experience, self-report as a measure of the reality of an emotional experience can be unreliable and should be complemented with other methods.

One last theoretical point should be mentioned. The combined evidence of self-report judgments and skin conductance responses demonstrates that the photos of beautiful and exciting landscapes that were used for the research into sublime experiences are not merely judged to be exciting and attractive, but do indeed elicit strong positive emotional experiences. The intensity of the subjective and physiological arousal is an indicator of strong emotional feelings.

The practical contribution of this dissertation

The studies conducted for this dissertation were primarily concerned with theoretical and methodological issues, yet a number of them generated practically relevant knowledge. The research into the affective evaluations of design gardens by students of landscape architecture and psychology students demonstrates a remarkable level of agreement between the expert and non-expert groups. From the findings of this research it can be cautiously concluded that the landscape architects' reliance on their own values and criteria of excellence does not have a detrimental effect on the public's evaluation of their work. This suggests that a high level of appreciation may be expected from the public where the formal design of landscapes is concerned.

In the research into affective restoration in natural and urban environments it was found that a well-designed and attractive urban environment might have a stress-reducing and mood-enhancing power equal to that of an attractive natural environment. Some of the physical characteristics of environments, which contribute to the enhancement of the restorative effect, have been identified. This information may potentially be useful to policy makers, architects, urban planners, and environmental experts, who could use it for improving the quality of urban environments and the quality of life in cities in general.

The determinacy of the concepts in the theory of psychology contrasts with the loose categorizations of experience applied in other fields of research. Psychological research is explicit about how and when to apply its concepts. The research into the sublime experience supplied a specification of vague and divergent representations of the phenomenon by relating it to particular experiential qualities. Similarly, the impact of narrative on experience was expressed in measurable parameters.

It was found that changes in the physical environment and the narrative framing of an environment each have the effect of changing the experiential qualities of the environment. These findings may be of use in the practice of landscape design. Some of the effects found may appear counterintuitive. It seems landscape design need not pursue only positive experiences. As was shown in the study on the sublime experience, a certain aspect of negativity may well transform a positive experience into an exceptional one.

Psychological research into landscape experience: a final note

One of the aims of this dissertation was to demonstrate the significance of psychological inquiry for the understanding of human-landscape interaction. The psychological research into landscape experience conducted for this dissertation combines two approaches. The qualities of experience are taken to be dependent on linguistic and cultural contexts, to be time- and place-bound, while respecting the achievements of psychology in finding regularities in and formulating generalizations about human behaviour. Another quality of psychological research into experience can be found in its extensive use of non-observable parameters that mediate the experience of landscape, such as attitudes, motives, personality traits, preferences, unconscious processes.

Many facets of landscape experience have been the subject of psychological inquiry, yet the central importance of the psychological phenomenon of experience has never been properly clarified. The bringing together of ideas from philosophy (the Sublime), cultural studies and tourism (impact of narratives), landscape design (art theory, landscape meanings and experience), and ecology (restorative environments) makes it possible to consider the experience of landscape in a variety of contexts and from a variety of theoretical perspectives. The choice of unusual topics, the emphasis on the centrality of the phenomenon of experience and the idea of its constructedness create opportunities for the integration of theoretical and methodological approaches from different disciplines involved in the research into landscape experience and facilitates communication across disciplinary boundaries.

Research into the experience of landscape might well be of central importance to landscape design. The evaluation of design solutions could then include an account of the landscape's experiential qualities. The psychological perspective on experience, which is central to this dissertation, can be instrumental in the elucidation of the phenomenon of landscape experience. It also provides a variety of research methods, which can contribute to the investigation of the relationship between the physical and formal characteristics of landscapes and their perceived experiential qualities.

The synthesis of theories and methods from psychological research that this dissertation provides will hopefully inspire future research into the fascinating subject of experience.

References

Abelló, R. P., Bernáldez, F. G., & Galiano, E. F. (1986). Consensus and contrast components in landscape preference. *Environment and Behavior*, *18*, 155-178.

Aoki, Y. (1999). Review article: Trends in the study of the psychological evaluation of landscape, *Landscape Research*, *24*, 85-94.

Appleton, J. (1984). Prospect and refuge re-visited. *Landscape Journal, 3,* 91-103.

Baljon, L. (1992). *Designing parks.* Amsterdam: Architectura & Natura Press.

Barrett, P.,& Sowden, P. (1995). Psychophysiological methods. In G. Breakwell., S. Hammond & C. Fife-Schaw (Eds.), *Research methods in psychology* (pp. 211-224). London: Sage Publications.

Baumgartner, T., Esslen, M., & Jäncke, L. (2006). From emotion perception to emotion experience: Emotions evoked by pictures and classical music. *International Journal of Psychophysiology*, *60,* 34-43.

Bendix, R. (2002). Capitalizing on memories past, present, and future. Observations on the intertwining of tourism and narration. *Anthropological Theory, 2,* 469-487.

Berleant, A. (2004). *Re-thinking aesthetics: Rogue essays on aesthetics and the arts.* Aldershot: Ashgate Publishing Limited.

Berlyne, D. E. (1971). *Aesthetics and psychobiology.* New York: Appleton-Century-Crofts.

Berridge, K. C. (2003). Pleasures of the brain. *Brain and Cognition, 52,* 106-128.

Borsboom, D. (2005). *Measuring the mind.* Cambridge: Cambridge University Press.

Bosselmann, P., Craik, K. H. (1987). Perceptual simulations of environments. In R. B. Bechtel., R. W. Marcus., & W. Michelson (Eds.), *Methods in environmental and behavior research* (pp. 162-190). New York: Van Nostrand Reinhold.

Boucsein, W. (1992). Electrodermal activity. New-York: Plenum Press.

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry*, *25*, 49–59.

Bradley M. M., & Lang, P. J. (2000). Affective reactions to acoustic stimuli. *Psychophysiology*, *37,* 204–215.

Brillenburg-Wurth, K. (2002). *The musically sublime. Infinity, indeterminacy, irresolvability.* Groningen: Groningen University Press.

Brown, G., & Gifford, R. (2001). Architects predict lay evaluations of large contemporary buildings: Whose conceptual properties? *Journal of Environmental Psychology, 21*, 93-99.

Bullard, P. (2005). The meaning of the 'Sublime and Beautiful': Shaftesburian contexts and rhetorical issues in Edmund Burke's 'Philosophical Inquiry'. *The Review of English Studies*, *56,* 169-191.

Burke, E. (1990). *A philosophical inquiry into the origin of our ideas of the sublime and the beautiful.* Oxford: Oxford University Press.

Burnham, D. (2000). *An introduction to Kant's Critique of Judgement.* Edinburgh: Edinburgh University Press.

Cacioppo, J. T., & Bernston, G. G. (1994). Relationships between attitudes and evaluative space: A critical review with emphasis on the separability of positive and negative substrates. *Psychoogical Bulletin*, *115,* 401-23.

Calvin, J. S., Dearinger, J. A., & Curtin, M. E. (1972). An attempt at assessing preferences for natural landscapes. *Environment and Behavior*, *4*, 447-470.

Carr, S., & Schissler, D. (1969). The city as a trip. Perceptual selection and memory in the view from the road. *Environment and Behavior*, *1*, 7-35.

Chronis, A. (2005). Coconstructing heritage at the Gettysburg storyscape. *Annals of Tourism Research, 32,* 386-406.

Cohen, D. C. (1977). Comparison of self-report and behavioral procedures for assessing acrophobia. *Behavioral Therapy, 8,* 17-23.

Cohen, E. (1995). Contemporary tourism-trends and challenges: Sustainable authenticity or contrived post-modernity? In R. Butler & D. Pearce (Eds.), *Change in tourism: People, places, processes* (pp. 12-29). London: Routledge.

Cook, N. D. (2002). *Tone of voice and mind.* Amsterdam: John Benjamins Publishing Company.

Corner, J. (1992). Representation and landscape: Drawing and making in the landscape medium. *Word and Image, 8,* 243-275.

Craig, A. D. (2002). How do you feel? Interoception: The sense of the physiological condition of the body. *Nature Neuroscience, 3,* 655– 666.

Crowther, P. (1989). *The Kantian Sublime.* Oxford: Clarendon Press.

Csíkszentmihályi, M. (1990). *Flow: The psychology of optimal experience.* New York: Harper and Row.

Damasio, A. R. (1999). *The feeling of what happens.* New York: Harcourt Brace & Company.

Damasio, A. R., Grabowski, T. J., Bechara, A., Damasio, H., Ponto, L. L., & Parvizi, J. (2000). Subcortical and cortical brain activity during the feeling of self-generated emotions. *Nature Neuroscience, 3,* 1049– 1056.

Daniel, T. C. (2001). Whither scenic beauty? Visual landscape quality assessment in the 21st century. *Landscape and Urban Planning*, *54*, 267-281.

Daniel, T. C., Wheeler, L., Boster, R. S., & Best, P. R. (1973). An application

of signal detection analysis to forest management alternatives. *Man-Environment Systems, 3,* 330-344.
Daniel, T. C., Anderson, L. M., Schroeder, H. W., & Wheeler, L. W. (1977). Mapping the scenic beauty of forests. *Leisure Science, 1,* 35-51.
Daniel, T. C., & Vining, J. (1983). Methodological issues in the assessment of landscape quality. In I. Altman & J. Wohlwill (Eds.), *Human behavior and environment* (pp. 39-84). New York: Plenum Press.
Dann, G. M. S., & Jacobsen, J. K. S. (2003). Tourism smellscapes, *Tourism Geographies*, *5*, 3-25.
Deinzer, R., Kleineidam, C., Stiller-Winkler, R., Idel, H., & Bachg, D. (2000). Prolonged reduction of salivary immunoglobulin A (sIgA) after a major academic exam. *International Journal of Psychophysiology, 37*, 219-232.
Devlin, K. (1990). An examination of architectural interpretation: Architects versus non-architects. *The Journal of Architectural and Planning Research, 7,* 235-244.
Devlin, K., & Nasar, J. L. (1989). The beauty and the beast: Some preliminary comparisons of 'high' versus 'popular' residential architecture and public versus architect judgments of same. *Journal of Environmental Psychology, 9,* 333-344.
Dorfman, P. W. (1979). Measurement and meaning of recreation satisfaction: A case study in camping. *Environment and Behavior*, *11*, 483-510.
Downs, R. M., & Stea, D. (1973). Cognitive maps and spatial behavior: Process and Products. In R. M. Downs & D. Stea (Eds.), *Image and environment* (pp. 8-26). Chicago: Aldine Publishing.
Eco, U. (2004). *On beauty: A history of a western idea.* London: Secker & Warburg.
Entman, R. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication, 43,* 51–58.
Esslen, M., Pascual-Marqui, R. D., Hell, D., Kochi, K., & Lehmann, D. (2004). Brain areas and time course of emotional processing. *Neuroimage, 21,* 1189-1203.
Fazio, R. H. (2001). On the automatic activation of associated evaluations: An overview. *Cognition and Emotion, 15,* 115-141.
Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology*, *50,* 229-238.
Fowles, D. C., Christie, M. J., Grings, W. W., Lykken, D. T., & Venables, P.H. (1981). Publication recommendations for electrodermal measurements. *Psychophysiology*, *18,* 232–239.
Fredrickson, L. M., & Anderson, D. H. (1999). A qualitative exploration of the

wilderness experience as a source of spiritual inspiration. *Journal of Environmental Psychology*, *19,* 21–39.
Gabrielsson, A. (2001). Emotions in strong experiences with music. In P. N. Juslin & J. A. Sloboda (Eds.), *Music and Emotion* (pp. 431-449). Oxford: Oxford Univesity Press.
Gärling, T. (1976). The structural analysis of environmental perception and cognition. A multidimensional scaling approach. *Environment and Behavior*, *8*, 385-415.
Gifford, R., Hine, D. W., Muller-Clemm, W. & Shaw, K. T. (2002). Why architects and laypersons judge buildings differently: Cognitive properties and physical bases. *Journal of Architectural and Planning Research*, *19,* 131-148.
Giner-Sorolla, R., Garcìa, M. T., & Bargh, J. A. (1999). The automatic evaluation of pictures. *Social Cognition*, *17,* 76-96.
Gitlin, T. (1980). *The whole world is watching: Mass media in the making and unmaking of the New Left.* Berkeley: University of California Press.
Gomez, P., Stahel, W. A., & Danuser, B. (2004). Respiratory responses during affective picture viewing. *Biological Psychology*, *67,* 359–373.
Graham, J. R. (2006). *MMPI-2: Assessing personality and psychopathology*. New York: Oxford University Press.
Grahn, P., & Stigsdotter, U. A. (2003). Landscape planning and stress. *Urban Forestry and Urban Greening, 2,* 1-18.
Groat, L. (1982). Meaning in post-modern architecture: An examination using the multiple sorting task. *Journal of Environmental Psychology, 2,* 3-22.
Groat, L., & Wang, D. (2002). *Architectural research methods.* New York: John Wiley & Sons.
Grout, D. J., & Palisca, C. V. (1996). *A history of western music*. New York: W. W. Norton & Company.
Hall, S. (1981). Encoding/decoding. In S. Hall (Ed.), *Culture, media, language* (pp. 128-138). London: Hutchinson.
Hammitt, W. E. (1982). Cognitive dimensions of wilderness solitude. *Environment and Behavior*, *14*, 478-493.
Hammond, S. (1995). Using psychometric tests. In G. Breakwell., S. Hammond & C. Fife-Schaw (Eds.), *Research methods in psychology* (pp. 175-194). London: Sage Publications.
Harkin, M. (1995). Modernist anthropology and tourism of the authentic. *Annals of Tourism Research, 22,* 650-670.
Hartig, T., Mang, M. & Evans, G. W. (1991). Restorative effects of natural environment experiences. *Environment and behavior*, *23*, 3-26.
Hartig, T., & Evans, G. (1993). Psychological foundations of nature

experience. In T. Gärling & R. G. Golledge (Eds.), *Advances in psychology. Behavior and environment: Psychological and geographical approaches* (pp. 427-457). Amsterdam: North-Holland.

Hartig, T., Evans, G. W., Jamner, L. D., Davis, D. S., & Gärling, T. (2003). Tracking restoration in natural and urban field settings. *Journal of Environmental Psychology, 23*, 109-123.

Hermans, D., Baeyens, F., & Eelen, P. (1998). Odours as affective-processing context for word evaluation: A case of cross-modal affective priming. *Cognition and Emotion, 8,* 515-533.

Hershberger, R. G. (1970). A study of meaning and architecture, *EDRA, 1,* 86-100.

Herzog, T. R. (1989). A cognitive analysis of preference for urban nature. *Journal of Environmental Psychology, 9*, 27-43.

Herzog, T., & Smith, G. A. (1988). Danger, mystery, and environmental preference. *Environment and Behavior*, *20,* 320-344.

Herzog, T. R. & Flynn-Smith, J. A. (2001). Preference and perceived danger as a function of the perceived curvature, length, and width of urban alleys. *Environment and* Behavior, *33*, 653-666.

Herzog, T. R., & Kropscott, L. S. (2004). Legibility, mystery, and visual access as predictors of preference and perceived danger in forest settings without pathways. *Environment and Behavior*, *36,* 659–677.

Hietanen, J. K., & Korpela, K. M. (2004). Do both negative and positive environmental scenes elicit rapid affective processing? *Environment and Behavior*, *36*, 558-577.

Holahan, C. J., & Dobrowolny, M. B. (1978). Cognitive and behavioral correlates of the spatial environment: An interactional analysis. *Environment and Behavior*, *10*, 317-333.

Holsti, O. (1969). *Content analysis for the social sciences and humanities*. Reading, MA: Addison-Wesley.

Hope Nicolson, M. (1959). *Mountain gloom and mountain glory: The development of the aesthetics of the infinite*. Ithaca, NY: Cornell University Press.

Howett, C. (2002). Systems, signs, and sensibilities. In S. Swaffield (Ed.), *Theory in landscape architecture* (pp. 108-116). Philadelphia: University of Pennsylvania Press.

Hubbard, P. (1996). Conflicting interpretations of architecture: An empirical investigation. *Journal of Environmental Psychology*, *16,* 75-92.

Hull, R. B., & Harvey, A. (1989). Explaining the emotions people experience in suburban parks. *Environment and Behavior*, *21*, 323-345.

Hunt, J. D. (2002). Reading and writing the site. In S. Swaffield (Ed.), *Theory in landscape architecture* (pp. 131-136). Philadelphia: University of Pennsylvania Press.

Ingold, T. (2000). *The perception of the Environment: Essays on Livelihood, Dwelling and Skill*. London: Routledge.
Ittelson, W. H. (1978). Environmental perception and urban experience. *Environment and Behavior*, *10*, 193-214.
Jackson, L. E. (2003). The relationship of urban design to human health and condition. *Landscape and Urban Planning, 64*, 191–200.
Jacobsen, J. K. S. (2007). Use of landscape perception methods in tourism studies: A review of photo-based research approaches, *Tourism Geographies*, *9*, 234-253.
Jansen, M. J., & Smolenaars, A. J. (1966). Kort verslag inzake een interlandelijk gestandaardiseerde semantische differentiaal (a short report on cross-culturally standardized semantic differential). *Nederlands Tijdschrift voor de Psychologie* (*Dutch Journal of Psychology), 21,* 211-216.
Jones, M. (2007). The European Landscape Convention and the question of public participation. *Landscape Research*, *32,* 613-633.
Kane, A. (2000). Reconstructing culture in historical explanation: Narratives as cultural structure and practice. *History and Theory, 39,* 311-330.
Kaplan, R. (1973). Predictors of environmental preference: Designers and "clients". *EDRA*, *1,* 265-274.
Kaplan, S. (1987). Aesthetics, affect, and cognition. Environmental preference from an evolutionary perspective. *Environment and Behavior*, *19*, 3-32.
Kaplan, S. (1995). The restorative benefits of nature: towards an integrative framework. *Journal of Environmental Psychology, 15*, 169-182.
Kaplan, R., & Kaplan, S. (1989). *The Experience of nature: A psychological perspective*. New York: Cambridge University Press.
Kaplan, R., Kaplan, S., & Ryan, R. L. (1998). *With people in mind: Design and management of everyday nature.* Washington, DC: Island Press.
Karmanov, D., & Hamel, R. (2008). Assessing the restorative potential of contemporary urban environment(s): Beyond the nature versus urban dichotomy. *Landscape and Urban Planning*, *86,* 115-125.
Kimbrell, T. A., George, M. S., Parekh, P. I., Ketter, T. A., Podell, D. M., & Danielson, A. L. (1999). Regional brain activity during transient self-induced anxiety and anger in healthy adults. *Biological Psychiatry, 46,* 454–465.
Kitchin, R. A. (1994). Cognitive maps: What are they and why study them? *Journal of Environmental Psychology*, *14*, 1-19.
Koh, J. (2004). *Ecological reasoning and architectural imagination.* Wageningen: Wageningen University Press.
Korpela, K. M., Klemettilä, T., & Hietanen, J. K. (2002). Evidence for rapid

affective evaluation of environmental scenes. *Environment and Behavior*, *34*, 634-650.
Korpela, K. M., Ylén, M., Tyrväinen, L., & Silvennoinen, H. (2008). Determinants of restorative experiences in everyday favorite places. *Health & Place*, *14*, 636-652.
Krog, S. (1983). Creative risk taking. *Landscape Architecture, 73,* 70-76.
Lambie, J. A., & Marcel, A. J. (2002). Consciousness and the varieties of emotion experience: A theoretical framework. *Psychological Review, 109,* 219-259.
Lang, P. J., Greenwald, M. K., Bradley, M. M., & Hamm, A. O. (1993). Looking at pictures: Affective, facial, visceral, and behavioral reactions. *Psychophysiology*, *30,* 261–273.
Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1998). Emotion and motivation: Measuring affective perception. *Journal of Clinical Neurophysiology, 15,* 397–408.
Laski, M. (1961). *Ecstasy. A study of some secular and religious experiences*. London: Cresset Press.
Laumann, K., Garling, T., & Stormark, K.M. (2003). Selective attention and heart rateresponses to natural and urban environments. *Journal of Environmental Psychology, 23*, 125-134.
Leff, H. S., & Deutsch, P. S. (1973). Construing the physical environment: Differences between environmental professionals and lay persons. *EDRA*, *1*, 284-297.
Lohr, V. I., & Pearson-Mims, C. H. (2006). Responses to scenes with spreading, rounded, and conical tree forms. *Environment and Behavior*, *38*, 667-688.
Lorimer, H. (2005). Cultural geography: the busyness of being 'more-than-representational'. *Progress in Human Geography*, *29*, 83-94.
Lothian, A. (1999). Landscape and the philosophy of aesthetics: Is landscape quality inherent in the landscape or in the eye of the beholder? *Landscape and Urban Planning, 44,* 177-198.
Lowenthal, D., & Riel, M. (1972). The nature of perceived and imagined environments. *Environment and Behavior*, *4*, 189-207.
Lundqvist, D., & Litton, J. E. (1998). *The averaged karolinska directed emotional faces – AKDEF*. Stockholm: Karolinska Institute.
Lynch, K. (1960). *The image of the city*. Cambridge (Mass.): MIT Press.
Marans, R. W., & Spreckelmeyer, K. F. (1982). Measuring overall architectural quality: A component of building evaluation. *Environment and Behavior*, *14,* 652-670.
Marans, R.W., & Stokols, D. (1993). *Environmental simulation: Research and policy issues.* New York: Plenum Press.
McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *Profile of mood states*.

San Diego, CA: Educational and Industrial Testing Service Press.
Marvell, A. Upon the Hill and Grove at Billborow, available at www.luminarium.org/sevenlit/marvell/billborow.htm (accessed 18 Augustus 2008).
Matless, D. (1992). An occasion for geography: landscape, representation and Foucault's corpus. *Environment and Planning D: Society and Space*, *10*, 41-56.
Mellinger, W. M. (1994). Toward a critical analysis of tourism representations. *Annals of Tourism Research, 21,* 756-779.
Mercille, J. (2005). Media effects on image. The case of Tibet. *Annals of Tourism Research, 32,* 1039-1055.
Merriman, P. (2005). Materiality, subjectification and government: The geographies of Britain's Motorway Code, *Environment and Planning D: Society and Space*, *23*, 235-250
Milfont, T. L., & Duckitt, J. (2004). The structure of environmental attitudes: A first- and second-order confirmatory factor analysis. *Journal of Environmental Psychology*, *24*, 289-303.
Monk, S. H. (1960). *The Sublime: A study in critical theories in 18th century England*. Ann Arbor: University of Michigan Press.
Mozingo, L. A. (1997). The aesthetics of ecological design: Seeing science as culture. *Landscape Journal*, *16,* 46-59.
Nasar, J. L. (1989). Symbolic meanings of house styles. *Environment and Behavior*, *21,* 235-257.
Nasar, J. L. (1998). *The evaluative image of the city*. Thousand Oaks, CA: Sage Publications.
Nasar, J. L., & Kang, J. (1989). A post-jury evaluation: The Ohio state university design competition for a center for the visual arts. *Environment and Behavior*, *21,* 464-484.
Nassauer, J. I. (1995). Messy ecosystems, orderly frames. *Landscape Journal*, *14,* 161-170.
Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited-capacity attention. *Journal of Experimental Psychology: General*, *106,* 226-254.
Nunnally, J. C. (1994). *Psychometric Theory*. New York: McGraw-Hill.
Ogden, H. V. S. (1947). Thomas Burnet's 'Telluris Theoria Sacra' and mountain scenery. *English Literary History*, *14,* 139-150.
Osgood, C. E. (1969). On the whys and wherefores of E, P, and A. *Journal of Personality and Social Psychology*, *12,* 194-199.
Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The measurement of meaning*. Urbana, IL: University of Illinois Press.
Oostendorp, A., & Berlyne, D.E. (1978). Dimensions in the perception of

architecture: Identification and interpretation of dimensions of similarity. *Scandinavian Journal of Psychology, 19*, 73-82.
Özguner, H., & Kendle, A. D. (2006). Public attitudes towards naturalistic versus designed landscapes in the city of Sheffield (UK). *Landscape and Urban Planning*, *74,* 139-157.
Panksepp J. (2000). Affective consciousness and the instinctual motor system: The neural sources of sadness and joy. In R. Ellis & N. Newton (Eds.), *The Caldron of consciousness: Motivation, affect and self-organization* (pp. 27-54). Amsterdam: John Benjamins Publishing Company.
Panzarella, R. (1980). The phenomenology of aesthetic peak experiences**.** *Journal of Humanistic Psychology*, *20,* 69-85.
Parsons, R. (1991). The potential influence of environmental perception on human health. *Journal of Environmental Psychology*, *11,* 1-23.
Parsons, R., Tassinary, L. G., Ulrich, R. S., Hebl, M. R., & Grossman-Alexander, M. (1998). The view from the road: Implications for stress recovery and immunization. *Journal of Environmental Psychology*, *18*, 113-139.
Parsons, R., & Daniel, T. C. (2002). Good looking: In defense of scenic landscape aesthetics. *Landscape and Urban Planning, 60,* 43–56.
Patsfall, M. R., & Feimer, N. R. (1984). The prediction of scenic beauty from landscape content and composition. *Journal of Environmental Psychology*, *4*, 7-26.
Pennartz, P. J. J., & Elsinga, M. G. (1990). Adults, adolescents, and architects: Differences in perception of the urban environment. *Environment and Behavior*, *22,* 675-714.
Potteiger, M., & Purington, J. (1998). *Landscape narratives: Design practices for telling stories.* New York: John Wiley & Sons.
Purcell, A. T. (1986). Environmental perception and affect: A schema discrepancy model. *Environment and Behavior*, *18,* 3-30.
Rapoport, A. (1982). *The meaning of built environment.* Beverly Hills, CA: Sage Publications.
Ribe, R. G. (1989). The aesthetics of forestry: What has empirical preference research taught us? *Environmental Management*, *13,* 55-74.
Rousseau, J. J. (1966). Emile. Online translation by Grace Roosevelt at http://www.ilt.columbia.edu/pedagogies/rousseau/Contents2.html (Institute for Learning Technologies). Latest access date 27 August 2007.
Russell, J. A. (1979). Affective space is bipolar. *Journal of Personality and Social Psychology*, *37,* 345-356.
Russell, J. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39,* 1161-1178.
Russell, J. A., & Feldman-Barrett, L. (1999). Core affect, prototypical

emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology, 76,* 805–819.
Santos, C. A. (2004). Framing Portugal. Representational dynamics. *Annals of Tourism Research, 31,* 122-138.
Scott, M. J., & Canter, D. V. (1997). Picture or place? A multiple sorting study of landscape. *Journal of Environmental Psychology*, *17*, 263-281.
Scruton, R. (2001). *Kant. A very short introduction*. Oxford: Oxford University Press.
Setten, G. (2004). The habitus, the rule and the moral landscape, *Cultural Geographies*, *11*, 389-415.
Shafer, E. L. (1969). Perception of natural environments. *Environment and Behavior*, *1*, 71-82.
Shafer, E. L., & Mietz, J. (1969). Aesthetic and emotional experiences rate high with northeast wilderness hikers. *Environment and Behavior*, *1*, 187-197.
Shang, H., & Bishop, I. D. (2000). Visual thresholds for detection, recognition and visual impact in landscape settings. *Journal of Environmental Psychology*, *20*, 125-140.
Shaw, P. (2006). *The Sublime.* London: Routledge.
Sheets, V. L., & Manzer, C. D. (1991). Affect, cognitiion, and urban vegetation. Some effects of adding trees along city streets. *Environment and Behavior*, *23*, 285-304.
Shibata, S., & Suzuki, N. (2002). Effects of the foliage plant on task performance and mood. *Journal of Environmental Psychology*, 22, 265-272.
Shoval, N., & Isaacson, M. (2007). Tracking tourists in the digital age. *Annals of Tourism Research*, *34*, 141–159.
Sloboda, J. A., & Juslin, P. N. (2001). Psychological perspectives on music and emotion. In P. N. Juslin & J. A. Sloboda (Eds.), *Music and emotion: Theory and research* (pp. 71-104). Oxford: Oxford University Press.
Smardon, R. C. (1988). Perception and aesthetics of the urban environment: Review of the role of vegetation. *Landscape and Urban Planning*, *15,* 85-106.
Spangler, G. (1997). Psychological and physiological responses during an exam and their relation to personality characteristics. *Psychoneuroendocrinology, 22*, 423-441.
Spinney, J. (2006). A place of sense: An ethnography of the kinaesthetic sensuous experiences of cyclists on Mt. Ventoux, *Environment and Planning D: Society and Space*, *24*, 709-732.
Spirn, A. W. (1998). *The language of landscape.* New Haven: Yale University Press.

Stamps, A. E. (2007). Mystery of environmental mystery: Effects of light, occlusion, and depth of view, *Environment and Behavior*, *39*, 165-197.
Stamps, A. E., & Nasar, J. L. (1997). Design review and public preferences: Effects of geographical location, public consensus, sensation seeking, and architectural styles. *Journal of Environmental Psychology*, *17*, 11-32.
Sternberg, E., (1997). The iconography of the tourism experience. *Annals of Tourism Research, 24*, 951-969.
Stowell, J.R. (2003). Use and abuse of academic examinations in stress research. *Psychosomatic Medicine, 65*, 1055–1057.
Summit, J., & Sommer, R. (1999). Further studies of preferred tree shapes. *Environment and Behavior*, *31*, 550-576.
Swaffield, S. (2002). Form, meaning, and experience. In S. Swaffield (Ed.), *Theory in landscape architecture* (pp. 73-75). Philadelphia: University of Pennsylvania Press.
Tabachnik, B. G., & Fidell, L. S. (2001). *Using multivariate statistics*. Boston: Allyn & Bacon.
Tennessen, C.M., & Cimprich, B. (1995).Views to nature: effects on attention. *Journal of Environmental Psychology, 15*, 77-85.
Thayer, R. (2002). Gray world, green heart. In S. Swaffield (Ed.), *Theory in landscape architecture* (pp. 189-196). Philadelphia: University of Pennsylvania Press.
Treib, M. (1995). Must landscapes mean? Approaches to significance in recent landscape architecture. *Landscape Journal, 14,* 47-62.
The Official Website of Central Park. Last access date 2 November 2006. http://www.centralparknyc.org/centralparkhistory/cp-history-150yrs
Ulrich, R.S. (1979). Visual landscapes and psychological well-being. *Landscape Research, 4,* 17–23.
Ulrich, R. S. (1981). Natural versus urban scenes: Some psychophysiological effects. *Environment and Behavior*, *13*, 523-556.
Ulrich, R.S. (1983). Aesthetic and affective response to natural environment. In I. Altman & J. F. Wohlwill (Eds.), *Behavior and natural environment* (pp. 85–125). New York: Plenum Press. ,.
Ulrich, R.S. (1984). View through a window may influence recovery from surgery. *Science, 224*, 420-421.
Ulrich, S.R. (1993). Biophilia, biophobia, and natural landscapes. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 73-137). Washington, DC: Island/Shearwater Press.
Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, *11*, 201-230.
Ulrich, R. S., Simons, R. F., & Miles, M. A. (2003). Effects of environmental

simulations and television on blood donor stress. *Journal of Architectural and Planning Research, 20,* 38-47.
Urbain, J. D. (1989). The tourist adventure and his images. *Annals of Tourism Research, 16,* 106-118.
Uriely, N. (2005). The tourist experience. *Annals of Tourism Research, 32,* 199-216.
Urry, J. (1990). *The tourist gaze: leisure and travel in contemporary societies.* Newbury: Sage.
Van der Ark, L. A., Marburger, D., Mellenbergh, G. J., Vorst, H. C. M., & Wald, F. (1995). *The adjusted profile of mood states*. Nijmegen: Berkhout. (In Dutch)
Van den Berg, A. E., Koole, S. L., & Van der Wulp N. Y. (2003). Environmental preference and restoration: (How) are they related? *Journal of Environmental Psychology, 23,* 135-146.
Van den Berg, A. E., & Ter Heijne, M. (2005). Fear versus fascination: An exploration of emotional responses to natural threats. *Journal of Environmental Psychology*, *25,* 261-272.
Van den Berg, A. E., Custers, M., & Van Winsum-Westra, M. (2006). Volkstuinen, een gezonde hobby? http://www.agnesvandenberg.nl/onderzoek2.html.
Van den Braembussche, A, A. (1996). *Denken over Kunst.* Bussum: Coutinho.
Vries, S. de, Verheij, R. A., Groenewegen, P. P., & Spreeuwenberg, P. (2003). Natural environments-healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environmental Planning A, 35,* 1717-1731.
Wells, N. M. (2000). At home with nature: Effects of "greenness" on children's cognitive functioning. *Environment and Behavior*, *32,* 775–795.
West 8. Urban Design and Landscape Architecture. Latest access date 27 August 2006. http://www.west8.nl/W8_Archives/archive.html
Whitfield, A., & Wiltshire, J. (1982). Design training and aesthetic evaluation: An intergroup comparison. *Journal of Environmental Psychology*, *2,* 109-117.
Wilson, E. O. (1984). *Biophilia*. Cambridge Mass.: Harvard University Press.
Wilson, M. A. (1996). The socialization of architectural preference. *Journal of Environmental Psychology*, *16,* 33-44.
Wilson, J. (2001). Incommensurable, supersensible, sublime. *American Catholic Philosophical Quarterly*, *75,* 221-241.
Winston, A. S., & Cupchik, G. C. (1992). The evaluation of high art and popular art by naïve and experienced viewers. *Visual Arts Research*, *18,* 1-14.
Wylie, J. (2007). *Landscape*. London & New York: Routledge.
Yu, K. (1995). Cultural variations in landscape preference: Comparisons among Chinese sub-groups and western design experts. *Landscape and Urban Planning*, *32,* 107-126.

Zube, E. H., Sell, J. L., & Taylor, J. G. (1982). Landscape perception: research, application and theory. *Landscape Planning, 9,* 1-33.
Zube E. H., Pitt D. G, & Evans, G. W. (1983). A lifespan developmental study of landscape assessment. *Journal of Environmental Psychology*, *3*, 115-128.

Summary

Six Psychological Studies into Landscape Experience: Feeling the Landscape

Landscape is a human habitat and it has many dimensions. To begin with it has a physical presence, it is a set of observable material entities. Yet it is imaginary, finding its place in stories and myths, in paintings and in films. It is a depository of cultural meanings, carefully recorded in images, texts and discourse. Landscape is a lived-in environment, a place where people experience the material world and are perceptually and bodily involved with it.

Experience is a psychological phenomenon and it is at the very centre of the human-landscape relationship. Experience encompasses emotions, moods, affective states (whether an experience is pleasant or unpleasant) and a myriad of feelings that resist categorization. Experience is fundamental and it defines our engagement with landscape. It governs all aspects of human-landscape interaction and its felt quality is instrumental in motivating, maintaining, changing and terminating our everyday interactions with landscape.

In the studies conducted for this dissertation practical as well as theoretical issues related to the experience of landscape were investigated. Landscape experience has been considered as a complex phenomenon reflecting cultural practices, beliefs, and values, and not as a simple response to a landscape's physical properties.

The experience of landscape is a proper topic of psychological enquiry as it's quality is determined by a variety of psychological dimensions: aesthetic preferences, perceptual and cognitive processes of landscape evaluation, personality traits, attitudes towards nature, motives, and past experiences, to mention just a few.

A variety of topics were chosen for the studies conducted for this dissertation, to which different research methods and techniques were applied. Each of the six studies was conducted as an independent enquiry, of value in its own right. This 'modular' approach does justice to the many-sidedness of the phenomenon of landscape experience and allows its coordinated investigation from different theoretical perspectives.

The introduction (chapter one) presents the general context of this dissertation. The focus is on the relationship between landscape design and landscape experience research, on the phenomenon of experience in general, on methodological and theoretical issues of experiences research. In addition, a brief description of the history of landscape perception and experience research is given.

Central to the study in chapter two is a number of interviews with prominent Dutch landscape architects. It demonstrates in which ways the topic of experience is applied in a variety of discourses on landscape meaning, aesthetics, perceptions and evaluations by landscape architects. Analysis of the interviews provides insights into the relationship between the concepts of beauty and experience, meaning, and emotions. It demonstrates that the aesthetic experience is an outcome of a complex interaction between the characteristics of both the object of the aesthetic evaluation and the evaluating individual.

Chapter three examines how the evaluation of perceived experiential qualities of design gardens differs between a group of non-experts, and a group of experts. It explores the affective and cognitive evaluations of twelve design-gardens by students of landscape architecture and psychology students. Probably the most remarkable finding of the study is, that in spite of the large variation in the designs of the gardens, no differences in evaluation were found between the professional and lay groups on eight out of twelve gardens. Extrapolating from the results of the study, it seems unlikely that the experts' reliance on their own criteria and preferences should result in a low perceived quality where landscape and garden design are concerned.

In chapter four, the presentation of urban environments as inherently deficient in stress-reducing and mood-enhancing capacities as compared to natural environments was challenged. It proved to be an oversimplification. Empirical evidence was found that a well-designed and attractive urban environment can have a stress-reducing and mood-enhancing power equal to that of an attractive natural environment. The physical characteristics of both natural and urban environments are discussed that may have contributed to the perceived restorative effect of the environments. From the available research on affective restoration and environmental quality and from the results of the study it can be concluded that a health-promoting urban environment provides the inhabitants access to natural elements such as water and greenery, natural light, and is spacious, distinctive and visually attractive.

In chapter five the representation of experience as dependent on its linguistic and cultural contexts is investigated. The natural and urban environments that were

considered in chapter four were judged to be very attractive and interesting. The question of this follow-up study was: can this impression be changed through the provision of information about the environments, and if so, to what degree? The provision of two different narratives to accompany the videos of both the urban and the natural environments significantly altered the perceived experiential qualities of the environments. One of the conclusions of this study is that the experience of natural and urban environments resulting from the perception of the physical characteristics of an environment is not phenomenologically 'closed', but can be significantly altered by providing an explicit commentary.

The experience of the Sublime in nature, a quite atypical topic in the context of psychological research, is investigated in chapter six. From the eighteenth century onward, the concept of the Sublime has been most closely associated with strong experiences in nature. The object of the study was to discover whether the mixture of positive and negative emotions, the central characteristic of the sublime experience, is a real phenomenon or merely a literary fiction. It was assumed that the negative emotions associated with the Sublime result from the presence of a real physical threat in the landscape. The perception of vertical depth was considered to be a potential source of perceived threat. Such landscapes, although breathtakingly beautiful, could potentially release the required paradoxical positive-negative mix of emotions. The two groups of photographs that were selected for the study consisted of landscapes with and without height/depth cues. The affective priming paradigm was applied to search for the presence of negative emotion that supposedly constitutes the experience of the Sublime. It was concluded that a conflicting mixture of positive and negative emotions is a real characteristic of the sublime experience and not a mere literary fiction.

In chapter seven the characteristics of strong positive emotional reactions to exciting and beautiful landscapes are explored in more detail. The primary goal of this study was to determine whether the emotions that are evoked by photos of sublime landscapes are manifest at the level of the sympathetic nervous system. In the study skin conductance response was measured while subjects looked at photos of sublime landscapes. Each of the landscapes was subsequently rated on two dimensions of affect: valence (pleasant-unpleasant) and arousal (dull-exciting). The study demonstrates that event-related skin conductance responses are a sensitive measure of a landscape's perceived excitingness and pleasantness. The results elucidate the way in which the experience of nature calls forth certain psychophysiological phenomena as well as the characteristics of strong positive experiences in nature.

Chapter eight, the final chapter of this dissertation, presents a summary of the main results and conclusions of the previous chapters which is followed by a general discussion. The theoretical, methodological and practical contributions of this dissertation are discussed.

One of the aims of this dissertation was to demonstrate the significance of psychological enquiry for the understanding of human-landscape interaction. The insights generated in these studies of landscape experience can only be obtained by applying methodologies and theoretical perspectives characteristic of psychological research.

The experience of a landscape begins as a pre-semantic phenomenon, free from social and cultural influences, as an evaluation of its physical characteristics: spatial and structural configurations, proportions, shapes, textures, coherence, balance of visual forces. This initial experience of landscape is then mediated by a multitude of factors: knowledge, education, personality, state of arousal, learning history, cultural and social influences, unique personal histories.

This dissertation is an attempt at psychological research which combines two approaches. The qualities of experience are taken to be dependent on linguistic and cultural contexts, to be time- and place-bound, while respecting the achievements of psychology in finding regularities in and formulating generalizations about human behaviour. The combination of these research perspectives has distinct advantages for the understanding of human-landscape interaction.

Samenvatting

Zes Psychologische Studies naar Landschapsbeleving

De huidige theorievorming binnen de omgevingspsychologie onderscheidt vier invloeden op de waarneming, beleving en beoordeling van landschap (Bell 2001): individuele verschillen, situationele factoren, sociale condities en culturele factoren.

De belangrijkste individuele verschillen die een rol spelen, zijn het adaptatieniveau en de kennis. Het adaptatieniveau is de ideale hoeveelheid op de zintuigen inwerkende prikkels, waarbij een individu maximaal kan presteren en zich het prettigst voelt. Ook kennis is zo'n individueel gegeven, zowel wat betreft de onderwerpen waarover iemand kennis heeft, als de omvang van de kennis.

Situationele factoren zijn de duur van het verblijf, het doel ervan (wonen, werken, bezoeken) en de positie van de beoordelaar (ontwerper, eigenaar, bewoner). Onder sociale condities verstaat de omgevingspsychologie de invloed van andere mensen op de beoordelaar, als gevolg van hun mening, status of expertise. Een oordeel kan niet los worden gezien van de sociale context van de beoordelaar. Ten slotte zijn er culturele factoren die van invloed zijn op de beoordeling van schoonheid. Zo kan bijvoorbeeld het bewust afkeuren van een bepaalde stijl de beleving en schoonheidsbeleving bepalen. Ook waargenomen symbolische verwijzingen in het landschap (aronskelken als symbool voor de dood) kunnen, als een nieuwe en andere kwaliteit, de beleving en schoonheidsbeleving van een landschap beïnvloeden.

Een landschap is zowel een fysieke, als materiele en denkbeeldige entiteit. Het wordt gevormd door in de cultuur heersende ideeën en beelden. In mijn visie is de beleving van landschap een complexe constructie van verschillende lagen van betekenissen en gemoedstoestanden. Ik heb geprobeerd deze lagen uit elkaar te halen en hun bijdrage aan de totale som van de beleving te verduidelijken.

Op een basaal niveau worden inhoud en kwaliteit van een beleving mede bepaald door de wetten van de perceptie. Wij organiseren visuele elementen in eenheden op basis van een aantal principes, die gestalt-principes worden genoemd. De gulden snede is bijvoorbeeld een ontwerpprincipe, dat op de wetten van de perceptie is gebaseerd. Het onbewust waarnemen van bepaalde verhoudingen komt tot uiting in een voorkeur voor op deze verhoudingen gebaseerde artefacten.

De evolutionaire, adaptieve benadering binnen de omgevingspsychologie beschrijft een andere bron van beleving: de waardering en de voorkeur voor landschappen. Er zijn theorieën ontwikkeld die verklaren welke landschappen de voorkeur genieten en waarom. Volgens Kaplan en Kaplan (1989) bijvoorbeeld, wordt de voorkeur voor landschappen bepaald door overlevingsstrategieën van de mens. Het landschap moet complex zijn om de belangstelling op te wekken en leesbaar en samenhangend om het begrip en de oriëntatie te vergemakkelijken. Appleton's (1975) theorie over de waardering van landschap verklaart de voorkeur voor specifieke landschappen vanuit een functioneel gezichtspunt: de aanwezigheid van uitzicht en schuilplaatsen ('prospect-refuge theory'). Het onbewust waarnemen van 'gunstige' landschapseigenschappen en de ermee gepaard gaande waardering dragen mogelijk bij tot de ervaring van schoonheid.

In mijn proefschrift komen zowel de theorievorming over landschapsbeleving als de praktische kant van het in kaart brengen van individuele en groepsverschillen in de beleving van landschap aan de orde. Mijn onderzoek is een poging om de relatie tussen formele eigenschappen van landschappen en de daaraan gerelateerde belevingseigenschappen te verduidelijken.

Hoofdstuk 2

In hoofdstuk 2 staat een aantal interviews met prominente Nederlandse landschapsarchitecten centraal. Deze studie is bedoeld om een analytisch kader te ontwikkelen voor het in kaart brengen van hoe landschapsarchitecten het concept van schoonheid en aanverwante concepten definiëren en toepassen. De interviews waren semi-gestructureerd en de vragen richtten zich op een aantal thema's: de schoonheid van landschap en de relevantie van het concept schoonheid voor de landschapsarchitectuur, betekenissen en emoties in de context van de ervaring van landschap en de verschillen in de ervaring van landschap tussen landschapsarchitecten en gebruikers.

De analyse van de interviews geeft inzicht in hoe de concepten van schoonheid en beleving, betekenissen en emoties verbonden zijn. De esthetische ervaring blijkt het resultaat te zijn van een complexe interactie tussen de kenmerken van zowel het object van de esthetische evaluatie als van het evaluerende individu. De esthetische ervaring manifesteert zich in een positief gevoel, dat gepaard gaat met de toekenning van waarde aan het object dat de ervaring opriep. Zo'n gevoel is de uitkomst van een veelheid aan ervaringen, die in het proces van perceptie en evaluatie van het landschap ontstaan. De esthetische ervaring begint dus als een pre-semantisch fenomeen, dat voortkomt uit onze waardering van het spel van

lijnen, vormen, kleuren en texturen, geuren en geluiden en dat wordt gemodificeerd door onze kennis, associaties en persoonlijke voorkeuren.

Hoofdstuk 3

In Hoofdstuk 3 worden de affectieve en cognitieve evaluatie van twaalf tuinen door studenten landschapsarchitectuur en studenten psychologie onderzocht. De theoretische en methodologische achtergrond voor het onderzoek naar de overeenkomsten en verschillen in de evaluatie van de tuinen is het onderzoek naar de cognitieve en affectieve evaluatie van de fysieke en formele eigenschappen van de gebouwde omgeving.

De inzet van de studie is de verdere ontwikkeling en uitwerking van de studies over experts en niet-experts. In eerdere studies werden representaties, foto's of dia's, van de gebouwde omgevingen aangeboden. Een foto kan echter de kwaliteit van een directe ervaring op locatie niet volledig adequaat reproduceren. De deelnemers aan deze studie zijn daarom naar de tuinen gekomen om ze op locatie te evalueren.

Voor het meten van de verschillen in de affectieve en cognitieve evaluatie van de fysieke en formele eigenschappen van tuinen zijn'design'-tuinen gekozen. Zo kon voorkomen worden dat de gebruiksproblematiek de affectieve en cognitieve evaluatie van de tuinen zou beïnvloeden.

Misschien wel het meest opvallende resultaat van het onderzoek is, dat er, ondanks de grote variatie in het ontwerp van de tuinen, geen verschil is gevonden tussen deskundigen en leken in de evaluatie van acht van de twaalf tuinen. Ook opvallend is de overeenkomst tussen beide groepen waar het om de interessantheid van de tuinen gaat, aangezien de ontwerpen van de meeste van de twaalf tuinen ongebruikelijk of experimenteel zijn. Voortdenkend vanuit de resultaten van de studie, mag aangenomen worden dat de waardering van landschappen en tuinen, ontworpen door landschapsarchitecten die varen op hun eigen criteria en voorkeuren, hoog zal zijn.

Hoofdstuk 4

In veel van de literatuur over het herstellend vermogen van een omgeving, wordt gesteld dat een stedelijke omgeving, vergeleken met een natuurlijke omgeving, een slechts gering stressverminderend en stemmingsverbeterend vermogen heeft. In hoofdstuk 4 wordt deze stelling betwist. Met gebruikmaking van traditionele onderzoeksmethoden is de stressverminderende capaciteit onderzocht van twee

hedendaagse en inspirerende natuurlijke en stedelijke omgevingen. Deze zelfde omgevingen zijn gebruikt om een ander, in de huidige literatuur sterk in de belangstelling staand, vraagstuk te onderzoeken: de uitwerking van kennis, van een verhaal, op de beleving van een omgeving.
Uit dit onderzoek blijkt, dat een goed ontworpen en aantrekkelijke stedelijke omgeving eenzelfde stressreducerende en stemmingsverbeterende werking heeft als een aantrekkelijke natuurlijke omgeving. Ook resulteert de verstrekking van culturele en historische informatie in een hogere waardering op de schalen interessantheid en aantrekkelijkheid.

Hoodstuk 5

In Hoofdstuk 5 wordt de uitwerking van verhalen op de waargenomen kwaliteiten van een omgeving geplaatst in de context van het onderzoek naar toeristische bestemmingen. In deze studie wordt de uitwerking op de waargenomen aantrekkelijkheid en interessantheid van een omgeving gemeten van verhalen met een positieve of een neutrale toonzetting. In Hoofdstuk 4 werden de natuurlijke en stedelijke omgeving beide als zeer aantrekkelijk en interessant beoordeeld. In deze vervolgstudie is onderzocht of dat oordeel verandert onder invloed van informatie die over de omgeving wordt verschaft.

Een van de conclusies van deze studie is, dat de ervaring van de natuurlijke en stedelijke omgeving, die voortkomt uit de perceptie van de fysieke kenmerken van een omgeving, niet fenomenologisch ‘gesloten’ is, maar als gevolg van een expliciet commentaar significant verandert. De toevoeging van historische en culturele informatie verrijkt de ervaringskwaliteiten van een omgeving. Het verhaal achter de natuurlijke zowel als de stedelijke omgeving kan niet volledig gereconstrueerd worden uit de perceptie van de fysieke kenmerken van een omgeving. Het verhaal en de ermee samenhangende belevingskwaliteiten zijn ontoegankelijk voor de toeschouwer en kunnen alleen zichtbaar gemaakt en gewaardeerd worden door de toevoeging van tekst.

Hoofdstuk 6

In dit hoofdstuk staat de ervaring van het ‘Sublieme’ centraal. Sinds de achttiende eeuw zijn het vooral heftige ervaringen in de natuur die als sublieme ervaringen worden aangemerkt. De ervaring van het Sublieme wordt doorgaans beschreven als een conflicterend mengsel van positieve en negatieve emoties, als een sterke en positieve ervaring met een hint van onaangenaamheid. De ervaring van het Sublieme in de natuur is niet eerder het onderwerp geweest van empirisch psychologisch onderzoek.

Het doel van de studie is, te ontdekken of het mengsel van positieve en negatieve emoties die het Sublieme kenmerkt, werkelijkheid is of niet meer dan literaire fictie. De aanname in deze studie is, dat negatieve emoties worden opgeroepen door de aanwezigheid in het landschap van reëel fysiek gevaar. Een afgrond in het landschap wordt beschouwd als een bron van fysiek gevaar en negatieve emoties. Dergelijke sublieme landschappen, ook al zijn ze van een adembenemende schoonheid, zouden het kenmerkende paradoxale mengsel van positieve en negatieve emoties kunnen oproepen.

De resultaten van het onderzoek geven steun aan deze hypothese. Landschappen met een afgrond roepen daadwerkelijk een mengsel van positieve en negatieve emoties op. Die landschappen worden als mooier en boeiender ervaren als sublieme landschappen zonder hoogteverschil tussen voor en achtergrond. Het meest opvallende resultaat van de studie is, dat de deelnemers eraan die hoogtevrees hebben, een sterkere sublieme ervaring meemaken als zij geconfronteerd worden met een landschap dat vanaf de rand van een ravijn wordt gezien.

Hoofdstuk 7

Een overweldigende ervaring in de natuur hoeft niet noodzakelijk een sublieme ervaring te zijn. In Hoofdstuk 7 worden de kenmerken van een sterke positieve reactie op boeiende en mooie landschappen in meer detail onderzocht.

Deze studie is met name bedoeld om vast te stellen of de emoties die foto's van sublieme landschappen oproepen meetbaar zijn op het niveau van het sympathisch zenuwstelsel. De resultaten geven inzicht in hoe een sterke positieve ervaring in de natuur psychofysiologische fenomenen oproept, gemeten als veranderingen in huidgeleiding . De veranderingen in de huidgeleiding blijken met name een maat te zijn voor de boeiendheid van landschappen.

Hoofdstuk 8

Het laatste hoofdstuk van deze dissertatie is een samenvatting van de belangrijkste resultaten en conclusies van de voorgaande hoofdstukken, gevolgd door een algemene bespreking.

In de zes studies worden verschillende onderwerpen onderzocht, met gebruikmaking van verschillende onderzoeksmethoden en – technieken. De studies zijn elk te lezen als een zelfstandig onderzoek. Deze 'modulaire' aanpak doet recht

aan de veelzijdigheid van de landschapservaring en maakt het mogelijk verschillende theoretische perspectieven op het onderwerp toe te passen.

Appendices

Appendix 1. A short description of the gardens of Makeblijde (Chapter 3).

Garden 1



From the outside, this garden looks like a timbered box from which a lush overgrowth of bamboo shoots out. Through an opening in the back of the box a passage opens up. It follows the outline of the garden and forms a transition between the exterior of the garden and its inner core. The passage is separated from the outside by the dense growth of bamboo and from the interior of the garden by a semi-transparent slatted partition. The central part of the garden is on a lower level and can be reached by a staircase. Two water features reflect the sky and form the only connection with the world outside the garden.

Garden 2



This is a garden with a traditional character. A path starting at the entrance runs between luxurious flower borders. A curve in the path opens into an oval-shaped

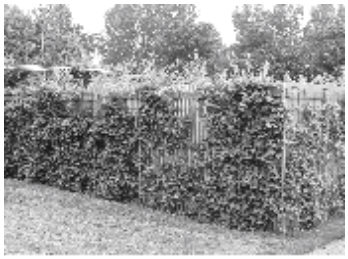
lawn encircled by hornbeam and grass. A hops, ivy, and clematis-clad arbour invites visitors to sit and enjoy the garden.

Garden 3



The garden is designed as a meditation garden and is divided into three parts. To enter the garden you walk, step by step, through an 'antechamber' and alongside a white glazed wall. The inner part of the garden is split into two by a mud wall with an opening in the middle. There is a wooden sitting space on both sides of the wall. On one side of the wall the garden's ground is covered with white pebbles. A black polished stone cube and an azalea tree are two prominent features. There is a subtle play of shadows of shrubs on the white glazed wall. On the other side of the clay wall a big meditation stone is the focal point of the garden. In a sequence of three different spaces contrasting materials, textures, and shapes are explored.

Garden 4



A two-meter high lightweight fence overgrown with ivy separates this garden from its surroundings. The garden has an elevated pathway of thick metal plates (thirty centimeters above the ground). The path runs through a thicket of luxurious willow

branches alongside it. The lower level of the garden is planted with grasses and flowers. The path finally reveals an elevated platform, an outside room furnished with a table, a table lamp, and a miniature kitchen.

Garden 5


A high hornbeam hedge with two entrances encloses this garden. The garden's ground is strewn with fine gravel. The garden consists of two spaces. The first has a series of metal supports bearing climbing roses and four big beds of annuals. Low box hedges surround the flowerbeds. The second space of the garden is square and separated from the rest of the garden by a high, nicely shaped and partly overgrown, railing. In this 'chamber' some lightweight chairs are set. Three small vertical mirrors at three of the four corners of the garden complete the scenery.

Garden 6


The idea of this garden was to create an abundance of colours and to contrast the geometric (tightly trimmed box blocks and simple benches) with the luxurious and free (plants and flowers). A path of heavy black tiles runs through the garden alongside a border full of colourful purple, red, white and yellow flowers.

Garden 7


The hedge around this garden is a semi-transparent row of willows. The sea was the source of inspiration for the design of this garden. The central path is covered with shells. Alongside the path fishing nets are hung out. The borders are planted with lyme grass and other seaside plants. Striking are the water-tanks of rusted iron, which reflect the sky like a row of mirrors and bring light and movement into the garden.

Garden 8


The descent into this small and sober garden is a narrow staircase integrated into the hedge. The hedge is low and connects the inside of the garden with its surroundings. The emptiness of the garden emphasizes the garden's outward, extroverted, character. The garden is paved with grey tiles and has a single tree in the middle. The tree accentuates the openness of the garden as well as providing a visual focus.

Garden 9



The idea behind the design of this garden was to create an enclosed wilderness, a mysterious place that seduces the visitor to explore it. A rough wooden fence around the garden makes it look like a black box from a distance. In the garden you force your way through a jungle. Wild plants run riot and a few exotic plants and trees enrich the scene. There are no paths and the ground is covered with a thick layer of shredded tree-bark. A double wall with a wooden roof at the west side of the garden creates an enclosed space. In it black ropes hang down, suggesting a forest of lianas.

Garden 10



The three sides of this garden are transparent. Special features of the garden are a reflecting pond, and a floor made of concrete slabs with imprints of leaves. A part of the garden is reserved for an undulating and landscaped dry area covered with gravel and planted. Metal columns beside the borders define the space of this compactly designed garden.

Garden 11



Everything this garden has to offer can be seen at a glance: hedges, beautiful paving, and water. A terrace paved with old bricks with a Hungarian Plum in the middle to provide shadow is the place to sit and look at the garden. A wire frame is stretched above the terrace. It is overgrown with climbing plants and forms a roof. Narrow-leafed bamboos and a mass of perennials and annuals are planted around the pond.

Garden 12



The tension in this garden stems from the contrast between living and dead materials. Shades of red dominate the garden. A striking feature of the garden is a red-painted dead oak. Many of the plants are orange or red-flowered and underline its impact. The path is covered with reddish gravel. The oak tree stands inside a wavy metal tray of rusty iron. In the tray are irises and a luxurious red rambling rose.

Appendix 2.

Amstelland (a positive version)

This film is about an area in the middle of the large polder of Amstelland. It shows the concise history and the exceptional features of this area. The history of Amstelland is principally a history of water, at least of the relationship between man and water. Before people started to intervene strongly in this landscape, Amstelland was part of a large peat area that stretched from the hills of the Gooi and the Utrechtse Heuvelrug to the dunes in the west. Large and small rivers intersected the peat area.

Alongside the rivers, on the lower banks, stood impenetrable tidal forests with willows, poplars and alders. Further from the rivers was a wet, semi-open landscape. Reed, rushes and aquatic plants grew in this wet environment. They died off and formed a fertile soil for new aquatic plants and for grasses, mosses, shrubs and trees. This cycle of growth and dying off continued undisturbed for thousands of years and the wet remains of the plants formed an ever-thickening layer of peat. In the course of time metres-high peat domes were formed, which lay like islands in the vast marshes. The peat swamps expanded for centuries. Through creeks and peat streamlets the peat domes discharged into larger peat rivers like the Amstel, the Oude Waver and the Kromme Mijdrecht.

Two of those rivers, the Waver and the Amstel, join here. From the bank there is a view of a large plain, situated below the rivers themselves. Long ago, before the arrival of humans, this peat bog was so high that the excess water could run freely towards the rivers. In the course of time the weak peat soils settled because of drainage and agriculture. Measures had to be taken in order to regulate the water-balance.

Free discharge into the rivers was no longer possible: ditches and watercourses were dug that led the water to the rivers through sluices. To prevent the rivers from flooding, embankments or dikes were constructed on the riversides. From the fifteenth century onwards windmills were used to pump away the water. However, the soil kept settling: areas that used to be well above sea level have now declined a few metres. Previously grain was grown here, but now the soil is mainly suitable for grassland.

The reclamation of Amstelland started in the Middle Ages. The first people to start reclaiming the land probably constructed primitive embankments along the banks

of the Waver and the Amstel to protect themselves from high water levels in the rivers. Simple farms were built. Ditches were dug at right angels to the rivers, deep into the peat. These ditches had several functions. The excavated ground was used to build terps, while the ditches lowered the ground water table and also clearly marked the borders of the various parcels. When the land had dried out sufficiently the farmers could go to work.

With a little imagination the lower course of the Waver and especially that of the Amstel can be compared to a delta, where the river branches off before it discharges into the sea. Because of this the settlers chose this area as the most favourable to a good life. Here, on top of the peat dome, it was dryer than the in the estuary area of the Amstel and the IJ and it was easier for the farmers to turn the peat into fertile grain fields. From here they opened up the wilderness in the direction of the IJ and the Amsterdam of today.
In the first half of the thirteenth century, when the first simple houses were built on the site of the present Amsterdam, this area already knew large settlements such as Nes and Ouderkerk aan de Amstel, situated further along the Amstel.

Like all barren lands in the Middle Ages, this area was owned by a landlord, in this case the German emperor. In the tenth century he assigned the peat lands to his vassal, the bishop of Utrecht. For a long time nothing much happened with the peat lands. The vast swamps formed a buffer against the county of Holland. However, when the counts of Holland actively started to reclaim the land on the Westside of the area, the bishop wasn't be left behind. In 1085 he ordered that a large part of these lands be reclaimed.

The lords of Amstel managed the reclaimed lands on behalf of the bishop of Utrecht. In the new settlements they were in charge of the administration of justice, the maintenance of order and other governmental duties. To underline their social status the Amstels built a castle, next to the old court of the bishop in present-day Ouderkerk aan de Amstel. Because of the location, the lords of Amstel had to serve two masters: the bishop of Utrecht and the count of Holland. This made them players in the power struggles of the thirteenth century. In the beginning of the fourteenth century the count of Holland took over the property and the rights of the lords of Amstel indefinitely and Ouderkerk became the administrative, economic and religious centre of the area.

The proximity and growth of Amsterdam plays a big part in the history of Amstelland. Fertile peat lands were exceptionally suitable to accommodate the increasing demand for food from the city. The farmers went to the city by horse and cart or by boat to sell their milk, cheese and other products. The city was also

an appreciative market for turf. The proximity of the city was beneficial to the 'warmoezeniers'. They were horticulturists who grew vegetables and fruit and sold them in the city. Besides, the proximity of the city and especially the harbour stimulated the cultivation of hemp, the raw material for sailcloth and rope.

The proximity of the city had its downsides as well. The defence of Amsterdam increasingly took place in the hinterland. Amstelland was part of several waterlines, especially that of the position of Amsterdam. To protect the city entrenchments and forts were built and the farmlands were inundated occasionally. The strategically situated fort Nessersluis, which can be seen from across the Waver, was part of the position of Amsterdam.

The wonderful landscape of Amstelland with its green estates and rivers glittering in the sunlight was and will remain a popular destination of many inhabitants of Amsterdam. Around 1700 there were hundreds of country houses in this region, many along the Amstel. Gardens, forests and parks formed a virtually uninterrupted strip of woodland. Amstelland is a land of water, peat and people. A landscape with special features: the medieval parcelling, the mills, sluices and pumping stations, the sharp contrasts between reclaimed lands and uplands. Less tangible things matter as well: the wind, cloudy skies, the smell of hay on a beautiful summer's day. Things that can't be put into words easily and definitely cannot be mapped, but that are important to the way this landscape makes one feel.

Sporenburg-Borneo (a positive version)

This film is about the new residential quarters that have arisen on what once was the Oostelijk Havengebied (eastern harbour area) of Amsterdam. This area has seen a true transformation over the last years. On the peninsulas where sea-going vessels once docked, new neighbourhoods were built. The area was developed in stages: first the Java- and KNSM-islands and finally Sporenburg and Borneo. In the design and styling of the residential quarters many references to the history of this special area can be found.

The development of the Oostelijk Havengebied started around 1900. The Oostelijke Handelskade was built first, which gave Amsterdam its first deep-water harbour. The wharf was set up in a 'modern' fashion with warehouses, railroads and steam-cranes for loading and unloading. In the first half of the 20th century the Oostelijk Havengebied was in full development. From here the passenger ships and freighters departed for South-America and the Dutch Indies. The activities were

concentrated around the big warehouses ‘Europa’, ‘Azië’ and ‘Africa’, where the goods were transferred.

Large shipping companies such as the KNSM and the steam navigation company Nederland developed along with the harbour. Another large shipping company that was located in the Oostelijk Havengebied was Het Koninklijke Hollandsche Lloyd. This company provided a regular service between Amsterdam and South-America and handled the fast growing transport of emigrants to Argentina and Mexico. For many Eastern European emigrants the Oostelijk Havengebied and the former Lloyd hotel were the final stopover en route to the New World.

Already before World War II business in the harbour was waning, partly due to the crisis. During the war the harbours lay idle. All ships had escaped the Germans to Great Britain, except for the J.P. Coen, which was sunk in the harbour of IJmuiden just before the floodgates and thus became an insurmountable barrier to navigation. In the last year of the war the Germans blew up the cranes of the harbours.

After the war the harbours came to life again, only to come to an almost complete halt in the fifties, after Indonesia was decolonised and the trade with the East dried up. In the sixties of the last century the harbour had to deal with an increase in the scale of navigation. Especially the transhipment of dry goods (coal, grain, minerals) increased strongly, but the transport of containers did as well. Large shipping companies merged and moved to Rotterdam; the Oostelijk Havengebied was too small for the ever-larger ships. With that, all harbour-related activities came to an end halfway through the seventies. The harbour area became abandoned and fell into decay. Little by little the buildings were demolished. The demolition lasted for years and over those years activity decreased. Until around 1990, the Oostelijk Havengebied was a dreary, abandoned district. Town-planners looked into this problem and came up with a daring plan for realising a housing development with a high building density in this area.

They had the ambition to build a district with the highest possible architectural quality. In a short amount of time over 8.000 houses arose on and around the islands, designed by either renowned or young, innovative architects.
Meanwhile, the approach to the Oostelijk Havengebied is viewed internationally as a unique project. The whole world of architecture comes to see for themselves how Amsterdam has accomplished such a high building density. The transformation of the Oostelijk Havengebied started with the development of the KNSM- and Java-islands into a new residential quarter. The most recent and striking developments in the area are the buildings on Borneo and Sporenburg.

Where the Java-island and the KNSM-island are characterised by large, high housing blocks, on Borneo and Sporenburg only low-rise buildings were realised – with the exception of two large, sculptural apartment buildings. The building density of the historic centre of Amsterdam was taken as the basic principle of the town-planning vision on Sporenburg and Borneo. No fewer than a hundred houses per hectare had to be built – the same quantity as in the high-rise building of the Java-island. Such a high quantity of low-rise buildings in a new development, however, had never been shown.

Thanks to an ingenious town-plan, the designers succeeded in combining low-rise building with a very high building density. One could forget about front and back gardens. Cars had to be accommodated within the houses. All houses on Borneo and Sporenburg have their own entrance at the street and are provided with a patio, inner court or roof terrace. Another special detail is the height of the ceiling of the ground floor levels, no less than three and a half metres. The high building density resulted in a lack of space to add public gardens. The assumption was that the great amount of water surrounding the houses and the many roof terraces would compensate for the absence of green parks.

Over the last ten years Borneo and Sporenburg have developed into an architectural showpiece. What used to be one of the most isolated areas of Amsterdam now is one of the favourite places to live for many trendy people in Amsterdam. The peninsulas – Sporenburg and Borneo – attract many interested people. Not only architects and town-planners, but also a fast-growing group of curious tourists come to see these islands.

Besides the extremely high housing density, the great variety of building styles makes this area exceptional. Almost sixty architects worked together on the development of Sporenburg and Borneo, striving to shape this area into a consistent unity. The architects were challenged to develop a typology of a family house with a private space outside in the shape of a small patio. These patios had to compensate for the limited light due to the narrow facades of the houses. Small patios offer the opportunity for individual expression and privacy. In a ‘harsh’ and open harbour landscape, the patios offer an unexpected and introverted world. These places remind us of the 17th century paintings of Vermeer and Pieter de Hoogh. The implementation of strict directives for design has produced a series of innovative formal solutions.

This is especially visible in the Scheepstimmermanstraat. The city sold sixty free parcels in this street to private persons, whose parcels were assigned by drawing a lot. On these parcels the owners were allowed to build houses to their own taste

and they could choose the architects themselves. Professional planners of the municipality watched this unique initiative with great interest. For it hadn't been possible to build your own house in Amsterdam for a very long time.

All of this delivered sixty unique houses. Noteworthy is the house around a tree on the ground floor by architect Koen van Velzen on nr. 120. Christian Rapp realised a freestanding house on the parcel of nr. 68. When a house isn't attached to the neighbours' houses it is required that the walls of those houses can be reached for upkeep. In a strip of 20 centimetres that divides the houses it is, however, not easy to work. The solution that he came up with is simple: the two side walls of the house can be opened completely so that the walls of the neighbouring houses can be reached from Christian Rapp's house.

Across the street the Scheepstimmermanstraat is one of the most beautiful canals of the area. Ton Schaap, who developed the project 'living in a house of your own design', described this quay as a modern addition to the typology of the Amsterdam canal house. The only thing these 'canal houses of the 21st century' have in common is the construction height, a front door at the street and a private domain on the waterside that can only be seen from the water. The result comes across as a modern kind of Venice.

Two remarkable architectural colossal buildings interrupt the dense development of both islands, as if two 'meteors' landed in a sea of low-rise buildings. One of them is 'The Whale' on Panama-quay. This complex consists of over 214 residences and is completely covered with zinc. Remarkable is its 'whale shape'. In order to let the morning- and evening sun penetrate deep into the building, the roof was kinked. For the same reason the lower levels of the north- and south front were cut off.

Another eye-catcher on Borneo-island is the impressive residential building 'Pacman'. It consists of 204 residences and functions as a beacon, standing out because of its size and shape. Pacman suddenly makes rustic Borneo appear much more urban. The architect purposefully designed a building in this harbour area that seems to have always stood there: an unpretentious, industrial building with large quantities of brickwork.

The islands of Sporenburg and Borneo owe their magic to an accumulation of qualities. As part of the town-plan for the Oostelijk Havengebied it is a milestone in the experimentation with the combination of low-rise building and high building density. Whoever enters this neighbourhood knows instantly: 'this is architecture'.

Appendix 3.

Amstelland (a neutral/negative version)

This film is about an area in the middle of the polder of Amstelland. It shows the history and the physical features of this area. The history of Amstelland is principally a history of water, at least of the relationship between man and water. Before people started to intervene strongly in this landscape, Amstelland was part of a peat area that stretched from the hills of the Gooi and the Utrechtse Heuvelrug to the dunes in the west. Large and small rivers intersected the peat area.

Alongside the rivers, on the lower banks, stood tidal forests with willows, poplars and alders. Further from the rivers was a wet, semi-open landscape. Reed, rushes and aquatic plants grew in this wet environment. They died off and formed soil for new aquatic plants and for grasses, mosses, shrubs and trees. This cycle of growth and dying off continued for thousands of years and the wet remains of the plants formed an ever-thickening layer of peat. In the course of time metres-high peat domes were formed, which lay like islands in the marshes. The peat swamps expanded for centuries. Through creeks and peat streamlets the peat domes discharged into larger peat rivers like the Amstel, the Oude Waver and the Kromme Mijdrecht.

Two of those rivers, the Waver and the Amstel, join here. From the bank there is a view of a plain, situated below the rivers themselves. Before the land was reclaimed, this peat bog was so high that the excess water could run freely towards the rivers. In the course of time the weak peat soils settled because of drainage and agriculture. Measures had to be taken in order to regulate the water-balance.

Free discharge into the rivers was no longer possible: ditches and watercourses were dug that led the water to the rivers through sluices. To prevent the rivers from flooding, embankments or dikes were constructed on the riversides. From the fifteenth century onwards windmills were used to pump away the water. However, the soil kept settling: areas that used to be well above sea level have now declined a few metres. Previously grain was grown here, but now the soil is mainly suitable for grassland.

The reclamation of Amstelland started in the Middle Ages. The first people to start reclaiming the land probably constructed primitive embankments along the banks of the Waver and the Amstel to protect themselves from high water levels in the rivers. Ditches were dug at right angels to the rivers, deep into the peat. These

ditches had several functions. The excavated ground was used to build terps, while the ditches lowered the ground water table and also clearly marked the borders of the various parcels. When the land had dried out sufficiently it was worked.

The lower course of the Waver and especially that of the Amstel can be compared to a delta, where the river branches off before it discharges into the sea. Because of this the settlers chose this area as suitable to life. Here, on top of the peat dome, it was dryer than the in the estuary area of the Amstel and the IJ and it was easier for the farmers to turn the peat into grain fields. From here they opened up the barren lands in the direction of the IJ and the Amsterdam of today.

In the first half of the thirteenth century, when the first houses were built on the site of the present Amsterdam, this area already knew large settlements such as Nes and Ouderkerk aan de Amstel, situated further along the Amstel.

Like all barren lands in the Middle Ages, this area was owned by a landlord, in this case the German emperor. In the tenth century he assigned the peat lands to his vassal, the bishop of Utrecht. For a long time nothing much happened with the peat lands. The vast swamps formed a buffer against the county of Holland. However, when the counts of Holland started to reclaim the land on the Westside of the area, the bishop wasn't be left behind. In 1085 he ordered that a large part of these lands be reclaimed.

The lords of Amstel managed the reclaimed lands on behalf of the bishop of Utrecht. In the new settlements they were in charge of the administration of justice, the maintenance of order and other governmental duties. To underline their social status the Amstels built a stronghold, next to the old court of the bishop in present-day Ouderkerk aan de Amstel. Because of the location, the lords of Amstel had to serve two masters: the bishop of Utrecht and the count of Holland. This made them participants in the power struggles of the thirteenth century. In the beginning of the fourteenth century the count of Holland took over the property and the rights of the lords of Amstel indefinitely and Ouderkerk became the administrative, economic and religious centre of the area.

The proximity and growth of Amsterdam plays a big part in the history of Amstelland. Peat lands were suitable to accommodate the increasing demand for food from the city. The farmers went to the city by horse and cart or by boat to sell their milk, cheese and other products. The city was also a market for turf. The proximity of the city was important to the 'warmoezeniers'. They were horticulturists who grew vegetables and fruit and sold them in the city. Besides, the

proximity of the city and especially the harbour stimulated the cultivation of hemp, the raw material for sailcloth and rope.

The proximity of the city had its downsides as well. The defence of Amsterdam increasingly took place in the hinterland. Amstelland was part of several waterlines, especially that of the position of Amsterdam. To protect the city entrenchments and forts were built and the farmlands were inundated occasionally. Fort Nessersluis, which can be seen from across the Waver, was part of the position of Amsterdam.

The landscape of Amstelland with its estates and rivers was and will remain a popular destination of many inhabitants of Amsterdam. Around 1700 there were many country houses in this region along the Amstel. Gardens, forests and parks formed a continuous strip of woodland. Amstelland is a land of water, peat and people. A landscape with medieval parcelling, mills sluices and pumping stations, sharp contrasts between reclaimed lands and uplands. Other things matter as well: the wind, cloudy skies, the smell of hay: things that can't be put into words and cannot be mapped, but that are important to the way this landscape is appreciated.

Sporenburg-Borneo (a neutral/negative version)

This film is about the residential quarters that have arisen on what once was the Oostelijk Havengebied (eastern harbour area) of Amsterdam. This area has been transformed over the last years. On the peninsulas where ships once docked, new neighbourhoods were built. The area was developed in stages: first the Java- and KNSM-islands and finally Sporenburg and Borneo. In the design of the residential quarters many references to the history of this area can be found.

The development of the Oostelijk Havengebied started around 1900. The Oostelijke Handelskade was built first, which gave Amsterdam a deep-water harbour. The wharf was set up complete with warehouses, railroads and steam-cranes for loading and unloading. In the first half of the 20th century the Oostelijk Havengebied was in full development. From here the passenger ships and freighters departed for South-America and the Dutch Indies. The activities were concentrated around the warehouses 'Europa', 'Azië' and 'Africa', where the goods were transferred.

Shipping companies such as the KNSM and the steam navigation company Nederland developed along with the harbour. Another shipping company that was located in the Oostelijk Havengebied was Het Koninklijke Hollandsche Lloyd.

This company provided a regular service between Amsterdam and South-America and handled the transport of emigrants to Argentina and Mexico. For many Eastern European emigrants the Oostelijk Havengebied and the former Lloyd hotel were the place from which they departed to the New World.

Already before World War II business in the harbour was waning, partly due to the crisis. During the war the harbours were not in use. All ships had escaped the Germans to Great Britain, except for the J.P. Coen, which was sunk in the harbour of IJmuiden just before the floodgates and thus became a barrier to navigation. In the last year of the war the Germans disabled the cranes of the harbours.

After the war the harbours returned to work, only to come to an almost complete halt in the fifties, after Indonesia was decolonised and the trade with the East dried up. In the sixties of the last century the harbour had to deal with an increase in the scale of navigation. Especially the transhipment of dry goods (coal, grain, minerals) increased, but the transport of containers did as well. Large shipping companies merged and moved to Rotterdam; the Oostelijk Havengebied was too small for the ever-larger ships. With that, all harbour-related activities came to an end halfway through the seventies. The harbour area fell into decay. Little by little the buildings were demolished. The demolition lasted for years and over those years activity decreased. Until around 1990, the Oostelijk Havengebied was a dreary, abandoned district. Town-planners looked into this problem and came up with a plan for realising a housing development with a high building density in this area.

They intended to build a district of high architectural quality. In a short amount of time over 8.000 houses arose on and around the islands, designed by different architects.

Meanwhile, the approach to the Oostelijk Havengebied is viewed internationally as a successful project. There is much interest as to how Amsterdam has accomplished such a high building density. The transformation of the Oostelijk Havengebied started with the development of the KNSM- and Java-islands into a residential quarter. The most recent and striking developments in the area are the buildings on Borneo and Sporenburg.

Where the Java-island and the KNSM-island are characterised by large, high housing blocks, on Borneo and Sporenburg only low-rise buildings were realised – with the exception of two large apartment buildings. The building density of the historic centre of Amsterdam was taken as the basic principle of the town-planning approach on Sporenburg and Borneo. A hundred houses per hectare had to be built

– the same quantity as in the high-rise building of the Java-island. Such a high quantity of low-rise buildings in a new development is, however, an exception.

The designers succeeded in combining low-rise building with a very high building density. One could forget about front and back gardens. Cars had to be accommodated within the houses. All houses on Borneo and Sporenburg have their own entrance at the street and are provided with a patio, inner court or roof terrace. Another detail is the height of the ceiling of the ground floor levels, no less than three and a half metres. The high building density resulted in a lack of space to add public gardens. The assumption was that the great amount of water surrounding the houses and the roof terraces would compensate for the absence of parks.

Over the last ten years Borneo and Sporenburg have been fully developed. What used to be one of the most isolated areas of Amsterdam is now a place to live for many people in Amsterdam. Not only architects and town-planners, but also tourists come to see these islands.

Besides the extremely high housing density, there is a variety of building styles. Almost sixty architects worked together on the development of Sporenburg and Borneo, striving to shape this area into a consistent unity. The architects were asked to develop a typology of a family house with a private space outside in the shape of a small patio. These patios had to compensate for the limited light due to the narrow facades of the houses. In a 'harsh' harbour landscape, the patios offer an introverted world. The implementation of strict directives for design has produced a series of innovative formal solutions.

This is especially visible in the Scheepstimmermanstraat. The city sold sixty free parcels in this street to private persons, whose parcels were assigned by drawing a lot. On these parcels the owners were allowed to build houses to their own taste and they could choose the architects themselves. Professional planners of the municipality watched this initiative with great interest. For it hadn't been possible to build your own house in Amsterdam for a very long time.

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Across the street the Scheepstimmermanstraat is one of the canals of the area. Ton Schaap, who developed the project 'living in a house of your own design', described this quay as a modern addition to the typology of the Amsterdam canal house. The only thing these canal houses have in common is the construction height, a front door at the street and a private domain on the waterside that can only be seen from the water.

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Another building on Borneo-island is the impressive residential building 'Pacman'. It consists of 204 residences and functions as a beacon, standing out because of its size and shape. Pacman suddenly makes Borneo appear much more urban. The architect purposefully designed a building in this harbour area that seems to have always stood there: an unpretentious, industrial building with large quantities of brickwork.

The islands of Sporenburg and Borneo owe their character to an accumulation of qualities. As part of the town-plan for the Oostelijk Havengebied it is a milestone in the combination of low-rise building and high building density.

Annex to statement. D.Y. Karmanov
PhD student, Mansholt Graduate School of Social Sciences (MG3S)
Completed Training and Supervision Plan

Description	Institute / Department	Year	ECTS*
Courses:			
Mansholt Introduction course	Mansholt Graduate School of Social Sciences (MG3S)	2005	1
Research Methodology I: From Topic To Proposal	MG3S/CERES	2008	4
Field Research Methods: Methods and Tools For Qualitative Data Analysis	MG3S/CERES	2008	2,3
Mobilising your scientific network	Wageningen Graduate Schools (WGS)	2008	1
Information Literacy, including introduction to Endnote	WGS	2004	0,6
Environmental Psychology	University of Amsterdam (UvA)	2006	6
Statistics for the Life Sciences	Wageningen Institute of Animal Sciences (WIAS)	2007	1,5
Discussion group 'Landscape: research, planning, politics and experience'.	MG3S	2005	1
Individual study trajectory:			
- basics affective priming			3
- basics of skin conductance			3
- basics of Photoshop			0,6
Giving four guest lectures in the course "Environmental Psychology" at the University of Amsterdam		2005-2008	1
Supervising MSc-Thesis "Plein maar fijn". Hanneke Busscher		2006	1
Supervising MSc-Thesis "The Art of Living Taijiquan". Andrey Kolybelnikov.		2005	1
Presentations at conferences and workshops:			
Mansholt Multidisciplinary seminar		2008	1
Annual Conference "Thinking through tourism" (Association of Social Anthropologists), London Metropolitan University, UK.		2007	1
Conference "Mens en Omgeving", Groningen University		2005	1
Total (minimum 30 ECTS)			**30**

Curriculum Vitae

Dmitri Yurievich Karmanov was born in 1969 in Tashkent, USSR. After finishing secondary school he served two years in the Soviet Army. From 1990 to 1994 he studied singing at the Moscow Conservatory. In 1997 he started his studies in Musicology and in 1999 in Psychology at the University of Amsterdam. He received his master's degrees in Musicology in 2003 and in Psychology in 2004 (with distinction). In 2004 he started his PhD-research at the Department of Socio-Spatial Analysis at Wageningen University which resulted in this dissertation.