the production of mindscapes

Promotor:
Prof. dr. Jaap Lengkeek
Hoogleraar Sociaal-Ruimtelijke Analyse, Wageningen Universiteit

Copromotor:
Dr. Hans Dooremalen
Universitair docent Rationality and Non-reductionism, Tilburg Universiteit

Promotiecommissie:
Prof. dr. John Ryan, Virginia Tech University
Prof. dr. Svein Larsen, University of Bergen
Prof. dr. Kris van Koppen, Wageningen Universiteit
Prof. dr. Andre van der Zande, Wageningen Universiteit/Ministerie van LNV
Dr. Peter Indefrey, Max Planck Institute/FC Donders Centre

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the production of mindscapes

a comprehensive theory of landscape experience

Maarten Jacobs

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Part 1

THE PROBLEM OF LANDSCAPE EXPERIENCE

Chapter 1 Introduction

Every neurologically normal person knows what landscape experience is. Simply look out of the window, attend to what you see, and there you have it: an experience of landscape. It may be hard to express what this particular experience is like, it may be even harder to express what the general properties of landscape experiences are like, and it may be impossible to give a clear-cut definition of landscape experience. Still, you have some knowledge of landscape experience: you have a feel of what landscape experience is, a feel that has evolved because you have often experienced the surrounding landscape. In this sense, you are an expert.

Being an expert, you know that the way you experience the landscape is not directly determined by the physical properties of the landscape you observe. When you are in a relaxed and peaceful mood, your experience of the scene outside your window differs from your experience of the same scene when you are angry or stressed. Our experiences can vary, even though the physical properties of the landscape being observed remain constant. Thus, without using scientific theories, we can infer from our own experiences that landscape experience is not the result of the physical landscape exclusively. On the contrary, landscape experiences are *produced* by subjects, as I will argue in this book. In this production process, many different factors may influence the outcome, that is, the particular individual experience that is created based on the information about the physical landscape as received by the senses of the subject.

To get insight into the factors that influence landscape experience, the knowledge we have gained through daily experience is insufficient, since various factors may influence experience unconsciously and are thus inaccessible to us directly. We have to attend to science to look for theories that might explain landscape experience. Landscape experience is studied by scholars with different disciplinary backgrounds, for example environmental psychology, sociology, philosophy, history, anthropology and human geography. Across the different disciplinary contributions, there is a wide variety of approaches, applied theories and concepts, inspired by different fundamental theories. In each approach, different factors that influence landscape experience and different aspects of landscape experience are stressed, and applied theories are developed to explain how these particular factors influence these particular aspects. As an illustration, I will give some examples.

Some environmental psychologists argue that the way we experience the landscape is partly innate (i.e. it has developed in the course of evolution) and is partly determined by the goal of survival. In this evolutionary approach, scholars have proposed different theories to explain the relation between evolutionary factors and landscape preferences. According to one of these theories – the prospect-refuge theory (Appleton, 1975) – human evolution has resulted in a preference for landscapes that offer the chance to prospect and refuge, because for our primitive ancestors it was of great importance to look out on the landscape in order to gather food and hunt prey (prospect), as well as to hide from large predators (refuge). According to some sociologists, philosophers and historians, the way we experience landscapes is greatly influenced by culturally developed meanings. For example, the idea behind the 'images of nature' approach is that different networks of meanings of nature exist alongside each other in society. The way an individual experiences nature in landscapes depends on the particular socially shared image he or she has acquired. Some human geographers contend that the experience of landscape is partly determined by the sense of place an individual has developed in the course of his or her life. Apart from culturally acquired meanings, this sense of place consists of very personal meanings that result from memories and associations.

While there is no lack of applied theories of landscape experience, and while each theory makes sense in its own way, it is hard to get an overall picture of the way landscape experience is produced and of the factors that determine this production process. The problem is that the scientific knowledge of landscape experience is dispersed: there are many unrelated theories and approaches, and each carries little explanatory power. The current state of landscape experience theory can be summed up as 'many highly selective theories, no comprehensive theory'. There is no fundamental theoretical framework connecting different approaches. Therefore, an understanding of landscape experience that exceeds a loose collection of chunks of knowledge of particular details has not emerged yet.

For several reasons, this fragmentary state of affairs is problematic. First, without a fundamental theoretical framework, it is hard to find relations between the knowledge produced in different approaches, because a picture of the whole is needed to see whether and, if so, how different parts are related. Do different applied theories of landscape experience mutually exclude, or are they complementary? Do the applied theories make sense at all? Second, fundamental theoretical issues are too easily neglected as long as research takes places in highly limited approaches, because in the approaches the concepts employed to describe factors influencing landscape experience and the aspects of landscape experience that

come into view are selected from the start. For example, the question what landscape experience is or how it works is seldom stressed. As a consequence, misconceptions about the nature of experience may lurk behind the applied theories of landscape experience. Third, the applied theories leave mostly unexplained *how* the factors stressed influence landscape experience. How does cultural influence work? How can personal history affect landscape experience? How does genetic make-up exercise influence on landscape experience?

The aim of this dissertation is to construct a comprehensive theory of landscape experience, one that explains how landscape experiences are produced and how various factors influence this production process. It is to be a comprehensive theory in the sense that it embraces the existing disciplinary theories of landscape experience. Thus, my aim is to contribute to improving the theoretical basis for landscape experience research. To construct a comprehensive theory of landscape experience, I will make use of the existing theoretical knowledge of landscape experience, insofar as this knowledge is plausible. I will develop a general theory of experience that is more fundamental than the current applied theories of landscape experience. The general theory of experience will serve as a fundamental framework. The applied theories of landscape experience will be reinterpreted, adopted and related within this fundamental framework.

The various factors stressed in the different approaches of landscape experience research can satisfactorily be divided into three domains: evolutionary, cultural and personal factors (Bourassa, 1991). If these three basic factors influence landscape experience, they must meet somewhere. Since our experiences are produced in our brain, I think that the place where these factors meet is the brain. Evolutionary, cultural and personal history can influence the way we produce experiences based on information our senses receive from the physical landscape, only *by virtue of leaving traces in our brain*. Therefore, I will take neuroscientific knowledge into account when constructing a general theory of experience.

Using neuroscientific knowledge to construct a theory of experience is not unproblematic. Neuroscientists can observe someone's brain and its processes by making use of a number of fairly reliable detection methods, but are unable to observe someone's experiences on the basis of brain activity records. While brain processes and experiences are related, it is hard to understand the nature of the relation between the brain and experience. This problem of understanding includes a philosophical problem. Is experience ultimately nothing but a complex set of brain processes? If this were the case, experience would be a material phenomenon, since brain processes are material phenomena. Why, then, does experience seem so different from material phenomena? For example, material phenomena are

publicly observable, while someone's experiences are not. I will reflect on the problem of the relation between experience and the brain, making use of arguments developed by philosophers of mind.

Apart from neuroscience and philosophy of mind, I will use empirical observations, empirically informed hypotheses and arguments from various other disciplines – such as psychology, phenomenology, philosophy of language, anthropology and semiotics – in order to construct a general theory of experience that will serve as a template to construct a comprehensive theory of landscape experience.

In the subsequent two chapters of the first part of this dissertation, I will argue that the problem of landscape experience is not just a scientific challenge, but also a problem relevant to society, and to spatial policy and planning. In the second part, I will review the existing scientific theories and concepts that are employed to study the phenomenon of landscape experience. In addition, I will present three empirical studies of landscape experience that reflect different approaches to the study of landscape experience. In the third part, I will construct a general theory of experience. I will pay special attention to the relation between experience and the brain, perception, cultural influence on experience, and emotion. Finally, in the fourth part, I will construct a comprehensive theory of landscape experience by using the general theory of experience as a framework to reinterpret and relate different disciplinary theories that stress landscape experience.

The central question underlying the comprehensive theory is how, by what processes, landscape experiences come into being. Such questions as which landscapes are preferred, how certain landscapes are perceived or which aspects of landscape experience are either similar or different across subjects will not be systematically discussed. Instead, I will focus on a more fundamental level and stress such issues as how it is possible that people prefer some landscapes above others, by which processes perceptions of landscapes are constituted, and why there are both similarities across and differences between subjects.

Chapter 2 Landscape, landscape and landscape: a threefold theory

2.1 Introduction: changing landscapes and the problem of quality

Many landscapes in the western world have changed dramatically over recent decades. Social processes are changing more rapidly, mainly as a result of the momentum of economic growth, technological achievements and the ever-increasing flood of information (Castells, 2000a; Harvey, 1989: 229-231). One of the results is that much has changed spatially.

For instance, in the Netherlands, more and more space outside the cities is being used for buildings, and much space is being taken up for all sorts of infrastructural facilities. Improvements in agricultural efficiency have changed the face of the countryside, especially since World War II. Large areas are being claimed for nature development. Plans for changing water management are being made in anticipation of the effects of global climate change. Many of these spatial transformations – some drastic, some less drastic in nature – are quite unpredictable. As Castells (2000a) points out, unforeseen powers can radically change entire regions in a short space of time. For instance, a major international company can decide to erect an enormous office building in a certain region. As a consequence, new infrastructures and housing may change the landscape dramatically.

As a consequence of the spatial transformations, the quality of landscape is a focal point in debates on landscape and spatial planning. 'At the turn of the millennium it is probably safe to say that the masses of the western world are emerging from concerns with standards of living to confront both global and private issues of environmental quality' (Porteous, 1996: 7). Many spatial changes are rated as negative: people find that they detract from the beauty of the landscape (Nohl, 2001). Not only lay people, but also researchers and policy makers focus a great deal of attention on the quality of landscape (e.g. Alterra, 2000; Assche & Jacobs, 2003; Daniel, 2001; Giorgis, 1995; Mansvelt & Lubbe, 1999; Ministerie van VROM, 2001; Nardon & van den Berg, 2001; Nohl, 2001; NRLO, 1998; Porteous, 1996; RIVM, 1998; RLG, 1999; van Zoest, 1994).

Studies into the origin and different meanings of the term 'landscape' have revealed different denotations, which make the term conceptually ambiguous. The term sometimes simply refers to a piece of land, a part of the earth's surface. It is also used to denote the management of the land, the interaction between man and nature, a unit of occupation, or a property. Another set of denotations refers to the

landscape as a sensory impression, an aesthetic experience and a pleasing object of depiction (e.g. Schama, 1995; Tress & Tress, 2001; Vroom, 2005).

This conceptual ambiguity recurs in the debates on landscape quality. The expression 'landscape quality' is used in studies that embrace a large variety of interests, such as ecological quality, economic quality or aesthetic quality. Moreover, the way in which landscape quality is expressed also differs: some scientists try to come up with measurable quantities (e.g. many papers in the *Journal of Environmental Quality*) and some policy makers and planners try to develop norms (Giorgis, 1995; Ministerie van VROM, 2001), while amongst citizens, landscape quality is a matter of worthwhile experience.

In this chapter, I will present a landscape theory that makes a distinction between three different phenomena of landscape. This tripartite landscape theory is founded on Habermas's differentiation of validity claims. I will use it to disentangle the obscurity of the concept of landscape, an obscurity that is abundant in debates on landscape.

First, I will present the theory and its background (sections 2.2 and 2.3). Subsequently, I will demonstrate its value by applying it to three different cases, each of which is about a different landscape debate. I will use the tripartite landscape theory to indicate conceptual fallacies in these debates (sections 2.4 to 2.6). Finally, I will discuss the status of the theory and draw my main conclusions (section 2.7).

2.2 Matterscape, powerscape and mindscape

One can divide reality into three different modes: physical reality, social reality and inner reality. In each of these different modes, landscape appears as a different phenomenon. I will call these three landscape phenomena matterscape, powerscape and mindscape, respectively.

Matterscape is the landscape in physical reality. The existence of phenomena in physical reality is objective, in the sense indicated by Searle (2000): the existence of objective phenomena does not depend on an individual subject's desires, moods, intentions or awareness. Therefore, only one physical reality exists. For example, trees and rocks exist, whether or not I am aware of them, whether or not I like them. Matterscape is a material reality, described as a system of facts to which laws of nature apply. In this landscape, one can, for instance, walk about, get wet or fall down on the ground.

Powerscape is the landscape in social reality. Social reality – or culture – consists of implicit or explicit rules that regulate the behaviour of those who belong to the

group to which these rules apply. For example, in many societies it is forbidden to cut down a tree that is growing in a public place unless one has official permission to do so. These rules are constituted by and are expressions of power. Without power, rules do not make any sense: one can just cut down the tree without any consequences. Social reality is intersubjective; that is, it is created between subjects who form a social group. Because there are many different groups, there are many different social realities. An individual can be a member of many groups on different scales, involuntarily or voluntarily. For example, a person be a citizen of the Netherlands by birth, and be forced to respect the official laws. The same person can be a member of the local skateboarders' culture, and adopt the habits that define the kinds of clothes to wear. Powerscape is the landscape as produced in society as a system of norms and objectives. These norms and objectives are sometimes clearly formulated in the form of laws, rules, regulations and government plans, and are sometimes embodied in customs and traditions. Powerscape is a system of norms that regulate how members of a particular society are required to behave with respect to the landscape.

Mindscape is the landscape in inner reality. Inner reality is constituted by consciousness or states of mind; for example, the experience or imagination of a tree and the associations it involves. Inner reality is subjective; it exists in the minds of subjects only. The number of inner realities is exactly the same as the number of conscious subjects in the world, since inner reality is the product of consciousness. Mindscape is the landscape as people experience it and can be very personal in meaning. It is the landscape produced by experiences and meaning-giving processes. Mindscape is a system of essentially individual values, judgements, feelings and meanings that are related to the landscape.

Matterscape, powerscape and mindscape are different phenomena. These phenomena differ also with respect to the way knowledge can be gathered and validated.

2.3 Epistemology: truth, justness and truthfulness

When are statements that reflect our beliefs about phenomena and processes, valid? This is the domain of epistemology. Habermas (1984: 19-23 and 38-40) makes a distinction between three fundamentally different validity claims. Statements are *true* if they correspond with an objective state of affairs (e.g. it is true that water flows downhill). Statements are *just* if they correspond with or fit in with norms that groups of people follow (e.g. it is just not to pollute water in our com-

munity). Statements are *truthful* if they correspond with the contents of consciousness of the subject: all that occurs in the conscious mind, the domain of the thoughts, wishes, intentions, desires and feelings (e.g. it is truthful that I find water fascinating).

These validity claims correspond with the three modes of reality: beliefs about the landscape as it appears in physical reality are valid if true; beliefs about the landscape as it appears in social reality are valid if just; and beliefs about the landscape in inner reality are valid if truthful. Hence, the epistemological correlates of matterscape, powerscape and mindscape can be called the true landscape, the just landscape and the truthful landscape, respectively.

Scientific knowledge about matterscape is gathered by disciplines that investigate external nature, such as ecology, geology, hydrology, soil science and environmental science. The facts and laws that describe the true landscape apply to everyone. Although there can of course be disagreement as to whether or not a certain statement is true, this does not mean that true facts, agreed on or not, do not apply to everyone. If it is true that water flows downhill, then it is true for everyone regardless of what an individual may believe.

Scientific knowledge about powerscape comes from disciplines that are involved in research into social reality, such as sociology, social geography, ethics and economics. These disciplines, when dealing with landscape, gather knowledge about the norms and interests that connect different groups of people to the landscape, and about the accompanying social processes that often have to do with spatial intervention. The norms that shape powerscape are not universal: what one group of people thinks is just, can differ from the opinion of another group. Different systems of norms exist alongside one another (for example, camping rough is allowed in some countries and not in others).

Scientific knowledge about mindscape is found in disciplines involved with the inner world, such as environmental psychology and human geography, which I will call 'experience sciences'. These disciplines investigate how people experience landscapes and what these landscapes mean to people. The values and meanings that people attach to the landscape are applicable only to the individuals themselves, although different individuals can have similar preferences, or they can be influenced by images that are socially acquired. Although almost all people have a strong appreciation of landscapes that include water, this does not stop an individual from perceiving them as not beautiful: the criterion for a judgement of this kind is whether the judgement corresponds with the inner states of the person who is expressing an opinion, and not whether it is in agreement with the majority. Table 1 is a summary of the basic properties of the three phenomena of landscape.

Table 1: A tripartite theory of landscape

Landscape phenomenon	**Matterscape**	**Powerscape**	**Mindscape**
Mode of reality	Physical reality	Social reality	Inner reality
Validity claim	Truth	Justness	Truthfulness
Science	Natural sciences	Social sciences	Experience sciences

The table may create the misconception that social scientists and experience scientists are involved not with the truth but with justness and truthfulness, respectively. This is not the case: they, like all scientists, seek the truth, but not the truth about landscape.

When sociologists investigate the way in which a group of people deals with the landscape, they focus on the group of people and not on measurements of the landscape. A sociologist attempts to get to the bottom of the truth about groups of people. In these groups, powerscapes appear as systems of norms. The scientist who registers the norms of a social group with respect to the landscape tries to give a true description of the powerscape as constructed by this particular group of people, which in turn reflects justness, for this group, with respect to the landscape.

Like a sociologist, an experience scientist would assess not the landscape but the experiences of people. An experience scientist is engaged in finding truths of the inner-self, the content of the person's consciousness. Mindscape is manifested through the experiences of the person. An experience scientist who is investigating a person's experiences of the landscape, therefore, focuses on mindscape as that person constructs it. Thus, social scientists and experience scientists derive their answers from groups of people or individuals, and not from landscapes. Therefore, the focus in their studies is not on coming up with statements that claim to reflect beliefs that are true with respect to the landscapes, but on coming up with statements that claim to reflect beliefs that are true with respect to powerscapes that apply to groups of people, or mindscapes that apply to subjects.

Moreover, studies performed by social scientists who are investigating powerscapes or by experience scientists who are investigating mindscapes may contain some statements that are claimed to reflect truths about landscapes. For example, a study of the way the inhabitants of a particular region experience their daily environment may start with a description of what the landscape is like in this region. This description contains statements that are claimed to be true of the landscape, for instance, that the region is densely forested. However, these kinds of statements are statements reflecting unproblematic claims to truth. Everybody who

knows the region already knows that it is densely forested. In studies that expound on matterscape, the aim is to come up with new statements that reflect beliefs claimed to be true with respect to the landscape, that is, about properties we did not know before. In studies that expound on powerscapes and mindscapes, on the other hand, statements reflecting beliefs that are claimed to be true with respect to the landscape are statements that are not problematic, that everybody would agree upon. These statements do not follow from the studies, but only serve as inputs to the studies, in order to be able to relate powerscapes and mindscapes to particular matterscapes.

The three phenomena can be used to describe every landscape or element of landscape, the descriptions being non-transferable from one to the other in any logical way. For instance, in matterscape, a road can be described as a strip of concrete or asphalt of a certain width and thickness. In powerscape, it can be described as a place where rules apply, for example the rule to drive on the right side of the road. This rule in powerscape does not follow from matterscape, but is produced in powerscape. In mindscape, a road can be described as a phenomenon that one can consider as either unsightly or beautiful, for example.

As stated in the introduction, the term landscape is often used in a conceptually ambiguous way in various debates on landscape quality. This conceptual ambiguity often results in fallacious claims and problem perceptions. The tripartite theory of landscape can be used as a tool to disentangle some of these fallacies, and hence to make landscape debates less obscure. In the following three sections, I will illustrate this claim by employing the theory in a discussion of three cases.

2.4 Theory at work I: the Brent Spar case

In 1996, the Royal Dutch Shell company decided to allow the obsolete Brent Spar oil platform to sink to the seabed. The company argued that research indicated that the sinking would not cause much pollution. However, citizens in Europe responded massively by boycotting Shell products. This action rapidly met with success: Shell was forced to seek another solution. Although organizations like Greenpeace had initiated the boycott, the power of these interest groups was not the deciding factor. Instead, the temporary virtual organization of millions of people involved in the boycott wielded the decisive power.

The investigation that Shell had carried out was about foreseeable environmental damage only (see RBAL, 1994). It was about matterscape, and thus was somewhat limited: the Brent Spar platform exists in matterscape, but also in pow-

erscape where, some action groups believed, there could be no question of sinking the platform. It also exists in the mindscape. Probably, the reasons why so many people joined the boycott had to do with opinions about primeval nature. For the boycotters, the sea – as last bastion of nature apart from man – represents a certain value that leaves no room for a sunken platform.

The mistake that Shell made in the public debate was to reduce landscape to matterscape. If in the mindscape of people the ocean and a worn-out platform do not fit together, the question whether in objective terms the solution to sink the platform would have caused the least environmental pollution or not, is irrelevant for those people. Shell's argument that the decision to let the Brent Spar sink because environmental damage would be slight, does not respond to these people. An intervention in the landscape always implies an intervention in three phenomena of the landscape, and therefore is problematic from three perspectives.

Moreover, Shell's rhetoric to the public was to make them believe that the decision was objective because it followed automatically from objective research. This kind of decision, however, is always normative. The implicit norm in this case was that the solution to sink the Brent Spar platform was justified because it was the least damaging solution for the environment. Here, Shell's mistake was to pretend that powerscape was determined by matterscape. This was, however, not the case: the decision about the justness of action could not be determined by knowledge of an objective state of affairs.

Generally, statements about one of the three landscape phenomena (e.g. powerscape) can never be deduced in a logical way from knowledge about another landscape phenomenon (e.g. matterscape). Laws that apply to one phenomenon do not apply to the other phenomena. For example, the law of gravity is valid in matterscape, but is meaningless in powerscape and mindscape. The principle that past experiences can heavily influence the way a person perceives a certain landscape is applicable to mindscape but not to matterscape or powerscape. Between matterscape, powerscape and mindscape, there are epistemological boundaries; in other words, knowledge about one landscape phenomenon is not directly transferable to another, as will be demonstrated in the following two sections that expound on the multiple land-use debate and the landscape quality debate in the Netherlands.

2.5 Theory at work II: the multiple land-use debate

'Multiple land-use' is being intensively discussed as a new strategy for spatial planning in the Netherlands (e.g. Habiforum, 2004). The central idea is to use the

same place for a multitude of purposes, thus creating multifunctional places. This strategy implies a major change in Dutch planning culture, which has generally been focused on the spatial segregation of different functions (Habiforum & RMNO, 2000: 4).

Multiple land-use is regarded by many policy makers and spatial planners as a promising solution to the perceived lack of space in the Netherlands. According to the adherents of the multiple land-use strategy, not all future claims for space can be met, because all the space in the Netherlands is already occupied. Thus, in this debate, the lack of space is perceived as a matterscape problem: it is seen as a problem of needing some extra square kilometres of space.

However, a simple thought experiment indicates that the lack of space is not a matterscape problem. If all Dutch citizens were housed as densely as people are in New York City, a strip of land of only two kilometres wide along the border with Belgium would be enough to accommodate everybody (Peters & Schwartz, 2000). Although a lot of extra space would of course be needed for industrial and agrarian activities, the existing space in the Netherlands would be more than enough to satisfy all spatial needs in matterscape.

The lack of space, then, is not a matterscape problem. For example, recently a new city of approximately 100,000 inhabitants was built in the most dense part of the Netherlands. Lack of space is a mindscape problem and a powerscape problem: it is the former because many people find the Dutch landscape too densely occupied, and it is the latter because a vast web of governmental spatial regulations makes it hard to develop activities in space. For example, it is extremely easy for a company to buy a piece of land in the Netherlands, especially as many farmers are giving up farming and are willing to sell their land. However, it is extremely difficult to build anything on the bought land, since Dutch spatial planning regulations are very conservative in this respect. I do not want to judge the web of spatial regulations as good or bad: I simply want to state that, if someone wants to erect a building, the lack of space exists not in matterscape but in powerscape.

To sum up, in the multiple land-use debate the problem of lack of space is falsely perceived as a matterscape problem. This conceptual fallacy may have bad practical consequences. For instance, perhaps the matterscape innovations leading to multiple land-use will increase the feeling of density amongst the majority of people. Thus, the so-called solution in matterscape will increase the problem in mindscape. The tragedy is that, without proper landscape experience research, nobody knows how the feeling of density relates to matterscape properties. Without this kind of knowledge, policy makers and spatial planners who advocate multiple land-use as a solution to the lack of space problem are just gambling.

2.6 Theory at work III: the landscape quality debate

Another common conceptual fallacy can be found in some debates on landscape quality. Generally, Dutch citizens, policy makers and land-use planners complain about the decreasing beauty of the landscape. A popular solution amongst policy makers and planners is to minimize the spatial claims for new city blocks, industrial sites, infrastructure and office buildings, and to pay attention to the conservation of natural areas and small-scale agrarian landscapes. The idea is that the first group of land-use categories is largely seen as decreasing the beauty of landscapes, while the second group is seen as increasing their beauty.

The decreasing beauty is primarily a mindscape problem, since the judgement of beauty is obviously an outcome of mind processes. The mentioned solution is primarily a powerscape solution, since the solution is to apply norms to different forms of land use. In this case, the problem is that an absolute bond is implicitly presumed between the experience of landscape beauty and categories of land-use planning. This presumption is seldom reflected upon in the landscape beauty debates.

It is very likely that some land-use categories will be experienced by many people as more beautiful than other categories. But these relations are not absolute: for example, some people do not like natural areas and love infrastructural landscapes. Furthermore, the presumed relations depend on the way objects are designed. The average industrial site may be rated as ugly, not only for being an industrial site, but also because it was designed without much attention being given to landscape beauty. If this is the case, the mentioned policy runs the risk of running in circles. First, the land-use category of industrial sites is rated as not beautiful. Second, because it is rated as not beautiful, no policy efforts are made to make industrial sites beautiful, since policy for landscape beauty concentrates on the so-called beautiful land-use categories. Third, because industrial sites are not designed to be beautiful, they are rated as not beautiful.

A policy that fallaciously presumes a fixed bond between powerscape categories and mindscape will easily overlook many opportunities to enhance landscape beauty by, for example, paying more attention to landscape beauty when planning and designing new industrial sites.

Three examples are sufficient to illustrate my statement that not making distinctions between the three phenomena of landscape leads easily to conceptual fallacies in landscape debates relating to landscape quality (for more examples, see Jacobs 2000, 2001, 2002 and 2004).

2.7 Conclusion: the problem of conceptual fallacies

I have distinguished three phenomena of landscape. Matterscape is the landscape as it exists in physical reality, powerscape is the landscape as it exists in social reality, and mindscape is the landscape as it exists in inner reality, in the mind. These phenomena cannot be reduced to each other. For example, although matterscape plays an important inferential role in the mindscape of a perceiving conscious being, the mindscape of the observer is not a function of matterscape exclusively. Mindscape depends as well on the memories of the observer, the associations he or she attaches to the observed landscape features, his or her emotional state at the moment of observing, etc. Apart from being different objects, matterscape, powerscape and mindscape are epistemologically different. Statements about matterscape are valid if they are true, statements about powerscape are valid if they are just, and statements about mindscape are valid if they are truthful.

Are matterscape, powerscape and mindscape ontologically fundamentally different phenomena as well? In some previous publications, I called this theory a threefold landscape ontology (Jacobs, 2002 and 2004). Ontology is about the nature of being. I stated that matterscape, powerscape and mindscape belong to fundamentally different ontological categories because they cannot be reduced to each other. Since it is an obvious empirical fact that two people can experience the same place differently, mindscape and matterscape cannot be the same. However, I now think that the question whether these phenomena belong to different ontological categories is open to dispute, since this conclusion cannot be drawn from the thesis that objects are different and cannot be reduced to each other. For example, an apple cannot be reduced to a pear, but an apple and a pear are nevertheless both material phenomena, and hence belong to the same fundamental ontological category of material objects.

Hence, non-reducibility does not imply categorical ontological difference. To conclude that, for example, mindscape belongs to an ontological category different from matterscape, it must be shown that mindscape is not material, and thus does not belong to the ontological category of matter, as matterscape does. Imagine that mind states and mind processes are ultimately nothing but brain states and brain processes. If this is the case, mind is ultimately made of matter, since brain states and processes are material phenomena. Mindscape would be matter, just as matterscape is. Therefore, mindscape and matterscape would not belong to different ontological categories. The question whether mind is reducible to brain is intensively debated by philosophers of mind, who have yet to come up with the ulti-

mate answer. In Chapter 8, I will reflect on the mind-brain debate. For now, I will leave open the question whether the three landscape phenomena are ontologically different. I will come back to this issue in the final chapter.

Independent of the question whether they belong to different ontological categories, matterscape, powerscape and mindscape are different phenomena. Even if mind could be reduced to brain states and processes, and thus be entirely material, the landscape as it appears in the mind would still be different from the landscape as it appears in physical reality outside of the mind. Thus, mindscape cannot be reduced to matterscape. Therefore, the following statements are valid regardless of whether the phenomena belong to different ontological categories.

The failure to distinguish matterscape, powerscape and mindscape easily leads to conceptual fallacies. Such fallacies occur in many debates that are about or are related to landscape quality. Three types of conceptual fallacies can be found in the examples I described above, namely:

- The confusion fallacy, which is when a problem or solution is ascribed to a certain landscape phenomenon while it exists in another. This fallacy occurred in the Brent Spar case, the multiple land-use debate and the landscape quality debate.
- The epistemological boundary fallacy, which is when, on the basis of knowledge about a particular phenomenon, conclusions about another phenomenon are drawn without further explicit arguments. This fallacy occurred in the Brent Spar case, when Shell thought it would be fine to let the oil platform sink to the seabed because it would not harm the environment too much. The same fallacy occurred in the landscape quality debate, where a fixed bond between mindscape beauty judgements and powerscape categories was implicitly presumed.
- The reduction fallacy, which is when landscape is reduced to just one of the three landscape phenomena. This fallacy occurred in the multiple land-use debate, where only matterscape was thought of.

Often, these three fallacies occur together. Of course, the more fundamental problem is the failure to distinguish matterscape, powerscape and mindscape, thus providing easy access to conceptually fallacious roads to nowhere. These conceptual fallacies are not only a pain for the purist. Because concepts precede action, conceptual fallacies may lead to inefficient and even harmful practices. In land-use planning, a bad consequence of these conceptual fallacies may be that so-called

solutions will not solve the problem, or will even make it worse. Thus, lots of intellectual efforts and lots of money can be wasted.

In the three examples given in sections 2.4 to 2.6, mindscape played an important role, whether recognized in the landscape debate or not. I think this is no coincidence, since we can characterize contemporary western society as an experience society. In the following chapter, this thesis will be explained and its consequences for places discussed.

Chapter 3 Why the Canyon became Grand: places in the experience society

3.1 Introduction

The Grand Canyon attracts more than five million visitors a year (Pyne, 1998). Most of them travel to this place for only one reason: to look at the landscape. Generally, the experiential qualities of landscapes are attracting increasing attention in contemporary western societies (Arler, 2000; Porteous, 1996; Urry, 1990 and 1995). Tourists swarm all over beautiful landscapes. More and more people are buying a second home in an attractive area (Elbersen, 2001: 15). The number and area of protected cultural heritage sites and nature conservation parks is growing fast worldwide (WCMC, 2000).

The increasing emphasis on the experiential qualities of landscape, namely mindscape properties, is a consequence of the rise of the experience society – a phrase adapted from Pine and Gilmore's *The Experience Economy* (1999). Following the agricultural, the industrial and the services economy eras, we now find ourselves in an economy in which experience has become the most predominant commodity (Jensen, 1999; Pine & Gilmore, 1999; Wolfe, 1999). Most money is earned nowadays by offering experiences, entertainment or dreams, whether or not they are linked to material products or services. The growth of the influence of experiences is a social phenomenon that overrides the economy; it penetrates all reaches of western society. Today, social traditions are fading into the background and the experiences that give our lives shape and form are filling the gaps. Therefore, we can speak of the experience society. What is new is not that people experience things (people did that in the past, too), but that experience is increasingly taking precedence over all kinds of social processes. Consequently, experiential qualities are important when it comes to the significance of place (Urry, 1995). Arler (2000) refers to post-productive landscapes, as does MacFarlane (2000).

The way people perceive an object is determined not only by the object itself (if this were the case, different experiences of the same object would be impossible). Perception is the result of stimuli affecting the senses *and* the organization and interpretation of these stimuli by the individual. In this process of organizing and interpreting, concepts are necessary elements. To put it simply: no concepts, no organized experience – as philosophers, psychologists and neuroscientists argue in various ways (e.g. Bruner, 1990; Crick & Koch, 1998; Edelman, 1993; Gendlin, 1962; Gregory, 1998; Kandel et al., 1995: 322; Maund, 2003) (I will elaborate this thesis

extensively in Chapter 10). In the multidisciplinary field of landscape experience research, many authors stress this thesis too (e.g. Coeterier, 1987; Lengkeek, 1996; Schama, 1995; Tuan, 1974).

Most concepts do not exist in the heads of newborn infants; they are produced. Apart from individual creative moments and learning processes, and evolutionarily developed capacities and predispositions, the production of concepts is intensively influenced by social processes (e.g. Bourassa, 1990; Bruner, 1990; Foucault, 1971; Lengkeek, 1996) (in Chapter 11, I will explain how social influence on the production of concepts takes place). Meanings of particular places are produced and mediated by story-telling, movies, photographs, all kinds of written texts, etc. For example, an individual experience when looking at the Grand Canyon may be shaped by the information boards, by expectations based on stories and pictures, and so on.

The aim of this chapter is to elucidate some features of the experience society (section 3.2), discuss the contemporary modes of production and distribution of place-meanings (sections 3.3 and 3.4), and mention some problems related to places in the experience society (section 3.5). I hope that my argument will contribute to a better understanding of the shifting sense of places in contemporary society. After all, it is the rise of the experience society that made the Canyon Grand.

3.2 The rise of the experience society

The basic premise of *The Experience Economy* is that society has entered a new era in which experiences are the economic offerings that are in highest demand and that thus generate the highest value returns (Pine & Gilmore, 1999). Pine and Gilmore argue that the experience economy is the fourth stage in the historical progression of economic value. The earliest agricultural economy was concerned with the abstraction of various substances from the world around us. Next came the industrial economy, where the primary economic offering was the making of products. In the recent past the services economy dominated, where the offerings of highest value were the delivery of intangible services. In the present experience economy, more and more businesses are staging memorable experiences that are entertaining or educational.

Similar thoughts can be found in *The Dream Society* (Jensen, 1999). According to Jensen, we most generously reward those who can tell stories in the dream society. Business firms have reached a new frontier – that of imagination, emotions and dreams. Of course, people have always bought more than they need to satisfy their

material needs. For example, people buy blue jeans not only to cover their bodies, but also – and perhaps above all – for the experience of values attached to blue jeans, like freedom and youth. Recently, the experiential values have become the biggest motives for the expenses incurred by people in the west. *The Entertainment Economy* (Wolfe, 1999) contains ideas that match the claims of Pine and Gilmore, and Jensen. Consumption goods need the 'E factor' to catch the attention of customers (here, 'E' stands for entertainment). Just selling good products simply no longer works.

The concept of the experience society denotes the idea that the actions of people in contemporary western societies follow to a greater extent from people's experiences and desired experiences, and are to a lesser extent determined by social traditions and rules than was the case in western societies in the past. I prefer to use 'society' rather than 'economy', because the significance of experience is a social phenomenon that is not limited to economy. I cannot justify the concept of the experience society with empirical evidence. The books mentioned above, which are mixtures of marketing and futurology, offer poor empirical evidence. On the other hand, many observations may provide anecdotal support. A century ago, one's family and the region in which one was born determined to a great extent one's job. Nowadays, people study and apply for the job they like most. While in the past if a married couple experienced their relationship as being of low quality this usually did not result in divorce, today many marriages end because of it. However, from a scientific point of view, anecdotal support is very weak support.

Nevertheless, I will employ the idea of the experience society in this chapter, for I find it interesting, fruitful and sound enough to take it as an assertion underlying an explorative analysis of the shifting meanings of places in contemporary society. I will employ the idea not as a solid foundation from which to derive arguments from that support core ideas of the main storyline of this book, but as a perspective useful for interpretation in this chapter.

The rise of the experience society is closely related to some important trends in western society. The steady growth of financial wealth facilitates expenditures on positive experiences, as the basic material needs are already met by a small part of the average income. Another related trend is individualization (Giddens, 1991). Experiencing is something done by the individual. Therefore, individuality must have a large role in people's self-identities before experience can be the basis of action. In tradition-based societies, self-identity is determined to a great extent by social rules. Although people in these societies experience, too, their actions are determined mostly by traditions, not by personal experiences. A third trend that constitutes the experience society is globalization: the development of a growing

intertwinement and involvement of processes and events occurring all over the world (Agnew, 2001; Castells, 2000a: 1 and 77; Castells, 2000b: 367). Globalization encompasses worldwide communication about experiences (e.g. by means of movies, books, Internet) and enables people to visit events and places that are worth experiencing.

3.3 Experience and meaning-production

What we experience is not the outer world per se, but the mental construction we build upon stimuli that are processed by the senses and organized by concepts stored in the mind (Gregory, 1998). Concepts are preconditions for perception. This is illustrated by the story of Virgil, a blind patient described by the neurologist Sacks (1995). In Virgil's early years, the diagnosis was *retinitis pigmentosa*, an incurable disease. After 45 years of blindness, a doctor found out that the initial diagnosis was wrong, and that the disease causing Virgil's blindness was curable. A simple medical operation followed. It succeeded: Virgil was able to see. After a few days of happiness about this miracle, a major problem became evident. Virgil's wife wrote in her diary: 'Like a baby who is just learning to see, everything is new, exciting, scary, does not know what seeing means' (Sacks, 1995). The problem was that Virgil did not possess the concepts that are necessary to organize the stimuli affecting his eyes. His eyes could see, but his mind could not handle the information. Virgil had not developed concepts for visual space, colour, visual patterns, etc. He was not able to attach specific meanings – like 'hand' or 'table' – to certain visual stimuli. Therefore, his mind did not have the capacity to make an orderly perception out of the information entering it. Although Virgil was able to experience a visual something, it did not mean anything to him.

Without concepts, experience is chaotic, like seeing was chaotic for Virgil. The concepts in the mind of an individual are produced during the course of his or her life (e.g. Edelman, 1993) (see Chapter 10 for an explanation of the way concepts are produced in the mind). These concepts are highly influenced by social processes of meaning production. In the experience society, meaning production is an important phenomenon, because concepts organize experiences.

In contemporary culture, important social processes and functions are shifting from traditional institutions (nation state, religion, local culture, family) towards a diversity of cultural communities, that is, networks of people from the worldwide to the local scale, organized around specific values (Castells, 2000b: 65). An example of a worldwide cultural community that intensively uses the Internet is sal-

sanet.nl. Salsa fans have developed a website as a stage to communicate, centred on salsa as a way of life. The website is for example used to have international meetings focused on salsa dancing when going on a holiday. An example of a local community is an action committee that is dedicated to protecting a hedgerow that belongs to a lighthouse on a little island in the north of the Netherlands. In these cultural communities, people give meaning to the phenomena around them.

The social modes of meaning production – in other words, the way concepts are socially influenced – is changing, because cultural communities are becoming the important modes of social life. This shift can be characterized as the popularization of meaning production. Because there is a wide diversity of cultural communities, different experiences of the same phenomenon exist alongside each other, because individuals belonging to different cultural communities employ different concepts to come to meaningful experiences. This is the post-modern condition, as Harvey (1989) explains: the lack of universal frames of reference. The way we experience is not taken for granted, but becomes problematic on many occasions. Experience thus becomes a basis for and the subject of conflict, debate, reflection and action.

3.4 The global production and distribution of place meanings

In the experience society, it is likely that increasing significance will be attached to the experiential qualities of landscape. The popularity of state parks for purposes of looking at natural features is increasing. In rural areas, there is a shift from the domination of the demands of agricultural efficiency to a variety of experience demands. Quality experiences for leisure purposes are the decisive factors in determining visits and investments. People are willing to pay for the experience of places. We have therefore seen the emergence of a place experience industry, comprising entertainment companies, leisure and tourism organizations, natural park managements, governmental bodies, etc. The main characteristic of this industry is the aim to design the place experience of the customers or visitors.

Producers of experiences are in stiff competition with each other. First, because the experience market is largely a global market (e.g. the travel market). Second, because people deliberately choose between all kinds of experiences (e.g. a shopping experience and a nature experience compete on a Friday afternoon). To attract the attention of people in this global competition, it is necessary to provide increasingly spectacular experiences. Extreme modes of nature-based recreation – such as survival trips or mountain-climbing – are increasingly popular. The travel industry

is opening up the most beautiful and most spectacular regions throughout the world to mass tourism.

Since concepts are prerequisites for orderly experiences, the place experience industry has to take control over the concepts employed by the visitors in order to design the experiences. Therefore, place experience producers are likely to invent and re-create concepts, and to impose these concepts upon places. Sometimes producers mark places with concepts in a materialistic way. For example, many seaside resorts along the Mediterranean coast have planted palm trees to optimize the holiday experience of tourists (Dietvorst, 2001). Often, the projection of concepts on places happens non-materialistically, by means of texts and photographs. For instance, a breathtaking image of a buffalo in the snow – as shown on a US National Park Annual Entrance Pass – promotes a romantic experience of these animals. Many imposed place concepts are a combination of these modes of projection. The information boards at the Grand Canyon are both material entities in the landscape and text. As material entities, they operate as signs. For instance, they can be regarded as an indication of human activity. The way a sign is interpreted depends on both the observer and the sign itself. As text, the information boards transmit concepts more directly to the minds of the people who read them.

Castells (2000a: 442-458) distinguishes two notions of space: the space of flows and the space of places. Flows are expressions of processes that dominate our social life, such as flows of technology, of information, of images, of symbols, of people. Function and power in western societies are organized in the space of flows. The Internet, a highway, a suburban subway station, an airport, etc. have a dominant character as a space of flows. A place, on the other hand, is a locale whose form, function and meaning are self-contained within the boundaries of physical contiguity. It is identifiable from the outside and from the inside. Experience is related to the space of places. An historic inner city, the Tuscan countryside, the Grand Canyon, etc. have a dominant character as a space of places. With the help of Castells' distinction, a peculiar characteristic of the contemporary production process of place meanings can be explained.

Nowadays, meanings of particular places are often detached from the original place. Cityness is detached from cities and exported to other places, as urban inhabitants buy a second house in a rural area in which to spend their weekends and holidays. Japaneseness is detached from Japan, as a city park in Japanese style is constructed in Groningen, a city in the north of the Netherlands. Images and concepts are freely produced and distributed in the global space of flows. Place concepts and images thus become footloose: they are detached from their original place, distributed and imposed upon places by the place experience industry.

Thus, the space of places is reconstructed by forces originating in the space of flows.

Harvey (1989) uses the concept of time-space compression to indicate that revolutionary changes in communication and transportation technologies have made the world smaller: the long periods of time that used to be required for travel and communication have been reduced to almost nothing. This idea is perfectly applicable to the production and distribution of place concepts: these processes accelerate and globalize. As a result, many bonds between places and place meanings are evaporating, because place meanings are detached from place, distributed and reconstructed within the space of flows and imposed upon other places by the place experience industry.

3.5 The death of genius loci

The above-mentioned mode of place concept production may cause conflicts. Here, I will mention two types of conflict. The first is between the production of concepts by the place experience industry on the one hand, and the popularization of meaning production on the other hand. Producing certain place experiences – that is, marking places with a dominating concept – often implies the exclusion of other possible experiences. Places where this is the case come directly to us as constructed concepts, not as stimuli that leave meaning-ascription to the imagination of the visitor. Typical signs were used to create an experience of Japaneseness in the Dutch city park. It is virtually impossible to avoid this experience, because the place is landmarked with Japaneseness. In Yellowstone National Park, the management has placed seats for hundreds of people in a wide circle around Old Faithful, a geyser that erupts every three hours. A schedule indicates the exact moment the geyser will erupt. Thus, a natural event is staged as a theatrical act. One can hardly escape from this theatrical experience; indeed, most people applaud the eruption of the geyser.

Thus, certain experiences can be excluded from places as a result of the production of other experiences. At the same time, in contemporary society there is a diversity of cultural communities, each wanting to give a different meaning to the same place. As Lefebvre (1991: 385-388) suggests, there is a permanent tension between the free appropriation of space for individual and social purposes, and the domination of space through different forms of social power, such as private property or the state. In the experience society, a special form of this tension exists: the tension between the free experience of place, dependent on the imagination of the

observer, and the domination of place experiences by the place experience industry. This is a scientific challenge (e.g. which types of place experiences exclude each other, which types of signs leave room to free imagination?), a political challenge (e.g. to what extent concept domination is acceptable at a particular place) and a management problem (e.g. how to deal with different provinces of meaning, for instance in a national park?).

A second type of conflict that is often mentioned is the possible tension between the projection of concepts that are produced and distributed in the space of flows on certain places and the concepts apparent at these places. Gunn (1988) makes a distinction between two levels of place knowledge: organic and induced. Organic knowledge describes a primary level of knowledge developed through the long-term assimilation of place-related information gleaned from a variety of everyday sources. Induced knowledge describes a secondary level of knowledge influenced by active efforts to advertise and promote particular destinations. Applied to the terminology in this chapter: organic place concepts are produced in the space of places (such as the Japaneseness of a Japanese city), while induced concepts are produced in the space of flows (the footloose Japaneseness, projected on a city park in the Netherlands).

Many authors find induced place concepts problematic, because they expel organic place meanings. The concept of *genius loci*, which is omnipresent in debates on place and landscape, expresses the idea that places have a unique sense or identity. The basic idea underlying many criticisms of the global mode of production and distribution is that it affects the authentic sense of place, by imposing inauthentic or even unreal meanings (Relph, 1976). For instance, the following quotation taken from the back cover of Boorstin's (1963) famous book *The Image* expresses this idea: 'Think of an image. Multiply by ten. Square the product. Add prestige. Take away the thing that made you think of it. Sell it. Print it. Film it. Broadcast it. And the answer is *unreality*.' In many cases, the idea of the inauthenticity of induced place concepts seems to make sense. Palm trees are not indigenous to the Mediterranean (Dietvorst, 2001), so introducing them for touristic experience purposes is not in line with the supposed sense of place. Buffaloes are not as friendly as depicted on the national park pass; in fact, every year they kill dozens of people (usually people who think that buffaloes are friendly).

Nevertheless, I cannot accept the idea that induced meanings that expel organic meanings harm the authenticity and the sense of place, simply because authenticity and sense of place do not exist. Places do not have a set of meanings. People ascribe meanings to places. Sense of place as such does not exist; only *someone's* sense of place exists. Since many cultural communities give different meanings to the

same place, many senses of place exist alongside each other. The concept of *genius loci* seems useful as long as only one relatively homogeneous community experiences a place. These days, as the exclusive bond between a particular community and a particular place is dissolving, *genius loci* becomes *genius imaginorum*: the images or sets of concepts that different communities attach to a place. In the experience society, the basic question is whether the projection of concepts onto places affects the images that different cultural communities have of these places, and if so, whether the new concepts can be embedded in these images.

3.6 Conclusion: the problem of landscape experience

The rise of the experience society has several consequences for places. Many cultural communities exist alongside each other, each giving a different meaning to the same place. Increasingly more significance is bestowed upon the experiential qualities of places. The experiential qualities of places are an economic commodity for the place experience industry. This industry produces and distributes concepts in the space of flows and projects these concepts upon places. Marking places with certain concepts might exclude some types of experiences. In this context, *genius loci* is not a useful concept, since it implies that places have a certain identity independent of the beholder. Nowadays, different groups of people give different meanings to the same place, thus creating a multitude of identities.

I believe that the concept of the experience society is useful. As used in this chapter, the idea enhances the understanding of contemporary place-making processes. The concept should not be understood in an absolute sense. It is relative: the influence of experience as a source of action increased during the twentieth century, and probably will continue to increase in this century. Although the concept is relative, the power of the experience society should not be underestimated. For a long time, the Grand Canyon was regarded as wasteland. Nowadays, many number plates of the state of Arizona are decorated with the text: 'Arizona: Grand Canyon State'.

One of the consequences of the rise of the experience society is that spatial planners and policy makers are increasingly faced with problems related to mindscape. That is, planners and policy makers are confronted with the problem how landscape policy, plans and designs can take into account the way people experience the landscape. In the most recent Dutch national nature policy document, the problem of landscape experience is expressed as follows: 'We want a beautiful country to live and work in' (Ministry of LNV, 2000: 3) – 'beautiful', of course,

being an experiential value. Also Dutch advisory boards for spatial planning recognize the problem of landscape experience (NRLO, 1998; RLG, 1999). And even if not recognized as such, mindscape is often relevant to spatial planning and policy, as I argued in Chapter 2.

Spatial planners and policy makers who are willing to take mindscape into account are confronted with the problem how to use knowledge of landscape experience. One commonly exercised strategy to take landscape experience into account is to use general assumptions about the way people experience landscape. For example, planners may simply assume that people like natural landscapes, and that developing such landscapes will therefore result in improved experiential values. The often implicit reasoning behind this strategy is that people are more or less the same in their responses to the physical landscape. I think that this strategy is often insufficient, for different groups of people will experience the same landscape differently, as argued in this chapter (and, in addition, different individuals will experience the same landscape differently). A better strategy is to actively obtain knowledge about the way people experience landscapes. To obtain this kind of knowledge is in the first instance a scientific problem, one typically addressed by landscape experience research.

The aim of this thesis is to construct a theory of landscape experience. Of course, a theory of landscape experience is not sufficient for planners and policy makers to take landscape experience into account in their various practices. Nevertheless, I think that a theory of landscape experience may enhance their practices, simply because understanding a phenomenon enhances dealing with that phenomenon. Although spatial planning and policy problems do not belong to the main storyline of this thesis, I will reflect on planning and policy practices at various places throughout this book.

In Part 2, I will start with a review of different approaches used in landscape experience research. I will especially pay attention to the theoretical frameworks used in these different approaches and to the factors that are thought to influence the way people experience the landscape. In addition, I will present three empirical studies that illustrate different ways of conducting landscape experience research.

Part 2

SCIENTIFIC KNOWLEDGE OF LANDSCAPE EXPERIENCE

Chapter 4 Approaches in landscape experience research: a review

4.1 Introduction

Of course, every single moment of experiencing is subjective, unique and thus unrepeatable. Once, Proust – who is famous for his detailed analyses of human experiences – concluded that it is impossible to describe adequately the complex experiences of one single moment (Conrad, 1999). The reason it is impossible to give a linguistic account of a particular experiential moment is that words must have a general meaning in order to make communication possible, while every experience is unique in its details.

The subjectivity and uniqueness of every single experience does not make generic knowledge of landscape experience (or any kind of experience) impossible. An example of generic knowledge is the fact that the way a person experiences landscape is influenced by the characteristics of the landscape in which that person grew up. Many people brought up in an open landscape find open landscapes more beautiful than do people brought up in a forested landscape. This example of generic knowledge does not conflict with the uniqueness of every single experience; on the contrary, it explains a source of differences between individual experiences.

The subject of landscape experience is studied by scholars representing a wide variety of scientific disciplines and using many different approaches. In this chapter, I will give an overview of the different approaches used in landscape experience research. The approaches differ with respect to the aspects of landscape experience addressed. For example, in some approaches landscape preference is studied and explained, while other approaches concentrate on place attachment. Another difference lies in the factors influencing the landscape experiences that are studied. In some approaches, evolutionary factors are studied, while other approaches study sociocultural processes. Furthermore, in different approaches different theories are employed, varying from the psychological arousal theory to the sociological/philosophical discourse theory. In technical terms, the approaches differ with respect to the explained variables, the explaining variables and the theories relating explained to explaining variables; the reason I use other terms is that these technical terms are employed in some approaches in landscape experience research and not in other approaches; the technical terms are thus already approach-loaded.

This review will not provide a summary of empirical findings; instead, I will concentrate on the theories used in the different approaches, on the factors that are thought to influence the way people experience landscape and on the aspects of landscape experience that are addressed. Some of the theories reviewed are clearly defined, in the sense that they are explicitly stated in publications. Other theories are not clearly defined, but are implicitly hidden in studies, and will be reconstructed in this review. I do not pretend to provide a complete review of all theories of landscape experience; the aim of this chapter is to provide an insight into the variety of approaches in landscape experience research.

I will start with landscape experience theories employed by environmental psychologists: the arousal theory (section 4.2), the habitat theory (section 4.3) and the information processing theory (section 4.4). The so-called adaptive approach, which underlies these three theories, will be critically appraised (section 4.5). I will continue with the human geographical approach (section 4.6), the images of nature approach (section 4.7), the historical approach (section 4.8), sociological and anthropological approaches (section 4.9) and approaches used in leisure and tourism studies (section 4.10). I will end this chapter with a comparison of the approaches and some conclusive statements (section 4.11) and an explanation of the strategy that underlies Parts 3 and 4 of this thesis (section 4.12).

4.2 Environmental psychology: arousal theory

Environmental psychology emerged as a discipline in the 1960s. The preference for landscapes has always been a subject of interest to environmental psychologists. Several researchers have developed theories that are intended to explain why certain landscapes are preferred above others. One of these theories is the arousal theory, which initially was developed by Berlyne as a general motivation theory. Berlyne created his theory to explain why people are inclined to stick to certain situations for a longer period of time than to other situations. Environmental psychologists have used this theory to explain landscape preferences.

Hedonic value is the central concept Berlyne used. Something (an artwork, a situation, a landscape) has a positive hedonic value if it is pleasant and rewarding to keep in touch with it (Berlyne, 1974: 8). For example, landscapes highly preferred by people have a high positive hedonic value. Berlyne supposes a relation between the hedonic value and variations in arousal (idem, 16), arousal being defined as the level of excitement and alertness (idem, 15). Berlyne does not go into the question whether arousal is a single psychological variable or a complex of

related psychological variables. The arousal level of a subject depends on three factors: cycle variations in the body, such drives as hunger and thirst, and arousal-changing features of the environment. According to this theory, the environment can have hedonic effects by virtue of its potential to change the arousal level.

Positive hedonic values and the arousal level are related in two ways. First, a moderate increase in the arousal level can increase the positive hedonic value. For example, after seeing the same landscape for a while, it is nice to see something else. Second, a decrease in arousal level can increase the positive hedonic value, if the arousal level is very high and therefore stress-evoking. For example, arriving outside one's home having survived a drive through a city during a chaotic rush hour can be very rewarding. According to Berlyne, these two ways in which arousal level influences hedonic value are linked to two different brain processes working in parallel (Berlyne, 1973: 21-22).

The net result of these two mechanisms is visualized in figure 1. A low arousal level causes a low hedonic value. The value increases as the arousal level increases. At some point, the hedonic value is at its highest level. After this point, the hedonic value decreases as a result of an increase in arousal level.

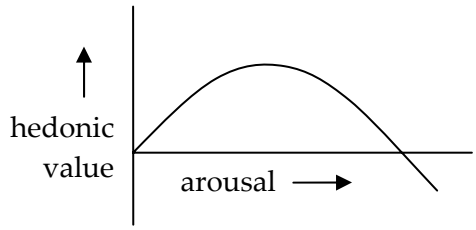

Figure 1: The hedonic value as a result of the level of arousal

The arousal potential, which is the arousal-increasing capacity of a situation, depends on three types of factors: psychophysical factors, such as colour, intensity, and degree of change of the stimuli; ecological factors, namely factors that influence motivation for being harmful or beneficial for the physical state of the perceiver; and collative factors, which are structural or formal features of the environment, such as the degree of novelty versus familiarity, stability versus variability, or ambiguity versus certainty (Berlyne, 1973: 14).

Why do stimuli that constitute an optimum for arousal potential cause a positive hedonic value? Berlyne gives an evolutionary explanation. The stimuli that constitute this optimum are a mixture of arousal-increasing and arousal-decreasing properties. Therefore, these stimuli make it cognitively difficult to understand the situation, but at the same time make it possible to resolve the problem. Thus, an optimal arousal potential trains our cognitive skills to resolve problems, and these

are capacities we need to survive (Berlyne, 1971). If we experience this optimum as nice, we are inclined to stick to the situation, training evolutionarily beneficial skills as a result. Figure 2 summarizes Berlyne's arousal theory.

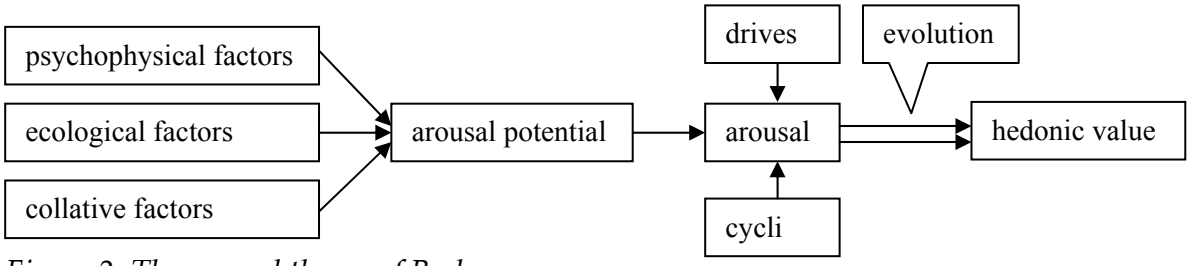

Figure 2: The arousal theory of Berlyne

Wohlwill (1976), an environmental psychologist, compared the results of published environmental psychological research with Berlyne's theory. Because psychophysical and ecological factors have not been the subjects of empirical research by environmental psychologists, Wohlwill's study was limited to collative factors. Wohlwill found no clear influence of the complexity and ambiguity of the physical landscape on the preference on landscape. He did, however, find a relation between landscape preference and the degree of mystery. He also found a relation between landscape preference and the degree to which different landscape features fit to each other (Porteous, 1996; Wohlwill, 1976: 119).

Compared to the complexity of Berlyne's theory, Wohlwill's study was very limited: he checked only for the relation between collative factors and preference. This demonstrates the problem of applying the arousal theory to landscape preference research. Many factors in the arousal theory do not belong to the research field of environmental psychology. This is probably why environmental psychologists started a search for less complex explanations. In the 1970s, new theories emerged in the field of environmental psychology, theories that draw less complex relations between landscape features and landscape preference.

Not surprisingly, Berlyne's theory fell into disuse among environmental psychologists. However, elements of his theory still abound in environmental psychological theory. The first element is that most theories assume an important ultimate cause of landscape preference to be evolutionary. The second element is the idea that two opposite mechanisms (e.g. the need for challenge and the need for safety) play an important role. These two elements form the core of the prospect-refuge theory.

4.3 Environmental psychology: prospect-refuge theory

According to Appleton (1975, 1984 and 1996), the relationship of the human subject to the perceived environmental is comparable to the relationship of an animal to its habitat. The human preference for landscape features is a spontaneous reaction to the landscape as a habitat (Appleton, 1975: 70). The aesthetic satisfaction a landscape evokes depends on the degree to which the landscape meets biological needs. Landscape preference is partially innate, fixed in the course of evolution. To put it simply: we prefer those landscapes that offered our primitive ancestors the best chances of survival (Appleton, 1975; Orians, 1986).

We like to see without being seen: we prefer landscapes that allow us to hide, as well as to survey the environment. Our ancestors – hunters and gatherers – needed to be able to hide from large predators. They also needed to be able to survey the landscape, in order to gather vegetables and hunt for prey. Appleton's prospect-refuge theory states that landscapes that provide both prospect and refuge opportunities are highly preferred, because they met the biological needs of our distant ancestors.

Not every single landscape scene has to be an optimal mixture of prospect and refuge opportunities in order to be preferred, just as not every bite of a balanced diet has to be a mixture of all ingredients (Appleton, 1984). Furthermore, prospect and refuge opportunities do not have to be physically present in the landscape: a symbolic presence may serve as well. For example, a visible chimney suggests a refuge possibility and may cause a high preference. Appleton explicitly states his theory is a simplification and that it does not include other factors that influence landscape preference, for example cultural factors (Appleton, 1984). The empirical evidence he offers is poor and only indirect. He analyses landscape paintings and garden designs (as expressions of preferred landscapes) and shows that most of them include both prospect and refuge opportunities.

Clamp and Powell (1982) tried to test the theory in a more straightforward quantitative study. They showed photographs of many different landscapes to respondents and asked them to rate their degree of preference. The researchers calculated the possibility to predict the preferences, based on the prospect and refuge opportunities found in the photographs. The results of this study were ambiguous: they could neither embrace nor dismiss Appleton's theory (Clamp & Powell, 1982). Another conclusion Clamp and Powell draw was that it was hard to determine the prospect and refuge opportunities in a particular landscape, making the theory hardly possible to test at all.

The African savannah is a half-open landscape that seems to have an optimal balance between prospect and refuge opportunities. In anthropology, it is thought that Homo sapiens originated in the African savannah. Many environmental psychologists have suggested that humans have an innate preference for landscapes that look like the African savannah (e.g. Kaplan, 1987; Orians, 1980 and 1986; Ulrich, 1983). In a carefully conducted quantitative study, Balling and Falk (1982) found that north-east American children prefer savannah landscapes above other landscape types. However, when children grow older, this preference changes into a preference for the landscape type the child grew up in. On average, children younger than eleven prefer savannah landscapes, while children above this age prefer their home environment (see also Parsons & Daniel, 2002). These results are compatible with the hypothesis that landscape preferences are partially innate: the younger the child, the more the innate responses come to the foreground, since a young child has had little time to acquire culturally shared preferences or to develop individual preferences.

Compared to the arousal theory, the prospect-refuge theory offers a more direct evolutionary explanation for landscape preferences. However, it is a long explanatory road from genes to experience. Appleton explains why people prefer certain landscapes, but remains silent about the cognitive processes underlying these preferences. At this point, Kaplan and Kaplan step in.

4.4 Environmental psychology: information processing

Steven and Rachel Kaplan investigated how people categorize images of landscapes. They gave respondents 40 photographs of landscapes and asked them to group them. People appeared to use two criteria to form groups of landscapes, namely content (e.g. houses versus industrial sites) and spatial configuration (e.g. half-open versus enclosed landscapes) (Kaplan & Kaplan, 1989).

Based on the result that spatial configuration is one of the criteria, Kaplan and Kaplan developed a theory called the preference matrix. The researchers agree with the evolutionary explanation: landscape preferences are 'ancient and far-reaching' (Kaplan & Kaplan, 1989: 10). They add to the evolutionary explanation the assumption that we need knowledge in order to survive in an environment. The preference matrix describes the conditions that optimize the possibility to gain knowledge of the surrounding landscape.

Gaining knowledge of a landscape depends on four factors: coherence, legibility, complexity and mystery (Kaplan & Kaplan, 1983 and 1989: 53; Kaplan, 1987).

These four factors together predict landscape preference. Coherence reflects the degree to which different parts of a scene fit together. Coherence facilitates understanding a scene. Complexity reflects the number of different visible elements in a scene; enough complexity makes a scene interesting. Legibility means the degree to which it seems one does not get lost in the environment: a legible scene is easy to understand and remember. Mystery reflects the expectation that there is more to learn about the environment if one continues to explore it. In the preference matrix, the factors are properties as perceived by the beholder.

Table 2: The preference matrix (Kaplan & Kaplan, 1989, 53)

	Understanding	**Exploration**
Direct scene	Coherence	Complexity
Inferred scene	Legibility	Mystery

The preference matrix (table 2) consists of two pairs of categories. First, understanding and exploration. To gain knowledge, we must be able to understand what we see. To continue gaining knowledge, a scene must invite exploration. Second, the direct and the inferred scene. The direct scene refers to the information that is directly available from the point of view. The inferred scene is the expectation of information to be found if one changes the point of view (Kaplan & Kaplan, 1989: 50). When combined, these two pairs give the four factors that predict landscape preferences: coherence (enabling quick understanding), complexity (meaning enough information is available), legibility (giving orientation) and mystery (enhancing the will to explore the scene).

According to Kaplan and Kaplan, we prefer those landscapes that score high values on all four factors. These are the landscapes that give the best opportunities to obtain the knowledge that is needed for survival. The more coherent, complex, legible and mysterious, the more we prefer it. Kaplan and Kaplan (1989: 58) argue that their two-dimensional preference matrix predicts landscape preference better than one-dimensional scales (e.g. a scale running from absolute order to absolute complexity).

Kaplan and Kaplan describe eleven empirical studies focused on the relations between one or more of the four factors and the preference for landscapes. In each study, significant results were found for combinations of the four factors. This means that the combinations of the factors offered significant predictions of landscape preference in all eleven studies. The results were different for isolated factors. Complexity was a significant predictor in one out of ten studies. Legibility was significant in one out of five studies, but negative, implying that the less legi-

ble a scene was, the more preferred. Coherence was a significant predictor in seven out of ten studies, and mystery in ten out of eleven (Kaplan & Kaplan, 1989: 66).

4.5 The adaptive approach: critical remarks

The arousal theory, prospect-refuge theory and preference matrix all fall under the adaptive approach, as Saegert and Winkel (1990) call it. The theories share the assumption that experience and behaviour are partly innate, evolutionarily determined and fixed in our genetic make-up, and that this inborn part is determined by the ultimate goal of psychological and biological survival. Ulrich (1983) distinguishes two different mental processes involved in the processing of stimuli entering the mind. First, a quick, evolutionarily developed, emotional response. Second, a cognitive, culturally developed response that takes more time. According to Ulrich, the adaptive approach is concerned with the quick emotional response (see also Graaff et al., 2002: 20-25).

Criticism of the adaptive approach often stresses the lack of attention to the sociocultural aspects of landscape experience, and the problem that landscape as it comes into the mind is not naturally given, but partially the product of meaning-giving processes (Saegert & Winkel, 1990). While it is true that the adaptive approach leaves out these factors that influence landscape experience, I do not find this kind of criticism correct, for all authors mentioned stress in their own publications the limits of the approach. Selecting a subset of all possible explanations and doing research on this selected part is a totally normal, justified scientific practice. Hence, it is not right to blame adherents of the adaptive approach for incompleteness, because they do not pretend to be complete and they show awareness of the limits of their approach. Perhaps the explanatory power of the evolutionary theories is sometimes exaggerated, but that is not a good reason to dismiss the theory.

In evolutionary psychology, the adaptive approach is applied to many areas, such as language skills (e.g. Pinker, 1995) and the attractiveness of human faces (for a review, see Dooremalen, 2003). Chomsky criticizes evolutionary psychology for being non-scientific, since evolution can probably explain every behaviour and experience (Horgan, 2000). For example, most children in the north-west of the United States prefer half-open landscapes above densely forested landscapes (Balling and Falk (1982). This empirical fact can be explained by the adaptive approach, as Appleton's prospect-refuge theory does. Now, imagine that most children prefer densely forested landscapes. It is conceivable that an evolutionary approach could explain this as well. For example, in the half-open savannah landscapes where

Homo sapiens originated, man had to find densely forested places in which to shelter and sleep out of sight of the deadly dangerous predators that were strolling around; we inherited a preference for forested landscapes because these were the landscape types that were safe for our ancestors. The kind of criticism expressed by Chomsky and illustrated above judges evolutionary explanations of psychological phenomena to be unscientific, because the theory can explain almost every psychological fact imaginable, and hence cannot be tested. In the field of landscape experience research, Coeterier (2001) comes up with the same argument against the adaptive approach to landscape preferences.

I disagree with the claims made by Chomsky and Coeterier. It is important to note that what they criticize is not the scientific status of the evolution theory, but the scientific status of the employment of evolution theory to explain psychological phenomena. Chomsky's requirement (which is obviously derived from Popper's philosophy of science) that a theory is scientific if and only if it can be falsified by an empirical test, is perfectly applicable to the adaptive approach in landscape experience research. The proposed theories, described in the preceding sections, do not explain every possible preference. The theories predict specific preferences as responses to particular properties of matterscapes. For example, from the prospect-refuge theory, one can derive the hypothesis that half-open landscapes are preferred. Since the prospect-refuge theory explains this preference as a result of innate predispositions, the theory predicts this preference to be found across cultures and to be stronger in young children, whose preferences reflect these innate predispositions more purely than do the preferences of adults. These predictions can be perfectly tested. If evolutionary psychologists (and landscape experience researchers who adopt the adaptive approach) would explain behavioural and experiential facts by just referring to the general evolution theory, the kind of criticism expressed by Chomsky would probably be fair. However, in the adaptive approach, specific experiential facts are explained by applied theories that are built on the general evolution theory.

It does not follow from this that the theories described in the preceding sections are correct. The empirical support for the arousal theory and the prospect theory is poor. And in the empirical studies conducted by Kaplan and Kaplan (1989), the preference matrix is somewhat doubtful, since two out of four predictors were not significant in most studies. Generally, the best strategy to find universal innate preferences is to conduct cross-cultural empirical research. Cross-cultural research, however, is almost non-existent in environmental psychology. Nevertheless, I think the overall idea that the way people experience the landscape is partly innate

and developed in the course of evolution, makes sense (I will make a detailed argument supporting this statement in Chapter 11).

Of course, landscape experience also depends on non-evolutionary factors, such as cultural and individual meaning-giving processes. In environmental psychology, studies that concentrate on sociocultural aspects of landscape experience are conducted as well (for a review, see Bonnes & Secchiaroli, 1995). However, these studies reflect approaches developed in other disciplines and are therefore not separately reviewed in this chapter. In the following sections, I will review approaches that take cultural and individual meaning-giving processes into account.

4.6 Human geographical approach

People give meaning to the environment and attach to places (Tuan, 1974). The fundamental concept underlying human geographical studies is not the concept of space, with its connotations of formality, abstractness and infinity, but that of place, referring to space as experienced by people and having meaning and identity for people. To analyse the way people experience the environment, many human geographers are inspired by phenomenology. This is a philosophical discipline focused on the analysis of experience as it directly presents itself to conscious agents (Luijpen, 1964).

Think of a garden. According to the adaptive approach, someone's preference for the garden is predictable on the basis of general, non-individual factors, for example because it is a good mix of prospect and refuge opportunities (Appleton, 1975) or because it is complex, mysterious, legible and coherent (Kaplan & Kaplan, 1989). Apart from that, the garden can have special meanings for its owner and it can have a particular identity for people who visit it often. Some places have a special meaning for a group of people. For example, Westerbork – a place in the Netherlands that played an important role in the deportation of Jews during World War II – has a meaning for many Dutch people that has little to do with the physical place and much to do with history.

Studies by human geographers often describe the set of meanings given to a place. Sometimes these studies describe particular places, for example the Grand Canyon (Pyne, 1998), and sometimes they describe a category of places, for example the wilderness (Murphy, 1996). The concept of *genius loci* – in other words, sense of place – is widely used in publications by human geographers: by studying the meanings given to a place, the unique identity of a place is reconstructed.

Thayler (1976) distinguishes five levels of meaning of landscape. The presentation level refers to the purely aesthetic sensation of such properties as surface, mass, form, texture and colour. At the associative level, these sensations are organized into a familiar image, making use of knowledge. For example a tree is perceived. This perception automatically involves behavioural dispositions; for instance, a tree is a place to find shade. At the affective level the environment evokes emotion. The tree can be found calming or interesting. At the symbolic level, the percept is compared with the value system of the perceiver. For example, the baobab tree is a holy tree in some African regions, hence many people show respect for that tree. Finally, at the activation level, the percept triggers action. One decides to sit in the shade of the tree, one cuts down the tree, etc.

The bond between people and places is another subject of research in human geography. According to Casey (1997), human existence is always related to particular places. For example, references to places often occur in people's self-definitions. Relph (1976) formulated a spectrum that expresses the bond people feel with places. At one extreme of this spectrum is existential outsideness – meaning complete alienation from a place – while at the other extreme there is existential insideness, meaning closeness with a place. Relph defined five other stages between these extremes.

The work of human geographers is often theoretical and narrative. Empirical research, for example by means of questionnaires, is often absent (Saldanha, 1999). Therefore, the validity of many concepts is obscure. For example, the spectra formulated by Thayer and Relph may make sense prima facie. However, the stages as formulated have not been tested by empirical research. Another problem in many works in human geography is the way the concept 'sense of place' is used. Often places are described as having a particular sense of place or identity (e.g. Relph, 1976; Tuan, 1974). As stated in section 3.5, this is conceptually incorrect, since people *ascribe* sense and identity to places. Consequently, different people can ascribe different identities to a particular place, making the idea of a place having a sense or identity incorrect. In other words, mindscape phenomena (such as sense, meaning and identity) are incorrectly ascribed to matterscape. Finally, the concept of sense of place is often used in a normative sense: old is better than new, the countryside is better than the city, feeling connected to a place is better than moving through it rapidly, etc. (Saldanha, 1999). Powerscape conclusions are incorrectly drawn from mindscape analysis. Contrary to human geography, images of nature research is focused on different sets of meanings ascribed to places by different groups of people.

4.7 Images of nature approach

Since the 1990s, several Dutch philosophers and sociologists have been investigating images of nature. Images of nature are complex formations of meanings, functioning as overall frames of mind, that structure the perception and valuation of nature (see Buijs, 2000; Jacobs et al., 2002; Keulartz et al., 2000). This formation of meanings includes a cognitive dimension (what nature is), a normative dimension (how to act towards nature) and an expressive dimension (what the experiential values of nature are) (Keulartz et al., 2004). In other words, an image of nature includes an image of nature in matterscape, powerscape and mindscape, respectively.

In different images of nature, a particular natural phenomenon can get different meanings. For example, the ocean can be seen as primeval nature by people who have a particular image of nature. For people who have another image, the same ocean can be seen as space that provides leisure opportunities. Several empirical studies have investigated the images of nature amongst Dutch citizens. The methods used were content analysis (Keulartz et al., 2000; Natuurbeschermingsraad, 1993), in-depth interviews (Buijs & Filius, 1998) and quantitive questionnaires (van den Born et al., 2001; Buijs & Volker, 1997; de Groot & van den Born, 2003). For overviews, see van den Born et al. (2001), Buijs (2000) and Jacobs et al. (2002). Keulartz et al. (2000) found three different images of nature, using content analysis of policy documents: the wild image, the Arcadian image and the functional image. Buijs and Filius (1998), who used in-depth interviews, found five images: the wild, the spontaneous, the broad, the decorative and the functional image. Van den Born et al. (2001), who used quantitative questionnaires, found five images: the wild, the penetrative, the Arcadian, the domesticated and the utility image.

Since different methods were used in these three studies, it is not surprising that the images found do not match perfectly. However, there is a common thread in these studies: in each one, researchers found different images ranging from a wild image to a functional image. People with a wild image of nature regard only nature that is untouched by man to be 'real' nature, they consider it not right to exploit nature for human purposes and regard rough nature without traces of human use the most beautiful. At the other end of the range, people who have a functional image of nature consider nature that is highly influenced by man nature as well, consider it right to use nature for human purposes and consider nature ordered by man to be the most beautiful. The other images fall in between these extreme images. For example, people with a broad image consider everything to be nature as long as it grows spontaneously. In this image, man is allowed to intervene in na-

ture, but not too much. Nature that expresses peaceful coexistence between man and nature is regarded as beautiful.

All authors mentioned in this section share certain ideas. First, the way we give meaning to nature depends not only on nature itself but also on the beholder. Second, in a cultural society (e.g. contemporary Dutch society), there is a set of dominant images of nature. Third, different images of nature can be distinguished on the basis of definable criteria (e.g. the degree of spontaneity). Fourth, the images of nature can be studied by investigating people or their products.

The significance of the images of nature has not been subject to much study. Do these images play an important role in, for instance, landscape preferences or decision-making processes? Furthermore, little has been written about the genesis of these images. How do images of nature originate, and how do they develop and change in time?

4.8 Historical approach

Several historians have studied changes in the way people ascribe meaning to landscape and nature (e.g. Schama, 1995; Thomas, 1998; Corbin, 1989; Pyne, 1998). According to de Groot (1999), for our distant ancestors – hunters and gatherers without a permanent residence – nature was taken for granted as the immediate, omnipresent religious universe. Trees and stones were thought to be animated. In that time, nature and culture were not separated. As agriculture entered human history, people built permanent settlements. Man projected intentions onto places; for example, a place has to be a field to grow corn. Nature and culture become divided. Nature appears as a disorderly thread, producing plagues, weeds and vermin. Nature is an enemy of man (de Groot, 1999). For example, in the Middle Ages the ocean was regarded as the chaotic domain of the devil, abandoned by god, inhabited by sea monsters and ruled by chaos and death (Corbin, 1989).

In the modern era, man started to master nature by using technical innovations (de Groot, 1999). The fear of primeval nature slowly faded. Beginning as health tourism for London's noble class, the coast became redefined as a place worth visiting (Corbin, 1989). During his Italian tour, Goethe was attracted to primeval nature rather than to cultivated rural landscapes (Fest, 1988). Writers, philosophers and painters constructed a romantic image of nature. In 1872, city-dwellers founded Yellowstone Park, the first place in history appointed by man to be nature (National Park Service, 1998). In the Netherlands, the Naardermeer became the country's first natural park (de Groot, 1999). Apart from studies dealing with the

change in attitude towards nature and landscape in general, many historical studies go into the changing ideas about specific places. For example, Pyne (1998) explains how the Grand Canyon was transformed in culture from wasteland into a tourist's highlight.

The historians cited in this section share certain theoretical ideas. First, that the ideas and images of places and landscapes change in the course of history. Second, the idea that the reasons for change can vary from place to place and from time to time. For example, the inhabitants of Poland attribute a very special meaning to the forest. The forest was the place where the battle for independence was organized when a foreign power conquered the country (Schama, 1995). Therefore, this particular meaning exists in Poland only. Third, many meanings of place that seem to be self-evident are not self-evident at all, but a typical product of the modern era. For example, the image of nature as a place of beauty is a modern image, and an exception in the long course of history.

Historians pay little attention to the diversity of ideas in a particular space of time. Moreover, historical research is often limited to the ideas of the upper class, such as writers, statesmen, painters, scientists and explorers. Little is known about the ideas of laymen.

4.9 Sociological and anthropological approaches

Although many sociological and anthropological studies are somehow related to places (since social processes are often intimately related to places), sociological and anthropological studies and theories are seldom explicitly about place or landscape experiences (Gieryn, 2000). This is a logical consequence of the object of the studies conducted by sociologists: social processes and structures. Experiences are individual phenomena. Of course, experiences and behaviours are influenced by social structures and processes. For example, people behave differently on a summer afternoon on the beach than they do in church during a funeral. But experiences themselves are not the core object of study for the majority of sociological and anthropological work. Therefore, this section is somewhat different from the previous sections. I will not review specific approaches or theories related to landscape experience, but point to two themes across social research that are relevant to the study of landscape experience.

One theme is the influence of social change on the transformation of places. In sociological research related to places, globalization is an often discussed process (Agnew, 2001; Castells, 2000a; Castells, 2000c; Harvey, 1989). For example, sociolo-

gists raise the question how the increasing connections between processes all over the world affect different places (Agnew, 2001). Urry (1990; 1995) demonstrates how the English countryside is changing drastically as a result of such social processes as the changing role of science in society, the shift in capital to new forms of business and the growth of tourism.

Social processes also result in a change in conditions for landscape experience. For example, the possibility to travel to all kind of places throughout the world can change the way one experiences the landscape one inhabits. Modernity has changed the way landscape is experienced, by formalizing space into abstract categories (such as metres), and by creating an image of space and nature as resources for production (Harvey, 1989; Lefebvre, 1991). As illustrated in Chapter 3, the rise of the experience society is another example of the influence of social processes on the experience of landscape. Thus, some sociologists study the consequences of social or cultural trends for places and conditions for experiencing places.

Another theme relevant to landscape experience is the way that micro-social processes, such as daily communication in a particular group of people, influences the way people look at their surroundings, a theme that is especially, but not exclusively, taken up by anthropologists. Like sociologists, anthropologists study communities of people. Unlike sociologists, anthropologists often adopt an insider's point of view. They participate in communities and observe the behaviour, speech and experiences of people. The bond between community and landscape is studied frequently in anthropological work (Hirsch & O' Hanlon, 1996). For example, van Assche (2004) describes the various bonds between images of places and self-definitions of communities. Discourse analysis is often used in anthropological studies related to the subject of landscape experience. A discourse is literally a sequence of speech acts. As Foucault (1971) stressed, the meaning people give to the surrounding world may be greatly influenced by language (here, language must be taken in its broadest sense to include written and spoken language, pictorial language, body language, etc.). Therefore, a discourse is regarded as the production of images of reality as well (van Assche, 2000 and 2004). In this approach, landscape experience is seen as dependent on discourse, for in discourses, ideas and meanings are conveyed between individuals.

Like in human geography, many sociological and social geographical studies can be criticized for being too normative. For example, the works of Castells, Harvey and Lefebvre abound with neo-Marxist elements, such as the idea that the power of capital threatens all kinds of highly valued phenomena (e.g. historical landscape structures). Furthermore, many sociologists and anthropologists tend to

deduce conclusions about experience from analysis of social structures and processes, without any subsequent explanation. This is too much of a simplification: experience is not the result of social structures and processes only, but depends on more factors.

4.10 Approaches in leisure and tourism studies

In leisure and tourism studies, many different approaches are adopted, since many scientific disciplines are engaged in studying leisure and tourism phenomena. Not surprisingly, leisure and tourism experiences comprise an oft-studied core subject, since the quest for worthwhile experiences is a major factor underlying leisure and tourism behaviour.

Cohen (1979) formulated a scale of tourist experiences that is based on the psychological distance from daily experience. According to Cohen, the tourist is looking for otherness (something else than the phenomena being the centre of daily life experiences), for example another culture, another era or nature as opposed to culture. The disruption with daily experience when engaging in the otherness can vary. In the recreational mode, the experience is just a small variation on daily experience (for example, taking a short walk to get some fresh air). In the diversionary mode, an escape from stressful daily life has a therapeutic effect. In the experiential mode, the tourist is strongly aware of a valuable world elsewhere, contrasted to the daily world, which is perceived as limited. In the experimental mode, the activity and setting makes the tourist feel in touch with the authentic self. Finally, in the existential mode, one is totally absorbed by the otherness, wishing the otherness was the normal, daily life. For example, some Dutch people emigrate to Provence to start another life. Cohen's theory is refined and applied in a number of studies by Elands and Lengkeek (2000), who identify patterns of recreation and tourist experiences that roughly resemble the five modes.

Lengkeek (1994 and 1996), like Cohen, states that recreationists and tourists seek an experience of reality that differs from daily experience. Inspired by the phenomenology of Schutz (1990), Lengkeek defined six parameters that form the structure of different experiential worlds. The tension of consciousness refers to the degree of awareness of the surrounding world. Bracketing refers to the extent of admission or suspension of fundamental doubts (e.g. normally we do not contemplate the finiteness of our existence). Proprioception refers to the experience of the physical self, the feeling where the different parts of the body are. Sociality refers to the social context, defining a background for behaviour. Finally, a sense of time

and space defines the structure of experience. Because the values of the parameters can vary, we can have an endless variation of experiential worlds, or, in Schutz' words, provinces of meaning. The parameters can be used to describe the structure of tourist and recreation experiences. For example, the experiential world of a beach visitor might be: a decreased tension of consciousness, the admission of doubts about daily existence, an intense experience of the physical self, a social context that allows one to be lazy, and an experience of endless time and space. Thus, tourist and recreation experiences are counterstructures to daily experience.

Schreyer and Driver (1989) structured the diversity of leisure and tourism experiences on the basis of psychological benefits, while Crompton (1979) and Ross (1994) used motivations as a factor to divide different experiences. All approaches mentioned in this section share the idea that different people can have different experiences. While the authors use a different basis (distance to daily experience, parameters of phenomenal reality, benefits, motivations), they all come up with a division of types of experiences.

4.11 Conclusion: the archipelago of landscape experience research

Despite their variety, the different approaches share three basic, implicit or explicit assumptions about landscape experience. Figure 3 illustrates these shared assumptions.

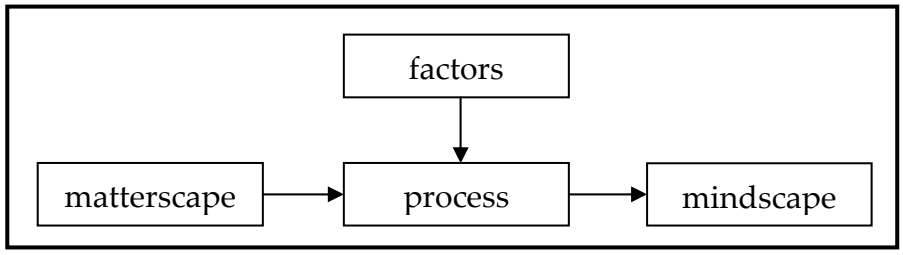

Figure 3: A default landscape experience research model

First, the way people experience the landscape is related to the properties of the physical landscape. In other words, mindscape is influenced by matterscape. Second, landscape experience is not determined by the physical properties of the landscape; all approaches hold that the relation between experience and the physical landscape is affected by factors that influence the way people experience the landscape, whether they be culturally acquired mental structures or evolutionarily developed emotional responses. In other words, mindscapes are not the product of matterscapes solely, but are affected by other factors as well. Third, some kind of

process mediates between the physical landscape and landscape experience, a process that is influenced by these factors. In other words, a process takes place between matterscapes and mindscapes.

The conceptual model depicted above can be seen as a pre-disciplinary default research model for the study of landscape experience. All the different approaches fit in this model. The differences between the approaches lie in which factors are stressed, which aspects of mindscapes are stressed and what is told about the mediating process.

The main characteristics of the different approaches in landscape experience research are given in table 3. In this table, a distinction is made between the applied theory – namely the theory used in landscape experience research – and the theoretical framework, namely fundamental theories that have been a source of inspiration for researchers developing applied theories. In addition, the table summarizes the factors that influence landscape experience as stressed by the approaches, and the aspects of landscape experience studied.

The variety of applied theories developed across the approaches is overwhelming, as is the variety of fundamental theoretical frameworks that have been inspiring landscape experience researchers. In different approaches, different aspects of landscape experience itself or different phenomena that are strongly related to landscape experience are studied: landscape preferences, place meanings and identity, socially shared images, the historical development of images, landscapes discourses or types of experiences. In addition, different factors are addressed to explain the way people experience the landscape: evolutionarily developed innate emotional responses; sociocultural factors such as culturally acquired images, historically developed and contemporary social and cultural conditions, and cultural meaning-giving processes; and, finally, individual factors such as individual personal history, motivations, benefits and parameters of phenomenal reality. Thus, every approach is highly selective: although landscape experience is a very complex phenomenon, the individual applied theories of landscape experience are limited to a small subset of aspects of landscape experience and of factors that influence landscape experience. Every approach fills in the default research model differently.

Table 3: Approaches in landscape experience research

Approach	**Applied theory**	**Theoretical framework**	**Factors influencing landscape experience**	**Aspects of landscape experience studied**
Environmental psychology	Arousal theory	Evolution theory; Psychological theory (arousal)	Evolutionary developed emotional responses to psychophysical, ecological and collative features of environment	Landscape preference
Environmental psychology	Prospect refuge theory	Evolution theory	Evolutionary developed emotional responses to prospect and refuge opportunities of environment	Landscape preference
Environmental psychology	Information processing theory	Evolution theory; Psychological theory (cognitive)	Evolutionary developed emotional responses to coherence, legibility, complexity and mystery (features mediating between environment and perceiver)	Landscape preference
Human geography	Place attachment and identity theory	Phenomenological theory	Personal and cultural history	Personal and cultural place meanings and place attachment
Images of nature	Mental images theory	Social theory	Cultural acquirement processes	Intersubjective cognitive structures framing experience
History	Mental images theory	Mental history theory	Cultural acquirement processes	Long term diachronic changes in intersubjective cognitive structures framing experience
Sociology	e.g. Globalisation theory, Experience society theory	Social theory	Changing social conditions	Diachronic changes in social conditions framing experience
Anthropology	Landscape discourse theory	Discourse theory	Cultural acquirement processes	Landscape discourse framing experience
Leisure and tourism studies	Escape theory	Phenomenological theory	Degree of otherness	Types of experiences (distance from daily experience)
Leisure and tourism studies	Counterstructure	Phenomenological theory	Parameters determining frame of experience	Types of experiences (personal and social structure of experience)
Leisure and tourism studies	e.g. Motivation theory, Benefit theory	Psychological theory (human needs)	Motivational factors	Types of experiences (psychological drives for landscape experiences)

The fragmentation in landscape experience research is an important reason why theoretical scientific knowledge of landscape experience is underdeveloped (Bourassa, 1990; Coeterier, 1987, 9; Dearden, 1987; Porteous, 1996, 10; Sundstrom, 1999). Bourassa (1990) writes:

> Among those who have investigated the matter, there is a clear consensus that theory has been neglected in landscape or environmental aesthetics. There has been a vast amount of research in the field, but that research has not been unified or informed by any comprehensive theory of landscape aesthetics. Instead, the various research efforts either are atheoretical or reflect fragmented and apparently incompatible theoretical foundations. The work that has been done in theory tends to focus exclusively on either biological or cultural bases for aesthetic behaviour, without any attempt to reconcile those apparently incompatible sets of explanations.

The problem is not that theory is absent, but that there is an abundance of separate theories, each carrying little explanatory weight (Gifford, 1987: 8-12; Sundstrom, 1999). Fundamental cross-disciplinary theoretical debate is virtually absent and a comprehensive theory of landscape experience is non-existent. Moreover – and related to the lack of a comprehensive theory – the phenomenon of experience itself is seldom reflected upon in the multidisciplinary field of landscape research. In each approach, the fundamental questions what experience is and how it works are neglected, with only a few exceptions (e.g. Ulrich, 1983). These questions can be easily neglected, because in the approaches the aspects of experience that come into view are selected from the start, thus leaving no necessity for a critical appraisal of the phenomenon of experience.

Probably, the different theories of landscape do not exclude each other, but are complementary: every theory makes sense in its own right and no approach necessarily rules out another approach, even if approaches are not compatible at first sight. Mutual exchange of empirical findings and theoretical ideas between approaches is, however, very limited. Every approach follows a separate pathway that is hardly influenced by any other approach. The field of landscape experience research can therefore be characterized as an archipelago: it is fragmented into small, disciplinary islands divided by the ocean.

4.12 Strategy towards a comprehensive theory of landscape experience

As stated in the introduction, the main objective of this study is to construct a theory of landscape experience. An obstacle to meeting this objective is that existing theoretical knowledge is fragmented into small and hardly connected islands. If all the factors identified by different approaches indeed influence the way people experience the landscape, it must be possible to relate the applied theories of landscape experience at some point. But where do the applied theories meet? Is it possible to integrate the applied theories of the separate approaches into a comprehensive theory of landscape experience?

Answers to these questions cannot be given straightforwardly, since relations between the applied theories developed in different approaches are not obvious at all. I will therefore take a step back to a more fundamental level, and concentrate on the questions what experience is and how it works, for a picture of the whole (experience) is needed in order to see whether and, if so, how the different parts (aspects of landscape experience and factors that influence landscape experience, as stressed in different approaches) are related. While the phenomenon of experience is hardly discussed fundamentally in the multidisciplinary field of landscape experience research, it is intensively studied and discussed by contemporary neuroscientists, psychologists and philosophers of mind (Antony, 1999). This body of research may be of help in obtaining fundamental knowledge of experience. Therefore, I will employ this knowledge to develop a fundamental theory of experience in Part 3. This theory will be a general theory of experience and not a theory of landscape experience. In Part 4, I will reinterpret the applied theories of landscape experience in terms of the general theory of experience. Hopefully, this strategy will reveal relations between the applied theories of landscape experience, and possibilities for integration of these theories into a comprehensive theory of landscape experience.

The aim of constructing a general theory of experience that will explain what experience is and how the process of experiencing works is too vague. Experience is a tremendously complex phenomenon, and the literature expounding on the phenomenon is both overwhelming and diffused, elucidating on many problems related to the phenomenon. It is therefore necessary to focus on some core questions in order to select the most relevant problems that have to be stressed, and to decide which issues can be left aside. The general theory of experience is instrumental, since it is a tool to find relations between the applied landscape experience theories, in order to construct a comprehensive theory of landscape experience.

Therefore, both the problems raised in this review of approaches and a preliminary image of the comprehensive theory are sources of core questions.

I want the comprehensive theory to explain landscape experience based on the factors that determine landscape experience. As table 3 shows, a wide variety of factors are stressed by the applied theories. With Bourassa's (1990, 1991) theoretical framework, this myriad of factors can be reduced to a small set of fundamental factors. Bourassa makes a distinction between three fundamental factors that influence landscape experience, namely biological, cultural and personal factors. His distinction is based on Vygotsky's developmental approach to understanding the human mind and human behaviour (Bourassa, 1991: 53). According to Vygotsky, the human mind and behaviour are determined by three fundamentally different processes, that is, phylogenesis (biological evolution), sociogenesis (cultural evolution) and ontogenesis (individual development). The human mind is the product of all three lines of development. Looking back at table 3, it is obvious that these three factors cover the field of landscape experience research. Thus, landscape experience is determined by three basic factors: biological, cultural and personal factors. Hence, a core question for Part 3 is: how do biological, cultural and personal factors influence experience?

In order to answer this question, other issues must be raised. It is helpful to have a picture of what experience actually is. While experience may be a mysterious phenomenon in some sense, this is no reason not to give an account of some of its basic properties. In addition, an appraisal of the processes constituting experiences is needed. The different approaches to studying landscape experience leave these processes largely unexplained. However, many empirical studies conducted by psychologists and neuroscientists shed light on these processes. Insights into these processes may provide an understanding how different factors exercise influence on experience. To sum up, the general theory must expound on the processes constituting experiences, explain how biological, cultural and personal factors work on these processes, and expound on the properties of experience, in order to facilitate the construction of a comprehensive theory of landscape experience.

Before proceeding to Part 3, however, I will present three empirical studies into landscape experience. The studies differ with respect to the theories and methods used. The first study reviews BelevingsGIS, a mathematical model designed to predict the average landscape preference for all places in the Netherlands based on landscape properties as represented in geographical datasets. In the construction of BelevingsGIS, the adaptive approach was a source of inspiration (Chapter 5). The second study investigated the images of aquatic nature held by employees of Rijkswaterstaat, the Dutch body responsible for the country's water management.

This quantitative study elaborates on the images of nature approach (Chapter 6). The third study is an investigation of the uses, experiences and meanings that gardeners connect to their allotment gardens. In this study, an anthropological, discourse approach was applied (Chapter 7).

Besides providing relevant information for those interested in the particular subjects investigated, the studies will together provide some enhanced insights into the spectrum of landscape experience research. While not all approaches will be covered, the three fundamental factors that influence landscape experience (i.e. biological, cultural and personal factors) will be stressed. In addition, the studies will demonstrate that different approaches provide knowledge of landscape experience that is relevant to different spatial planning and policy contexts. Finally, the studies will reveal some theoretical problems as well as some limits of the applied landscape experience theories employed.

Chapter 5 Modelling landscape preferences: BelevingsGIS

5.1 Introduction

In 1999, several researchers at the Alterra research institute (the Netherlands) launched a project called BelevingsGIS (in Dutch, *beleving* means 'experience'). BelevingsGIS is a mathematical model that predicts the average beauty preference for the landscape on the basis of physical properties of the landscape as represented in digital geographical datasets. The assumption is that the way a landscape is experienced relates systematically to the physical properties of the landscape. In datasets used in geographical information systems (GIS), all kind of physical properties of the landscape are represented and related to exact locations. If the relations between physical landscape properties and average beauty preferences can be expressed quantitatively, GIS datasets can be used to calculate the average landscape preference at particular locations (de Vries & Gerritsen, 2003). Thus, a map can be made of the Netherlands indicating the degree of average landscape preference for every location (except locations in cities and open waters, since BelevingsGIS predicts for 'green' spaces only).

The aim of this chapter is to present and discuss BelevingsGIS. In the following section, I will explain the theoretical background and the theoretical indicators used to predict the landscape preference. I will then illustrate the way the theoretical indicators are translated into calculated parameters (section 4.3). In section 4.4, I will present the two validation studies for BelevingsGIS. I will discuss the possible use of BelevingsGIS for policy purposes in section 4.5. In the last section, I will state the main conclusions. In this chapter, I will leave out many details, since my aim is to provide a general insight and a general discussion (for detailed information and detailed discussion, see Buijs & van Kralingen, 2003; Roos-Klein Lankhorst et al., 2002: 36-44; Jacobs & Klijn, 2003; Roos-Klein Lankhorst et al., 2004; de Vries & Gerritsen, 2003).

5.2 Evolutionary based landscape preferences

An assumption underlying BelevingsGIS is that the way people respond to the physical environment is partly evolutionary based, resulting in commonalities across subjects. Therefore, the landscape preferences of different individuals show

similarities (de Vries & Gerritsen, 2003: 15). Of course, individual and cultural factors influence the experience of landscape too. Nevertheless, the evolutionary based cross-individual and cross-cultural similarities in landscape preference can be used to predict to some extent the average landscape preference based on information about the physical properties of the landscape. Thus, BelevingsGIS is based on the evolutionary or adaptive approach (see Chapter 4 for an explanation of this approach). In addition, there might be landscape preferences that are not innate but culturally shared in such a way that these preferences are shared by most Dutch citizens. A literature study identified eight theoretical indicators that can be used to predict the average landscape preference. These indicators are the:

- abundance of vegetation
- degree of naturalness
- degree of variation
- abundance of water
- abundance of relief
- degree of landscape identity
- degree of skyline disturbance
- degree of noise pollution (Buijs & van Kralingen, 2003: 38).

Three types of considerations played a role in selecting these indicators. First, the availability of previous research showing that the indicator influences landscape preference. Second, the availability of a theoretical explanation, mostly based on the adaptive approach, why the indicator influences landscape preference. Third, a pragmatic consideration, namely the opportunity to express the indicator in terms of data available in GIS datasets (see Roos-Klein Lankhorst et al. 2004: 12-14, for the specific reasons why these particular eight indicators were selected). These indicators are theoretical constructs. Before they could be used as predictors for landscape preferences, they had to be translated into parameters that can be calculated based on GIS datasets. For each indicator, a study was conducted to create a mathematical parameter representing the theoretical construct. In the following section, I will show how the indicator 'variation' was translated into a mathematical parameter.

5.3 Variation: finding a GIS-based parameter

Variation in the landscape is thought to be an important predictor for landscape preference (Herzog, 1992; Kaplan & Kaplan, 1983, 1989; Purcell & Lamb, 1998). For example, Kaplan and Kaplan's (1989: 60) predictor 'mystery', which is closely related to variation, was found to correlate with preference in ten out of eleven studies.

For BelevingsGIS, two mathematical parameters were constructed to represent landscape variation (Buijs et al., 1999: 22-23), namely the length of the borders between different types of vegetation in a grid cell representing a square of 250 by 250 metres, and the number of different types of vegetation in a grid cell representing 250 by 250 metres. An empirical study was carried out to test whether the calculated variation adequately represents experienced variation, and whether the calculated variation correlates with stated landscape preferences. Grid cells, together representing the Dutch landscape, were divided into five classes of the calculated variation (very low to very high). For each class, photographs were taken at six different locations (i.e. six locations in the very low variation class, six in the low class, etc.). Thus, photographs were taken at thirty different locations. At every location, three photographs were taken in different directions. Together, the three photographs give a fairly good visual impression of the location.

The photographs were shown, three by three, to 115 respondents, who were asked to indicate the degree of experienced variation in the landscape and the degree of experienced beauty of the landscape. It was found that the two parameters (variation calculated as the number of types of vegetation in a cell, or the length of borders between vegetation types in a cell), represent the experienced almost equally well (Buijs et al., 1999: 32). Furthermore, the calculated variation correlates with the experienced beauty. However, the influence of calculated variation on experienced beauty depends on the openness of the landscape: for relatively open landscapes, more variation leads to higher preferences, while for relatively closed landscapes, the effect was absent or even slightly negative (Buijs et al., 1999: 37).

Thus, the study provides insights into the adequacy of calculated parameters to represent experienced variation, and the relation between calculated variation and experienced beauty. For the other indicators, similar studies were conducted to translate the indicator into a mathematical parameter and calculate the effect on landscape preference. Based on the eight parameters, the average predicted landscape preference was calculated for each grid cell. To do so, the parameters were put together as follows. Vegetation, naturalness, variation, water, relief and iden-

tity influence landscape preference positively (e.g. the more vegetation, the higher the predicted landscape preference), while skyline disturbance and noise pollution influence landscape preference negatively (e.g. the more skyline disturbance, the less the predicted landscape preference). Each positive parameter was equally weighted for the landscape preference prediction. The two negative parameters were weighted twice as much as the positive ones (these weight factors are default weight factors; their magnitude does not result from empirical studies). For each cell, BelevingsGIS calculated the predicted landscape preference. Thus, a map of the Netherlands was created, indicating the predicted landscape preference for each cell representing a square space of 250 by 250 metres. This first version of BelevingsGIS was tested in a validation study conducted by de Vries and Gerritsen (2003).

5.4 Validation studies and improvements

To validate the predicted landscape preference, approximately 50 people in each of 12 neighbourhoods in different regions in the Netherlands were interviewed (total of 648 respondents). The selected neighbourhoods vary in degree of urban character and in openness of the surrounding landscape. The respondents were asked to indicate how beautiful they found 30 different landscapes. Photographs were used to represent the 30 landscapes in cells of 250 by 250 metres. Because photographs were used, the parameter noise pollution was left out.

It was found that the landscape preferences as indicated by BelevingsGIS predict 30% of the average landscape preference as indicated by the respondents (de Vries & Gerritsen, 2003: 42). Individual respondents differed with respect to the indicated landscape preference. However, the individual differences do not account for the unexplained 70%, since average preferences were tested for. One reason for the unexplained 70% could be the way the parameters were weighted: each positive parameter once, and the negative parameter twice. Therefore, the optimal weight for each parameter (i.e. the weight that produces the best prediction was calculated with the data from the validation study. The calculated landscape preferences, which are based on the adjusted weights, predict 74% of the average landscape preferences as indicated by the respondents. Since in this case the data that were used for the adjustments of the weights of the parameters and the data that have to be predicted by the model are the same, it is very likely that the predictive value will decrease if new data are collected. The predictions based on the adjusted weights cannot be validated by this study.

In the same study, the predictive value of BelevingsGIS was tested in another way: people were asked to rate the beauty of the landscape surrounding their own neighbourhood. This was compared with the average predicted landscape preference for all cells within a radius of 7.5 kilometres drawn from the middle of the neighbourhood, as calculated by BelevingsGIS. The calculated preferences predicted 34% of the stated preferences for the surrounding landscape (de Vries & Gerritsen, 2003: 44). If the adjusted weights are used to calculate the preferences for the surrounding landscape, the predictive value decreases to 22% (de Vries & Gerritsen, 2003: 45). In other words, it is doubtful whether the adjusted weights for the parameters are better then the original weights as judged by the researchers who created BelevingsGIS.

The results of the validation study provided some suggestions for improving the second version of BelevingsGIS. First, the indicators naturalness, vegetation and variation were integrated into one new indicator called naturalness, because these indicators correlated highly. Second, the indicator identity did not correlate with the stated preferences. Therefore, this indicator was replaced by a new one, called historical identity. Third, a new indicator – urbanity – was introduced. It was found that the degree of urban forms of land-use highly correlated with the stated preferences for the surrounding landscape. Therefore, it is likely that the predictive value of BelevingsGIS will improve if a new indicator expressing the degree of urbanity is used. To sum up, six indicators were used in the second version of BelevingsGIS: naturalness, relief and historical identity (positive indicators); skyline disturbance, urbanity and noise pollution (negative indicators). Based on the findings of the first validation study, the weights of the indicators were adjusted so that every indicator had the same weight. In addition, the way the theoretical indicators are translated into mathematical parameters was changed. For exact descriptions of the parameters, see Roos-Klein Lankhorst et al. (2004: 28-44.)

For the second validation study, an existing dataset was used (see ibid: 53-64). In this study, people were asked to rate the attractiveness of the landscape in their home area. Because general attractiveness was asked for, the parameter noise pollution was included in the calculations of the predicted landscape preference. A questionnaire was filled in by 831 respondents divided over 277 neighbourhoods (3 respondents per neighbourhood). Neighbourhoods in 15 different landscape types were selected. For each landscape type, respondents were divided into two classes of urbanity: 'non-urban areas' versus 'at-least-a-little-urban areas'. The average predicted landscape preference of all cells within a radius of 5 kilometres of the neighbourhood as calculated by BelevingsGIS was compared with the stated attractiveness of the landscape. In this study, the predicted average landscape

preference explained 31% of the stated average landscape attractiveness. This finding suggests version 2 is not an improvement over version 1 of BelevingsGIS. However, the correlations between the indicators were far lower than in the first validation study. Therefore, version 2 *is* an improvement, because it achieves the same level of prediction with fewer indicators, and less mutual overlap between the indicators. It is noteworthy that in this study, the average stated landscape preference was calculated on the basis of data from only three respondents. Thus, the data used may not represent the average stated preference very well.

Explaining 31% of the average stated landscape preferences may, at first sight, be considered as not so much, given that 69% is left unexplained. However, I think that this level of explanation is pretty high. First of all, it is 31% more than nothing, which is the alternative as far as getting an image of the average landscape that covers the whole Netherlands is concerned. Furthermore, generally, explaining 31% is considered pretty good in the social sciences. This has much to do with the complexity of human experience and behaviour, which are brought about by a myriad of processes and on which a manifold of different factors may exercise influence. Moreover, given the rigidity of BelevingsGIS (predicting landscape preferences on the basis of matterscape properties only), 31% is a fairly reasonable achievement. Finally, it is possible to make improvements that will increase the predictive value of BelevingsGIS. The preliminary results of a new, so far unpublished validation study indicate a predictive value of 47% (de Vries, personal communication). In this study, the average stated preference was calculated on the basis of at least 40 respondents per neighbourhood. Thus, compared to the second validation study, the data probably represent the average preference better, which may explain the increased predictive value. In my view, the predictive value of BelevingsGIS is good enough to use it as an instrument for some landscape policy purposes, as will be discussed in the following section.

5.5 Applying BelevingsGIS to landscape policy

The way people experience the landscape is increasingly taken into account in Dutch landscape policy. For example, the most recent Dutch nature policy plan (Ministerie van LNV, 2000: 1 and 15) states that such policy should be 'linked up with the perceptions of people', that 'we want a beautiful country' and that 'the experiential value of nature has to play a role in policy.' In this context, BelevingsGIS may be of value for policy purposes. According to its creators, BelevingsGIS is an adequate method with which to produce a spatial map indicating the average

landscape preference that can be used to indicate directions for spatial policy. Furthermore, BelevingsGIS can be used for monitoring purposes. BelevingsGIS and its indicators, however, cannot be used as norms for design (Roos-Klein Lankhorst et al., 2004: 65-67). I agree with these statements, which I will briefly discuss in this section.

Landscape preference is only one dimension of landscape experience, namely the dimension of attractiveness (de Vries & Gerritsen, 2003: 11). Some landscapes may be highly valuable for many people without being very attractive. For example, the place where the Battle of Waterloo took place is valuable not because it is aesthetically attractive, but because it is a relic of an important historic event. Because of this conceptual reduction of landscape experience, BelevingsGIS and its indicators cannot be used to deduce prescriptions for landscape design, as the researchers have clearly indicated.

BelevingsGIS can be used to make a spatial map indicating the average landscape preference and covering every part of the Netherlands. Such a map might provide policy makers with insight into which landscapes are highly preferred and which are not. The map could also give some indications of where the existing landscape should be protected and where it should be enhanced in order to meet the policy aim of taking into account people's landscape perceptions and attractiveness judgements. Of course, such a map should be cautiously treated as a global indication, since its predictive value would be only approximately 30%, it would indicate only the attractiveness dimension of landscape experience and indicate only average preferences, omitting cultural and individual differences between people. Nevertheless, such a map could be of use, for example, in selecting target areas to pay attention to in order to meet landscape beauty enhancement policy purposes.

Policy makers can use BelevingsGIS as a monitoring device. The GIS datasets used to calculate the predicted landscape preferences are regularly updated. Therefore, changes of the predicted landscape preferences resulting from changes in the landscape could be calculated. This would allow one to, for example, monitor whether landscape policy aimed at increasing landscape beauty has been successful or not within a particular time period. A map indicating landscape preferences and monitoring changes of landscape preferences could be produced without making use of BelevingsGIS. However, one advantage of BelevingsGIS is its cheapness, since it predicts landscape preference on the basis of existing databases. Without BelevingsGIS, it would be extraordinarily expensive, since thousands of questionnaires would be needed to produce a map covering every area of the

Netherlands. For monitoring purposes, the costs would be even greater, since the same questionnaire research would have to be done twice.

5.6 Conclusion: the benefits and limits of BelevingsGIS

Shafer et al. (1969) have developed a model to predict landscape preferences on the basis of landscape properties. They used numerous photographs of landscapes, and used regression analysis to make a model predicting preferences on the basis of the properties of landscapes as represented on photographs. Bourassa (1991) criticizes this model for being atheoretical. As long as enough parameters are used in the model, it is not difficult to achieve a reasonable level of prediction. Without a theoretical basis, however, the model does not make sense. In this respect, BelevingsGIS is a much better model, since the indicators (i.e. naturalness, relief, historical identity, skyline disturbance, urbanity, noise pollution) are both theoretically sound and empirically proven to influence the average landscape preference. Therefore, apart from making preference predictions, the model provides some insights into why particular landscapes are found attractive and others are not. The model can be used to generate some indications for policy that is related to landscape experience and to monitor changes in landscape preferences in time.

'Some indications' is a pretty vague but carefully chosen expression. The outcomes of BelevingsGIS cannot be norms for rigorous policy measures, since BelevingsGIS reduces landscape experience too much for this purpose. First, landscape experience is reduced to landscape attractiveness. Second, the model focuses on similarities across subjects. Cultural and individual differences are left out, and not tested for, since average landscape preferences have been used in the validation studies. Third, the GIS datasets used to calculate the predicted preferences are a reduction, since not all landscape features are represented in the databases.

The first and second validation studies show that the landscape preference as calculated by BelevingsGIS predicts approximately 30% of the stated landscape preference. The third (yet unpublished) validation study suggests an increased predictive value of 47%. Let us assume an improved version of BelevingsGIS leaves unexplained 53% of the average stated landscape preferences. An obvious source of the unexplained percentage is that factors other than evolutionary or cultural factors that work similarly on the whole Dutch population exercise influence on the way people experience landscape too. However, it is impossible to determine on the basis of the validation studies whether the explained part means that this part of the landscape preference can be explained by these factors. Differ-

ences between respondents were irrelevant in the studies, since average stated preferences were used to validate the predicted preferences. Thus, cultural and personal factors may play a role in the stated preferences, but remain hidden in the validation.

It would be interesting to test BelevingsGIS with groups of children and foreigners. If evolutionary factors do play an important role in BelevingsGIS, the average stated preference of young children should be better predicted than the average stated preference of adults. Since young children have to a lesser extent been exposed to cultural influence, innate predispositions may play a greater role in their landscape preferences, as the study by Balling and Falk (1982, see also section 4.3) suggests. If cultural factors also play a role in BelevingsGIS, the stated preferences of foreigners should be less well predicted by BelevingsGIS than the preferences of inhabitants of the Netherlands.

Modelling landscape preferences as responses to matterscape properties is only one of the myriad of landscape research methods. In the following two chapters, I will present two studies that pay attention to cultural and individual differences in landscape experience, and that may be of use for planning and policy purposes.

Chapter 6 Images of aquatic nature

6.1 Introduction: aquatic nature at stake

During the past decades, the awareness of environmental problems and the will to protect and develop nature have increased worldwide amongst politicians as well as the general public. Due to the intrinsic link between nature and water systems (water systems are a main defining factor for ecosystems, and many important ecosystems exist in or alongside water), nature protection and development goals are increasingly incorporated in water management organizations. For example, Rijkswaterstaat (the Dutch organization responsible for the country's water management) runs many nature development projects, like creating natural sites in river basins.

One of the problems water management organizations have to deal with in order to succeed in their aquatic nature development goals is that the different stakeholders can have different images of aquatic nature. Even if general goals for the development of aquatic nature are shared by all stakeholders, these different views can be sources of conflict. For example, in the Netherlands some people regard only the prehistoric habitats that existed in river basins and that have not been influenced by man as real aquatic nature and want to restore these habitats. Others regard habitats that have been influenced by man as aquatic nature as well. This difference has led to ongoing debates about the kind of aquatic nature that should be developed in Dutch river basins. Everybody seems to agree as long as people talk about aquatic nature as such, but when it comes to practical proposals, a myriad of views are expressed.

In this research, aquatic nature is defined as all nature that exists in or alongside water. An image of aquatic nature is a relatively sustainable network of meanings and ideas that people attach to aquatic nature. Knowledge of images of aquatic nature is relevant to water-management purposes, especially when many stakeholders are involved. Because differences in images of aquatic nature can cause misunderstandings and conflicts, knowledge of these images may enhance the management and planning of and communication about the development of aquatic nature.

Aspects of the way people regard water in the landscape are studied by environmental psychologists and sociologists, who stress that people highly appreciate water (Appleton, 1975; Burmil et al., 1999; Coeterier et al., 1986; Hammitt et al.,

1994; Jacobs, 1999; Kaplan et al., 1989; Kaplan, 1987; Lengkeek, 2001). This body of research is on people's perceptions and experiences, not on the images of aquatic nature. Several historians investigated the development and change of cultural images of nature and aquatic nature (Corbin, 1989; Schama, 1995; Schouten, 2001). For example, Corbin shows that the image of the seaside has changed dramatically: in the Middle Ages it was seen as the horrible domain of chaos and evil, while nowadays the coast is the most popular destination for tourists. This body of historical research demonstrates that images of aquatic nature are culturally produced and can change in time. A systematic overview of the different contemporary views of aquatic nature cannot be abstracted from this historical research. Therefore, empirical research is needed to unravel the different views of aquatic nature. Since the early 1990s, several Dutch researchers have been investigating the images of nature that exist in society (see section 4.7). Because images of aquatic nature can be seen as being derived from images of nature (Lengkeek, 2001), this line of research is highly relevant. First, the body of research provides a theoretical background. Second, a quantitative research method is well established in this kind of research (de Groot & van den Born, 2003); this method will be applied in this research.

In this chapter, I will present a study into the images of aquatic nature amongst employees of Rijkswaterstaat. A questionnaire was used to collect information about the images of aquatic nature. For the employees of Rijkswaterstaat, the questionnaire was put on a website (every employee has Internet access) and was announced in the organization's weekly magazine. A total of 625 respondents filled in the questionnaire correctly.

In the following section, I will explain the theoretical framework underlying this study. In section 5.3, I will expound on the images of aquatic nature found in this research. In section 5.4, I will stress the relation between the images of aquatic nature and other variables, such as the perception of the relation between man and nature, the preference for political decisions in complex policy cases regarding aquatic nature, and the kind of work. Finally, I will discuss the results and draw some conclusions (section 5.5).

6.2 Theoretical framework: lessons from images of nature approach

The theoretical framework for this research was adapted from the nature of images approach. I will briefly summarize some of the main results of this line of research

(as described in section 4.7), add some other findings and summarize the theoretical framework that will be applied to this study.

Many studies that used different methods found a variety of different images, ranging from a wild image to a functional image (van den Born et al., 2001; Buijs & Filius, 1998; Buijs & Volker, 1997; de Groot & van den Born, 2003; Keulartz et al., 2000; 2004; Natuurbeschermingsraad, 1993). People with a wild image of nature regard only nature that is untouched by man as real nature, consider it not right to use nature for exploitation for human purposes, and regard rough nature that does not have traces of human use the most beautiful. At the other end of the range, people with a functional image of nature consider nature that is highly influenced by man to be nature as well, consider it right to use nature for human purposes and regard nature that is ordered by man to be the most beautiful.

Because the images found with different research methods can be placed in a common range, it makes sense to suspect that a basic principle is the source of different images of nature. This principle might be the perception of the relationship between man and nature. People have different perceptions of this relationship, ranging from anthropocentric (man is superior to nature) to ecocentric (nature is superior to man). For example, de Groot (1999) distinguishes four different perceptions, based on a review of the work of Achterberg (1994), Kockelkoren (1992) and Zweers (1995):

- Man as the master of nature: man has the right and the skills to dominate nature; nature has no value outside man.
- Man as the protector of nature: nature has its own value, but is above all a source for man; man has to take care of nature.
- Man as the partner of nature: nature is something different, outside of culture; man can have a respectful and equal relationship with nature.
- Man as the participant of nature: nature is bigger than man; man as part of nature cannot master nature at all.

The relation between these perceptions and the images of nature is as follows: people who have a more anthropocentric perception tend to have a more functional image of nature, while people who have a more ecocentric perception tend to have a more wild image of nature.

Keulartz et al. (2000; 2004) distinguish three different basic dimensions that underlie the images of nature. While using different terms, van den Born et al. (2001) use a quite similar division. First, the cognitive dimension, determining what nature is. Second, the normative dimension, denoting how man should deal with

nature. Third, the expressive dimensions, about the aesthetic values of nature. People with different images of nature have different opinions of what nature is, how we should deal with nature and what the aesthetic value of nature is. The main differences between the various images of nature on these dimensions can be extracted from the literature. On the cognitive dimension: the degree of spontaneity of nature (the less managed by man, the more spontaneous); people with a wild image consider only nature that has a high degree of spontaneity to be real nature, while people with a functional image consider nature that has a low degree of spontaneity to be real nature as well (van den Born et al., 2001; Buijs & Filius, 1998). On the normative dimension: the degree of using nature for the benefit man; people with a wild image feel we should not use nature for the benefit of man, people with a functional image feel we can over even should use nature for the benefit of man (de Groot & van den Born, 2003; Keulartz et al., 2004). On the expressive dimension: the degree of challenge; people with a wild image hold challenging, rough nature to be the most beautiful, while people with a functional image regard orderly, safe nature to be the most beautiful (Buijs, 2000; Keulartz et al., 2004).

The theoretical framework abstracted from the literature on the images of nature, and applied to this research on the images of aquatic nature, can be summarized as:

- An image of aquatic nature is a relatively sustainable network of meanings and ideas that people attach to aquatic nature.
- In society, there may be different images of aquatic nature, ranging from a wild to a functional image.
- The source of differences in images may be the view on the relationship between man and nature, ranging from ecocentric to anthropocentric.
- Images of aquatic nature consist of a cognitive dimension (what aquatic nature is), a normative dimension (how we should deal with aquatic nature) and an expressive dimension (what the beauty of aquatic nature is).
- The most important differences between the images of aquatic nature are the degree of spontaneity of aquatic nature (for the cognitive dimension), the use of aquatic nature for human benefit (normative) and the degree of challenge (expressive).

6.3 Images of aquatic nature

In the questionnaire, the respondents were asked to indicate on a six-point scale (varying from 'total agreement' to 'total disagreement') the extent to which they agreed with 18 different statements about aquatic nature. Examples of the statements are 'A lake is most beautiful without traces of man', 'A spontaneously streaming brook is real nature' and 'Man is allowed to intervene in rivers or the ocean for the benefit of man'. Six statements were about large bodies of water (e.g. oceans and rivers), six were about intermediate sized bodies of water (e.g. big lakes and canals) and six were about small bodies of water (e.g. brooks, ditches and small lakes). In each group, two statements were about the degree of spontaneity (cognitive dimension), the degree of use for the benefit of man (normative dimension) and the degree of absence of human influence (expressive dimension). In short, the different water features and the different dimensions were covered by the statements.

A cluster analysis was used to reconstruct the images of aquatic nature based on the reactions to these 18 statements. With this statistical technique, groups were formed of people who show a similar pattern of reactions to the 18 statements. The idea is that different clusters represent groups of people with a different image of aquatic nature, because they show different patterns of reacting to the statements. All people in one cluster share a similar image of aquatic nature, which is why their answers have a similar pattern. By making use of the mean answers on the statements given by people in a particular cluster, the image of that group of people can be reconstructed and interpreted.

A cluster analysis of the 18 statements resulted in an optimum of 5 clusters, which can be interpreted as 5 different images of aquatic nature. In order to exclude subjectivity in the interpretation as much as possible, a rigid interpretation of the images was made, only making use of the statements that were statistically most decisive for the differences between the clusters.

In table 4, the images are given, together with the rounded-up mean answers to the most decisive statements for each image. Based on the mean answers on the six most decisive statements, the five images of aquatic nature can be described as:

1. The wild image (29%): people who hold this image regard only water that is untouched by man as real nature (cognitive dimension; statements 1, 3 and 6), think we should not use water for the benefit of man (normative dimension; statement 5) and consider water to be the most beautiful when it is not influenced by man (expressive dimension; statements 2 and 4).

2. The spontaneous image (22%): people who hold this image think that water influenced by man is not totally unnatural (cognitive), think that man is allowed to make some use of water for the benefit of man (normative) and consider water that does not show traces of man to be beautiful (expressive).
3. The intermediate image (23%): people who hold this image think that water influenced by man is somewhat natural (cognitive), think that it is better not to use water for man's benefit and consider water that does not show traces of man to be beautiful (expressive).
4. The influenced image (11%): people who hold this image regard water that is influenced by man as somewhat natural (cognitive), think that we should not use water for the benefit of man (normative), and think that water that shows traces of man to be somewhat beautiful (expressive).
5. The functional image (15%): people who hold this image consider water that is influenced by man to be nature as well (cognitive), think that we can use water for the benefit of man (normative) and regard water that shows traces of man to be beautiful (expressive).

Table 4: Mean answers to the most decisive statements for images of aquatic nature

Image	**Wild**	**Spontaneous**	**Intermediate**	**Influenced**	**Functional**
1 The ocean and rivers are real nature only if they are not influenced by man	5	4	3	2	2
2 The ocean is most beautiful if nothing about it reminds one of culture	5	5	5	3	2
3 A river with dams is not real nature	5	3	3	3	2
4 A lake is most beautiful without traces of man	5	4	4	3	2
5 Man is allowed to put fish in lakes for recreational fishing	2	4	3	2	5
6 A man-made canal is not real nature	5	4	3	4	3
Number of respondents	**182 (29%)**	**138 (22%)**	**146 (23%)**	**67 (11%)**	**92 (15%)**

(5 = agree, 4 = agree somewhat, 3 = disagree somewhat, 2 = disagree)

The two extreme images (wild aquatic nature and functional aquatic nature) are very distinctive. The three images in between (spontaneous, intermediate and influenced aquatic nature) are only slightly different. Although these three images are statistically highly significant, the differences are hard to interpret rigidly. Nevertheless, the overall range gives a clear picture: five images of aquatic nature, ranging from wild to functional. This is the same range as found in the images of nature research, as mentioned in the previous section.

The wild image of aquatic nature is the most popular, followed by the intermediate, spontaneous, functional and influenced image. Each image is pretty popular, the influenced image being the lowest with 67 respondents (11%). However, an overall tendency towards the wild side is obvious: the wild and spontaneous image together are twice as popular (320 respondents, 51%) as the influenced and functional image together (159 respondents, 25%).

Factor analysis was used to look for cohesion between different statements. The components resulting from the factor analysis can be seen as the main factors that determine the differences between different images. Ideally, the degree of spontaneity, the degree of use for the benefit of man and the degree of absence of human influence (the three dimensions of images of nature) should be resembled in factor analysis. A factor analysis of the 18 statements resulted in 3 main components. These three components resemble almost perfectly the degree of spontaneity, the degree of use allowed for the benefit of man and the degree of absence of human influence as posed by the theoretical framework. This is not surprising, because the items were designed with this structure in mind. Still, this result indicates consistency between the theoretical assumptions and the empirical results.

Besides reconstructing the images by means of cluster analysis, a direct measurement of images of aquatic nature was conducted by asking respondents to indicate their preference for five predefined images of aquatic nature: the wild, autonomous, broad, decorative and functional image. The definitions of these images were created by applying the images of nature as described by Buijs and Filius (1998) to aquatic nature. Interestingly, the results differ from the images rendered by cluster analysis. The most popular predefined image was the broad image (289 respondents, 46%). This image was described in the questionnaire as: aquatic nature is everything that grows and moves in the water; it is fine to use aquatic nature a bit for the benefit of man; aquatic nature is beautiful if man and nature peacefully coexist. The wild image (151, 24%) and the autonomous image (158, 25%) were almost equally popular. Surprisingly, the decorative (14, 2%) and the functional (13, 2%) predefined images were not popular at all. Hence, the distribution on the total range from functional to wild is very different as it is in the

range rendered by cluster analysis. Apparently, if people are forced to make a conscious choice for their preference for a predefined image of aquatic nature, they are not willing to choose an image towards the functional side of the range.

This seems a contradiction: although the answers given by a large group of respondents indicate a preference for a functional image, they do not explicitly prefer a functional image. A possible reason is that people find the functional image politically incorrect, and are therefore not willing to explicitly state their preference. Another reason may be that a person is unaware of his or her own image of aquatic nature: some people might have a functional image without realizing it. However, the predefined images and the images rendered by cluster analysis show a strong correlation ($p < 0.00$). The more people tend towards the wild images rendered with cluster analysis, the more people tend to prefer the predefined wild image.

6.4 Images, dilemmas, perception of man – nature, work

Do images of aquatic nature make a difference when it comes to judgements about policy for aquatic nature? To give an indication, the respondents were asked to indicate to what extent they agreed to a policy decision in three complex cases that were described. The first case was about developing nature alongside rivers. The Dutch government buys land alongside rivers in order to let natural processes run their course. At these places, the cultural landscape, including agricultural use, disappears. Most people consider this good policy, many consider it very good policy, some consider it somewhat good policy, and only a few consider it somewhat bad, bad or very bad policy. The degree of agreement with this policy is related to people's images of aquatic nature: the more people tend to have a wild image, the stronger they agree with this policy ($p < 0.00$). This is no surprise, since people with a wild image consider it best not to influence nature, while people with a functional image will have more problems with the disappearance of agricultural use.

The second case was about nutrients management. The government wants to prevent agricultural nutrients from running off into lakes. The lakes will become more natural. But the number of water birds will be lower, because less nutrients means fewer fish, the food of water birds. Most people consider this policy good or somewhat good, many consider it very good, and some consider it somewhat bad, bad, or very bad. The more people tend to have a wild image, the stronger they agree with this policy ($p = 0.01$). Natural processes without influence of man are

important in the wild image, so these people will accept a lower number of birds because the contemporary higher number is humanly influenced. On the other hand, people with a functional image do not consider it a problem that the higher number of birds depends on human influence, so they tend not to agree with this policy.

The third case was about windmills. Building a windmill park in the North Sea will provide environmentally friendly energy, but the seascape will be influenced and water birds may be killed. Most people consider this policy to be somewhat good or good, while many consider it to be very good, somewhat bad, bad or very bad. The more people tend to have a wild image, the less they agree with this policy ($p < 0.00$). People with a wild image do not like human intervention in aquatic nature, even if it is for environmental sustainability purposes.

In all three political dilemmas, people's images of aquatic nature show a significant effect on their judgement of the policy decisions. However, significance provides little insight into the effect of water-images on policy judgements. With a large number of respondents, small effects tend to be highly significant. To reveal the magnitude of the effect, the explained variance was calculated. In all three cases, the explained variance was low (10%, 2% and 6%, respectively). In other words, while images of aquatic nature do make a difference for policy judgements, the effect is very small. Thus, when it comes to policy measures, factors other than the images of aquatic nature play an important role.

A question was asked to test whether differences in the view on the relationship between man and nature explain why people have different images of aquatic nature. Respondents had to indicate on a 6-point scale to what extent they consider nature to be superior to man (one extreme) or man to be superior to nature (the other extreme). Most people chose one of the options in the middle (297, 48%), meaning that they consider man to be somewhat superior to nature or nature somewhat superior to man. Many people consider nature to be superior to man (252, 40%), and fewer consider man to be superior to nature (76, 12%). The correlation between the perception of the relationship between man and nature and the images of aquatic nature is highly significant ($p < 0.00$). The explained variance, however, is low (5%), meaning that the perception of the relationship between man and nature is not a very good predictor for the image of aquatic nature.

The relation between the professional occupation and the image of aquatic nature was investigated. Amongst managers, researchers and policy makers on the one hand, images that tend towards the wild side are more popular than amongst designers and people responsible for construction and maintenance ($p = 0.03$). A reason may be that the first group works mostly at the office, while the second

group works in the field. In the Netherlands, there is no longer any primeval nature, since every place is managed by man. If people experience aquatic nature on a daily basis, they are aware that aquatic nature in the Netherlands is influenced by man. Therefore, their image of aquatic nature might tend more to the functional side than the images of managers and researchers. Since the latter do not experience aquatic nature on a daily basis, they can more easily have a wild image, which is pretty idealistic if compared to the field situation in the Netherlands. This interpretation is consistent with the finding of Keulartz et al. (2000) that people's images of nature tend to be more functional if concrete local policy measures are at stake.

6.5 Discussion and conclusion

The main objective of this study was an explorative one, namely to establish what images of aquatic nature are held by employees of Rijkswaterstaat. The study revealed five different images of aquatic nature, ranging from a wild image to a functional image. This range is in line with previous research on images of nature. Thus, the assumption that images of aquatic nature are derived from images of nature seems right. The images that tend towards the wild side are more popular than the images that tend towards the functional side. Langers et al. (2002) studied the images of nature held by lay people in the Netherlands. Because the questionnaire used in their study was slightly different, a statistical evaluation of lay people versus employers of Rijkswaterstaat is impossible. Nevertheless, in their study almost the same range of images of aquatic nature was found. Moreover, amongst lay people, the wilder images are more popular too. This suggests that a person's image of aquatic nature does not depend on, or does so only slightly, whether or not that person is a professional water manager.

A consequence of the fact that people have different images of aquatic nature is that communication is important when aquatic nature is at stake. Within Rijkswaterstaat, often many professionals working in different departments have to cooperate to make a spatial plan, design or management plan. A major difficulty experienced in these complex planning processes is that as long as people talk about the philosophy for the plan, all members talk enthusiastically about aquatic nature. At this point, everybody has the feeling that there is mutual agreement. However, when it comes to concrete proposals, a myriad of views are expressed, since members have different images of aquatic nature. The message is easy: when dealing with aquatic nature, communication about the images of aquatic nature

amongst the participants is recommendable. Thus, existing conflicts become explicit, instead of lurking behind the term aquatic nature waiting to frustrate planning processes when substantive decisions are to be made.

Because Rijkswaterstaat requested that the time needed to fill in the questionnaire should not exceed fifteen minutes, the possibilities to investigate the source of differences in images of aquatic nature, as well as the effects of different images of aquatic nature, were very limited. Thus, one question about a possible source of differences in images was added (perception of man – nature), as were three questions about the effect of images (policy judgements).

In the literature on images of nature, it is often assumed that a major factor underlying differences in such images is the perception of the relationship between man and nature. However, this study does not confirm the assumption: it was found that different perceptions of the man – nature relation do not predict different images of aquatic nature very well. Likewise, images of nature are assumed to play an important role when it comes to preferences for policy measures. This study does not corroborate this assumption, since the images of water explain only a small part of the preferences for policy measures.

These results point to a weakness in the images of nature approach. While the spectrum of different images ranging from wild to functional is well corroborated by a number of studies, including this study, about both the source as well as the effects of different images of nature, little is known. Although assumptions about the source and the effects are often made, the assumptions are hardly tested empirically. While this study is very limited in stressing these issues empirically, the results challenge two ubiquitous assumptions about source and effect of images of nature. Thus, a recommendation for future research can be derived, namely to investigate both the genesis and the effects of images of nature. Knowledge about the genesis is important to obtain insight into the changes in images of nature in time and into the factors that influence these changes. Knowledge about the effects is absolutely necessary to elucidate the relevance of images of nature.

Though little is known about the genesis and effects, the fact that there are different images on a spectrum ranging from wild to functional cannot be dismissed. Although the effects are as yet unknown, it is very likely that the images somehow affect the way people experience landscape.

Chapter 7 Contested places: allotment gardens in Rotterdam

7.1 Introduction: contested place meanings

As illustrated in Chapters 5 and 6, both the adaptive approach and the images of nature approach are valuable approaches for gathering knowledge of some aspects of landscape experience: average landscape preferences and relatively stable socially shared networks of meanings people attach to nature. However, neither approach stresses an important aspect of landscape experience, namely the fact that during the course of life, people develop bonds with particular places. Some places play an important role in personal as well as social life. People attach particular meanings to particular places, thus constructing place identities. These place identities are focused upon in the human geographical approach, and in some anthropological approaches. According to van Assche (2000 and 2004), there are mutual relations between place identity, social identity and personal identity. In the Rotterdam allotment garden study presented in this chapter, I will concentrate on place meanings that found these relations between place, self and society.

In the early 1950s, several allotment garden complexes were established in Zestienhoven, an area just north of Rotterdam city centre. The land is rented by the allotment holders from the city council, while everything on the land is private property. Each garden complex is managed by a garden union that organizes various kinds of social activities, makes rules for the complex and is allowed to exclude people who break the rules. Most gardeners have built a summer house in their garden. Many gardeners live in their summer house in the spring and summer, either permanently or during the weekend.

In March 2001, Rotterdam city council accepted a plan for Rotterdam's spatial development until 2010. The plan is meant to be a starting point for detailed plans and designs for the area. In this plan, Zestienhoven is indicated as a place for building new residential areas and providing room for companies. According to the initial plan, all 600 allotment gardens in the three complexes in Zestienhoven will disappear. The garden unions reacted by founding *Ieders Land* ('Everybody's Land'). The aim of Ieders Land is to develop a spatial strategy for Zestienhoven, in cooperation with everybody interested in the area. For this strategy, Ieders Land wants to 'combine the appointed new functions (residential areas, companies) with the qualities existing in the area' (Ieders Land, 2002). In addition to the gardeners, a committee of house owners and Rotterdam's green movement actively participate

in Ieders Land. Since 2002, an ongoing confrontation between the city council and Ieders Land has been taking place, sometimes as a fruitful conversation and sometimes as a battle.

The aim of this study was to analyse the uses, experiences and place meanings of the gardeners (section 7.3), the social identities developed in the garden complexes (section 7.4) and the ongoing competition for place meanings between the city council and Ieders Land (section 7.5). A mixture of qualitative methods was used: observing by walking around in the garden complexes, conversations with gardeners, semi-structured interviews with gardeners (20 interviews) and with key persons (e.g. representatives of Ieders Land, the house owners' committee and the green movement), and a content analysis of publications by Ieders Land and the city council. This mixture is typically used in anthropological studies. To interpret the results, a discourse theory was adopted as a conceptual framework. This theory will be elucidated in the following section.

7.2 Discourse theory

Two senses of the term 'discourse' have to be distinguished. First, a sense of discourse as a communicative practice. In this empirical sense, a particular conversation between people is a discourse, as is this text. Second, a sense of discourse as an analytical concept. In this sense, a discourse is a set of particular ideas about a part of reality, shared by a social group (van Assche, 2004: 20). In this chapter, I will refer to the second sense of discourse. An assumption underlying this characterization of discourse is that meanings of parts of reality are not pre-given, but to a great extent socially constructed by different forms of communication. Here, communication is taken in its broadest sense: it can be speech or written text in natural language, body language or pictorial language, as well as behaviour. For example, the way a gardener maintains his garden is an expression of ideas about gardening and nature, an expression that can be interpreted by others and that is therefore a form of communication. By analysing the different expressions of a group of people, the discourse of that group can be reconstructed by formulating the underlying ideas that are inherent in the expressions. In this study, the design of gardens, the conversations of gardeners, the publications of garden unions, etc. were analysed. Some structuring ideas behind these different expressions were found.

The set of ideas shared by a group – a set that cannot be observed directly but only be reconstructed on the basis of a manifold of expressions – contains rules of formation that determine the difference between what *can* be said and done (theo-

retically, possibly) and what *is* said and done (practically, actually) at a particular time and place in a particular social context. For example, a tree can be seen in an infinite number of ways, for example as an economic resource for a woodcutter, a part of an ecosystem, a decoration of a landscape or a hindrance for building a highway. A particular group of people does not see the tree in all these forms, but in a specific form (Foucault, 1972: 49). Environmentalists may see it as a part of an ecosystem. Therefore, in the environmentalists' discourse, the tree appears as an object that has particular, socially constructed meanings. 'Object' in the former sentence does not refer to an object in the physical world (the physical tree), but to a mental object, an image, idea or thought (the idea of a tree). Social practices take place against a background of historically specific discourses. Thus, social practices and the exercise of power that these practices imply can be interpreted by means of discourse theory.

This characterization of discourse is typically a post-structuralistic approach, of which Foucault is a famous proponent. It should be noted that different discourse theories can be identified (e.g. Hammersly, 1997; Howarth, 2000: 5-8; van Assche, 2004: 48-49). The critical discourse theory is a different approach. For example, Habermas (1984) aims to reshape the forms of discourses to ensure the absence of power in order to enhance democratic processes. Another approach is the pragmatic discourse theory, which focuses on the details of language use (van Assche, 2004; Hammersly, 1997: 49). In this chapter, I adopt the post-structuralistic approach, since this study is not about social ideals but about social reality, and because the object of study is not limited to language use but also covers other forms of social practice. In addition, the post-structuralistic discourse theory – which stresses the socially shared ideas and inherent powers that underlie social practices – forms a good interpretative framework for this study, since the members of the garden complexes can be regarded as distinct groups of people with distinct social practices. Once more, I use the term 'discourse' to refer to an analytical concept. While in this study I observe social practices (e.g. garden design, conversations, publications, all instances of observable empirical entities and events), discourses – as sets of socially shared ideas – cannot be observed but only reconstructed from the observations as patterns in social practices.

7.3 Uses, meanings and experiences of the gardeners

Conceptually, one can make a division between the uses of a place, the meanings attributed to a place and the way a place is experienced. In daily life, however,

people often do not make such a division, since uses, meanings and experiences of a place are intimately intertwined. This is the case in the garden complexes: the gardeners interviewed about the special characteristics of the gardens, in making up their sense of the place, came up with use-meaning-experiences complexes. An analysis of the interviews revealed eight different complexes:

- Rest, privacy, being alone, relaxing, doing nothing ('Our garden's a mess, but I don't mind, I like to rest.').
- Nature, birds, plants, watching things grow and change with time.
- Social contacts, talking, attending club nights, helping each other ('At this place, people don't think "me", "me", "me".').
- Safety, social control, no criminality ('People watch your stuff.').
- Health, recuperation, fresh air, relieving stress ('This place is good if you feel down; there's no stress. You can relax.').
- Being away, escaping daily life, being somewhere else ('The feeling of not being in the city.').
- Hobbies, doing things, being busy, joining activities ('I've already got three ponds in my garden, which is pretty stupid. But I need to do something, so I'm going to make a fourth one this summer.').
- History, memories ('Everything's loaded with stories. One house is built out of bricks from a church that was bombed in World War II.').

Special emphasis should be put on the social contacts. Many gardeners explicitly stated that they feel a strong sense of community in the garden complexes, which is very important to them. Generally, the uses, meanings and experiences mentioned by the gardeners are not very surprising. They largely resemble the outcomes of many studies into landscape experience. For example, Kaplan and Kaplan stress that for many people, the experience of nature has to do with privacy, being away, recuperation and doing things (Kaplan & Kaplan, 1989).

From the notion that the uses, meanings and experiences as expressed are often found in landscape experience research, we cannot draw the conclusion that the place is not very special for the gardeners. On the contrary, all gardeners without exception mentioned that the place has a very distinctive and special identity for them. They call the place marvellous, fantastic, heaven on earth, etc. 'This place is gold to me'; 'I was surprised what this place means to me, it pulls at me like a magnet'; 'What can I say, I cried when we were told we had to leave this place'.

The set of opportunities as mentioned above does not cover what makes the place special and unique. It is the personal bond with the place, developed in the

course of years, that has converted the place into *the* place. Many people have been renting their garden for a long time – as long as 50 years – have built a little house on it, have been living in the house every spring and summer, have raised their children at this place, have seen little trees become big trees, etc. For most people, the place is not special because of the particular opportunities it offers, but because it has become a vast network of memories, associations and stories. The longer the personal history with the place and the more memories connected to the place, the stronger the bond with a place becomes. For people living there for years, the place has become an inseparable part of self-identity. For them, the garden is a mirror of their soul.

This unique sense of place, consisting of the place being an intimate part of personal history, can hardly be expressed. One can state that the place has a very special personal sense, and one can tell stories to illustrate it, for example: 'One cold winter, we skated from our house in Rotterdam to the allotment garden and drank a cup of chocolate there, we and our children, who were very young, the whole family. It was a peaceful day; it's wonderful to remember.' But one can hardly explain what this special sense consists of.

When gardeners talk about their place, they often compare their garden to the world outside the garden complexes in general or to the city of Rotterdam in particular. According to the gardeners, in the city there are criminals, people do not talk to each other, there is no place for hobbies, there is no nature, while in the garden complexes, it is safe, people meet, there is room for hobbies, there is nature, etc. This way of expressing indicates a strongly felt social identity, one intimately related to the place. In the following section, I will go into social identities related to the allotment gardens.

7.4 Social identities

In this study, I will speak of social identity whenever a group of people defines themselves as distinct from another group of people. This means social identities are products of social practices in which social distinctions and oppositions are created. Of course, one individual can have a multitude of social identities. A person can define him- or herself socially as a Dutch citizen, and at the same time as a member of an international salsa society. Social identities as constructed by a particular group in a particular discourse may very well be totally ignored by other groups and in other discourses.

The most important and strongly felt social identity is the distinction already mentioned: the 'we versus them' or the 'here versus the rest of the world' identity. Many people used the word 'we' when interviewed, referring to all allotment gardeners in the area ('We like green', 'We are not lazy people'). Most gardeners find they share a particular attitude that is not common outside the garden complexes. Why is this we versus the world identity that strong? One reason is that the social practices that produce this social identity are very dominant and stable, because they are embedded in organizations that have the power to exclude people who do not fit into the social practices. The following example illustrates this statement.

In the garden complexes, certain opinions about the maintenance of the gardens dominate, for example weeds should be removed, hedgerows clipped and lawns mowed. In short, an idea underlying the dominant practices is an image of an allotment garden as a place where nature must be controlled in detail by human labour. This image is reflected in the rules of the garden unions. The rules allow the board of the union to intervene if a gardener does not maintain his or her garden 'well' (that is, 'well' according to the image mentioned). A gardener who breaks the rules is warned. If several warnings do not achieve the desired result, the gardener will be excluded and forced to sell his or her property. Because the dominant image of a garden is expressed in the rules, only people holding the same image will be allowed to have a garden. This way, the dominant discourse of the controlling gardener is self-maintaining because it selects people who reproduce it. The discourse selects 'we', resulting in a very strongly felt we versus them identity.

The existence of an external threat is another obvious reason for the strength of this identity. The initial decision of the city council to destroy all the gardens to make place for new residential areas was a threat to everyone. No matter how the gardeners differ with respect to opinions, place meanings and experiences, the external threat strengthens the strong feeling of 'we, the gardeners', since all gardeners feel the same fundamental will to protect their garden.

Having said this, on a less fundamental level, different social practices in the allotment gardens can be identified, producing different social identities of gardeners. The historically dominant social identity – the social identity reflected in the garden rules – is undergoing a process of change. A shift in generations is the main reason for this change. The older generation, who created the allotment garden complexes after World War II, is decreasing in number, making room for younger people with different ideas. First, I will characterize the historically dominant

social identity. Then I will mention some elements of new discourses that are dominant amongst younger people and challenge this identity.

For the older generation, the gardens have to be maintained very well. To them, a garden means work. They also feel obliged to do some work for the garden union. Some older people complain about people with different opinions: 'They're not real gardeners: they don't like to work' or 'There's gardeners and there's camping people; sometimes camping people buy a garden, but they don't realize how much dedication a garden needs; often, they will leave within a year or two; if not, we force them to leave'. I think this strong emphasis on work is a heritage of the labour ethics that dominated in the Netherlands in the 1950s. During World War II, much of the Netherlands had been destroyed. For many years, people were determined to work very hard to rebuild the Netherlands and its economy. Especially Rotterdam – whose centre was completely destroyed in the war and where hard, low-paid work was performed in the harbour – is famous for its labour ethics. This attitude is perfectly reflected in the most famous line of the hymn of the Feyenoord soccer club, which is based in Rotterdam: '*Geen woorden maar daden*' (roughly: 'Not words, but deeds'). Although I did not experience the 1950s myself, I have an image of it, constructed from stories and TV documentaries. Being at the gardens complexes and talking with the gardeners often gave me the feeling of being back in the 1950s. While elsewhere in the Netherlands this labour ethics has disappeared, it has pretty much been conserved at this place, because, as mentioned, the idea is embedded in the rules of the garden unions, which have the power to exclude people who do not have the same attitude.

Another element of the historically dominant social identity connected with this attitude towards labour, is a particular image of nature. Most older people share an image of nature that resembles the functional image of nature, as described in Chapter 6. They consider a place to be natural if it is well maintained by people: 'Here in our gardens we produce real nature. Look over there, that spot just outside our garden complex, nobody cares for that place; that's not nature, it's just some trees and other messy stuff.' Nowadays in the Netherlands, most people do not have a functional image of nature, but an image tending towards the wild side, finding places natural if not much human influence is visible. When people of the older generation grew up, environmental problems were seldom heard of and man was generally regarded as the master of nature. This might explain the dominant functional image amongst older people.

As the number of people of this generation decreases at the allotment gardens, people of younger generations – including ethnic minorities – increase in number. They bring in other ideas, challenging the historically dominant social identity.

Most younger gardeners have other images of nature and other opinions of gardening. Many regard everything that grows spontaneously as nature, and enjoy it: 'Each spring, I see new species spontaneously grow in my garden. Isn't that wonderful?' For many young people, the reason to buy a garden is not to work in it, but to relax: 'A bottle of wine, the newspaper, sit and relax.' They find the regulations somewhat irritating. While the older people talk a lot about social contacts and social control, the younger often refer to privacy: 'A nice place just for me alone, privacy, no coffee conversations.' The older and the younger generation have a different attitude to gardeners who belong to ethnic minorities. Many older people do not like the way ethnic minorities maintain their gardens: 'Some just don't maintain it' or 'They grow strange vegetables, but they have no eye for beauty.' Many younger people are much more positive about them: 'It's really nice, they grow vegetables I've never seen before, and sometimes they give me some, so I can learn something about other cultures and other food.' Many older people have some problems with the changing opinions about gardening: 'It's a pity, real gardeners hardly exist any more. All this beautiful nature will disappear.' Despite that, most older people understand that opinions change: 'Things change, you know: younger people don't have much time. I think it's time to revise the rules, since they were good for us but they're not for them.'

Despite the existence of different social identities in the garden complexes (old vs. young, social contact seekers vs. privacy seekers, workers vs. relaxers), all differences became almost irrelevant in the light of the ongoing planning process, which united all gardeners in sharing the same fundamental interest: keeping their gardens.

7.5 The competition for place meanings

The life world of the gardeners, as described in the previous sections, was contested by the initial spatial plan of the city council. In this plan, the area was seen as an excellent area for the development of new residential areas to attract rich people to the city. The garden complexes were seen as economically uninteresting, easy to remove phenomena. Therefore, a competition for place meanings between the gardeners and the city council has developed since 2001. I will briefly highlight some events in this competition.

Ieders Land invited the city council to participate in the efforts to make a spatial plan for the area with all stakeholders. The city council refused to do so. This reflects a fundamental difference in the role of the council, as seen by Ieders Land on

the one hand and the council on the other. Ieders Land regards the city council as one of the stakeholders in the area, amongst other stakeholders such as the gardeners, house owners, companies and the green movement. The city council, however, sees itself not as one stakeholder among others, but as an organization that stands above all the different stakeholders, an organization that is capable of judging all interests of different stakeholders in order to make a good spatial plan.

Therefore, Ieders Land developed a spatial plan without the cooperation of the city council. In this plan, all functions (residential areas, room for new businesses) as indicated in the council's initial plan are met and no gardens are destroyed. In 2003, Ieders Land organized a symposium to present this plan. Representatives of the city council attended the symposium and said that they like the initiative and see it as valuable inspiration. At the same time, however, the city council developed its own spatial plan for the area.

In the Netherlands, a procedure called Milieu Effect Rapportage (MER; 'Report on Environmental Effect') is obligatory for all spatial plans. In this procedure, all kinds of environmental effects, including social and landscape quality effects, are judged for different alternative plans. The idea is that this procedure helps to compare alternative spatial plans, thus enhancing the likelihood of choosing the best options. While Ieders Land offered its plan to be part of this MER procedure, the city council decided to exclude it – thus excluding Ieders Land from the official planning process.

Nevertheless, the efforts of Ieders Land did make a difference. All kinds of activities were organized to inform the members of the city council about the special identity of the garden complexes: letters were written, journalists working for local newspapers were invited to write about the gardens, excursions were organized to make members of the city council experience the gardens, and city council meetings were attended. The council was affected by these activities. While in the initial plan all the gardens were to be destroyed, in the contemporary plans only about half of the gardens will be destroyed. Thus, the efforts of Ieders Land have succeeded in influencing the ideas of the council.

In the planning process for Zestienhoven, a participatory planning approach was not adopted. Still, some of the results of this study provide a good occasion to reflect on participatory planning. The basic idea of participatory planning is to include all stakeholders in a planning process, from the start (defining the problem) to the end (providing a solution). Adherents of this planning approach expect less resistance to the plans, since everybody's voice is heard during the process. While this approach is often promoted in planning theory, the conditions for mak-

ing this kind of planning process a success are less reflected upon. I will mention some of problems in meeting the right conditions.

First, all stakeholders have to be willing to participate. The city council – a very important stakeholder since it has legal power to make decisions about spatial plans – decided not to participate in the planning process started by Ieders Land. Second, there must be a reasonable degree of trust between the different stakeholders. Most gardeners do not trust the city council at all: 'They never listen to people'; 'They just do what they want'; 'They're only thinking about money.' Third, stakeholders have to accept uncertainty, since the outcome of a participatory process is unknown. Many gardeners indicate that they hated the uncertainty about the future of their gardens: 'I'd rather they flattened the gardens than have all these years of uncertainty; the strain's killing me.'

Generally, there is a gap between the ideals of participatory planning and the reality of social practice. This gap resembles an opposition between the discourse theories of Habermas and Foucault. 'The works of Habermas and Foucault highlight an essential tension in thinking about political and administrative rationality. This is the tension between consensus and conflict, ideals and reality' (Flyvberg, 2000). In his theory of deliberative democracy, Habermas (1984) sketches an ideal situation of communication between stakeholders who are striving primarily for an optimal democracy. Habermas (1993: 31) defines the conditions for ideal democracy in communication: generality (no party affected should be excluded), autonomy (all participants should have equal possibilities to speak and criticize), ideal role taking (participants must empathize with each other), power neutrality (existing power differences between participants should be neutralized) and transparency (participants must openly explain their intentions). These conditions can be seen as conditions to meet the ideal of participatory planning.

On the one hand, it can be argued that these conditions are hardly met in the planning process for Zestienhoven. The city council does not want to neutralize its power. On the contrary, it used its power to exclude the plan of Ieders Land from the obligatory MER procedure, thereby frustrating the conditions of generality and autonomy. Moreover, Ieders Land and the city council do not show a great deal of empathy towards each other. 'Power is always present' says Foucault (1998: 11 and 18). Power is embedded in discourses, and communication involves discourse. The gardeners and the city council are striving not for pure ideal democracy, but primarily for the goals defined by their respective discourse.

'Habermas's thinking is well developed as concerns political ideals, but weak in its understanding of actual political processes', Flyvberg (2000) writes. The same applies to participatory planning theory. It concentrates on the theoretical optimal

conditions to enhance communicative and collaborative planning, broadly ignoring the question whether it is possible to meet these conditions in social practice (Edwards, 1998). Power, strategy and conflict are immanent to planning in a polyvocal society (Flyvberg, 2000; Hillier, 2003; Pløger, 2004). Power, strategy and conflict should not be dismissed as unwanted in planning theory, but be taken as a prerequisite for planning theory, since these phenomena are embedded in social practice, as this study illustrates.

On the other hand, the ideas of the city council have been changing under the influence of Ieders Land. Not because the latter has exercised 'strong' forms of power (e.g. by threatening city governors), but because it has convinced some city councillors of the important meanings of the allotment gardens in an ongoing communication process. This way of influencing resembles at least a part of the ideals of Habermas and the adherents of participatory planning. Thus, criticism that states that participatory planning theory and Habermas's discourse theory are too idealistically oriented to provide good interpretation frames for planning practices is not corroborated by this study. Power, strategy and conflict should not be dismissed, nor overstressed. The opposition between Habermas and Foucault may at first sight be strong, since their theories are oriented towards different goals, but might not be that strong below the surface.

7.6 Conclusion: miniature societies

The gardeners in Zestienhoven have created networks of meaning that constitute complex relations between personal, social and place identity. For many gardeners, the place is a resource for personal identity, since important events in their personal history took place in the garden complexes. The place is a resource for social identity, too. Not only because social relationships developed at the place, but, more importantly, the social identities produced in gardeners' discourses are directed to the place: ideas about gardening and nature are foundational ideas in these discourses. In the gardeners' discourses, other discourses are embedded, transformed and applied to gardening (e.g. the labour ethics discourse). Social distinctions that exist in society do not disappear in the gardeners' discourses. Rather, they are transformed and get new meanings. The distinction between older and younger generations manifests itself in the gardeners' discourse as different ideas about gardening and the importance of a sense of community. In this sense, the garden complexes are miniature societies that resemble big society.

When it comes to spatial planning processes, the city council should be characterized not as an organization that stands above stakeholders, but as one of the stakeholders, operating in a specific discourse. The city council discourse was initially based upon the will to enhance the city's economic welfare. The planning process can be seen as a confrontation between different discourses. During this confrontation, the different discourses influenced each other. In the city council discourse, sensitivity to the place identity of the gardeners has emerged. In the Ieders Land discourse, the new functions of the area were accepted.

The insights offered by this study may be of help for spatial planning and political decisions; not because it expounds on good or bad decisions about the area (as a scientist, I will remain silent about political decisions), but because it provides insights into the reality that spatial planners and policy makers have to decide about. The personal and social meanings the gardeners attach to the place are part of the reality of Zestienhoven. Having knowledge of this part of reality may enhance the likelihood of taking good decisions about the area – whatever 'good' may be in the end.

In this study, discourse theory offered a useful framework to study the place meanings, experiences and identities, especially because the gardeners have developed a strong sense of community. At the same time, the study shows that not all place meanings and experiences are determined by discourse. For many gardeners, personal memories create a personal experience, which is neither the product of discourse nor expressible in discourse. Discourse is primarily a social phenomenon, while experience is a personal psychological phenomenon. The experiencing subject is greatly influenced by discourse, but not limited to discourse. Therefore, a part of experience cannot be captured by a discourse approach. In addition, while this study demonstrates that discourse theory offers a conceptual framework to describe the cultural influence on experience, discourse theory offers no detailed explanation how culture influences experience. It is rightly assumed that there is such an influence, but the relation between the social and the psychological remains obscure, since discourse theory expounds on the social reality. Actually, some circular argument is inherent in most works on discourse theory: discourses produce subjects, and subjects produce discourses. Thus, discourse theory, like the other approaches mentioned in the review study and the empirical studies, does not offer a framework to construct a comprehensive theory of landscape experience, since only the cultural part of landscape experience can be stressed.

The three empirical studies presented in Part 2 together demonstrate the fragmentary character of the field of landscape experience research. While every approach adopted in these studies makes sense and may be of use for spatial policy

and planning, it is hard to establish relations between these approaches. Relations remain hidden beneath the surface of the applied theories. As explained, my reason for uncovering relations between different approaches is to construct a general theory of experience (Part 3). By reinterpreting the applied theories of landscape experience into terms of the general theory of experience, I hope to find relations between the different applied theories and thus find opportunities to construct a comprehensive theory of landscape experience (Part 4).

Part 3

TOWARDS A THEORY OF EXPERIENCE

Chapter 8 Experience and the brain

8.1 Introduction: experience is the content of consciousness

Experience is the content of consciousness (Chalmers, 1995a; Nagel, 1974; Searle, 2000), that is, the stream of phenomena that pop up in our conscious mind. Experiencing something implies being conscious of something. Being in a conscious state implies experiencing something.

> When you look at the page, you are conscious of it, directly experiencing the images and words as part of your private, mental life. You may have vivid impressions of coloured flowers and vibrant sky. At the same time, you may be feeling some emotions and forming thoughts. Together such experiences make up consciousness … (Chalmers, 1995b)

Of course, unconscious mental processes exist, and can affect consciousness, but unconscious mental processes are not experienced.

Consciousness, and hence experience are mongrel concepts that are hard to define in a clear-cut manner (Block, 1994, 1995a; Chalmers, 1997; Searle, 1997: 5). Block (1994: 11) writes about 'phenomenal consciousness', a term he uses synonymously with experience:

> … there is no non-circular definition to be offered; the best that can be done is the offering of synonyms, examples and one or another type of pointing to the phenomenon. I used as synonyms 'subjective experience' and 'what it is like to be us'. In explaining phenomenal consciousness, one can also appeal to conscious properties or qualities, e.g. the way things seem to us or immediate phenomenological qualities. Or one can appeal to examples: the way things look or sound, the way pain feels and more generally the experiential properties of sensations, feelings and perceptual experiences. I would also add that thoughts, wants and emotions often have characteristic conscious aspects.

Searle (1997: 5) distinguishes between analytical definitions – which reflect the underlying essence of a phenomenon – and common-sense definitions, which just

identify what we are talking about. Though analytical definitions of consciousness are difficult, a common-sense definition is not a problem. Searle (1997: 5) states:

> Consciousness refers to those states of sentience and awareness that typically begin when we awake from a dreamless sleep and continue until we go to sleep again, or fall into coma or die or otherwise become unconscious. Dreams are a form of consciousness, though of course quite different from full waking states. Consciousness so defined switches on and off. By this definition a system is either conscious or it isn't, but within the field of consciousness there are states of intensity ranging from drowsiness to full awareness.

Nagel (1974) formulates a condition denoting when an organism is conscious: 'an organism has conscious mental states if and only if there is something it is like to be that organism – something it is like for that organism. We may call this the subjective character of experience'.

According to Searle (1992: 151-174), it is important to distinguish between conscious, unconscious and nonconscious states. Conscious states are experiences accompanied by a subjective feel. Unconscious mental states are, in Searle's definition, mental states that are not experienced at a particular moment, but that are in principle accessible to consciousness (Searle, 1992: 152). For example, my belief that trees have roots is unconscious most of the time, but can become conscious every then and when. Most of our beliefs, desires and memories are not present to our consciousness at any given moment, but can be made conscious. An unconscious state is state that is a possible thought or experience (Searle, 1992: 159). Nonconscious states refer to phenomena that are not mental at all. Some nonconscious states can nonetheless influence mental states. For example, the serotonin level in a part of the brain may exercise influence on experience, while we have no conscious access to the serotonin level. Not every state of the brain that functions essentially in the production of mental phenomena is itself a mental phenomenon (Searle, 1992: 154).

We can easily identify different modes of experience. For example, Lormand (1996) distinguishes between:

> … perceptual experiences, such as tastings and seeings; bodily sensational experiences, such as those of pains, tickles and itches; imaginative experiences, such as those of one's own actions or perceptions; and streams of thought, as in the experience of thinking 'in words' or 'in images'.

Moreover, in each mode, every single moment of experiencing can be different. For example, seeing a blue door differs completely from hearing a yell. No matter how experiences differ from each other, they all share the fact that they are conscious. Flanagan (1991) calls this the homogeneity and heterogeneity of experiences: they are all conscious, and yet all different. Therefore, the properties of consciousness are the only properties that all experiences have in common. These properties are the subject of the following section.

In the subsequent sections, I will explore different philosophical positions that expound on the relation between consciousness and the brain. While we can infer from observations that consciousness and the brain are probably intimately related, the nature of this relation is conceptually problematic. In section 8.3, this conceptual problem – the 'mind-body problem' or 'explanatory gap' – will be explained. In sections 8.4 to 8.6, I will review different philosophical positions that expound on the problem. I will argue that a position that can be called the 'supervenience view' is favourable (sections 8.7 and 8.8).

8.2 Properties of consciousness

Since we all have experiences, we are all experts on the subject of consciousness, in some sense. By virtue of having experiences, we are capable of stating properties of consciousness by systematically reflecting on our experiences. A set of properties is not an analytical definition of consciousness, but a characterization of consciousness. Moreover, such a set is not a theory of consciousness but a set of empirical observations. A theory of consciousness should explain why consciousness has these properties. In this section, I will argue that consciousness has the following properties: it is qualitative, subjective, a unity, a process, continuous, structured, intentional, comes in a mood, has a centre and periphery of attention, and has a Gestalt structure.

Consciousness is qualitative. Every experience has 'a certain qualitative feel to it' (Searle, 2000). Seeing a tree differs qualitatively from smelling a perfume. It makes no sense to state that the experience of seeing a tree is larger or smaller than the experience of smelling a perfume. The qualitative character of experience is often described as follows (e.g. Nagel, 1974; Searle, 2000): for every experience there is something it feels like, or something it is like, to have that experience. To refer to the qualitative character, philosophers and scientists often use the term *qualia* (Alter, 2002; Leon, 2001).

> Consider your visual experience of reading these words, or the auditory and tactile sensations you had when you turned the previous page. There is something it is like to have those experiences. That is, the experiences have certain qualities characterizing what it is like to have them. Those properties are known as *qualia* (singular: *quale*). Common synonyms include 'phenomenal properties' and 'phenomenological properties', amongst others. Phenomenally conscious states, by definition, are states with *qualia*. (Alter, 2002)

Consciousness is subjective. 'Conscious states exist only when they are experienced by some human or animal subject. In that sense, they are essentially subjective.' (Searle, 2000)

> The only states of consciousness that we naturally deal with are found in personal consciousness, minds, selves, concrete particular I's and you's. Each of these minds keeps its own thoughts to itself. There is no giving or bartering between them. No thought even comes into direct sight of a thought in another personal consciousness than its own. Absolute insulation, irreducible pluralism, is the law. Neither contemporaneity, nor proximity in space, nor similarity of quality and content are able to fuse thoughts together which are sundered by this barrier of belonging to different personal minds. (James, 1950: 227)

We have direct access to our own minds only. We are unable to know exactly what another person experiences. Therefore, consciousness has a subjective or first-person ontology. Objects like mountains or chairs have an objective or third-person ontology: their existence is independent of the subject's predispositions (such as wishes, emotional states, thoughts or beliefs). Consciousness, on the other hand, exists in these predispositions. Of course, the objective ontology of phenomena in the physical world does not imply that our knowledge of these phenomena is objective (epistemological objectiveness does not follow from ontological objectiveness). Still, physical phenomena and consciousness are different from the epistemological point of view as well. Phenomena in the objective world are observable from different points of view, for example, by different subjects with different predispositions. Consciousness, on the other hand, is accessible from one point of view only: the experiencing subject.

Consciousness is a unity. 'All conscious experiences at any given point in an agent's life come as part of one unified conscious field' (Searle, 2000). A state of

consciousness at a particular moment is not separated into different parts. For example, a subject does not have divided synchronous experiences of a sunset, the wind touching the skin and the taste of salt air. All these aspects are united into one experience (Edelman, 1993: 143; Hurley, 1998: 4). The unity of experience is illustrated by the fact that 'we cannot be aware of two incongruent scenes at the same time, as indicated by the bistability of ambiguous figures and the phenomenon of perceptual rivalry' (Tononi & Edelman, 1998). The picture below is an example of an ambiguous figure.

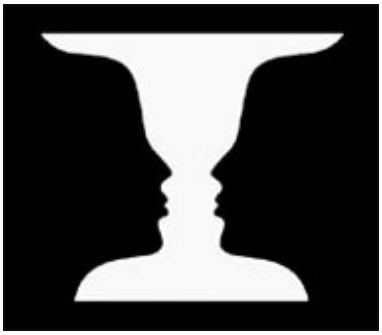

Figure 3: Ambiguous figure

The picture can be experienced in two different ways. But we are able to experience only one of the two ways at a single moment. We see either a vase or two faces. In the case of perceptual rivalry, two dissimilar images are presented to the two eyes. The two incongruent scenes are integrated into a new percept, or eventually, one of the two scenes is suppressed (Fries et al., 1997). Though it is not the classic state-of-the-art test, the next do-it-yourself experiment illustrates perceptual rivalry. If you hold a finger right in front of you left eye, and you close your right eye, you will see your finger. If you close your left eye and open your right eye, you will see a different scene, without your finger. Obviously, the scenes observable by your right and left eye differ. If you open both your eyes, you will not experience the two scenes, but either experience one of the scenes, or experience a new scene, in which it seems you can watch through your finger. We all know it is an illusion to watch through your finger. An illusion is a discrepancy between the physical reality and our experience of reality. This does not make the experience unreal.

Consciousness is a process (Edelman, 1993: 140, 171). 'Within each personal consciousness thought is always changing' (James, 1950: 226 and 229). The contents of consciousness constantly change. Two moments of experience are never completely the same. Of course, one can have two or more experiences of, for instance,

the same table. In that case, the object of your experience is the same (James, 1950: 231), but all the details of the two experiences will never be the same.

Consciousness is continuous (Edelman, 1993; James, 1950: 226). 'Within each consciousness, thought is sensibly continuous … without breach, crack or division' (James, 1950: 237). We experience continuously, except when we fall asleep, go into a coma or die. Still, if conscious states are interrupted, continuity exists between consciousness before and after the interruption (James, 1950: 237). It feels like the same mind: the self is still the self.

Consciousness is structured. Our experiences have a sense of familiarity. For example, you will experience a house as a house, even if you have never experienced that house before. If you experience your own house in a different light than you did in your past experiences, or under a different angle, you still experience your own house. In this sense, consciousness is structured, since regularities are to be found in our experiences.

Consciousness is intentional (Edelman, 1993: 141; Siewert, 2003). All consciousness is consciousness of something (Searle, 2000). 'Thought appears to deal with objects independent of itself' (James, 1950: 226 and 271). It is impossible to be conscious without experiencing something. The something does not have to be an object out there. If you stare at a bright light for a moment and then close your eyes, you will experience an after-image of the light. In this case, the object of experience is not an object out there. The objects of experience can be objects in the external world, after-images, abstract thoughts, emotions, etc.

Consciousness comes in a mood (Damasio, 2001; Searle, 2000). At every single moment we experience, we are in a particular mood, whether bored, excited, sad, happy, etc. On many occasions, we do not pay attention to our mood. Still, at any moment, we are in a mood: we can decide to direct our attention to our mood and we'll always find one. It may be hard to express what our mood at a particular moment feels like, but it is there. Our mood may not be very intense, or may be a mood we would describe as 'neutral', but even on these occasions, we are in a mood, because a not very intense, neutral mood is a mood too, and is recognized by us as being a particular mood.

Consciousness has a centre and periphery of attention (Searle, 2000). We can deliberately switch between aspects, or details, of the contents of our consciousness (Searle, 2000). Consciousness 'is interested in some parts of these objects to the exclusion of others, and welcomes or rejects – chooses from among them, in a word – all the while' (James, 1950: 225). Attention directs consciousness to its objects and wipes out or weakens surrounding irrelevant aspects (Edelman, 1993: 175).

Consciousness has a Gestalt structure (Searle, 2000): we tend to integrate loose stimuli into a coherent experience. Figure 4 demonstrates the Gestalt structure of experience. Looking at it, we will see a triangle. Nevertheless, the picture consists of three dots, with indentations oriented towards the centre. In our minds, we integrate these dots into a triangle and we project this triangle onto the picture. The Gestalt structure is not the same property as the unity of consciousness. The unity refers to the integration of different aspects of experience (like seeing the sun and feeling the wind) into a single experience. The Gestalt structure refers to the integration of loose stimuli into a coherent whole. A unified experience can consist of a number of Gestalts (for example, a triangle and a square).

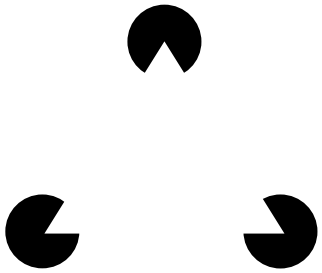

Figure 4: The Kanizsa triangle

To sum up, consciousness is a continuous, intentional, structured process of qualitative subjective unity, that comes in a mood, with a centre and periphery of attention and with a Gestalt structure. No matter how experiences differ from each other, they all share these properties. I do not pretend to provide a complete list of the properties of experiences; there might be more, but this overview contains the most important properties. A complete theory of experience should explain these properties. Since my aim is not to produce a complete theory of consciousness, I will not explain all these properties thoroughly. However, I will, in the subsequent sections of part 3 of this book, give some explanation why consciousness is structured, intentional, continuous, a process, qualitative, subjective and a unity, and comes in a mood and has a Gestalt structure.

8.3 The explanatory gap

Hippocrates (400 BC) assumed that consciousness and the brain are intimately related. Most contemporary scientists and philosophers share this assumption (e.g. Dooremalen, 2003; Edelman, 1993; Horgan, 2000; Kandel & Squire, 2000; Nørretranders, 2000; Rees et al., 2002; Searle, 1992). The empirical evidence that con-

scious processes and brain processes covary systematically is overwhelming. Brain damage often results in changes in consciousness (e.g. Zihl et al., 1983). Antidepressants, which change the brain's chemical content, are developed to change the mood of the user. Neuroscientists have discovered that the physical stimulation of brain cells alters experiences. Maguire et al. (2000) found that London taxi drivers, who have to memorize every street in London, develop new nerve cells in the hippocampus, a brain region that is known to play an important role in both long-term memory and spatial orientation. In this case, a series of experiences seems to result in a modification of the brain. Since consciousness and the brain show systematic covariation, it is very likely that they are related. However, the nature of this relation is philosophically problematic. The problem was made explicit by Descartes in the seventeenth century.

In Descartes' view, minds and bodies differ fundamentally. First, bodies have spatial properties, just as a chair has a particular size and is located at a particular place. Mental entities, in contrast, do not have spatial properties. According to Descartes, it is nonsense to ask for the size of someone's experience of a tree. Second, bodies have material qualities, such as hardness. Mental entities have qualities that differ from material qualities; mental entities, for example, do not have the qualities of hardness. Third, the possibilities to gather knowledge differs between minds and bodies. Knowledge of mental entities is private, while knowledge of bodies is public (Heil, 1998: 16-18). Descartes concludes that minds and bodies are substances of distinct kinds that, in the case of living human beings, happen to be intimately related. A substance is that which can exist alone. Hence, in Descartes' view, the mind can exist alone, independently of matter, and vice versa. This view is called substance dualism. Though being fundamentally different, minds and bodies seem to interact causally.

> The Cartesian picture is easy to spell out. Imagine that you sit on a tack planted in your chair by a practical joker. Your sitting on the tack (a material event involving a pair of material objects, the tack and your body) gives rise to a distinctive sensation of pain (a mental event). The feeling of pain in turn generates another mental event, a desire to leap upward, and the desire brings about an appropriate leaping bodily motion (a material event). (Heil, 1998: 21)

The mind-body problem refers to the question how two substances can causally interact while being fundamentally different. Descartes did not provide a satisfying solution to the problem.

The mind-body problem, as described by Descartes, is, in contemporary debates in philosophy of mind, specified as the problem how consciousness and the brain are related. According to Nagel (1974), 'consciousness is what makes the mind-body problem really intractable'. If all mental processes were unconscious, subjectivity – or the what-it-is-like character of consciousness – would not exist; hence, there would be no conceptual problem.

Intuitively, the suggestion that consciousness and the brain causally interact seems right. A causal relation explains the covariation. It seems that antidepressants cause a change of mood. It seems that the experiences of memorizing London streets causes the modification of the hippocampi of taxi drivers. 'Ignoring tall stories, we know that consciousness is always associated with neural activity in a complex brain, and that altering that activity, whether by changes in sensory input, disease, drugs, direct electrical stimulation or neurosurgery, can alter the contents of consciousness' (Glynn, 2001). The suggestion that consciousness and the brain are causally related creates a philosophical problem. Because consciousness and brains seem so different, it is hard to understand how they can causally interact. The missing link is often called the 'explanatory gap', a term coined by Levine (Horgan, 2000: 24).

Why is it important to reflect on the explanatory gap? Without a theory that offers a way to bridge the gap, we have no idea how to interpret the covariation between brain processes and conscious processes. In this dissertation, neurological data are one of the sources I want to use in order to build a theory of experience. Therefore, I need a theory to guide the way in which I can use these data. Moreover, reflecting on a central problem in the philosophy of mind helps to gain an insight into the nature of consciousness itself, since a theory bridging the gap between consciousness and the brain implies a view on consciousness.

In the subsequent sections, different theories expounding on the relation between consciousness and the brain will be reviewed and criticized. According to dualistic views, consciousness and the brain are fundamentally different phenomena (section 8.4). Adherents of monistic theories reject the assumption that consciousness and the brain are different substances. In this view, three options remain: there is only consciousness, there is a unknown basic substance being the source of both consciousness and matter (section 8.5), or there is only physical matter (section 8.6). I will argue that most of these views are problematic and that an alternative view is needed. Before giving this view, I will sum up my assumptions, which can be logically abstracted from my criticism of the reviewed theories (8.7). A view of the relation between consciousness and the brain that meets these assumptions will be posed (8.8). Finally, I will state some conclusions (8.9).

This chapter does not provide a complete review of the different philosophical positions; rather, I illustrate some views in order to build up my argument. For elaborated reviews on this topic, see Broad (1925), Chalmers (2003) or Heil (1998).

8.4 Dualistic theories: parallelism, epiphenomenalism, interactionism

Dualists think that consciousness and brains are fundamentally different phenomena. Consciousness is not physical, according to dualists. Substance dualists, Descartes being an example, think that consciousness and brains are different substances. Property dualists think that consciousness is not necessarily another substance, but nevertheless is some property that is fundamentally different from the properties of physical bodies. Intuitively, dualism seems to make sense, since consciousness seems so different from physical phenomena. However, dualists have to face a problem: if consciousness is non-physical, and if consciousness and brains causally interact, the causal closure of the physical world will necessarily be violated. The assumption that the physical reality is causally closed is shared by many scientists and philosophers. A physical object never starts to move without a physical cause. A billiard ball on a table does not move unless hit by a cue or by another ball. And it never stops moving without a physical cause, such as air resistance. Three assumptions (consciousness is not physical, consciousness and brains causally interact, the physical reality is causally closed) that seem intuitively to be true, do not fit together. Therefore 'consciousness is deeply mysterious on anyone's view. We have no idea how to accommodate consciousness to the material world, no idea how to explain the phenomenon of consciousness' (Heil, 1998: 127). According to Chalmers (Chalmers, 1995b), 'consciousness fits uneasily into our conception of the natural world'. What explanation do dualists offer to solve this problem?

According to Leibniz (1973), mental events and physical brain events occur simultaneously, without any causal interaction. This view is called parallelism. 'Minds, parallelists contend, appear to interact with the material world, but the appearance is just that: an appearance' (Heil, 1998: 27). If you sit on a tack, your nervous system registers your sitting on a tack and sends a signal to particular muscles, resulting in your jumping out of the chair. Parallel to this entirely physical process, you have an experience of sitting on a tack, you decide to jump out of the chair and you have an experience of jumping out of it. These sequences of physical events and mental events occur perfectly parallel, without the first being the cause of the latter, and vice versa. Why do sequences of physical events covary

systematically and universally with sequences of mental events? According to some, this is an unsolvable mystery and we just have to accept it: 'Scientists should not seek to determine the nature of consciousness at all. They should take consciousness for granted and study its correlates in their various domains of enquiry' (Griffiths, 1999). According to others, it is God creating the perfect synchrony (Heil, 1998: 28).

The problem with parallelism is that this view blocks in advance the road to scientific research and understanding of the relation between consciousness and the brain, by stating that such a relation is limited to synchrony, which is mysterious or an act of God (God being, in this context, a mystery with a name). Moreover, it is logically wrong to conclude this relation is a mystery forever unsolvable, just because it appears as a mystery for us at the moment.

Epiphenomenalism is another dualistic view. Epiphenomenalists argue that states of consciousness have physical causes but no physical effects (Alter, 2002). According to Jackson (1982), mental events are by-effects (in other words: epiphenomena) of neural events. Your sitting on a tack causes neural event *p*. Neural event *p* causes an experience of pain. Neural event *p* also causes neural event *q*, which causes you to leap out of the chair. Neural event *q*, in addition, causes your desire to leap out of the chair. It is not this desire that causes your move, but the neural event *q*, that causes the desire as a by-effect. Epiphenomenalism explains the covariation because, according to this view, consciousness is caused by neural events. Consciousness, in turn, cannot be the cause of physical events. According to epiphenomenalists, the bridge across the gap is a one-way thoroughfare, causally speaking.

By assuming consciousness is a causally inactive by-effect, epiphenomenalists hope to hold on to the assumption that the physical reality is causally closed, since in their view nothing outside the physical domain can cause a physical event. I doubt whether they succeed in their efforts. In the normal view on causal closure, effects of causal powers, like a billiard ball moving as an effect of a cue hitting it, become causes in turn. For example, the billiard ball causes heating of the billiard table's surface and the movement of air. Thus, physical events form an uninterrupted chain of causality. In the epiphenomenalistic view, however, the chain is interrupted, because some causal powers leak away into the mental domain and never return. Blocking one direction is not enough to keep up with the normal view on causal closure; both directions should be blocked (but this would be falling back to parallelism). Moreover, epiphenomenalism, as well as parallelism, seems to contradict our daily experiences (Heil, 1998: 38). For example, if we plan

to take a walk, we have the idea that it is our desire to take a walk that makes us move.

It seems hard to combine the assumptions that consciousness is not physical and that the physical reality is causally closed, by dismissing the assumption that consciousness and the brain causally interact. Full-blown interactionistic dualists bite the bullet here. They think consciousness and the brain causally interact and argue that physical reality is not causally closed (Alter, 2002). Often, interactionistic dualists refer to quantum theory. Niels Bohr saw that quantum mechanics violates some assumptions of classic Newtonian physics (Faye, 2002). A particle can split itself seemingly spontaneously. It is impossible to predict whether or not a particle will split itself within a given space of time; only the probability can be calculated. Hence, the physical world seems not causally determined at the quantum level. Perhaps, Eccles (1986) states, the mental world somehow pops in to fill this causal vacuum, thus eliminating the causal indeterminacy.

Those dualists who refer to quantum theory often mention a thought experiment known as Schrödinger's cat (see Schrödinger, 1935, for the original publication). In this experiment, a cat is sealed in a box. Attached to the box is a device containing a radioactive atom and a canister of poison gas. There is exactly a fifty per cent chance of the atom decaying within one hour. If the atom decays, the poison will be released and kill the cat; if the atom does not decay, the cat will remain alive. In quantum mechanics, the atom is described as existing partly and simultaneously as decayed and undecayed. And the intriguing issue is whether the state of the cat is an alive/death in-between state as well.

Some interactionistic dualists argue that Schrödinger's cat is indeed in an in-between state, a state that ceases to exist only if an observation is made. As soon as one opens the box, the cat is either dead or alive. From this, these dualists conclude that experience (the observation) causes material states. This argument falls short. Also without observations made, the cat is either dead or alive at a certain point in time, but we can simply not know whether the cat is dead or alive. Thus, our description of the cat is a description of an in-between state. The interpretation of dualists is simply a false interpretation.

Moreover, since quantum processes occur continuously everywhere in the universe, is the whole universe always loaded with consciousness? If not, why are some quantum processes related to consciousness and others not? Empirically, we know that consciousness is related to neural events. Perhaps, on quantum scale, the physical reality is not causally closed. But on the larger scale of neural events, physical reality can be described as though it were physically closed. Interactionistic dualism does not make the mystery of the gap any less mysterious. At most,

this view moves the mystery to another place. In addition, most interactionistic dualists simply bypass the observation that we encounter consciousness in biological organisms only.

The dualistic views mentioned in this section are neither logically nor empirically impossible. Nevertheless, it is wise to dismiss these views since they do not provide insights that make the gap less mysterious. The various dualistic views provide answers, but the problems raised by these answers are at least equally difficult as the problem of the gap in first place. My criticism of parallelism and epiphenomenalism implies that I embrace the assumption that consciousness and the brain interact. From my criticism of interactionistic dualism, my support for the assumption that the physical reality is causally closed can be abstracted. Perhaps, then, the assumption that consciousness and physical bodies are fundamentally different should be dismissed. This is exactly what monists do. There are three fundamentally different options for developing a monistic theory of consciousness: one can assume that only matter exists (materialism), that only mind exists (idealism) or that a yet unknown substance exists that somehow constitutes both matter and mind (dual aspect theory). Idealism and the dual aspect theory will be reviewed in the following section, while materialist theories will be the subject of the subsequent section.

8.5 Monistic theories: idealism and dual aspect theory

Idealists think that there is nothing outside the mind and its contents (Heil, 1998: 33). If we describe our experiences, we often describe a physical world outside us that we perceive. According to Berkeley (1713), we cannot conclude from these descriptions that a physical world exists apart from us. For example, if we talk about a table, what we are actually talking about are our perceptions of or ideas about a table, not about a substance independent from us. The table only exists for us within our experiences, and it is impossible to conclude whether a physical table really exists independently without making use of our experience. Hence, talking about a table as a physical object existing independent of our experiences is totally meaningless. Therefore, we have no reason to assume a physical reality exists independently, Berkeley states. For idealists, the gap does not exist for they do not assume the existence of an independent physical world.

It is hard to refute idealism definitively (just as it is hard to refute dualistic theories definitively), if at all. Idealism is sceptical towards all knowledge we think we have about a world outside us. In the end, arguments can be found to be sceptical

about almost every statement about reality. With an example, Russell (1921) shows that radical scepticism undermines all knowledge. Imagine, Russell writes, somebody claims that five minutes ago God created the world as we know it, including us, with our memories of the past, and including 'old' things in the world. Although this claim contradicts all scientific knowledge, it is impossible to prove that the claim is false. This example teaches us that all beliefs we have are in the end founded on assumptions that cannot be proven to be true. Therefore, the criterion for a good assumption is not whether or not it is true, in the sense of empirically proven, but whether it works well. An assumption works well if it offers a good foundation for explanations of how the phenomena that we experience happen.

In this respect, the assumption that a physical reality apart from us exists works wonderfully well. The assumption underlies almost all natural scientific knowledge gathered in the past centuries and all kinds of experiments that confirm scientific theories. The assumption also offers an excellent explanation for many experiences we have. For example, the fact that when returning home we see the table we saw when leaving home is easily explained by assuming a physical reality existing outside our consciousness. The same applies to the fact that we feel something hard when we fall to the ground. The claim of idealists that we cannot assume an independent physical reality since we cannot know for sure that this assumption is true, is not sound when it comes to explaining what we experience. Thus, I find idealism implausible since I think we have good reasons to assume the existence of an independent physical reality.

An alternative monistic view contends that a fundamental and yet unknown substance x may be a basic substance from which both the mental and the physical spring: the dual aspect theory.

> … A view, once proposed by Bertrand Russell (1927), on which the causal powers of qualia derive from intrinsic properties of the physical world. Physical theory characterizes its basic entities relationally. Basic particles, for example, are described in terms of how they interact with other particles and forces. Perhaps fundamental physical entities have intrinsic properties, which ultimately account for their relational properties. If so, then those intrinsic properties might be phenomenal properties. Or perhaps they are protophenomenal properties, from which both physical and phenomenal properties are constructed. (Alter, 2002)

Nagel (1988) also suggests that qualia and physical properties may be manifestations of some deeper phenomenon, but he thinks our present concepts distort the

underlying reality. He proposes that we try to develop new concepts to close the explanatory gap, and that they should be modelled on Maxwell's development of the concept of a magnetic field, which enabled us to comprehend the relationship between electricity and magnetism (Alter, 2002).

Chalmers (1995a, 1995b) hypothesizes that information may be the fundamental phenomenon. He argues that information has both material and mental aspects, and that therefore every physical configuration that contains information might have consciousness.

To explain the relation between the mind and the physical world, the dual aspect theory proposes a new substance. This substance (or phenomenon; I am not sure whether the proposed x's are all substances) is pretty obscure: something having protophenomenal properties, something we probably should conceive analogously to Maxwell's magnetic field concept, or information. Instead of offering a solution, these views give a particular name to the mystery of the gap, but this does not make the gap any less mysterious. In addition, substance x has an implausible consequence. If protophenomenal properties underlie both the mental and the physical, or if physical configurations containing information are conscious, then consciousness should be everywhere in the universe. This position is called panpsychism. Chalmers is consistent at this point by stating that maybe every physical system that contains information is conscious; a computer is conscious, and so too is a thermometer. This consequence of the dual aspect theory has never been confirmed by any empirical observation. On the contrary, observations indicate that consciousness is limited to a subset of living organisms. Humans and, very probably, some animal species are conscious. Though it is unknown how far exactly down the phylogenetic ladder species have consciousness (Searle, 1997: 5), it is likely that very primitive organisms lack consciousness. This indicates that consciousness has emerged in the course of evolution. Therefore, I think that substance x does not offer a satisfactory answer to the problem of the gap.

8.6 Monistic theories: eliminative and reductionistic materialism

Materialists (or, more precisely, materialists in the context of philosophy of mind) think that only matter exists, and nothing else. All materialists share the idea that dualism is wrong, since consciousness, in the end, is a physical phenomenon or is constituted by physical phenomena (Heil, 1998: 53). How do materialists explain that consciousness is physical? One option is to argue that consciousness simply does not exist at all; this position is called eliminativism. Another option is to argue

that consciousness exists but is, in the end, reducible to particular types of brain states: reductive materialism. A third option is to adopt the view that consciousness is constituted by brain activity, but is not reducible to brain activity. In this section, I will review the first two materialistic views. In the subsequent sections, I will argue that adopting a form of non-reductive materialism is the most fruitful position with which to tackle the problem of consciousness and the brain.

In the book chapter *Quining qualia*, Dennett eliminates consciousness by arguing that consciousness, as normally conceived, does not exist. Some printers mention on their display that they are out of paper. We would find it odd to say that the printer experiences it has run out of paper, for we think printers do not have experiences. The printer displays a particular message under particular conditions, simply because it is made to do this. Contrary to printers, humans are conceived to have experiences, including these special qualia or what-it-feels-like character. According to Dennett (1988), this concept is false. Our brains are a set of dynamic predispositions that make us react in a particular way under particular conditions; our brains are more complex than but not fundamentally different from printers. The idea that we have experiences that consist of mysterious qualia is an illusion, Dennett says, nothing but a way of saying things.

Dennett illustrates his claim with an example of a wine-tasting machine. Imagine that we know exactly which chemical elements in which configuration create particular wine tasting sensations. We would be able to create a machine that can analyse wine and make wine quality reports.

> Such a machine might well perform better than human wine tasters on all reasonable tests of accuracy and consistency the winemakers could devise, but surely no matter how sensitive and discriminating such a system becomes, it will never have, and enjoy, what we do when we taste a wine: the qualia of conscious experience! Whatever informational, dispositional, functional properties its internal states have, none of them will be special in the way qualia are. If you share that intuition, you believe that there are qualia in the sense I am targeting for demolition. (Dennett, 1988)

Subsequently, Dennett just states that the machine does exactly the same as a person tasting wine, without additional arguments. And since the machine has no qualia, and does the same as wine tasters, wine tasters have no qualia, Dennett concludes.

With his wine tasting machine thought experiment, Dennett misses the fact that this experiment is totally irrelevant. In order to make the machine, valuations must

be added to it. Only chemical analyses of wine cannot do the job, since the machine has to connect the outcomes of analyses to valuations in order to calculate a quality report. These valuations are outcomes of human experience. Experience data go into the machine, and, after some calculations, the machine outputs experience data. Hence, the thought experiment says nothing about experience. Experience just goes in and out. The experiment only shows that a machine can make calculations with data representing properties of human experience, which is obvious. People differ from the machine in having experiences when tasting wine. A machine lacks these experiences. Therefore, a machine cannot make quality reports out of chemical analyses unless it is equipped with data that represent human experience.

Why does Dennett offer no strong arguments (in fact, any arguments at all) for his claim that consciousness does not exist? The answer, in my view, is because it is impossible to provide good arguments for this position. A simple do-it-yourself experiment proves that consciousness exists. Pinch your cheek. You will notice there is something it feels like to pinch your cheek. That is an experience. Hence, consciousness exists. Moreover, Dennett's claim that consciousness is an illusion is self-contradictory. Without experience, illusions cannot exist, since an illusion is a false idea or belief; in other words, a discrepancy between an experience and a state of affairs. Experience is a condition for having illusions. Dennett would of course never put it this way, but the structure of his basic argument is as follows: we experience that we have experiences, but this is an illusion, since we do not have experiences. (It should be noted that it is hard to determine whether Dennett expresses his belief that consciousness does not exist or that he plays a tricky game with our intuitions regarding to the nature of consciousness in *Quining qualia*. On other occasions Dennett expresses beliefs that seem not to match with the mentioned text. For the above interpretation I took the text literally, without being bothered about possible intentions of the author.)

Reductionists do not eliminate consciousness, and do not deny that consciousness has special properties, but identify consciousness with neural activity. Thus, reductionism, which is also known as the identity theory, offers an easy answer to the problem of the explanatory gap: mental processes are identical to neural processes (Churchland, 1986; Loar, 1990; Place, 1956; Smart, 1959). Given the current stock of knowledge, we do not know exactly how to bridge the gap between the mental and the physical. However, reductionists contend that, in the end, it will turn out that consciousness can be reduced to neural activity (Churchland, 1986; Loar, 1990). Hence, consciousness is physical, though we do not yet know all the details about how consciousness can be equated with particular types of neural

activity. Reductionists claim that future research will probably solve this conceptual problem and demonstrate that consciousness is physical. If consciousness is nothing but particular neural processes, which are obviously physical, there is no mystery: the problem of consciousness becomes a normal scientific project.

To get a better grip on this position, I will compare the problem of consciousness with the problem of lightning. If we go back to some point in history, lightning was a scientific problem, since a scientific explanation of the nature of lightning and its causes was not available. Scientists have, however, discovered that lightning is identical to a type of electrical activity in the air and have described satisfactorily those processes that cause lightning. Nobody wants an explanation for the fact that lightning is identical to electrical activity in the air: we just have two names for the same phenomenon. According to reductionists, the same applies to consciousness: when we talk about consciousness, we are talking about certain types of neural activity. We just do not know which types yet. This is not an ultimate mystery, but a challenge for neuroscientists. Very probably it is a difficult scientific project, but nevertheless nothing but a normal scientific project. For reductionistic materialists, the causal interaction between consciousness and the physical world is of course not a problem: since consciousness is a physical phenomenon, the causal interaction between consciousness and the physical world does not contradict the observation that the physical world is causally closed.

While on the one hand reductionism demystifies consciousness by assuming it is a material phenomenon, this assumption is, on the other hand, re-mystifying. The problem of reductionism is that it does not offer a satisfactory explanation for the special characteristics of consciousness, the qualia or the subjectivity (Chalmers, 1997; Honderich, 1996-1997; Nagel, 1974; Searle, 1997). If we argue that 'X is Y', we have concepts of X and Y in mind that enable us to grasp the meaning of equating the two. For example, the expression 'your sister is my colleague' makes sense because we know that sisters and colleagues are both persons. Likewise, the expression 'lightning is a type of electrical activity in the air' makes sense because we know both lighting and electrical activity are particular material processes. Only with this adequate theoretical background are we able to understand the 'is' in the expression. For reductionistic theories, we lack a theoretical background to understand the equation: it is hard to imagine that consciousness, being characterized by subjectivity or qualia, is exactly the same as neural activity. Therefore, theories that identify consciousness with neural activity are mystifying (Nagel, 1974): we just have to take for granted the identity, without being able to understand it.

I have dismissed parallelism, epiphenomenalism, interactionism, idealism, the dual aspect theory and eliminativism for combinations of various reasons: the implausibility of assumptions (e.g. the assumption no physical reality independent of us exists), the contradiction with empirical observations (e.g. consciousness is to be found in a subset of organisms only), the lack of offering any solution (e.g. a position that promotes causal leakage does not tackle the problem of the causal closure of the physical world) or being self-contradictory (e.g. we think we have experiences, but that is an illusion). I cannot dismiss reductionistic materialism, for I find this position not based on implausible assumptions that offer a solution to the explanatory gap, not contradictory with observations, and not self-contradictory. True, I think that reductionistic materialism does not offer a good explanation for the subjective nature of consciousness yet, but this might be nothing but a contemporary conceptual problem, to be solved in the future by neuroscientists who are in pursuit of a Nobel Prize.

Still, there are strong arguments against reductionistic materialism, for example the multiple realizability argument put forward by Putnam (1975) and Fodor (1976). Multiple realizability is the thesis that the same mental states can be realized by different physical states. For example, the mental state of 'being in pain' can be realized in my nervous system, in your nervous system and in a dog's nervous system. These nervous systems are, however, different in details. Thus, 'being in pain' probably correlates with different physical states of nervous systems in different organisms. If reductionistic materialism were true, the mental state 'being in pain' would be identical with a particular physical state, and hence, could not be realized by two different nervous systems.

Therefore, reductionistic materialism is not the best default position as a foundation for a theory of consciousness. It is better to assume that consciousness and neural activity are fundamentally different and that different neural systems can give rise to the same mental states, unlike reductionistic materialists do. There is an alternative position – nonreductive materialism, which depicts consciousness as a supervenient or higher-order property of neural activity – that is in my view the best default position, because it is in accord with both empirical observations and our current stock of knowledge. Before explaining this position, I will state some assumptions about consciousness and the physical world that reflect these observations and our knowledge.

8.7 Ten assumptions about consciousness and the physical world

For the most part, the assumptions stated below follow from the arguments made in the preceding sections. In my view, the theory with the best chance of bridging the explanatory gap is a theory that meets these assumptions. Again in my view, a theory that expounds on the relation between consciousness and the brain has to meet the following assumptions:

1 Matter exists. Though it is probably impossible to prove this assumption is true, we have good reasons to embrace the assumption, since it offers the best explanation we have to understand to world as we experience it.

2 Consciousness exists. If you read this sentence, you have a vivid experience of it. We cannot dismiss experience as illusory, since having an illusion implies having an experience. Therefore, I dismiss eliminativism.

3 Consciousness makes the mind-body problem difficult. If all mind processes were unconscious, qualia – the what-it-is-like character of experience – would not exist. It is hard to understand why neural activity is accompanied by qualia.

4 Consciousness has emerged in the course of evolution. This follows from our empirical observations that only some living organisms are conscious, and that, apart from all non-living objects, primitive organisms probably lack consciousness. Therefore, I dismiss parallelism and the dual aspect theory.

5 Consciousness is correlated with neural activity. Neurological research has shown that experience and neural activity systematically covary. Only organisms that have a nervous system are conscious (although not all organisms that have a nervous system are necessarily conscious). Computers and thermometers lack consciousness.

6 Consciousness somehow arises out of neural activity, or conceivably out of a material functional equivalent of neural activity. This means that consciousness cannot exist without a material substrate.

7 As far as we know, consciousness differs from matter. Consciousness is ontologically subjective, while matter is ontologically objective. We have no good explanation of how a subjective phenomenon can be equated with an objective

phenomenon. Consciousness seems irreducible to neural activity (argument from multiple realizability). Therefore, I dismiss reductionistic materialism.

8 Changes in neural activity can cause changes in consciousness. There is a wealth of neurological evidence that lesions in the brain (if they pass a critical threshold) cause alterations of consciousness. Also drugs that influence the chemical composition of the nervous system can cause altered states of consciousness.

9 Changes in consciousness can be the cause of events in the physical world. At this very moment I can deliberately make a conscious decision either to stop writing or to continue writing, and this decision will have effects in the physical world, such as closing my laptop. Of course, this effect is mediated by neural activity that initiates my behaviour, but the assumption still holds, since neural activity itself is an event in the physical world.

10 At the scale of neural activity and any scale pointing to bigger phenomena, the physical world can be understood as physically closed. From the thesis that on the quantum level the physical world is not causally closed since quantum processes seem to be not determined, it does not necessarily follow that we have to understand the physical world as observed on a larger scale as not physically closed. Quantum theory implies that the behaviour of an individual micro-particle is not determined. However, the probability that a particular quantum event occurs is fixed. Therefore, the sum of behaviours of a large subset of particles is predictable by normal statistical laws. Hence, the indeterminacy of the physical world is probably erased on a larger scale of observation. At least, this seems the case with observations on the scale of our daily experiences, as nobody ever observed a billiard ball starting or ceasing to role without a cause. Probably on the scale relevant to the problem of the gap – the scale of neural activity – the physical world can be perfectly understood as being causally closed.

A theory of consciousness has to be in line with these assumptions. Apart from that, I will reflect on the question what a theory of consciousness (a theory about the relation between consciousness and the physical world is part of a theory of consciousness) must explain. Jackson (1982) offers a thought experiment that is often considered to be relevant at this point. Mary, a scientist in the 23rd century, is the leading expert on all processes that bring about colour vision. During her life, Mary has only been in a black-and-white room and has never seen any other colours. She knows everything there is to know about physical processes in the brain

– its biology, structure and function. Therefore, she understands everything there is to know of how the brain discriminates stimuli, integrates information and produces verbal reports, and the way colour names correspond with wavelength on the light spectrum. Still, Jackson contends, there is something crucial about colour vision that Mary does not know: what it is like to experience a colour, such as red. The structure of the argument is easy: although Mary knows all the physical facts about colour experience, there are some facts about colour experience that she does not know (the qualia), hence, not all facts about colour experience are physical facts.

Jackson (1982) argues that a theory of consciousness is incomplete if it does not explain to Mary what it feels like to experience red. Nagel (1974) expresses the same demand: 'I want to know what it is like for a bat to be a bat.' As Dooremalen (2003: 63) points out: 'Nagel's and Jackson's arguments are related for they both demand that a theory of consciousness should tell us what it is like to have phenomenal experiences …'. In other words, Nagel and Jackson want a theory of consciousness to produce or substitute real experiences, since you only know what it feels like to experience red if you actually experience red. Dooremalen stresses that this demand is absurd. Nobody would demand of a theory of storms that it produces real storms. Analogously, nobody should expect a theory of consciousness to produce real experiences. According to Edelman and Tononi (2000: 12):

> Scientific explanations provide the conditions that are necessary and sufficient for a phenomenon to take place, can explain the phenomenon's properties, and can even explain why the phenomenon only takes place under those conditions. But no scientific description or explanation can substitute for the real thing.

I agree with these demands. I think a theory of consciousness must explain how consciousness and the physical world are related, which on the ground of the assumptions mentioned above can be rephrased as how consciousness arises out of neural activity. In addition, such a theory must provide an explanation for the properties of consciousness (these properties are mentioned in section 8.2). So, instead of explaining the subjective feel of a particular experience of a particular person, a theory of consciousness must explain how it is possible that experiences have particular properties, including a subjective feel, and how these particular properties arise out of ontologically objective neural activity.

Having said this, I think that it is impossible, given the current stock of knowledge, to construct a complete theory of consciousness. Nevertheless, the right

demands put us on the right track towards constructing a theory. In the following section, I will present a view on the relation between consciousness and the brain, a view that is in line with the assumptions. This view is part of a theory of consciousness.

8.8 Consciousness as a supervenient property of neural activity

According to many philosophers, consciousness is a supervenient property of neural activity. Other ways to express the same thought are: consciousness is a higher-level property of neural activity or consciousness is an emergent property of neural activity. All these expressions designate a non-reductionistic materialistic view on consciousness. To explain what a supervenient property means, I will start with an example.

> It is because that a group of H2O molecules interact in manner X with each other at the level of molecules, that water is a liquid at a higher level. If the same molecules were to interact in manner Y, then the water would be ice. This means liquidity cannot be reduced to the lower level, for there is no liquidity at this level, or as John Searle puts it: one cannot reach into a glass of water and pick out a molecule and say: this one is wet. (Dooremalen, 2003: 14-15)

Liquidity is a supervenient property, since it is constituted by molecules that interact in a particular way but is not reducible to the lower level properties of molecules, for at the level of molecules, liquidity does not exist. Supervenient properties are new, higher level qualities of a system as a whole, constituted by but not reducible to the lower level qualities of the units that are the parts of the system. Thus, liquidity is a new quality of a particular set of molecules that interact in a particular way (the system), constituted by but not reducible to molecules (the units). 'The higher quality emerges from the lower level of existence and has its roots therein, but it emerges therefrom, and it does not belong to that level, but constitutes its possessor a new order of existence with its special laws of behaviour' (Alexander, 1920). Once liquidity has emerged from a system of water molecules interacting in a particular way, the system has a new order of existence. If a salt molecule is added to the system, the molecule will behave in a particular way once the system is liquid, a way that would be different were the system ice. In this case, the boundary conditions for the behaviour of the salt molecule are set by the

supervenient quality (I prefer the phrase 'boundary conditions for behaviour' above Alexander's phrase 'special laws of behaviour', since I am not convinced that supervenient qualities introduce new laws).

In this theory, the idea of different levels has been introduced. Indeed, the notion of supervenience implies a mereological or layered model of the world (Dooremalen, 2003: 13). According to Dooremalen (2003: 13), talking about levels is metaphorical, but nonetheless not problematic: 'Maybe we should use terms that describe amounts of complexity and functional relations between properties. I use the mereological terminology as an economic way of doing just that.' Adherents of the mereological model state that the world consists of different levels of reality:

> The bottom level is usually thought to consist of elementary particles, or whatever our best physics is going to tell us are the basic bits of matter out of which all material things are composed. As we go up the ladder, we successively encounter atoms, molecules, cells, larger living organisms, and so on. (Kim, 1998: 15)

The layered model of the world is developed by 20th-century philosophers. For example, Hartmann (1940, 1952) argues that reality is stratified, higher strata being dependent on lower strata. Hartmann (1952: 47) distinguishes four basic strata: inorganic being, organic being, psychic being and spiritual being (every stratum can be subdivided into substrata). While a higher stratum depends on a lower stratum, the higher cannot be reduced to the lower, since a *categorical novum* (a new quality) is introduced in the higher stratum. For example, in the stratum of organic being, the categorical novum 'life' emerges. Once we have a complex set of molecules interacting in a particular way, life emerges. Life is a new quality, since it makes the complex of interacting molecules behave in peculiar ways, ways that are very different from those of non-living complex sets of interacting molecules.

In the supervenience view, the supervenient properties (e.g. consciousness or liquidity) are related to the base properties (e.g. neural activity or water molecules) in a particular way (e.g. Johansson, 2001; Kim, 1999). Supervenient properties are constituted (or realized) by base properties. Therefore, supervenient properties depend on base properties. For example, without neural activity, consciousness does not exist. Moreover, if *a* and *b* are identical in their base properties, they are necessarily identical in their supervenient properties. And, if *a* and *b* differ in their supervenient properties, they necessarily differ in their base properties. A supervenient property entails a qualitative novelty (e.g. liquidity) that emerges if units of a particular level (e.g. molecules) attain an appropriate level of organizational

complexity; the qualitative novelty is not possessed by any of the units of the subvenient level (a single molecule is not liquid). Therefore, supervenient properties cannot be reduced to base properties, and descriptions of base properties do not entail descriptions of supervenient properties (since categorical nova emerge).

Dooremalen (2003: 11) states that consciousness, seen as a supervenient property, belongs to the broadly physical domain:

> By a broadly physical property I mean that that property is constituted by physical entities. Biological properties for instance are broadly physical, for they are realized by molecules, which evidently are physical entities. So, if a property belongs to the broadly physical domain, it is either itself physical (in the narrow sense, e.g. the way molecules are said to be physical), or it is constituted by it.

If consciousness belongs to the broadly physical domain, probably consciousness and neural activity can causally interact without violating the causal closure of the broadly physical domain.

8.9 Conclusion: supervenience as a template to bridge the gap

Though experience, the content of consciousness, is hard to define, it can be characterized as a continuous, intentional, structured process of qualitative subjective unity, that comes in a mood and has a centre and periphery of attention and a Gestalt structure. If we compare this characterization with the subjects of research in the different approaches of landscape experience research, the limited scope of the concepts used is immediately evident. The landscape beauty scores which are often studied by environmental psychologists and were used in the construction of BelevingsGIS (Chapter 5), are surely products of landscape experience, but landscape experience is much more than can be captured by beauty scores. The culturally shared images of nature, as applied to the images of aquatic nature study (Chapter 6), influence the way people experience the landscape, but can never provide us with a full account of landscape experience. The bonds people develop with particular places, constructed by individual as well as social processes during the course of life, as studied in the allotment garden study (Chapter 7), reflect some aspects of landscape experience, but is not exhaustive on the topic. The comparison between the characterization of experience and the approaches in landscape experience research again shows that in every approach, only a part of the complex

phenomenon of landscape experience comes to the foreground. And, therefore, it is possible that the approaches are complementary.

In this chapter, I argued that seeing consciousness as a supervenient property of neural activity is the most plausible view on the relation between consciousness and the brain, since this view is in line with empirical observations and plausible assumptions. The supervenience view suggests that consciousness is constituted by but is not reducible to or identical with neural activity. The supervenience view is in line with all the assumptions stated in section 8.7. In this view, both matter and consciousness exist but differ ontologically, since consciousness exists on a higher level of reality; the subjective character of experience is a new quality, emerging at the higher level. Consciousness and neural activity can causally interact without violating the causal closure of the physical reality.

I do not claim that the supervenience view eliminates the mystery of the gap completely. Still, it is arguable that the emergence of new qualities that are not reducible to the lower lever base properties entails a mystery. But at least, in the supervenience view, the mystery of the gap appears as a normal mystery, like the mystery of liquidity supervening on a set of interacting molecules, or the mystery of life supervening on a complex system of interacting molecules. Of course, the mechanisms that make consciousness emerge from neural activity are different from the mechanisms that make life emerge from a complex system of molecules, but the principle of new qualities of emerging from lower level properties is equally mysterious. I take emergence, mysterious or not, to be a brute fact of the world. Consciousness, then, is not fundamentally more mysterious than any other emergent property. However, practically, the emergence of consciousness may be more mysterious than the emergence of, for instance, life, since we know a lot more about the mechanisms that make life emerge from molecules than we know about the mechanisms that make consciousness emerge from neural activity. But these mechanisms are not an ultimate mystery, but a question open for research.

The supervenience view of consciousness offers a template to bridge the gap, as far as the current stock of knowledge allows us to do so. The view is not neutral on the covariation between conscious states and neural activity. The view states that the covariation is not an ultimate mystery, at least no more a fundamental mystery than the emergence of liquidity (against parallelism), that consciousness can play a causal role in the world (against epiphenomenalism) without violating the causal closure of the physical world (against interactive dualism), that consciousness including its special properties is irreducible to matter (against reductionistic materialism), that matter exists (against idealism), that consciousness exists (against eliminativism) and that consciousness is constituted by neural activity (against

dual aspect theory). Moreover, the template of the supervenience view evokes a challenging question: what are the mechanisms that constitute consciousness? I will reflect on this question in the following chapter, in which I will develop a preliminary theory of perception.

Chapter 9 Perception

9.1 Introduction: towards a theory of perception

Perception is only one of the modes of experience; the other modes include dreaming, imagining and thinking in natural language. I had reasons to choose perception as the mode of experience to construct a theory of in this chapter. First, to give an account of all modes of experience would probably make a theory very complex. Therefore, it seemed wise to select a mode of experience. Second, perception is the mode of experience that is most relevant in the context of this dissertation. This dissertation is about landscape experience, which is perceptual experience by definition, since it is about experiencing objects in the external world. Of course, imagining and thinking can play a role in experiencing landscapes, but experiencing landscapes is a perceptual process in first place. Third, even if the task is to construct a theory of experience, entailing all different modes of experience, starting with perceptual experience is a good strategy, since perceiving is a prerequisite for most other modes of experience. For example, when imagining, or thinking in words, people make use of knowledge (images of things or words) that is acquired by means of perception. Though I will focus on perception, many of the statements made in this chapter are valid for other modes of experience too.

'Constructing a theory of perception' is a pretty vague aim, one that has to be clarified. The theory of perception is to explain how perception works. Perception, like all modes of experience, is a process. How does this process take place, and what conditions are necessary for the process to take place? The theory must be in line with the properties of experience as stated in section 8.2. If possible, the theory should explain these properties. Furthermore, the theory must be in line with the supervenience view, as explained in section 8.8. The supervenience view entails the assumptions about mind and matter as stated in section 8.7. Hence, being in line with the supervenience view implies being in line with these assumptions. In addition, the theory must be in line with neuroscientific knowledge. The supervenience view states that experience is realized by brain activity. I therefore want to try to explain how perception is realized in the brain. A complete theory of perception, one that explains all the ins and outs of the process in detail, it not possible given the current stock of knowledge. It is also beyond the scope of this book to construct a complete theory. The final purpose of the theory of perception is to contribute to the possibility of a more fundamental explanation of the concepts

used in landscape experience research, and to point out where the different approaches meet (a task taken up in Chapters 12 and 13).

In the following section, I will stress that we have to make a distinction between perception and sensation. Then, I will argue that concepts are preconditions for perception (section 9.3), and that perceptual experiences have two components: sensory and conceptual content (section 9.4). In section 9.5, the way concepts are produced in the mind and the brain will be explained. Next, I will expound on the neural correlates of consciousness (section 9.6). In the conclusion (section 9.7), I will present a model for perception.

9.2 Sensation, information processing and perception

According to Reid (1970), it is crucial in accounts of perception to distinguish between sensation and perception. Sensation is the process of sensing our environment through touch, sight, taste, smell or sound. Sensation brings information from the outside world into the brain. Our sensory organs absorb energy from a physical stimulus in the environment. The sensory receptors convert this energy into neural impulses that enter the brain. Perception refers to the way we interpret these sensations and therefore make sense of the world. Before sensation becomes perception, the information sent to the brain by the senses is analysed and interpreted. Perception is the process of experiencing organized and interpreted information extracted from sensations. In most cases, we are not aware of the difference between sensation – the process of taking in raw information – and perception, the process of experiencing something meaningful in the external world. For example, in the case of the Kanizsa triangle, which was depicted in section 8.2, we immediately perceive a triangle. In figure 5, however, it takes some time to perceive what is depicted.

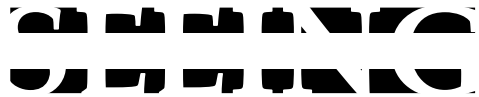

Figure 5: Sensation and perception

The picture demonstrates a difference between sensation and perception. At first glance, we see two groups of fuzzily formed black blobs divided by a white bar. After a while, we perceive the meaningful word ‘seeing’. In this case, we are aware that it takes a while to abstract the meaningful percept ‘seeing’ from the sensory

information. Strictly speaking, what we experience when we first glance at the picture is perception as well: however, we do not perceive the word 'seeing'; what we do experience is not raw, meaningless information, since we immediately perceive the picture as comprising black blobs that have particular forms. Nevertheless, this example shows that sensation and perception have to be distinguished. While the sensation is the same during the first glance and at the moment that we see the word 'seeing', since the incoming stimuli have not been changed, our experience abstracted from this sensation is different. Hence, sensation and perception are different events.

Between our first glance at the picture and our perception of the word 'seeing', the incoming information must somehow be analysed and interpreted. We are not aware of this process of analysing and interpreting: it is mostly an unconscious process. We experience black blobs, until, seemingly suddenly, we experience the word 'seeing'. Furthermore, we have no voluntary control whether the perception of the word 'seeing' pops in or not. The unconscious process of analysing and interpreting sensory information is often called perception as well. I am reluctant to follow this definition of perception, for the term would, as Maund (2003: 52-53) contends, refer to two different processes: (1) the basically unconscious process of analysing and interpreting sensory information, and (2) the conscious experience of analysed and interpreted information coming in through our senses. To avoid confusion, I will use perception to refer to the latter process only. Hence, by this definition, perception is a conscious process. I will use the term 'information processing' to refer to the first process.

In this section, I argued that perception and sensation, though intimately related, have to be distinguished. In the following section, I will argue that perception is the result of both sensations and pre-existing concepts that are used in the process of analysing and interpreting sensory information.

9.3 Concepts as preconditions for perception

How does perception work? As a default position, I will start with the 'camera view'. If we perceive objects in the world, we perceive these objects as they are, like a camera makes records of the world as it is. According to the camera view, if we look at a tree, we perceive the tree as it exists in the external world. Hence, we experience the actual tree. I will argue that this view – which implies that we perceive objects in the world directly, without any intermediary between objects and perception – is wrong. First, because we employ concepts that are stored in the

mind to create perceptions out of sensations, and second, because sensations are not properties of the object sensed, but properties of neural activity that is caused by physical stimuli affecting the senses.

Figure 6: Eastern characters

We perceive the picture depicted in figure 6 as being two Eastern characters. Yet, most of us probably do not recognize the characters as particular Eastern characters. For those of us who do not, this is illustrated by the fact that we are not absolutely sure whether or not the symbols are actual Eastern characters. Perhaps the picture consists of fake characters that look like Eastern characters but are the product of a practical joker (to avoid useless annoyances: they are Chinese characters, meaning 'good luck'). We perceive this picture as being Eastern characters not because we have seen these particular two characters before and remember them, but on another basis. We perceive Eastern characters because we possess concepts that we use to analyse sensory information. We possess concepts of 'Eastern characters'. Because the sensory information fits in these concepts, we perceive the picture as being Eastern characters. These concepts are acquired during the course of life, because we have seen Eastern characters before. Without possessing these concepts, it would be impossible to perceive the picture as being Eastern characters. Exactly the same argument can be made with the help of other examples. If you take a walk and see a tree you have never seen before, you still perceive the tree as a tree. Although each time you see a familiar face the sensory information is a little different (e.g. the detailed shades of light differ), you perceive the face as being the face of a particular person you know. All these perceptions in which sensory information is perceived as being a particular something would be impossible without the employment of concepts.

The thesis that we do not perceive objects in the world directly as they are, but that perception is mediated by pre-existent concepts, is also revealed by the ambiguous figure shown in section 8.2. While the sensory information is roughly constant, our perceptions switch. If we were to perceive objects just as they are, it would be impossible to explain the switch between the two perceptions, since the object does not change while our perceptions do. The switch is possible because the sensory information fits in two different concepts. The switch occurs because we

change the concepts that play a role in our perception when seeing the ambiguous figures. Furthermore, the conceptual character of perception is demonstrated by the Kanizsa triangle (see section 8.2). We perceive a triangle, while the triangle is not actually in the picture. The sensory information activates the concept 'triangle', which exists in our minds.

The examples demonstrate that perception involves the employment of concepts on some occasions. An additional argument is needed to defend the thesis that perception implies the use of concepts on all occasions. If we have perceptual experiences, we always experience a particular something, whether it be the word 'seeing', Eastern characters, a tree or even black blobs. In other words, we always recognize something.

> Your perceptual experience does not consist in a meaningless dance of colors and shapes. Rather, it is experience of objects and of events, of recurrent features and relationships, exhibiting recognizable patterns, etc. That is, what is consciously experienced is experienced as organized. The world of experience is a richly and sophisticatedly structured world. (Kriegel, 2004)

There must be 'x' in our minds that makes us structure and recognize whatever our senses take in. The 'x' is what I call concepts. Without the employment of concepts in perceptual experiences, recognition would be impossible, even if the sensory information is exactly the same on two occasions of perceiving. Storing groups of objects, events and actions in concepts that transcend immediate reality is thus extremely useful (Miller et al., 2003). Perceptual experience appears to be experience of a structured world, hence to be at least partly conceptual (Kriegel, 2004). Thus, 'the character of our perceptual experience itself … is, so to speak, thoroughly permeated – saturated, one might say – with the concepts employed in our judgements' (Strawson, 1992: 62). By exercising the ability to represent a tree in front of you as a tree, you are employing your concept of a tree. Hence, pre-existent concepts are preconditions for perception. Without possessing concepts, perception is impossible. Therefore, the view that in the act of perceiving we experience objects as they are is wrong, because our perceptions are, at least partly, loaded with concepts that are properties of our mental structure, not of the objects perceived.

The camera view is wrong for another reason. We do not perceive objects directly, because the sensory information is not a property of the object that we perceive, but a property of the neural system of the sensing subject. Hence, sensory information, the input for the information processing that results in perceptual

experience, is itself indirect information about an object. The surface of a tree has properties that make the surface absorb photons that have a certain set of wavelengths, while reflecting photons that have another set of wavelengths. Hence, if we look at a tree, photons with a particular set of wavelengths affect our eyes. Our eyes are sensitive only to a certain set of wavelengths; for example, we are not capable of detecting infrared with our eyes. The photons that are reflected by the tree and fall within the eye detection range of wavelengths cause our senses to transform stimulation into sensory information. Thus, sensory information is itself indirect, since it is neural activity and not a property of objects we perceive.

To conceive the indirect character of sensory information, I will give an analogous example. Imagine a cup of water in which there is a digital thermometer connected to a computer running a program that registers the value of the thermometer. The computer registers the temperature of the water not directly, but indirectly. It registers the value indicated by the thermometer. This value is a natural sign of the temperature of the water. Our sensory information is, so to speak, our set of thermometer values, which we use as natural signs of the objects we perceive. Since perception depends on pre-existing concepts and sensory information that is indirect, the camera view of perception is false. This conclusion is consistent with neuroscientific findings:

> Different modes of interaction with the world – an object seen, a face touched, or a melody heard – are processed in parallel by different sensory organs. The receptors in each system first analyse and deconstruct stimulus information. Each sensory system then abstracts this information and represents it in the brain in specific pathways and brain regions. From moment to moment, this constant flux of information is edited into an apparently seamless continuum of unified perceptions. Thus, the appearance of our perceptions as direct and precise images of the world is an illusion. (Kandel et al., 1995: 321)

Perception is the result of a constructing process of the mind, depending both on the pre-existing concepts employed in the constructing process and on the sensory information that is caused by the stimuli affecting our senses. 'For example, a falling tree causes pressure waves in the air. It does not create a sound. Sound occurs only if the pressure waves are sensed and perceived by a living being capable of constructing sounds' (Kandel et al., 1995: 370). The same can be said about colours, smells, tastes, etc.: as they occur in our perceptions, they are not properties

of objects we perceive, but constructions of our mind (Huemer, 2004; Maund, 2003: 85).

9.4 The two components of perception

In the previous section, I argued that perceptions have conceptual content. Perceptual experiences also have non-conceptual, sensory content. Normal perceptual experiences have a rich complexity that far outruns the content of the concepts they involve.

> I can reflect on the fact that my perceptual experience contains, as Brian O'Shaughnessy notes, a mass of 'teeming detail'. I do not, and cannot attend to every aspect of it. The point is that there is usually too much that is present in my experience in a single moment for me to attend to and conceptualize every aspect. The concepts that naturally spring to mind when I contemplate my surroundings in no way exhaust what is present in a non-conceptual way. (Coates, 2004)

In his book on concepts, Peacocke (1992) argues that the fineness of grain of perceptual experience outstrips the conceptual experiences of the perceiver.

Figure 7: Ocean view

If you look at the picture above, you employ some concepts, such as 'sea'. But you can see far more details in colours, shades and forms than the concepts employed in your perceptual experience can account for. These details are sensed, but not conceptualized. This non-conceptualized set of details is the sensory content of

your perception. Coates (2004) summarizes Sellars's argument for the existence of sensory content in the act of perceiving as follows. A person sees a particular tree. The same person can think of that tree, without actually seeing it. It is possible that the set of concepts employed in seeing the tree and thinking of the tree are the same. This being the case, the content of experience when seeing the tree is more than the content when thinking of a tree. Therefore, perceptions entail non-conceptual content, besides conceptual content. This non-conceptual content is called sensory content. Hence, perceptual experiences have non-conceptual, sensory components and conceptual, non-sensory components (Maund, 2003: 209).

What are concepts? According to Howard (1987: 1), 'a concept is a mental representation of a category, which allows us to sort stimuli into instances and noninstances'. Sperber and Wilson (1998) define a concept as 'an enduring elementary mental structure, which is capable of playing different discriminatory or inferential roles on different occasions in an individual's mental life'. These two definitions are mutually compatible, and in line with the argument made in this chapter. Concepts are mental structures. And concepts allow us to discriminate between stimuli in such a way that recognition is possible. Concepts are abstractions from experience (Howard, 1987: 3), that is, they take out some essentials or important aspects and ignore the remainder. Concepts are not necessarily linguistic concepts:

> … it might be argued that people do form many idiosyncratic, non-lexicalized concepts on the basis of private and unshareable experience. For example, you may have a proper concept of a certain kind of pain, or a certain kind of smell, which allows you to recognize new occurrences, and draw inferences on the basis of this recognition, even though you cannot linguistically express this concept, or bring others to grasp and share it. More generally, it is arguable that each of us has ineffable concepts – perhaps a great many of them. (Sperber & Wilson, 1998)

Concepts may be divided into different types (Howard, 1987: 23). For example, we can divide between concepts for objects and concepts for events, or between identity concepts (e.g. a concept employed to recognize a familiar person under different circumstances) and kind concepts (e.g. a concept employed to recognize different instances of a tree). However, there is no universal taxonomy of concepts (Howard, 1987: 23). In the human mind, concepts are linked to vast networks of concepts. For example, the concept for tree is related to the concepts for leaves, stem, roots, etc.

In various publications, Block (1991, 1993, 1994, 1995a, 1995b) distinguishes between access consciousness and phenomenal consciousness. Since this distinction is often referred to in philosophy of mind, and since this distinction might resemble the conceptual and sensory content of perception, I want to spend a few words on it. 'Phenomenal consciousness is experience; the phenomenally conscious aspect of a state is what it is like to be in that state. The mark of access consciousness, by contrast, is availability for use in reasoning and rationally guiding speech and action' (Block, 1995b).

Access consciousness seems similar to the conceptual component of perceptual experience. Only the conceptual component of perceptual experience is available for further conscious acts, such as remembering, expressing in words (at least, if the right words to express can be found), thinking or imagining. The sensory part of perception exists during the act of perceiving only. For example, if you try to remember the picture of the seascape, you cannot remember all the details of your perceptual experience. While the sensory qualities are experienced, they cannot be used for further conscious acts such as remembering. The sensory qualities are only there in the act of perceiving. You can remember only those aspects of your perceptual experience that were conceptualized in the act of perceiving. If Block means by access consciousness the conceptual component of experience that is indeed available for reasoning and behaviour, I fully agree with his distinction. The problem is, however, that Block is obscure on this point. Therefore, I will not use his distinction, but will use Maund's terms: the conceptual and sensory components of perception.

The capacity of attention, the sensory qualities and the concepts employed in perceptual experiences relate to each other in the following way. By paying attention to a part of the total sensory field, we can employ new concepts. For example, if you have been looking at the seascape for just a few seconds, you have been employing some concepts (e.g. for sea, sky, waves, foam, horizon), while leaving many details not conceptualized. For instance, while you saw the foam in the lower left corner, you were not aware of the patterns of the foam. If you look back at the picture, you can voluntarily focus on the lower left corner and conceptualize the pattern of foam. Hence, by paying attention, we are capable of conceptualizing parts of our sensory field appearing in perceptual experience, thus converting sensory content into conceptual content. Once converted into conceptual content, this content becomes available for further conscious acts.

This is illustrated by a study conducted by Simons and Chabris (1999). They made videotapes (75 seconds) of two teams of three basketball players, one team wearing white shirts and one wearing black shirts, playing in a small area (ap-

proximately three by five metres). The players of each team passed a standard orange basketball to one another in regular order, and made other basketball movements, like dribbling. After a while, an unexpected event occurred: a women either holding an open umbrella or wearing a gorilla costume covering her whole body walked from one side to the other. The observers of the video were asked to keep a silent mental count of the total number of passes in one team. The 192 observers were distributed across different conditions of the experiment (type of unexpected event, black team versus white team, etc.). Across all conditions, 46% failed to notice the unexpected event (Simons & Chabris, 1999). Of course, the observers who failed were affected by the stimuli of the unexpected event, but they did not conceptualize these stimuli because their attention was attracted to the difficult cognitive task.

The role of attention in employing concepts is probably experienced by all of us every now and then while reading a book. Sometimes, while reading, your attention may be distracted, for instance by internal thoughts. After a moment, you turn the page, and suddenly realize you did not notice the meaning of the sentences of the page at all. Your eyes have been scanning the sentences automatically, but because of your distracted attention, you did not grasp the meaning. Some mental concepts necessary for understanding the meaning of sentences are not employed without attention.

A difference between perceptual experiences and such experiences as thinking, imagining or remembering is that perceptual experiences have conceptual and sensory content, while thinking, imagining and remembering are only conceptual. The concepts we possess are acquired throughout our life during the process of perceiving. For this reason, starting with perception is a good strategy to develop a theory of experience. In the following section, I will explore how concepts are established in the brain.

9.5 The acquisition of concepts

Psychological research and neuroscientific research into concepts that play a role in experience and behaviour is usually labelled under the term ‘memory’. An organism’s memory is the vast network of concepts and their relations possessed by the organism. Thus, concepts are the units of memory. Generally, different types of memory are distinguished (Kandel, 2001; Miyashita, 2004; Wieser & Wieser, 2003). A first distinction is between explicit (or declarative) and implicit (or non-declarative) memory. Explicit memory consists of those concepts we are able to be

aware of: they can be recalled by a deliberate act of recollecting. Implicit memory consists of concepts that play no direct role in consciousness, but can play a role in behaviour. For example, using a fork to eat without paying attention to it implies the use of concepts, such as a concept for the fork and concepts for the hand using the fork. Implicit memory consists of skill concepts and perceptual concepts. Implicit concepts are created automatically, and typically by repetition. For example, it is impossible to learn to play the violin without actually using a violin. We are unable to create consciously all the concepts needed, let us say, out of a textbook and then play the violin. Explicit memory is subdivided into semantic (fact) memory and episodic (event) memory. An example of a semantic memory is the knowledge that Amsterdam is a city. Episodic memories refer to recollections of earlier experiences, for example, your first day at school. In daily language, we typically say we know something in the case of semantic memory, and we remember something in the case of episodic memory.

Different types of memory depend on different regions in the brain. The creation of explicit memories depends on neural circuits in the medial temporal lobe and the hippocampus (Kandel et al., 1995: 656-657; Miyashita, 2004). The hippocampus is a temporary depository for long-term memory. It is thought that, ultimately, the concepts are transferred to other areas for permanent storage, particularly the cerebral cortex. For example, concepts that deal with visual information about faces are stored in the fusiform face area, a region in the cerebral cortex concerned with face recognition (Kandel et al., 1995: 657). During remembering, the regions that store the concepts are reactivated (Miyashita, 2004). The non-declarative forms or memory also depend on different regions: 'many kinds of motor learning depend on the cerebellum, emotional learning and the modulation of memory strength by emotion depend on the amygdala, and habit learning depends on the basal ganglia' (Kandel & Squire, 2000).

Though different types of memory (in other words: different types of concept collections) can be distinguished, and different brain regions are found that constitute the various types, all types of memory share two important features in the way they are created. First, the creation of all memories has two stages: a short-term stage and a long-term stage. Second, for all different types of memories the constitution of the short-term and the long-term stage is equal on both the molecular and the cellular level (Kandel, 2001).

To unravel the molecular and cellular mechanisms that constitute the development of memory, Kandel and colleagues have been studying the Aplysia californica, a sea slug that is also known as the California sea hare. For this purpose the Aplysia has two advantages: its nervous system is made up of a relatively small

number of nerve cells (20.000) and many of its nerve cells are relatively gigantic: up to 1 millimetre – the largest nerve cells found in the animal kingdom (Kandel, 2001). One of the types of learning processes that have been studied is called sensitization: a form of learned fear in which a person or an experimental animal learns to respond strongly to an otherwise neutral stimulus. For example, if a person hears a gunshot, he is sensitized and his reaction to an otherwise neutral stimulus, like a tap on the shoulder, will probably be one of fright (Kandel, 2001; Kandel & Squire, 2000). Similarly, if the Aplysia receives an aversive shock to a part of the body, such as the tail, the Aplysia will react defensive on a number of otherwise neutral stimuli (e.g. a soft tactile stimulus). The defensive reaction is shown by a quick withdrawal of the tail under the mantle cavity. Sensitization implies memory storage, since the defensive reaction on the neutral stimulus is explained by the aversive stimulus received before.

Kandel and colleagues (2001) found that sensitization modifies the strength (in the case of short-term memory) and structure (in the case of long-term memory) of the synaptic connections between neurons: 'our studies provided clear evidence for the idea proposed by Ramon y Cajal, that learning results from changes in the strength of the synaptic connections between precisely interconnected cells'.

After a single training trial, sensitization lasts a few minutes: the Aplysia responds with defensive behaviour on the soft tactile stimulus. After a few minutes, the memory has disappeared and the Aplysia reacts normally, without defensive behaviour, to the soft tactile stimulus. Thus, a single training trial gives rise to short-term memory. It was found that short-term sensitization results in the enhancement of transmitter release. Enhancement of transmitter release, in turn, causes the strengthening of synaptic connections: the post-synaptic signal becomes stronger (Kandel, 2001).

It was found that the molecule cyclic AMP (cAMP) plays an important role in the chemical processes that mediate the relation between sensitization and the strengthening of the synaptic connections (many details of the chemical processes have been unravelled, but these details are irrelevant to the purposes of this book). In an experiment, cAMP was injected directly into nerve cells. This injection too resulted in the strengthening of the synaptic connections (Kandel, 2001).

Long-term memory is realized in the nervous system in another way: 'long term memory involves altered gene expression, protein synthesis, and the growth of new synaptic connections' (Kandel & Squire, 2000). After repeated training trials, sensitization in the Aplysia lasted longer. It turned out that repeated training trials by mediating the repeated release of cAMP molecules results in the entering of kinase molecules in the nucleus of the neuron. In the nucleus, kinase activates

particular genes. The activation of genes results in the growth of new synaptic connections (Kandel et al., 1995: 675-676). Following long-term sensitization, the number of connections of a neuron grew from 1200 to 2600. In time, the number decreased to 1500 connections (Kandel, 2001).

To sum up, the message is that short-term memory is realized by strengthened pre-existing synaptic connections, while long-term memory is realized by the growth of new synaptic connections. In other words, learning processes correlate with changes of specific neural circuits, either by strengthening existing circuits or by changing the structure of circuits. These empirical findings show that the thesis that specific neural circuits are the neural basis of specific concepts is justified. The reasoning behind this thesis is as follows: learning implies the acquirement of concepts; learning processes correlate with the establishment of specific neural circuits; hence, specific neural circuits code for specific concepts.

Using functional magnetic resonance imaging (fMRI), neuroscientists have found many different brain regions that code for different types of concepts (for a review of visual regions, see Grill-Spector & Malach, 2004). For example, different areas have been found for information processing of colour, form and motion (Kandel et al., 1995: 445). For object recognition, the regions activated for faces, places, animals, tools, body parts and letter strings are different (Grill-Spector & Malach, 2004). fMRI scans are, however, not fine grained enough to record the activity of specific neural circuits. In order to measure the activity of individual neurons, electrodes have to be introduced into the brain. For obvious ethical reasons, this kind of research cannot be conducted using human subjects. Hence, other organisms, for example monkeys, are used for invasive neural activity measurement techniques.

Newsome et al. (1989) trained rhesus monkeys to indicate whether or not they perceived dots displayed on a screen moving in a particular direction. In an experiment, they recorded specific neurons in the area MT (a region of the cortex that is activated during the perception of motion) of the monkeys, while the monkeys judged whether the dots moved in a specific direction. The proportion of dots moving coherently in a specific direction was varied: from all dots moving randomly to all dots moving in the same direction. In this experiment, specific neurons were identified that were activated if the monkey judged that the dots move in the specific direction, correlations between judgements and activity of the neurons being very high. In the vocabulary employed in this chapter: these neurons participate in the neural circuits that code for the concept 'movement in this specific direction' (e.g. horizontally to the left). In a subsequent study, the neurons that code for the perception of movement in this specific direction were electrically

stimulated. It was found that electrical stimulation influenced the monkey's judgements of motion direction (Britten et al., 1992). For example, if the dots moved randomly and the neurons coding for a specific motion direction were electrically stimulated, the monkeys were more likely to perceive the dots as moving in the specific direction. These findings support the thesis that specific neural circuits code for specific concepts, since the activation of neural circuits alters the perception of stimuli.

I will briefly summarize the main line of thought employed in this chapter so far. Sensation, unconscious information processing, and perception have been distinguished, the last-mentioned being the process of experiencing organized and interpreted information abstracted from sensations. In the processing of information that enters the nervous system, we make use of pre-existing concepts. This is illustrated by, for example, the fact that we can recognize objects we have never seen before, such as previously unknown Eastern characters. Thus, perceptual experiences have both sensory and conceptual content. I have been arguing that concepts are constituted in the nervous system by neural circuits, which are groups of interconnected nerve cells. This thesis is supported by studies that reveal the neural basis of learning processes: learning results in the strengthening of existing neural connections and the growth of new connections. Hence, learning – the acquisition of concepts – accompanies specific changes in neural circuitry. In addition, the fact that electrical stimulation of specific neural circuits in monkeys has a precise influence on the monkey's judgement of motion, supports the thesis that neural circuits code for concepts.

With these statements, the contours of a general model for perception come into view. However, before such a model can be formulated, there is another problem to be faced. Experience supervenes on neural activity. But not all neural activity gives rise to experience. For instance, we are not aware of the neural activity regulating our heart beat, and we are not aware of a great deal of the neural activity that transforms primary sensations into perceptions. What, then, is the difference between neural processes that give rise to experience, and neural processes that do not?

9.6 The quest for neural correlates of consciousness

An intriguing question is whether neural processes that give rise to consciousness are physically different from neural processes that do not give rise to consciousness. This problem is labelled by the term 'neural correlates of consciousness'

(Chalmers, 1998; Glynn, 2001; Koch & Crick, 2001). Neural correlates of consciousness are physical events (or properties of physical events) in the nervous system that systematically covary with the presence of consciousness: the events are present if the organism has conscious experiences, and absent if the organism does not have any conscious experience. Since consciousness is a process, the neural correlates must be processes or properties of processes. Thus characterized, the neural correlates of consciousness refer to physical events that correlate with being in a conscious state.

In the past twenty years, many exotic suggestions for the neural correlates of consciousness have been offered: 40 Hertz oscillations (Crick & Koch, 1990), quantum processes in microtubuli (Penrose, 1994), re-entrant loops in different neural assemblies (Edelman, 1993), activated semantic memories (Hardcastle, 1996), neuronal Gestalts in an epicentre (Greenfield, 1995), high-quality representations (Farah, 1994), etc. (see Chalmers, 1998, for a synopsis of suggestions). The divergence of the suggestions illustrates that the neural correlates of consciousness are difficult to address empirically (Rees et al., 2002) and that decisive empirical support for a particular suggestion has not been established yet.

Lesion studies have shown that consciousness probably does not correlate with activity in a specific brain region. Empirical studies have shown that damage to area V5/MT – a brain region that codes information about movement – can result in akinetopsia, the inability to experience the movement of visual objects (Zihl et al., 1983). Damage to another area, the fusiform face area, results in prosopagnosia, the inability to recognize faces (Damasio et al., 1982). For consciousness in general, such a specific area has never been found. Thus, it is highly unlikely that consciousness correlates with neural activity in a particular brain region.

This observation supports the global workspace theory developed by Baars (1988, 1996, 1997). According to this theory, consciousness correlates with neural activity that can occur in many different brain areas. In time, the brain areas that are involved in consciousness change, just as the contents of consciousness change continuously. Consciousness, then, can be conceived of as a dynamic global workspace, in which the neural activity playing a role is located in different areas of the brain. The dynamic core theory of consciousness formulated by Edelman (1993) perfectly fits in the global workspace theory.

According to Edelman, consciousness implies re-entrant loops between neural activity in the cortex, the thalamus and the amygdala. Roughly speaking, cognitive systems are located in the cortex, categorizing systems in the thalamus and value systems in the amygdala (Edelman, 1993). These regions all play a role in processing the stimuli that enter the brain: ‘distributed neural activity, particularly in the

thalamocortical system, is almost certainly essential for determining the content of conscious experience' (Tononi & Edelman, 1998). Re-entry refers to 'the ongoing, recursive, highly parallel signalling within and among brain areas' (Tononi & Edelman, 1998). 'A key mechanism underlying conscious experience is the re-entrant interactions between posterior thalamocortical areas involved in perceptual categorization and anterior areas related to memory, value, and planning for action' (Tononi & Edelman, 1998). Edelman and Tononi call the neural groups thus interconnected the dynamic core. From moment to moment, the distribution of neural activity in thalamocortical regions that are part of the dynamic core can change.

The global workspace theory and the dynamic core theory are overlapping models for consciousness, in line with current neuroscientific knowledge. Although neither theory specifies the neural correlates of consciousness, an important suggestion about the neural correlates of consciousness can be abstracted. Since consciousness is not constituted by neural activity in a specific area in the brain, but is constituted by continuously changing interconnected neural activity throughout many different areas in the brain, the neural correlates will probably be a property of neural activity that can occur in and be absent from many areas in the brain.

Out of the set of speculations for the neural correlates, the 40 Hertz hypothesis offered by Crick and Koch (1990) is the most serious candidate, for it seems to be supported by a body of empirical studies and it suggests that the neural correlate is a property that can occur in and be absent from different areas in the brain. To fully appreciate this hypothesis, I will first explain the binding problem. Neuroscientific research has pointed out that 'the visual system analyses information by decomposing complex objects into simple components (visual features) that are widely distributed across the cortex' (Usher & Donnelly, 1998). For example, if we see a moving blue car, the colour, shape and movement of the car are analysed in different pathways in the nervous system. In our experience, however, these features are part of one unified experience of a moving blue car. 'When several objects are present simultaneously in the visual field, a mechanism is required to group (bind) together visual features that belong to each object and to separate them from features of other objects' (Usher & Donnelly, 1998). The binding problem, then, is the problem how the various features of one object get coded as bound to the same object (Hurley, 1998: 42).

Gray and Singer (1989) found that neurons in the visual system of cats that respond to a stimulus fire synchronously in the gamma range (35 to 75 times a second (Hertz)). It has been hypothesized that these so called gamma-band

synchronous oscillations are the mechanism that binds the different features of a perceived object together. The 40 Hertz hypothesis takes one more step by stating that these synchronous oscillations are the neural correlates of consciousness (the frequency of the synchronous firings can vary between 35 and 75 Hertz; Crick and Koch adopted the term '40 Hertz' because in humans the exact frequency is often around 40 Hertz). In the last decade, many studies have been carried out that seem to support this hypothesis. As an illustration, I will summarize the results of a small selection of gamma-band synchronization studies.

Fries et al. (2001) demonstrated that selective visual attention in monkeys correlates with increased gamma activity synchronization of neurons representing the relevant stimulus in a region in the cortical area. In line with these results, Steinmetz et al. (2000) observed that switching attention between visual and tactile stimuli is correlated with modulation of synchronous gamma oscillations by neurons in the somatosensory cortex of monkeys. These studies were conducted on monkeys (and many other studies on monkeys, cats and rabbits), since invasive recording techniques were used (small electrodes were inserted in the brain). Though it is impossible to ask the animals whether they were conscious of the offered stimuli, we can infer that they were, since attention is typically thought to accompany consciousness in higher mammals, as is the case in humans.

EEG techniques are used to study gamma-band synchronization in humans. While the invasive techniques used in animals record gamma activity in single neurons, EEG recordings are coarse grained: only gamma activity in assemblies of approximately one billion neurons can be recorded. It was found that, as in monkeys, attention modulates auditory evoked gamma-band activity (Debener et al., 2003). Rodriguez et al. (1999) asked people to study pictures that could, on occasion, be recognized as faces. The pictures shown are comparable to the picture of 'seeing' shown in section 9.2: it takes some time to recognize a set of black blobs as depicting faces. Perceiving the pictures was correlated with increased synchronized gamma activity in the cortical regions known to be important for visual processing. The synchronized activity lasted longer when the picture was recognized as a face. Llinas et al. (1998) found gamma oscillations during both wake states and REM sleep states (the sleep states in which we dream), while they were absent during deep sleep states. The difference between wakefulness and REM sleep lies in the response to sensory input: during wake states, auditory stimuli produce well-defined gamma oscillations, while these oscillations are absent during auditory stimulation during REM sleep. Based on a review of many experiments, Engel et al. (2001) state that 'synchrony can be modulated by intrinsic signals that reflect experience, contextual influences and action goals'. Further-

more, they conclude that areas representing goal direction, action planning, working memory and selective attention could entrain neural assemblies involved in the representation of new stimuli.

Stopfer et al. (1997) found that disrupting synchrony in the olfactory system of honey bees caused impairment of odour discrimination capabilities. Honey bees were trained to respond to particular odours. Previously, the researchers had discovered that applying a molecule (picrotoxin) to a region in the honey bees' nervous system that plays a role in odour encoding, results in the desynchronization of the firing of different neurons. In this study, it was found that this desynchronization disrupted the odour discrimination capacity of the honey bees for relatively similar odours. Since we do not know whether insects have consciousness or not, we cannot infer from this experiment that 40 Hertz constitutes consciousness.

In short, a large body of experiments seems to support the 40 Hertz hypothesis. In his review study, Sauvé (1999) concludes that 'these experiments strongly suggest that gamma-band oscillations are causally related to stimuli discriminations and motor outputs that typically occur as part of our paradigmatic cognitive state: consciousness'. The studies carried out thus far have demonstrated that gamma-band synchrony correlates with particular capacities associated with consciousness, such as attention or discrimination. Decisive studies demonstrating that gamma-band synchronizations are the neural correlates of consciousness, however, have yet to be carried out, since there is no evidence that disrupting synchrony throughout the brain results in the total absence of consciousness in humans and higher mammals.

Furthermore, there is a theoretical problem. The 40 Hertz hypothesis states that different features of one perceived object are bound together by synchronized activity of neurons in different regions of the brain. For example, the neurons in different brain areas processing information of the colour, form and movement of a moving blue car are bound together by firing synchronously at, let us say, 40 Hertz. If we perceive at the same moment a moving red car, the neurons processing the information of the red car fire synchronously at a slightly different frequency, for example 41 Hertz. Thus, the features of the different objects are sorted out by the brain. The problem is that the blue and the red car come as two aspects of one unified experience. How are brain activities corresponding to the red and the blue car, which are separated by different frequencies, finally bound together? To my knowledge, this question has neither been addressed empirically nor been raised in the literature on gamma synchronization. Probably, gamma-band synchronization plays an inferential role in binding different features of an object

together. Upscaling gamma-band synchronization to the neural correlates of consciousness is a step too far, in my view: it is a hypothesis that is not really supported by empirical evidence and that points to the disruption of capacities associated with consciousness, but not to the disruption of consciousness.

True or not, it is noteworthy that the 40 Hertz hypothesis does not expound on the nature of the relation between consciousness and the brain (Dooremalen, 2003; Rees et al., 2002). The hypothesis is primarily about correlations, and as such is indifferent to the question whether consciousness is identical with, caused by or supervenient on the synchronous gamma-band neural activity. For example, if the hypothesis were true, reductionistic materialists could state that experience is identical with synchronous gamma-band activity. Epiphenomenalists could state that experience is a by-product without further causal powers, caused by synchronous gamma-band activity. Therefore, to interpret the hypothesis, a separate discussion of the relation between consciousness and the brain, as illustrated in the previous chapter, is still needed. Using the supervenience view, which is the most favourable view on the relation between consciousness and the brain, as I argued in chapter 8, neural correlates have to be interpreted as those properties of neural activity that constitute consciousness, being a higher order phenomenon of particular types of neural activity. On this higher level, a new quality emerges: the subjective qualia that characterize consciousness.

To conclude, consciousness correlates with the dynamic core or the global workspace, to be conceived as a dynamic assembly of different activated neural populations throughout the thalamus and cortex, together constituting consciousness. By which mechanism these activated neural populations constitute consciousness is yet unknown. Probably, gamma-band synchrony plays a role in binding distributed neural activity. We cannot, however, conclude from this that gamma-band synchronizations are the neurocorrelates of consciousness.

9.7 Conclusion: a model for perception

In this section, I will summarize a model for perception (figure 8), based on the findings in the preceding sections. In the model, the world is presented as the broadly physical domain, referring to the sum of all material entities or phenomena constituted by matter. The organism is a subset of the broadly physical domain, and the brain is a subset of the organism.

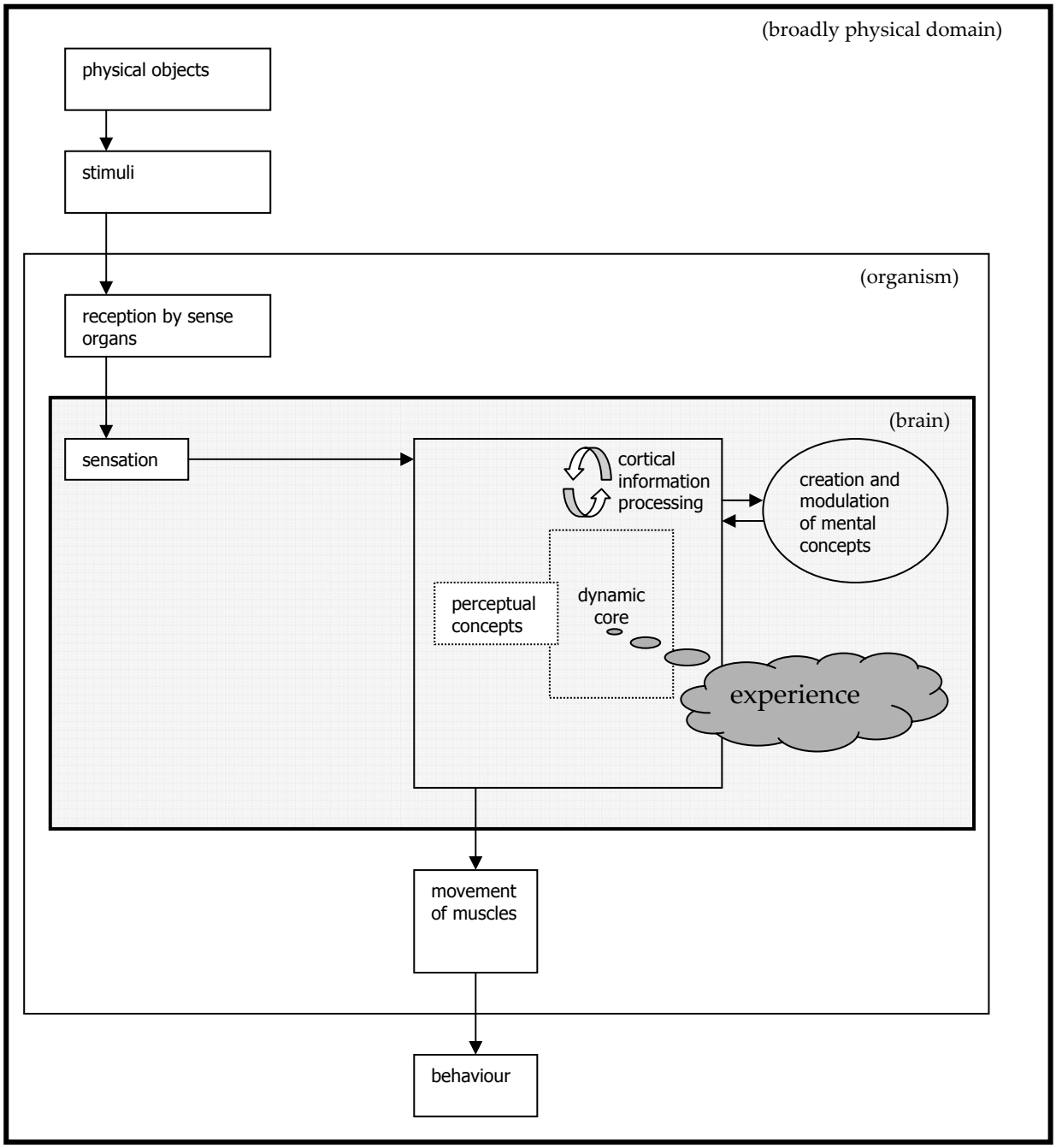

Figure 8: A model for perception

Stimuli originating from physical objects and consisting of physical activity affect the sensory organs of the organism. The sensory organs transform physical energy into neural signals, which enter the brain, giving rise to sensation. Sensation causes information processing in cortical regions in the brain. The processing of information is often very complex. For instance, in the case of visual processing, many different brain areas are involved for analysing colour, motion and form, and areas for object recognition, these areas often being connected by feedback loops. Perceptual mental concepts, coded for by neural circuits, are employed during the processing of information that contributes to perception. These concepts are employed

if the neural circuits coding for them are activated. Information processing causes the modulation of pre-existing concepts and the creation of new concepts. Different neuronal groups, distributed throughout the thalamus and cortex, form the global workspace or dynamic core at a particular moment. The assembly of neural populations engaged in the dynamic core can change in time. The dynamic core constitutes experience (in this case: perceptual experience).

Perceptual experience is a higher order property of the neural activity that makes up the dynamic core. Perceptual experience has both conceptual and sensory content. Only the conceptual content is accessible for further conscious acts, such as remembering, thinking or reporting. Perceptual experience can have a causal influence on information processing. For example, selective attention, a conscious act, influences the way sensory information is processed. Information processing can result in motor output: signals sent to muscles by the brain. These signals can cause muscles to move, resulting in observable behaviour, for example speech or body movements.

This model of perception indicates how the process of perception works. Moreover, the theory takes into account how the process of perception is established in the brain (nevertheless, many more details are unravelled, but, for the final purpose of this dissertation, many details do not add further insights). In addition, the model indicates how past experiences can influence contemporary experience: past experiences create and transform concepts that may be employed in contemporary experiences. Thus, the theory of perception as developed in this chapter can account for the individual factors that influence landscape experience, as stressed by Bourassa. The theory leaves unexplained, however, the cultural and biological factors that influence landscape experience. In the following two chapters, I will expound on these factors and demonstrate that they can be embedded in the proposed theory of perception.

Chapter 10 Culture and experience

10.1 Introduction: the problem of cultural influence

According to Geertz (1973: 49), 'there is no such thing as human nature independent of culture'. Indeed, the way people experience and behave is intensively affected by culture. For example, the way people dress varies with culture. Many people in the West use a knife and fork to eat, while most people in the East use chopsticks. If we attend a funeral, our behaviour is completely different from our behaviour on a beach. In some cultures, however, the yelling heard at funerals almost resembles the yelling at Western beaches. Lehman et al. (2004) conclude in their review study on psychology and culture that 'much recent research has demonstrated the strength of culture in influencing the perceptions, construals, thoughts, feelings, and behaviour of its members'.

In landscape experience research, the cultural influence on landscape experience is stressed by many approaches, for example human geography, history, the images of nature approach, and sociological and anthropological approaches (Chapter 4). The empirical evidence demonstrating cultural effects on landscape experience is overwhelming. For example, Corbin's (1989) historical study revealed that the experience of the sea has been changing under the influence of changing social conditions and world views. The allotment garden study (Chapter 7) revealed that the gardeners' ideas about gardening are shaped by the garden union's culture.

But how does culture affect experience? Reflection on this question is nearly absent in the field of landscape experience research. In different approaches of landscape experience research, it is simply assumed that culture influences experience, but the applied theories leave unexplained how this cultural influence is established. As long as the theories make sense, the absence of reflection on the fundamental question about the way culture affects experience is not problematic. In this dissertation, however, one of the questions is whether and, if so, where the different approaches in landscape experience research meet. An answer to the question of cultural influence on experience may be of great help to point out relations between approaches.

Of course, the way individuals experience varies, within a culture or cultural group as well. Cultural influence, then, can be understood as variation between cultural groups across individual variation. For example, although the experience

of people living in Medieval western Europe varied from individual to individual, as does the experience of people living in contemporary Europe, systematic variation between the experience of the sea by Medieval and contemporary European inhabitants is illustrated by Corbin on the basis of investigation of documents.

The problem of the cultural influence on experience is difficult because experience and culture are very different phenomena. Experience is a psychological, subjective process. 'Virtually every definition of culture suggests it represents a coalescence of discrete behavioural norms and cognitions shared by individuals within some definable population that are distinct from those shared within other populations' (Lehman et al., 2004). In short, culture consists of a set of collective habits and views. How can these collective habits and views affect individual experience? Since cultural influence implies that the same set of stimuli (e.g. seascape stimuli) will be experienced differently by members of different cultures, culture must somehow contribute to the shaping of the concepts stored in the individual's mind.

Natural language is an important vehicle for cultural influence. Therefore, I will especially, but not exclusively, pay attention to natural language. According to Bloom (2004), 'the question of how language and thought are related is one of the deepest questions in psychology'. In the following two sections, I will discuss two famous views on the relation between language and experience: the extreme versions of the Sapir-Whorf hypothesis – which states that experience depends on language (section 10.2) – and a Wittgensteinian thought experiment, which results in the conclusion that a relation between language and experience is absent (section 10.3). I will argue that both views are wrong. Next, I will make a distinction between the intension and the extension of words, and explain how intension and extension are related (section 10.4). In sections 10.5 and 10.6, I will give an account of the relation between culture and experience. This account will be elaborated for natural language (section 10.7). In the conclusion, I will embed the account for the influence of culture on experience in the model for perception, as depicted in the concluding section of the previous chapter.

10.2 The Sapir-Whorf hypothesis

The ideas of Sapir and Whorf (one of Sapir's former students) about the relation between language and experience are known as the Sapir-Whorf hypothesis. In its extreme version, the hypothesis consists of two related principles: linguistic determinism and linguistic relativism (Campbell, 1997; Chandler, 1995). The first prin-

ciple expresses the idea that our experiences are determined by language: 'we see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation' (Sapir, 1929). Whorf expresses the idea as follows:

> We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds – and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way – an agreement that holds throughout our speech community and is codified in the patterns of our language. The agreement is, of course, an implicit and unstated one, but its terms are absolutely obligatory; we cannot talk at all except by subscribing to the organization and classification of data which the agreement decrees. (Whorf, 1940)

The principle of linguistic relativity states that the ways that people belonging to different linguistic communities experience the world vary in accordance with the different categories employed in different languages: 'no two languages are ever sufficiently similar to be considered as representing the same social reality. The worlds in which different societies live are distinct worlds, not merely the same world with different labels attached' (Sapir, 1929). The two principles are logically related: if language determines experience, the experience of people living in different linguistic communities will be different.

The extreme version of the Sapir-Whorf hypothesis, which states that experience is determined by language, is false. In all natural languages (e.g. Dutch and English), the number of words for different shades of blue is limited. However, if we look at colour strips in a paint shop we are capable of discriminating between a number of different shades of blue that far exceeds the number of different words for blue. If experience were determined by language, this discrimination capacity would be impossible. Moreover, the Sapir-Whorf hypothesis is not in line with the fact that animals possess mental concepts.

> Studies using classical training approaches as well as methods that tap spontaneous abilities reveal that animals acquire and use a wide variety of

> abstract concepts, including tool, color, geometric relationships, food, and number. (Hauser et al., 2002)
>
> There is a mismatch between the conceptual capacities of animals and the communicative content of their vocal and visual signals. For example, although a wide variety of non-human primates have access to rich knowledge of who is related to whom, as well as who is dominant and who is subordinate, their vocalizations only coarsely express such complexities. (ibid.)

Pinker (1995: 60) puts forward some objections against the hypothesis. Every now and then, we have the experience that we have to search a while for the right words to express a thought. Hence, thought entails elements that do not belong to a natural language. Furthermore, in natural languages, new words emerge constantly in the course of time. If thought were determined by language, how would new words be invented?

Hespos and Spelke (2004) demonstrated that children think before they can speak. In Korean, there is a word for 'tight-fitting contact' and one for 'loose-fitting contact' (for example, a pair of shoes may fit tightly or loosely in a box). In English this distinction is not covered by single words. Hespos and Spelke asked whether making the conceptual distinction between tight and loose fit exists before language learning. They showed five-month-old babies instances of a given category (tight or loose fit) for two different situations (cylinder placed in a container, ring-like object places around a post), until the babies got bored and stopped looking. Then they showed the babies an instance of the other category. If the babies are interested again, it means that the babies are sensitive to the categorical difference, and thus possess concepts for tight and loose fitting. This method is a standard method used in infant cognition research (Bloom, 2004). It was found that both Korean and English babies are interested again when an instance of the other category is presented (all other circumstances being equal). Babies, who do not have language skills, understand the difference between tight and loose fit.

The idea that experience is determined by language is evidently wrong. Of course, we can have linguistic thoughts (such as inner reasoning in languages), but we can have non-linguistic experiences as well, such as discriminating between shades of blue not covered by linguistic terms: 'it is arguable that each of us has ineffable concepts – perhaps a great many of them' (Sperber & Wilson, 1998). According to Fodor (1976), we all possess a language of thought, a kind of inner mental language, in which thought and experience take place. The language of

thought precedes the use of natural language (Sperber & Wilson, 1998). Two persons possess a different language of thought, since the way an individual language of thought develops is influenced by the unique history of a person (Sperber & Wilson, 1998). I do not necessarily agree with all the details of the language of thought theory as developed by Fodor (for example, according to Fodor, the language of thought has a semantic and syntactic structure pretty similar to natural language; I do not know if this is indeed the case; moreover, this subject is beyond the scope of this study). However, I agree that we possess some kind of inner language, consisting of a vast network of non-linguistic mental concepts. The idea is perfectly compatible with the theory of perception elaborated in Chapter 9. The theory of perception explains how mental concepts are created and transformed in the course of life. According to the theory of perception, language is not a necessary condition to develop such concepts.

Does the subjective language of thought relate to the public natural language? In the following section, I will present an extreme view, namely the idea that language and experience are not related.

10.3 Wittgenstein's box

A famous thought experiment by Wittgenstein addresses the problem of the relation between language and experience. Imagine that different persons all get a box that contains a beetle. Everyone is allowed to look in his own box, but not in the box of another person. If the persons communicate about the content of their box, they will all say that it contains a beetle. Everyone will assume that every box contains a beetle. However, nobody can be really sure that every box contains a beetle. A box may contain another object, or even nothing. From the message that a box contains a beetle, it does not follow that the box indeed contains a beetle.

Wittgenstein's box is a metaphor for consciousness. We can try to express our experiences, but nobody can deduce from linguistic expressions what our experiences are like exactly. According to Wittgenstein, linguistic expressions do not reflect experiences. Instead, the use of linguistic expressions is determined by the sum of conventions that prescribe which words to use for which situation. Thus, the use of the word 'blue' does not reflect an inner event, but reflects cultural conventions that determine when to use the word.

The fact that, in the Wittgensteinian view, it is impossible to deduce the experiential content from the word, does not make communication impossible. As long as members of a linguistic community use the word 'blue' for the same category of

external properties, communication is unproblematic. If a room has a blue and a red door, and people are told to exit through the blue door, communication works well as long as everybody calls the same door the blue door, no matter how the individual experiences may differ. Cross-individual similarities in experiences are not necessary conditions for communication.

Wittgenstein is right in the sense that we can never be absolutely sure about another person's experiences on the basis of his linguistic expressions about those experiences. However, Wittgenstein is wrong in the sense that linguistic behaviour and experience are not totally unrelated and that linguistic expressions can tell us something about experiences. The value of the thought experiment is that it shows that additional assumptions are needed to defend the thesis that experience and language are related, namely the assumption that other people have experiences (in other words, that the box is not empty), and the assumption that expressions may inform us about experiences.

Do other people have experiences – or are they zombies, being and acting like humans but lacking experience? I know that I have experiences, and I know that other people belong to the same biological species as I do. Therefore, it is safe to assume that other people have experiences. Moreover, since the neurological make-up of all healthy humans is globally the same, it is very likely that our experiences, while not exactly the same, share some common features. If a person reports an experience, we are able to make a reconstruction of his or her experience on the basis of our own experiences in the past. It is unlikely that a person who is reporting about experiencing a blue door has an experience that is completely different from my experience of a blue door, and has an experience that is like my experience of a black cow. And if someone's experiences differ completely from ours, it becomes evident. For example, one of Sacks' patients suffered from a cognitive failure. He once mistook his wife for a hat (Sacks, 1985). His deviating perception of his wife was immediately evident when he tried to put his wife on his head. In addition, in many cases a person's experience can be tested, since many of our experiences refer to the external world. Thus, colour blindness can be tested for by showing different colours and asking a person if he or she can discriminate between them.

To conclude, language and experience are not unrelated. Although linguistic expressions can never perfectly resemble experiences, they can inform us about experiences. Experience is neither determined by nor separated from language. The relation between language and experience (or more precisely, the relation between public words and mental concepts employed in experience) lies somewhere in between complete determination and complete separation. We are capa-

ble of having non-linguistic experiences and thoughts, in which mental non-linguistic concepts are employed, and we are capable of relating mental non-linguistic concepts to public words. In the following section, I will explain how we relate public words to mental concepts.

10.4 Extension, intension and correction

Writers on the theory of meaning have long used a pair of terms to disambiguate the notion of meaning; these terms are intension and extension (Putnam, 1975: 216). Extension is the set of things to which a word refers. These things can be all kinds of things: objects in the physical world (e.g. trees), properties (e.g. big), psychological states (e.g. sad), etc. As Putnam points out, it may be hard to define what set of things a word refers to exactly. Often, extension is defined as 'the set of things a term is true of. Thus, "rabbit" is true of all and only rabbits, so the extension of "rabbit" is exactly the set of rabbits' (Putnam, 1975: 214). This definition is, however, an idealization. For example, while it is obvious that there are things of which the description 'tree' is true and things for which 'tree' is not true, there are a host of borderline cases (Putnam, 1975: 217). For some things in the world, there is dispute whether it is a tree or not, even amongst scientific experts on tree-ness. In the context of this dissertation, however, it is not necessary to know exactly the set of things that belong to the extension of a word. Words simply have an extension, whether or not we are able to define it exactly.

Intension is the way a word is understood by somebody. In other words, intension is the mental concept or the network of mental concepts evoked in a subject who reads or hears the word. Words that have a particular extension can have different intensions for different subjects. For example, the word 'elm' might have a different extension for a biologist familiar with tree species than for a person not familiar with tree species. The other way around, different words can have the same extension. For instance, the terms 'creatures with a heart' and 'creatures with a kidney' refer to the same set of things. Nevertheless, the intensions these words have will be different for most subjects. The terms mean something different in our experience. Words having different extensions can have the same intensions for a given subject. 'Beech' and 'elm' refer to different species of trees, thus having different extensions. For someone who does not have corresponding mental concepts to discriminate between beeches and elms, the intension of both words may be the same (Putnam, 1975).

The last example demonstrates that intension does not determine extension. While the intension of a word is subjective, the extension of a word is socially established. In a linguistic community, implicit and explicit codes (or rules) exist that relate words to things. Because these codes are social and not subjective, a member of a linguistic community using a word wrongly to refer to a thing can be corrected by other members. For example, if someone points to his car and states 'I'll drive to work in my tree', he will probably be corrected. If he believes the correctors, the person will transform the association between his mental linguistic concept for the word 'tree' and his mental concept for the object car into an association between his mental linguistic concepts for the word 'car' and his mental concept for car. This principle of correction relates the social extension to the private, subjective intension. Consequently, the extension of a word shapes the intension of a word. Therefore, we know that the intensions of different members of a linguistic community are, in some respect, similar. If a person uses the words 'car' and 'tree' for different cars and trees the same way as I do, I can infer from his behaviour that his mental concepts for cars and trees are functionally similar with respect to discriminating between cars and trees, and recognizing cars and trees. While I do not know what his experience of a car and a tree is like exactly, I know that a feature of his experience of a tree is that it differs from his experience of a car, since this difference is a precondition for the capacity for using the words correctly (in accord with the cultural codes) for experiences of cars and trees.

In this explanation, words referring to external objects were used as examples. The principle of correction is possible because we can point to external objects. But how are relations between the extensions and the intensions established, by the principle of correction, for words referring to experiential states? We cannot point to sadness. Still, the subjective intension gets attuned to the social extension by pointing to external objects or events. For example, the extension of 'sad' could be explained to a child by stating 'How you felt the day your pet died' or 'How people feel when they cry'.

Thus, the mapping between public words and private mental concepts is established by the principle of correction. Though this example shows that culture can exercise influence on an individual mind, it does not show that culture influences the way a person perceives the world. In this example, the person probably perceived cars as cars and trees as trees before the correction. He just used the wrong words to express his perception. As a result of correction, his association between a particular mental concept and a particular word has changed. The distinction between intension and extension as well as the principle of correction that makes extension shape intension, are important but not sufficient to explain the cultural

influence on experience by means of language. In order to influence perception, culture must somehow transform the mental concepts that are employed in perception, apart from establishing the relation between mental non-linguistic concepts and words. The cultural aspects of language are not limited to the establishment of the codes that determine the extension of a word, and the principle of correction on the basis of these codes. Besides determining the extension, culture influences experience by relating a manifold of ideas to a word. In the following two sections, I will discuss a model for cultural influence on experience developed by Eco, because the model stresses this problem.

10.5 Public expressions and cognitive types

While explaining Eco's model for cultural influence, I will take for granted that there are words of which the extension in a culture and the intension for the members of a culture are established, and take for granted the relation between intension and extension (at least to some extent; for instance to the extent that the members of a culture equally use the word 'tree' to refer to trees). Thus, the relation between a word and the set of things a word refers to (extension) and the relation between a word and the mental concepts needed to identify the things a word refers to, is regarded as non-problematic in this section (in section 10.4, I explained how this non-problematic situation can be established in practice).

In a society, a host of public expressions of a word and the set of things to which the word refers are produced. For example, a painting of nature contains a public expression of nature. Thus, experiences and ideas of nature are publicly expressed in books, scientific texts, TV documentaries, conversations, paintings, etc. These expressions are public in the sense that they are not private because they can (theoretically) be encountered by everybody. Public expressions are always material (even a conversation is material: sound consists of air pressure waves). The term 'public expressions' is a modification of the term 'public interpretations' as employed by Eco (1997). Probably, the reason Eco uses the term 'public interpretations' has to do with the fact that public expressions (or public 'interpretations', in Eco's terminology) are produced on the basis of people interpreting the content of their minds. However, since public expressions are the products of these interpretations and not the interpretations themselves, I prefer the term 'public expressions'. If, in a particular culture, all written texts, images, etc. that expound on nature are collected, and all conversations about nature are put on tape, we would

have a controllable set of all public expressions of nature for that culture (Eco, 1997: 129-130).

Besides establishing the extension of a term by relating a set of things to a term, the public expressions add a manifold of associations, knowledge or ideas to the term or set of things to which the term refers. For example, the public expressions of nature consist of an almost endless set of associations that expound on the way nature is organized (e.g. texts on ecosystem theory), what nature looks like (e.g. paintings, TV documentaries), what kind of emotional experiences people have had in natural settings (e.g. paintings, conversations), etc.

Eco (1997: 123) calls the set of mental concepts a person relates to a word or the set of things to which a word refers the 'cognitive type'. Just as public expressions are much more than the plain definition of a word, the cognitive type an individual relates to a word is much more than the mental concepts needed to identify the set of things to which the word refers. For example, the mental concepts a person relates to the word 'tree' and the set of things to which the word refers (actual trees) may include all kinds of oppositions (e.g. oppositions that establish the capacity to discriminate between trees and cars), perceptual images (e.g. the forms and colours of trees, the sound of leaves whispering in the wind), knowledge of trees (e.g. many trees consist of roots, a stem, branches and leaves), personal memories of trees (e.g. memories related to a tree a person often climbed in as a child), behavioural repertoires, etc. (Eco, 1997: 148).

While the cognitive type is personal and mental, the public expressions are public and non-mental (Eco, 1997: 130). The distinction between cognitive type and public expressions globally resembles the distinction between intension and extension. However, cognitive type is more than intension and public expressions are more than extension. Cognitive types and public expressions are related by two kinds of individual interpretation processes, namely an interpretation process in which the individual interprets existing public expressions, and an interpretation process in which the individual interprets his own cognitive type to produce public expressions. I will illustrate both kinds of interpretation processes in the following section.

10.6 The twofold relation between public expressions and cognitive types

In 1972, the Club of Rome published the book *The Limits to Growth* (Meadows et al., 1972). In this book, it was argued that the pace of using natural resources outruns the carrying capacity of nature and environment. The book is a landmark in an

almost endless collection of books, scientific publications, newspaper articles, TV documentaries, symposia, campaigns of organizations such as Greenpeace, etc. that expound on the extinction of species, the erosion of soils, the destruction of ecosystems, the pollution of the environment, etc. All these expressions involve public expressions of nature. An element of these public expressions may be that nature is vulnerable. An individual may interpret these public expressions. In this interpretation process, his cognitive types for nature and vulnerability are activated, and a relation between the two cognitive types is established. A result of this ongoing interpretation process of many sources may be that the individual transforms his cognitive type of nature by adding the connotation of vulnerability. Once his cognitive type for nature – in other words, his network of mental concepts related to nature – is transformed, his experience of nature may be different. If he perceives a natural site, his experience may include, *inter alia*, an experience of something vulnerable. And he may be more sensitive to evidence of, for instance, erosion.

Thus, ultimately, nothing but the individual himself changes his cognitive type, on the basis of his interpretation of public expressions. This change may or may not be a voluntary conscious act. In many cases, the transformation of a cognitive type happens almost automatically, without the individual taking a decision. For many people, the connotation of vulnerability in their cognitive type of nature is not the result of a decision. In some cases, however, an individual may take a decision. For example, some people may decide not to believe all the publications on the vulnerability of nature. But, even for those people, it may be very likely that some kind of vulnerability connotation slips into their cognitive type of nature.

The result is that the cognitive types of members of a culture gradually get attuned to each other to some extent (Eco, 1997: 204), not because culture exerts some kind of direct power over the cognitive types of its members, but because the members of a culture encounter a host of material expressions that contain a core of similar public expressions, and transform, involuntarily on many occasions, their cognitive types in accordance with these interpretations to some extent. Therefore, it is very likely that the cognitive types of individual members of a particular culture, however strictly private, share some similar properties, as a result of ongoing multimodal communication. Thus, a part of the cognitive types of individuals is shared by the members of a culture (Eco, 1997: 164 and 204). For example, part of the cognitive types for nature of members of Western culture may be the connotation of vulnerability. Eco calls this shared part the 'overlapping cognitive type' (164). I will call it the 'cultural core content'. Cultural core content is an analytical term referring to similarities in cognitive types of the members of a

culture. Cultural core content cannot just be observed, it can only be reconstructed on the basis of inference from behaviour (including linguistic behaviour). For example, if members of a culture are asked to give a complete description of their sense of nature, the cultural core content of nature can be reconstructed as the similarities in these descriptions.

Of course, a culture is not a homogeneous mass of people being exposed to the same set of public expressions. Within a culture, different groups of people may share different public expressions. For example, biologists specialized in trees share particular public expressions of trees, and woodcutters share other particular public expressions of trees. Thus, within a culture, the cognitive types of individuals are attuned within specialized groups. That is, the cognitive types of biologists share some similarities, and the cognitive types of woodcutters share some similarities different from those of biologists. I will call these group-specific similarities of cognitive types the 'cultural modular content'. The term – like cultural core content – is analytical: it refers not to something that can be grasped, but to something that can only be reconstructed by analysing similarities. The cultural modular contents of different groups partially overlap, that is, the cognitive types share some features with the cognitive types of woodcutters, and the cognitive types of lay people. This overlap between different cultural modular contents is the cultural core content.

So much for the first kind of interpretation processes that relate public expressions and cognitive types: the individual interpretation of public expressions, resulting in alterations of cognitive types and gradual mutual adjustment of the cognitive types of members of a culture. There is another kind of individual interpretation process that links cognitive types and public expressions. The public expressions are produced by individuals. In this production process, the producer interprets features of his cognitive type (Eco, 1997: 129) in terms of some kind of public language. For example, a painter painting an observed tree interprets his experience of that tree, in order words, he interprets the mental concepts employed in his experience, in terms of, say, his painting language. Likewise, expressing a thought in natural language involves an interpretation of the mental concepts employed in that thought in terms of natural language (the fact that we often need some time to find the right words for a thought, even if we know the exact thought in our language of thought, shows that an interpretation process is going on). Thus, the other interpretation process that relates cognitive types to public expressions is the interpretation by the individual of his own cognitive type (or a part of it) into public expressions, that is, into terms of some kind of public language

(paintings, body language, natural language, etc.). Figure 9 represents the two kinds of interpretation processes that link cognitive types and public expressions.

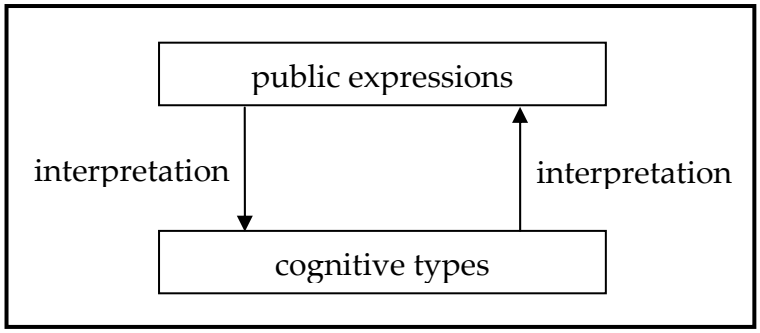

Figure 9: The relations between cognitive types and public expressions

The scheme represents a model that explains the dynamic interplay between culture and experience. Culture influences experience if and only if an individual transforms his cognitive type by interpreting public, material, expressions, which are, in turn, individual interpretations of (parts of) cognitive types (being networks of mental concepts) in terms of some kind of language. Experience influences culture if and only if an individual interprets his cognitive type into public expressions, which, in turn, are interpreted and lead to transformations of cognitive types of other individuals. These ongoing interpretations result in the gradual mutual adjustment of the mental concepts of members of a culture. Since mental concepts are employed in perception, the mutual adjustment of mental concepts influences perception.

In most publications that stress the relation between culture and experience, the relation is simply assumed. For instance, Lehman et al. (2004) write:

> Psychological processes influence culture. Culture influences psychological processes. Individual thoughts and actions influence cultural norms and practices as they evolve over time, and these cultural norms and practices influence the thoughts and actions of individuals.

While I fully agree with this statement, it leaves the relation unexplained. The model represented in figure 9, which is based on Eco's theory, fills this gap by specifying the mutual influence. Of course, the model as depicted is oversimplified, but in the concluding section I will embed this model into the model for perception as explained in section 9.8. Together with the model of perception, an explanation of the cultural influence on experience is possible.

The model explains the influence of culture on experience, and vice versa, solely on the basis of individual mental processes and material entities (public expressions are material entities). Thus, it is not necessary to assume that culture is a real entity separate from mental and material entities in order to explain cultural influence on experience. Concepts that point to cultural phenomena (such as culture, social reality, social constructions, money, discourse, cultural core content, collective habits, the extensions of words, etc.) are not needed to explain how cultural influence on experience is established in practice.

It does not follow that culture and cultural phenomena are not real, or are perfectly reducible to mental processes and material entities. My task is to develop a theory of experience; therefore, I did not systematically analyse whether culture exists as a real distinctive entity, an entity that belongs to an ontological category different from the categories of material and mental phenomena. I will briefly explore this intriguing issue, and conclude with a default position.

Cultural phenomena exist. For example, the extension of the word 'tulip' exists, the Western collective habit to eat with a knife and a fork exists, and money exists (by 'money', I mean not only the material expression of money, such as bank notes, but also the collective view that adds value to this material expression). Moreover, cultural phenomena can bring about something. For example, the extension of the word 'tulip' has affected the way in which I use the word, the collective habit of eating with a knife and fork influenced my way of eating, and money greatly affects the life of people, as can be observed by looking at the consequences of a stock market crash. Thus, cultural phenomena are real, in the sense that they exist and do something.

The fact that there are real cultural phenomena does not imply that all cultural concepts employed in scientific and daily language necessarily point to real cultural phenomena. There might be purely analytical concepts that refer not directly to real cultural phenomena, but to an outcome of the analysis of a collection of phenomena. For example, the concept of social stratification might not refer to a real cultural phenomenon, but point to categories to be created by researchers who are analysing, for example, the incomes of a number of people.

Analytical terms referring to abstractions can be very useful to shed light on parts of reality. For example, Einstein's theory of relativity has demonstrated that the Newtonian notion of gravity does not refer to a force that exists in reality. In reality, the phenomena explained by gravity force are caused by curves in space-time, not by a real force. Still, the Newtonian notion of gravity force, even though it is an analytical term that does not refer to a real phenomenon, gives an economic and good explanation of a set real processes. Likewise, cultural variables that are

analytical terms that do not refer to real phenomena can be powerful interpretative tools to explain real processes or phenomena. For example, in the Rotterdam allotment garden study (Chapter 7), the notion of discourse was employed in an analytical way (that is, I did not observe discourses) and helped to understand real phenomena (similarities in opinions of the gardeners) in an economic way.

Although some cultural theoretical constructs probably do not denote real phenomena, cultural phenomena are real, like money is real. Still, if real cultural phenomena could be satisfactorily reduced to material and mental phenomena, cultural phenomena would not belong to a distinctive ontological category. Compare the reductionistic materialists in the context of philosophy of mind (section 8.6). They regard consciousness as a real phenomenon, but not as ontologically different from matter, since they contend that consciousness is perfectly reducible to brain states or processes. Likewise, are cultural phenomena ultimately nothing but mental phenomena, material phenomena or a combination of these phenomena? An argument against reductionistic materialism is the argument from multiple realizability (section 8.6). Since the same mental state (e.g. being in pain) can be realized by different neural systems (e.g. my brain and your brain), the mental state cannot be identical to the neural state.

The same argument applies to the non-reducibility of cultural phenomena. These phenomena are multiple realizable. For example, the material part of money can be realized by paper money, computer data or vouchers. The mental part of money can also be multiply realized. If I stop believing in the function of money, the members of my culture can go on doing the same things with their money. Thus, even though the mental part of money is realized differently (my mental concepts for money have changed), the cultural phenomenon money will remain the same.

My default position with respect to the ontological status of cultural phenomena, then, is that cultural phenomena are higher order phenomena, entailing new qualities that do not exist on the lower level of the phenomena constituting culture. Therefore, cultural phenomena belong to a distinctive ontological domain. This position is in line with the social system theory developed by Luhmann (1995). According to Luhmann, social systems are constituted by communication (Luhmann extensively uses such expressions as 'constituted by' or 'emerges from', the same terms that are employed in the supervenience view in ontological debates). Within instances of communication, patterns emerge; these patterns are social systems.

Interestingly, Luhmann (1995: 59) argues that social systems and psychic systems are not hierarchically related, but are different emergent systems that are

mutual resources. I, as a conscious agent – a 'psychic system' in Luhmann's terms – use culture as a resource. For example, in the process of producing this book, I use the university, a social system, as a resource. Culture, as a social system, uses consciousness as a resource. The university, a social system, uses me as a resource, for publishing this book adds to the goals and (hopefully) the prestige of the university. In the allotment garden study, the view that the garden union (seen as a social system) uses the gardeners to maintain itself (e.g. by selecting gardeners reinforcing the rules and excommunicating those that do not) is perfectly applicable.

To conclude, although my analysis has been far from extensive, I think that cultural phenomena are real, higher order phenomena, probably supervening on communication. Consciousness and culture, are mutual resources. For example, the extension of a word (a cultural phenomenon) is a resource for my consciousness (to create mental concepts being my intensions of a word), and the other way around, the intensions of words of members of a culture are resources for extensions to survive.

Importantly, the interpretation process whereby the individual interprets public expressions can be perfectly understood in the terms of the model of perception constructed in Chapter 9. Basically, the interpretation of public expressions is not fundamentally different from the interpretation process involved in the perception of objects, like material trees. In fact, the interpretation process is an instance of perception, the perception of public expressions, which are a particular set of objects.

The model of cultural influence on experience given in this section can be seen as a template for different modes of cultural influence, for instance cultural influence by means of natural language, body language, pictorial language, etc. For different modes of cultural influence, the model can probably be refined in different ways. In the following section, I will summarize some main findings of the neuroscientific study of language processing, and show how this knowledge can be used to refine the model.

10.7 The neural basis of natural language

The knowledge about the neural basis of language is far from complete (Lieberman, 2002). For a long time, the classic Wernicke-Geschwind model has been conceived as a satisfying model to explain the neural basis of linguistic behaviour. In this section, I will explain the basic features of the model. I will mention

both the criticism of the model, and the features of the model that are still widely accepted and in line with empirical observations.

According to the classic model, there are two main language centres in the brain, both in the left hemisphere: Broca's area is the site for the deposition of motor images of words, and Wernicke's area is the site for the deposition of acoustic images of words (Poeppel & Hickok, 2004). The child who is acquiring language forms mental acoustic concepts of words (a purely auditory entity) in Wernicke's area, and mental motor concepts in Broca's area (Poeppel & Hickok, 2004). It is empirically confirmed that damage to Broca's area may result in difficulties in expressing thoughts in either written or spoken language (Broca's aphasia). Subsequently, damage to Wernicke's area often leads to difficulties in comprehending both speech and writing (Kandel et al., 1995: 639). Broca's area lies near the motor cortex, Wernicke's near the primary auditory cortex (Kandel et al., 1995: 642). These two language centres are connected (by a fibre tract called the arcuate fasciculus). The activation of mental acoustic images in Wernicke's area causes the activation of the corresponding mental motor images in Broca's area (Poeppel & Hickok, 2004).

The classic model states that, apart from Wernicke's and Broca's areas, other areas are involved in language processing. In order to understand words, the acoustic and motor mental concepts corresponding to words have to be associated with distinct non-linguistic mental concepts. Thus, not only is there a connection between the two language centres, but there are also connections between the conceptual representation systems distributed throughout the cortex (Poeppel & Hickok, 2004). For example, hearing the word 'tree' activates the acoustic mental concept 'tree' coded for in Wernicke's area, which in turn activates a network of mental concepts representing a tree in different cortical areas (visual areas, auditory areas, etc.).

In order to master a natural language, the individual must be capable of recognizing different material signs that refer to a particular word. For example, the signs 'tree', 'TREE' and '*tree*', as well as the spoken word 'tree', are physically different but refer to one word. Therefore, the individual needs to create a mental concept for the word. This mental concept for a word is stored in Wernicke's area. It is a mental concept for auditory recognition of a word. If a person reads a text, the visual information is first interpreted in the normal visual areas, until a visual image of the word is created in the higher visual cortex. This information is subsequently projected to Wernicke's area. This indirect loop corresponds with the chronology of the individual acquisition of language skills: generally, infants first learn to hear and speak language, and then learn to relate written text to it. Only

recognizing a word is not sufficient to master language. In addition, the individual has to relate his mental concept for a word to other mental concepts, or, in other words, his cognitive type for the object a word refers to.

The classic model has been challenged by many studies in recent decades. First, the model cannot account for the range of distinctive aphasic syndromes that have been found (Poeppel & Hickok, 2004). Second, the model is seriously linguistically underspecified: in theoretical and experimental research into language, many more phenomena are distinguished than the production and reception of words (for instance, the classic model gives no account for syntactical rules). Third, the model is anatomically underspecified. Wernicke's and Broca's areas are not anatomically homogeneous, and many brain areas not stated by the model play a role in language processing as well (Hauser et al., 2002; Lieberman, 2002; Poeppel & Hickok, 2004).

Despite this criticism of details of the classic model, the basic features as explained in this section are still widely accepted. The criticism basically states that the neural basis of language processing is much more complex than the model can explain. That Wernicke's area is the basic storage deposit for auditory word concepts, that Broca's area is the basic storage deposit for motor word concepts, and that these areas are associated with many other brain areas where mental concepts are stored, is well corroborated by empirical findings (Poeppel & Hickok, 2004). For the purposes of this chapter, this knowledge is sufficient.

The general model for cultural influence on experience can be specified for natural language as follows. In the interpretation process of public expressions, the individual grasps words. These words evoke mental linguistic concepts, coded for by neural circuits in Wernicke's area. In the case of reading text, the outcome of visual interpretation processes is projected to Wernicke's area. The mental linguistic concepts, in turn, activate mental concepts distributed in different cortical areas, such as visual concepts, explicit memory concepts, auditory concepts, etc. Together, this network of mental concepts is the cognitive type of the individual related to a word. On the basis of a text, that relates different words, an individual may relate different cognitive types to each other, for example, for nature and vulnerability. Eventually, this may lead to an enduring connection between different cognitive types. Thus, the cognitive types may change and, as a result, the way an individual interprets sensory information may change.

10.8 Conclusion: cultural influence on experience

In figure 10, the account for the cultural influence on experience developed in this chapter is embedded in the model for perception, as developed in the previous chapter.

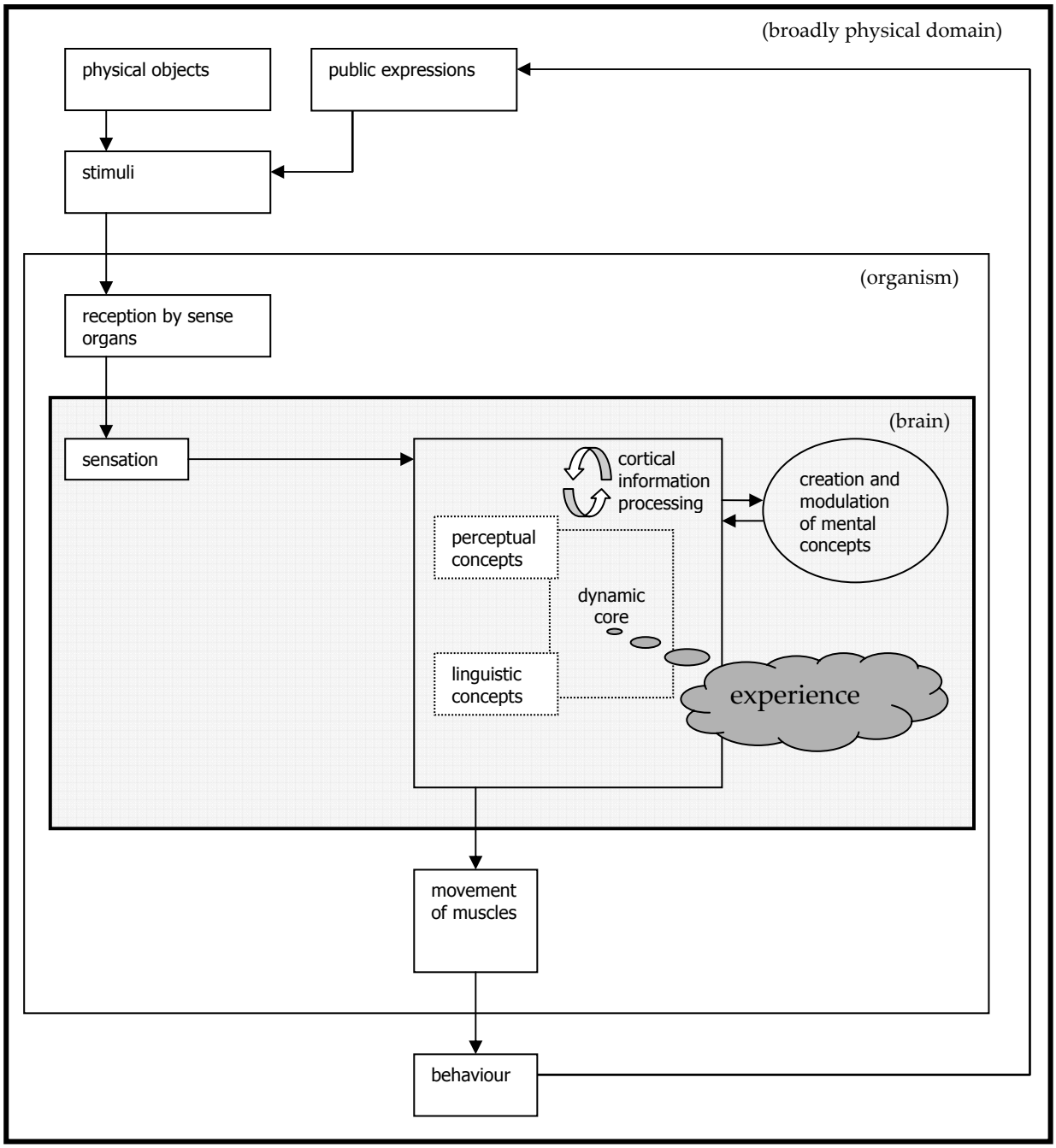

Figure 10: A model for experience, including cultural influence on experience

Only two items are added to the model of perception: public expressions and linguistic concepts. The reason that the addition of two items is enough to give an

account of cultural influence is that this influence comes down to series of individual interpretation processes that are already captured by the model for perception.

According to the model depicted in figure 10, culture exercises influence on experience because subjects encounter and interpret public expressions, which are material entities and events that contain expressions of people, leading to alterations of the mental concepts of the subjects. In the cortical information processes of interpretation, mental concepts are employed. In the case of encountering public expressions in natural language, such as speech or text, the mental concepts employed are linguistic concepts. The linguistic concepts, in turn, activate other mental concepts, such as perceptual concepts for the objects the linguistic concepts refer to. The activation of mental concepts leads to modulation and the creation of new mental concepts. Since in most cases of encountering public expressions different networks of mental concepts are employed simultaneously, these different networks may get connected. When the altered mental concepts are employed in future experiences, these experiences have a particular quality that is influenced by culture.

Public expressions are produced by people, who, willingly or unwillingly, express the contents of their mind. In the case of expressing in natural language, an individual interprets aspects of his experience in terms of linguistic concepts. In turn, these linguistic concepts generate motor output, leading to movement of muscles, thus generating behaviour. This behaviour is a public expression (e.g. body language). Behaviour may also lead to public expressions, such as in the case of writing a text.

We are all engaged in a constant flux of creating public expressions that express our experiences and interpreting public expressions that express the experiences of others. To some extent, this may result in gradually attuned networks of mental concepts of individual members of a culture, and thus to commonalities in experiences of a given physical object or event.

While we can never be sure how an individual interprets a given public expression exactly, for example a word, we can infer from the behaviour of people that there are commonalities in these individual interpretation processes of members of a culture, as explained in section 10.4. True, communication problems are daily phenomena, but to some extent we can understand each other. If we did not count on the possibility of conveying thoughts from one mind to another in a fairly predictable way, there would be no reason for me to put effort into writing this dissertation and there would be no reason for you to read it.

This explanation of cultural influence on experience provides a basis to reinterpret the theories and concepts as offered by the images of nature approach, and by

historians, sociologists and anthropologists expounding on landscape experience. The explanation also suggests that cultural factors and individual factors that influence experience may be intimately intertwined, since cultural influence is to a great extent mediated by the same subjective interpretation processes as influences on experience by past experiences. Actually, cultural influence as explained in this chapter is an instance of the influence of past experiences on current experience – not past experiences of matterscape, but past experiences of public expressions.

In the following chapter, I will give an account of the way emotions work. Emotions are, for us, important aspects of experience, colouring our life, so to speak. In addition, biological factors as stressed in landscape experience research are factors that are linked to emotional aspects of landscape experience.

Chapter 11 Emotion

11.1 Introduction

In Chapters 9 and 10, I described the way both personal factors (previous experiences) and cultural factors (leaning from others) exercise influence on experience. In the multidisciplinary field of landscape experience research, environmental psychologists stress a third set of factors that influence landscape experience: evolutionary or biological factors (see Chapter 4). To complete my general theory of experience that will serve as a framework to create a comprehensive theory of landscape in the following chapter, an account is needed of the way evolutionary or biological factors may influence experience.

In landscape experience research, the term evolutionary factors denotes the idea that some aspects of landscape preferences are the result of evolutionarily developed emotional reactions to the environment that are innate and genetically coded for. Evolutionary influences on experiences are of course not limited to emotions and to the preferences following from emotions. Since experience is without doubt related to the brain (in my view, supervenes on some neural processes), and the brain is a biological phenomenon whose structure is greatly influenced by the genetic make-up that is the result of evolution, every aspect of experience is permeated (but not determined) by evolution. For example, while the particular language a child learns to speak is determined by culture, the general human capacity to learn a language has developed in the course of evolution. Evolutionary factors as stressed by environmental psychologists, that is, inborn landscape preferences, are therefore a particular subset of all evolutionary factors that influence experience.

No environmental psychologist claims that landscape preferences are completely determined by evolutionary factors, and are not influenced by personal history and culture. The claim of those who study evolutionary factors is that across individual and cultural variation, some similarities in landscape preferences can be found in most humans. These preferences are theorized to be evolutionarily programmed, because they are supposed to be universal. This theoretical argument is not unproblematic. Universal aspects of experience, found in all human subjects, are not necessarily innate and genetically coded for (Turner, 1992). For example, most humans possess mental concepts for up and down. Although these concepts are universal aspects of experience, they may be acquired by experience

rather than being evolutionarily developed and genetically programmed. All healthy humans have senses capable of discriminating between different directions. Many objects (e.g. trees, humans) are asymmetrical in the vertical direction. The sky is always up, the ground is always down. Many objects behave differently in the up direction than in the down direction, due to gravity. Thus, for all cultures and individuals, there are systematic differences between up and down. The universality of the concepts for up and down might result from this stability of the environment across earth, and not from genetically coded predispositions. Universal aspects of experience result either from innate, genetically coded, predispositions, or from commonalities in experience that result in cross-individual and cross-cultural acquirement of similar experiential dispositions. Another problem with the evolutionary approach in landscape experience research is that the empirical evidence for universal landscape preferences is not very strong, due to the virtual absence of cross-cultural studies. However, the lack of convincing evidence, and the interpretational problem of universal aspects of experience, does not rule out the existence of innate aspects of landscape preference. In this chapter, I will argue that we have good reasons to believe that innate aspects of landscape preference exist, notwithstanding the lack of decisive evidence.

In the evolutionary approach in landscape experience research, preferences are seen as emotional reactions. We are capable of preferring landscapes because we are capable of having emotional states related to landscapes. Emotions can be either positive (e.g. happiness) or negative (e.g. fear). The preference for an object or situation is the net result of all positive and negative emotions invoked by the object or situation. Preferences have a qualitative feel (there is *something it feels like* to prefer something) and are about something (if we prefer, we always prefer something). Since preferences are emotional aspects of experience (LeDoux, 1996: 53), I will pay attention to emotion in this chapter.

Kleinginna and Kleinginna (1981) studied different definitions of emotion and tried to put everything together in one all-embracing definition:

> Emotion is a complex set of interactions among subjective and objective factors, mediated by neural/hormonal systems, which can give rise to affective experiences such as feelings of arousal, pleasure/displeasure; generate cognitive processes such as emotionally relevant perceptual effects, appraisals, labelling processes; activate widespread physiological adjustments to the arousing conditions; and lead to behaviour that is often, but not always, expressive, goal-directed and adaptive.

Brinda (1970) has identified different experimental approaches in emotion research. Some approaches expound on emotional experience; emotions as felt and subjectively reported by subjects. Another set of studies is dedicated to emotional arousal, that is, changes in internal bodily processes (including neural processes) induced by environmental stimuli. Emotional action, namely the overt emotional responses of behaviour, is the subject of a third approach identified by Brinda. And last, a branch of emotion research concentrates on emotional stimuli, that is, stimuli properties of the physical or social environment that may induce emotional experience, arousal and action (environmental psychologists have typically engaged in this approach).

The studies of definitions and approaches point to different aspects of emotions that have to be considered in a theory of emotions. First, emotional stimuli. Emotional reactions are triggered by some categories of stimuli and not by others. Strictly speaking, stimuli do not have the property of being emotional. The term is just an economic way of designating stimuli that induce emotional responses. Second, emotional bodily reactions. Emotions often accompany all kinds of bodily reactions, which can be subdivided into overt behaviours – such as blushing, sweating, facial emotional expressions, stuttering, etc. – and less overt bodily responses, such as changes in heart rate, changes in the conductivity of the skin, changes in the hormonal level in the blood system (e.g. fear goes with rise of adrenalin level in the blood), etc. Third, emotional experience. Emotional reactions are often (but not necessarily always) accompanied by conscious feelings, such as feelings of happiness, fear, sadness, etc. Fourth, an aspect not mentioned by Brinda but studied by many scholars in recent decades, interactions between emotion and cognition. While emotion and cognition are distinctive psychological functions, mediated by separate brain systems, several kinds of interactions occur between emotion and cognition. Though some aspects mentioned by Kleinginna and Kleinginna, and Brinda might seem to be lost in my division, my explanation of emotions will cover all aspects.

In the following sections, I will develop a theory of emotion that is inspired by the theories proposed by Damasio (2001) and LeDoux (1996), as well as by various empirical studies. Humans, as well as many other species, respond to stimuli that have emotional significance with automatic bodily reactions. These bodily reactions are to a great extent built-in, evolutionarily determined responses (section 11.2). We are also programmed by evolution to respond to stimuli that have particular properties, but we can learn to respond to other stimuli with these bodily reactions. For the detection of the emotional significance of stimuli, and the bodily responses, conscious awareness is not needed (section 11.3). Emotional responses

are constituted by subcortical brain regions (section 11.4). An emotional experience arises if output of the brain regions triggering the bodily responses, as well as feedback from the body, projects to brain regions that give rise to consciousness (section 11.5).

After this explanation of the theory, I will pay attention to the influences of perception (section 11.6), and learning (section 11.7) on emotional processing. After summarizing the main line of thought developed in this chapter (section 11.8), I will reflect on the ways place preferences can come into being (section 11.9).

11.2 Evolutionarily programmed emotional responses

An important element of the emotion theories of both LeDoux and Damasio is the thesis that many emotional bodily reactions are innate, programmed by evolution. What evidence supports this thesis? In the expression of emotions in man and animals, Darwin (1872) concludes that:

> … the chief expressive actions, exhibited by man and by the lower animals, are now innate or inherited – that is, have not been learnt by the individual – is admitted by every one. So little has learning or imitation to do with several of them that they are from the earliest days and throughout life quite beyond our control; for instance, the relaxation of the arteries of the skin in blushing, and the increased action of the heart in anger. … That these and some other gestures are inherited, we may infer from their being performed by very young children, by those born blind, and by the most widely distinct races of man.

Darwin argued that a number of emotional expressions, such as facial expressions, are similar across cultures. He sent questionnaires to diplomats across the world about emotional expressions, and draw this conclusion from the answers sent back to him. Darwin also saw that people who were born blind and are thus not capable of learning these expressions, still exhibit the same facial expressions in emotional states. Moreover, Darwin observed that many emotional bodily expressions are conserved across species. For example, the erection of body hair in dangerous situations can be found in dogs, lions, hyenas, cows, pigs, antelopes, horses, cats, rodents, bats, etc. The fact that similar bodily expressions can be found across cultures and species, and even in people born blind, can only be explained by the

assumption that these bodily responses are innate and have developed in the course or evolution.

Darwin's method to demonstrate the universality of emotional expressions across cultures may be criticized, but later research, in line with contemporary scientific standards, has confirmed Darwin's conclusions. For example, Ekman (1992, 1999b; Ekman & Friesen, 1971) studied facial expressions in 21 different literate countries. After some explorative studies, he showed six photographs depicting six different facial expressions of emotions. People had to pick from a list of emotions named in their own language which emotion was expressed. Ekman found that facial expressions of happiness, anger, fear, surprise, sadness and disgust are universally recognized. Ekman calls these universal emotions basic emotions. Other scholars have used different methods to comprise a list of basic emotions, for example emotion words in different languages, general bodily expressions, or electrical stimulation of different brain areas in rats (see LeDoux, 1996: 113 for an overview). While the lists are slightly different, there is a great deal of overlap. According to LeDoux (1996: 121), the lists include some version of fear, anger, disgust and joy. The differences between the lists are to some extent due to the use of different methods to find basic emotions and to the use of different names for the same emotion.

The existence of basic emotions does not rule out cultural and individual differences in emotional behaviour, or the existence of non-basic emotions that might vary across cultures. Aspects of emotions, such as which stimuli trigger emotional responses, aspects of the expression of emotions, and the conscious feeling and behaviour after an emotion occurs, can be influenced by personal history and culture (Damasio, 2001: 65). Still, it seems undeniable that there are some basic emotional bodily responses. According to many emotion scientists, these basic emotional responses are innate, generated by brain systems that are highly conserved through many levels of evolutionary history (LeDoux, 1996: 17). According to many emotion scientists, emotions evolved as complex sets of automatic bodily responses – including chemical, neural and behavioural responses – controlled by the brain. These responses were beneficial to the survival of ancestral organisms, for their adaptive value in dealing with fundamental life tasks (Damasio, 2001: 60; LeDoux, 1996: 40; Ekman, 1999a). For example, in sudden fear responses, many species, including humans, tend to freeze and erect body hair. This reaction may serve the survival of an animal that detects a predator. Since most predators typically react to movement and noise, freezing is a very beneficial reaction. Erecting body hair makes the animal look bigger and thus potentially more harmful to a predator. Built-in responses have the special benefit of being fast responses. As

LeDoux writes, if an animal had to plan what to do when it detects a predator, it would probably be the predator's dinner by the time it had come up with a strategy.

Bodily emotional reactions are closely related to homeostasis. Homeostasis refers to mutually attuned, to a great extent automatically occurring physiological reactions, regulated by the central nervous system, that stabilize the internal conditions of a living organism (Damasio, 2001: 49). For example, as a response to changes in temperature, physiological reactions are needed to keep the body temperature within safe limits. Or during physical exercise, the body needs more oxygen; the heart beat will increase. We are not aware of the neural processes that regulate this homeostatic process. Emotional bodily responses are complex sets of physiological reactions that regulate homeostasis in response to significant situations. For example, if a rat sees a cat that is nearby, it will freeze. Meanwhile, its heart rate and blood pressure will rise (LeDoux, 1996: 132). These physiological changes induced by the appearance of the cat, prepare the rat to fight or flee: for example, its muscles have access to more oxygen than usual. Besides being evolutionarily beneficial for the organism that exhibits emotional bodily reactions, the evolutionary benefit of the overt expression of emotions, like facial expressions, lies in communication with conspecies (Ekman, 1999a).

Earlier, I argued that experiential universality does not automatically point to genetically fixed predispositions. Likewise, behavioural universality does not necessarily point to innate behaviour. In the case of basic emotional responses, however, there are convincing reasons to assume that these responses are innate. First, basic emotional responses are demonstrated by organisms that have had no possibility to learn these responses, such as recently born animals. Second, many aspects of these emotional responses are autonomic processes that are beyond any control. For example, we are unable to control processes like heart beat, or adrenalin release in the blood. Of course, we are able to voluntarily engage in situations that we know will lead to increased heart beat and adrenalin release, such as stepping in a roller coaster. However, in this case it is not the processes that we control, but our engagement in situations that turn on these processes automatically. Since we have no control over many aspects of emotional responses, these responses are not open to learning. In short, basic emotional bodily responses are to a great extent evolutionarily developed, innate behaviours.

The implication of emotional responses being adaptive complex physiological responses, is that emotions have developed as reactions that in certain situations are crucial for survival. Healthy organisms are not always frightened or happy. In

order words, emotional responses are triggered by specific categories of stimuli (emotional triggers).

11.3 Natural and learned emotional triggers without conscious awareness

There is evidence that not only are the emotional bodily responses innate, but that animals and humans also have an innate capacity to exhibit these responses in specific situations (natural triggers). Natural triggers can lead to emotional responses, without any previous learning process involved. For example, rats, raised in isolation in a laboratory, never having seen a cat, show fear responses when exposed to a cat, such as increased heart rate and freezing (LeDoux, 1996: 132). And very young babies, having had no time to learn anything, generally start to cry after a loud unexpected sound. If the claim that we have some innate preferences for landscapes having particular properties is true, then there must be landscape properties that are natural emotional triggers for us.

During the course of life, organisms learn to react to other, not innate, categories of stimuli (learned triggers). An important mechanism for emotional learning is conditioning. In conditioning, a stimulus gets associated with another stimulus (Damasio, 2001: 66; LeDoux, 1996: 141). For example, a rat learns to respond emotionally to a place or a category of places with specific properties where a cat is often seen. A place (e.g. a place where a cat if often seen) might become a learned trigger by virtue of association with a natural trigger (e.g. a cat) for an individual organism. What is learned in this case is not the emotional response, but the trigger that induces the response.

Some way or another, incoming stimuli have to be evaluated for emotional reactions to occur, whether these reactions occur in response to natural or learned emotional triggers. Organisms must have the capacity to detect the emotional significance of stimuli. Emotion theorists call this evaluation of emotional significance appraisal, a term coined by Arnold (1960). Even in the most simple model of an emotional unit (a system that produces emotional reactions), a set of inputs (stimuli), an appraisal mechanism (that is capable of detecting the emotional significance of the input) and a set of outputs (the emotional responses) have to be distinguished (LeDoux, 1996: 127). As argued earlier, the appraisal mechanism is programmed by evolution to detect the emotional significance of specific stimuli (natural triggers), but also has the capacity to learn to detect stimuli (learned triggers) that tend to be associated with natural triggers.

It may seem plausible that cognition plays a role in appraising emotionally relevant stimuli. To explain the facts that are on the table thus far, a good guess would be that we first determine what something is (cognition) in order to be able appraise the emotional significance of the object perceived. If stimuli are appraised as being emotionally significant, a complex set of automatic emotional bodily reactions turns on. For example, if confronted with a snake, we may first recognize the snake and then determine its emotional significance, which starts up emotional responses. There is, however, convincing evidence that the appraisal mechanism works well without cognition. For many stimuli, we are able to know whether we like something or not, or whether something is good or bad for us, without knowing what it is. I will discuss three experiments, each of which involved a different method, that demonstrate the capacity for emotional discrimination without cognition.

Damasio (2001: 53-55) describes an experiment with David. David has lost the capacity for creating explicit memories, due to damage to the hippocampus (which is crucial for the formation of conscious, explicit memories). Therefore, David has lost the capacity to recognize new people. If he meets someone, he immediately loses conscious memory for this person. Next time he meets the same person, the person is completely new to him. For example, he introduces himself and asks the name of the person. In the experiment, David was exposed to three categories of social interaction: one person behaved pleasantly towards David, another behaved neutrally and a third behaved unpleasantly. After several meetings, four photographs of people were presented to David. One of the photographs depicted one of the three persons he met before. David was asked which person he would approach were he to need help. If one of the four persons was the pleasant one, he chose this person in 80 per cent of the trials (chance level being 25 per cent). If the person was the neutral one, David chose him approximately one out of four times (in accord with the chance level). He hardly chose the unpleasant person. When photographs of the three persons were presented to David and he was asked to say something about these persons, nothing appeared in David's mind. He did not have any conscious memory of these persons. Hence, his preferences were processed subconsciously, without conscious recognition playing a role.

Zajonc (1980) used the mere exposure effect to demonstrate that preferences for stimuli can be formed without conscious awareness of that stimuli. The mere exposure effect designates our tendency to prefer stimuli that have been presented before. For example, if subjects are exposed to a novel pattern (e.g. a particular Chinese character) and after some delay are asked to choose which of a number of novel patterns (e.g. a set of different Chinese characters) they prefer, they reliably

choose the pattern they were previously exposed to (LeDoux, 1996: 53). In Zajonc's experiment, stimuli were presented subliminally, that is, for a very brief period of time, immediately followed by a masking stimulus that prevented the conscious awareness of the first stimuli (this was tested for: subjects were unable to state whether or not they had seen the stimuli). Still, the mere exposure effect was there. The experiment illustrates that emotional discrimination can occur without conscious recognition.

In a neuroscientific experiment, Jolij and Lamme (2005) used TMS (transcranial magnetic stimulation) to demonstrate the emotional discrimination of stimuli without conscious cognition. Normal neural processing can be blocked by using a TMS device to introduce a strong magnetic field into particular brain regions. The method is non-invasive (a coil is positioned near the skull). Which regions are blocked from normal processing depends on the position of the coil relative to the head. In this study, four emoticons (☺'s) were shown very briefly on a computer screen (not followed by a masking stimulus). One of the four emoticons had either a happy or a sad expression. Subjects were asked to indicate the expression (happy or sad) and the location (left or right) of the happy/sad emoticon. Subjects in trials without TMS pulses reported to be aware of the four emoticons, and performed approximately 80 per cent on both tasks.

Performance changed with TMS pulses. The coil of the TMS device was located near the back of the head, disrupting normal activity in the early visual areas. When the stimuli were presented for 16.7 milliseconds, and TMS pulses were generated at 110 milliseconds after stimulus onset (TMS pulses after 90 to 130 milliseconds are known to suppress stimulus visibility), subjects were unable to tell which of the four emoticons was the emotional one (performance being much less than non-TMS-pulsed subjects). They also reported not being able to perceive the emotional stimuli. However, subjects' performance on the task to tell whether the emoticon was happy or sad was fairly good (70 per cent; well above chance level). Even when the subjects were wrong about the location, performance on emotion discrimination was still 65 per cent. Hence, without conscious perception (illustrated by the inability to localize the emotional emoticon), emotion discrimination is possible. Subjects do not consciously know what they have seen, but somehow know the affective meaning of it.

These experiments in which different methods were used suffice as an illustration. The evidence for the capacity to detect the emotional significance of stimuli without cognition is overwhelming (see, e.g. LeDoux, 1996: 59; Jolij & Lamme 2005; Morrisj, 2002). It is undeniable that the emotional meanings of stimuli can be processed unconsciously (LeDoux, 1996: 64). Moreover, the experiment with David

demonstrates that emotional learning can occur without conscious memory: consciousness is not necessary for emotional conditioning. The question how emotional responses without perception (including conscious cognition) can occur was taken up by neuroscientists. They found an answer by unravelling the neural constitution of emotional responses.

11.4 The neural constitution of emotional responses

Throughout the history of neuroscience, scholars have been searching for a single neural emotion system in the brain. Such a single system has never been found. 'Most likely, attempts to find an all-purpose emotion system have failed because such a system does not exist' (LeDoux, 1996: 106). Since we have different emotions that have evolved for different evolutionary benefits, it is not surprising that various classes of emotions are mediated by different neural systems (LeDoux, 1996: 16). For example, the amygdala is crucial for fear responses (removal of amygdala reduces fear responses in animals), but the amygdala is not crucial for the preferences for persons in the experiment with David (David's amygdala was also damaged). Though different emotional responses are probably mediated by different neural systems, there is overlap between the neural systems that produce various emotional responses.

The neural mechanisms that generate emotional bodily responses are realized in brain areas that regulate and represent bodily conditions (Damasio, 2001: 60). These areas include the brainstem and the hypothalamus (Damasio, 2001: 69; Kandel et al., 1995: 595). The internal condition of the body (heart, blood vessels, skin, muscles) is sensed by nerve cells that project information to the brainstem and the hypothalamus. These areas also receive information about concentrations of hormones, glucose and oxygen in the blood. Thus, the brainstem and the hypothalamus map the body constantly. The brainstem and hypothalamus react to this incoming information: if necessary, these regions regulate homeostasis by turning on responses (e.g. regulating heart rate, breathing, hormone emission in the blood) in order to adjust the bodily conditions to critical limits. These processes are autonomic (self-regulating) and built in: the processes do not need conscious triggers and do not give rise to consciousness directly (in other words: they are not part of the dynamic core that constitutes consciousness).

Apart from reacting to internal bodily information, the hypothalamus and brainstem can react to external stimuli that have emotional significance. For example, if external stimuli evoke a fear response, the hypothalamus and brainstem may react

by increasing the heart rate (which causes increased blood flow to muscles, a good preparation for either fighting or fleeing). However, the hypothalamus and brainstem do not appraise the emotional value of incoming stimuli.

The emotional evaluation of stimuli is executed in other brain regions. The amygdala plays a role in different positive and negative emotions (Kandel et al., 1995: 609; Morris et al., 1998; Whalen et al., 1998). The amygdala is not crucial for all emotions. Hence, other structures might be crucial to evaluate the emotional significance of stimuli for particular emotions. Various studies, in animals as well as humans, have demonstrated that the amygdala is crucially involved in the appraisal of stimuli that evoke fear responses (LeDoux, 2000: 173-174). Moreover, the amygdala is the structure where fear conditioning is established (LeDoux, 1996: 155-157; Morris & al, 1998; Morrisj, 2002; Whalen & al, 1998). If the amygdala detects an aversive emotional situation, it projects the output of evaluation to the hypothalamus and the brainstem (LeDoux, 1996: 207), which turn on all kinds of bodily responses.

Neuroscientists engaged in emotion research have unravelled more details about emotional processing than given in this section. For example, in the amygdala, different nuclei play a different role in fear responses (Kandel et al. 1995). For the purpose of this book, however, a more detailed notion of the brain structures involved in emotional responses without conscious cognition of stimuli is not necessary.

The main message of this section is that the structures that are crucial for emotional bodily responses – both the structures that execute the emotional appraisal and the structures that turn on the bodily responses – are all subcortical structures, and the neural processes in these structures probably do not give rise to consciousness, which is constituted by the thalamus and cortical structures engaged in the dynamic global workspace. Various neuro-imaging experiments have demonstrated that the human amygdala responds to fear conditioned stimuli that are outside subjects' conscious awareness (e.g. Morris et al., 1998; Whalen et al., 1998). Hence, the amygdala can bypass conscious processing in its appraisal process. Neural processes in subcortical structures that do not give rise to consciousness, can account for emotional appraisal, emotional bodily responses and emotional conditioning (a form of emotional learning).

Perceptual neural processing, as described in the preceding chapter, and the emotional neural processes, as described thus far, take place in different brain regions. The perceptual systems and the emotional systems in the brain are two separate systems working in parallel. If the senses receive stimuli, neural information is sent to the thalamus (more precisely, to different relay nuclei in the thala-

mus for different senses). The thalamus projects simultaneously to particular subcortical structures that give rise to emotional bodily responses and to particular cortical structures that constitute perception. Thus, incoming sensory information follows two different routes: the emotional and the perceptual route. The first can give rise to unconsciously processed emotional bodily responses, the second to conscious perceptions (including cognition). These neuroscientific findings explain how emotional responses and even emotional learning without conscious cognition are possible.

Though the perceptual and emotional systems are separate systems in the brain, many interactions occur between the two systems. In the following sections, a lot of these interactions will be mentioned. Thus far, the story of emotions is a story of automatic unconscious neural and bodily processes. An important, and for this dissertation a crucial, aspect is missing: conscious emotional feelings. How do these unconscious emotional bodily responses give rise to emotional experiences, that is, to feelings?

11.5 The production of feelings

The step from unconsciously generated emotional responses to conscious feelings is in one respect incredibly simple: 'conscious emotional feelings occur when brain systems generating emotional behaviour function in a species that also has the capacity for conscious awareness' (LeDoux, 1996: 17). 'Conscious feelings, like the feeling of being afraid or angry or happy or in love or disgusted, are in one sense no different from other states of consciousness, such as the awareness that the roundish, reddish object before you is an apple …' (LeDoux, 1996: 19). What differs between a perception and a feeling is basically the kind of input that, after neural processing, plays a role in conscious states. In the case of perception, the input consists of sensory stimuli. These stimuli are processed by neural circuits in the cortex coding for perceptual concepts. If these neural processes are engaged in the dynamic global workspace, a perceptual experience emerges. In the case of feelings, the input consists of feedback from both the subcortical brain structures that generate emotional responses and from bodily states (that are affected by emotional responses). These modes of input are processed by neural circuits in the cortex coding for emotion concepts. If these neural processes are engaged in the dynamic global workspace, a conscious feeling emerges. Thus, the cortex constructs feelings, much like it does for visual experiences.

Just as we have visual concepts to organize incoming visual stimuli, we have emotion concepts to organize incoming stimuli representing subcortical emotional processing and bodily responses. The fact that we can consciously discriminate between instances of feelings (sadness, happiness, anger, etc.) and recognize instances of feelings, indicates the existence of emotion concepts playing a role in the construction of conscious feelings. Without emotion concepts, the discrimination and recognition of feelings would be impossible. Just as we need perceptual mental concepts to construct perception out of sensation, we need emotion mental concepts to construct feelings out of bodily emotional reactions.

Stimuli representing subcortical emotional processing and bodily responses enter the cortex in various ways. First, the structures that generate emotions project information to different cortical regions. For example, the amygdala is found to project to the regions involved in different stages of processing sensory information (such as the primary visual cortex and the visual association cortex) (Kandel et al., 1995: 608). The amygdala also projects to the hippocampus, the site playing an important role in implicit long-term memories (McGaugh, 2004). This influence of emotion generating brain structures on cortical areas might account for the fact that we tend to consciously concentrate on emotionally relevant stimuli. Second, subcortical brain structures can turn on brain structures that release neurotransmitters in the cortex, thus increasing the arousal level in the cortex (LeDoux, 1996: 286-289). In a state of arousal, neurons become more sensitive to signals. This might also contribute to increased attention for emotionally relevant stimuli. Third, feedback from bodily responses enters the cortex in numerous ways, directly and indirectly. For example, structures in the brainstem that regulate homeostasis and constantly detect bodily conditions (such as heart rate or oxygen level in the blood), project information to the cortex. Patients with pure autonomic failure (PAF) do not show autonomic bodily responses in response to emotionally relevant stimuli (Morrisj, 2002). Compared to neurologically normal subjects, PAF patients report feelings that have a greatly reduced intensity (Critchley & al, 2001). Apart from feedback from automatic bodily responses, somatic feedback – that is, information about bodily behaviour (e.g. we are capable of locating our different body parts relatively to each other, without external sensory information) – is probably involved in the construction of conscious feelings (this might explain why PAF patients still report feelings, albeit reduced in intensity). Ekman (1993) asked subjects to move facial muscles. The subjects did not know that the movements resulted in the exhibition of typical emotional facial expressions. Based on subjects' answers to questions about their mood, it turned out that feelings were

influenced by expressing a negative versus positive emotion. This studies demonstrates that somatic feedback influences the construction of feelings.

It has not been established which region in the cortex constructs feelings out of emotions. Morrisj (2002) suggests the cortex insula. A study by Critchley et al. (2002) demonstrates that activity in the insula interacts with both conscious awareness and autonomic bodily arousal. Moreover, the insula is well placed for this role, since it receives inputs from different sensory modalities, and has reciprocal connections with the amygdala and the hypothalamus (Morrisj, 2002).

Even with a global picture of the unconscious evaluation of the emotional relevance of stimuli, the automatic generation of emotional responses and the construction of conscious feelings out of these processes, the story of emotion is still not complete. For example, it is impossible to explain the difference in emotional reactions between encountering a bear in the wild and encountering a bear in the zoo. It is very likely that the wild bear will evoke a fear reaction that is much more intense than the zoo bear will do. Apparently, our knowledge that a bear in a zoo lives behind bars and is therefore not harmful, plays an inferential role in our emotional reaction. In the following section, I will pay attention to this problem.

11.6 Influences of perceptual processing on emotional processing

As explained, the amygdala (and probably for some emotions, other subcortical structures) receives inputs directly from the thalamus, appraises these inputs and reacts in cases of emotional significance by projecting output to the brain structures that regulate homeostasis (the emotional pathway). Meanwhile, the thalamus projects sensory information to the sensory areas in the cortex. These areas analyse the information, and, eventually, a conscious perception may be constituted by cortical processing (the perceptual pathway).

Interestingly, the output of sensory processing (of all sensory modalities) in the cortical regions is projected to the subcortical brain regions that evaluate the emotional relevance (such as the amygdala in the case of fear); this especially applies to output from the late stages of sensory processing (Kandel et al., 1995: 608). Hence, there are two routes of sensory information from the thalamus to the amygdala (or other subcortical structures for some emotions): the direct subcortical route and the indirect cortical route. The direct route provides relatively unprocessed, raw information. The indirect route – sensory information processed by the sensory regions in the cortex and projected to subcortical structures that appraise the emotional relevance of stimuli – provides relatively extensively processed, 'meaning-

ful' information. Since the indirect route involves different stages of processing in different cortical sensory regions, the indirect route takes more time to reach the subcortical structures than the direct route does. The indirect route, however, gives more sophisticated and detailed information (Kandel et al., 1995: 608; LeDoux, 1996: 163-165; Morris et al., 1999).

The response of the subcortical structures that appraise the emotional relevance of stimuli on the sensory information flowing in via the direct, relatively unprocessed route is a relatively primitive emotional response. If we look at a bear, the response based on the direct route is so quick that it occurs even before we become consciously aware of the bear. Meanwhile, the sensory information gets processed in the cortical sensory areas. In these multistage information processes, the brain might, so to speak, find out the bear is behind bars. The output is sent to the same subcortical structures. The initial emotional response will be either suppressed or enhanced, depending on the outcome of the perceptual processes.

Thus, the perceptual pathway influences the emotional pathway by projecting processed, 'cognitively loaded' information onto it. The quick initial primitive response can either get supported – if the cognitive information indicates that the situation is indeed emotionally relevant (e.g. the oscillating line-shaped object that gave rise to the quick emotional response is indeed a snake) – or suppressed, if the cognitive information indicates that the situation is not emotionally relevant (e.g. the object turns out to be a twig, moved by the wind).

For example, a study carried out by Critchley et al. (2002) demonstrates the influence of perceptual processing on emotional reactions. They found that amygdalic response to fear stimuli is influenced by consciously seeing stimuli: whereas only the right amygdala responded to consciously unseen fear conditioned stimuli (masked condition), both left and right amygdala responded to consciously seen stimuli (unmasked condition). Hence, the response of the amygdala increases by perceptual processing that determines that the stimulus is emotionally relevant. In this study, conditioned fear stimuli were used. The amygdala responds to conditioned fear stimuli independently of perceptual processing in the cortex. The perceptual pathway modulates the emotional response that is already there. What if there is no initial emotional response, established by the direct emotional pathway? Can emotional responses to stimuli be evoked by the perceptual pathway only? In other words, can we emotionally respond to stimuli only because we *know* that these stimuli are relevant, and not because we are evolutionarily determined to, nor conditioned to respond emotionally?

Isenberg et al. (1999) studied differences in brain activation between threat valenced words (e.g. injure, pursue, death, spy, suffer, gun) versus neutral

valenced words (e.g. wheel, walking, sheets, arrange). They had subjects name the colour of words that were shown (five different colours were used randomly). The naming of the colour of threat valenced words produced activity in the amygdala, in contrast to the naming of neutral valenced words. Though this study does not rule out the possibility, it is highly unlikely that the amygdala appraises the emotional meaning of words. The most plausible explanation is that cognitive, cortical processing of the words that determine the meaning of words, influences amygdala activation. If this is indeed the case, emotional responses can follow from the projection of perceptual, cortical processing to subcortical structures, without an initial emotional response resulting from the direct emotional pathway.

Naccache et al. (2005) demonstrated that even subliminally presented (29ms) masked threat valenced words can modulate activity of the amygdala (as opposed to neutral words). The modulation of amygdala activity was found at a latency of 800 ms after stimulus onset (in epileptic patients, with electrodes in the amygdala; the regions crucial in this study were not damaged). The relatively great latency of the amygdalic response is interesting. For example, if fearful faces are presented, the amygdala responds quicker. The difference between subliminally presented stimuli, such as fearful faces, and words showing greater latency is probably that cortical processing is needed before output of perceptual processing is projected to the amygdala. Though the stimuli are not consciously seen, they can still evoke perceptual information processing in the cortical language areas. The studies of Isenberg et al. and Naccache et al. indicate that perceptual processing can lead to emotional responses, even in the absence of a quick direct subcortical emotional response. An emotional response can follow from the knowledge that stimuli are emotionally relevant.

11.7 Influences of learning on different aspects of emotions

Some aspects of emotions are innate, that is, evolutionarily determined: 'our genes give us the raw materials out of which to build our emotions. They specify the kind of nervous system we will have, the kinds of mental processes in which it can engage, and the kinds of bodily functions in can control' (LeDoux, 1996: 137). Our genes specify many aspects of the emotional bodily response, as well as some categories of stimuli that evoke emotional responses. This explains why humans are far more predictable in their emotions than they are in their thoughts, as Greenfield (2000) observes. During the course of life, however, different learning processes exercise influence on different aspects of emotions: 'the exact way we

think, act, and feel in a particular situation is determined by many other factors and is not predestined in our genes' (LeDoux, 1996: 137). In the previous sections, some examples of the influence of learning on emotional responses were mentioned. Besides influencing to which stimuli an organism responds with emotional reactions, learning can also influence some aspects of the expression of emotions, and the interpretation of emotional reactions into feelings. In this section, I will review these influences.

Individuals and cultures differ with respect to emotional responses to particular events (Ekman, 1999a). For people who are not used to it (e.g. most Western people), it is a disgusting experience to see an animal being slaughtered with a knife, blood flowing everywhere and the animal screaming. In some cultures, animals are sacrificed this way during rituals (e.g. in the Toraja culture on the Indonesian island Sulawesi). People raised in these cultures normally neither experience nor exhibit disgust. Likewise, individuals in particular cultures differ in their emotional reactions to circumstances. For example, in Western cultures, some people like wild nature, while others fear wild nature.

An important mechanism for learning emotional responses to particular stimuli is conditioning, a mechanism mentioned earlier. In conditioning, a conditioned stimulus gets associated with an emotional stimulus. By virtue of this association, the conditioned stimulus becomes an emotional stimulus as well. The association can be established in the absence of consciousness, in subcortical brain regions. Thus, we may like or dislike a situation because we unconsciously associate the situation with emotional stimuli. For example, a place may evoke fear for somebody, because he has had a fearful experience at that place in the past (or the place resembles some properties of the place where the fear-evoking event happened), without any explicit memory of the fearful event in the past. Thus, the world may be loaded with emotional triggers, but we may be largely ignorant why the objects and situations are emotionally meaningful for us.

Conditioning, a form of implicit learning, is not the only way of learning to respond emotionally to particular stimuli. A visit to Auschwitz can be a sad and disgusting experience. For those visitors who did not spend time in Auschwitz during World War II, the emotional response is not learned by conditioning since they did not experience the terrible practices that were carried out at this place. Thinking of a friend who just passed away can be a very sad experience.

Emotional responses to situations can result from explicit learning as well (Damasio, 2001: 65). Explicit emotional associations are stored in other brain regions than those in which implicit emotional associations resulting from conditioning are stored: cortical areas and the hippocampus play an important role. In the

case of explicit learning, we know or at least are able to know why a situation is emotional to us. The sad and disgusting Auschwitz experience is due to explicit knowledge of the history of the place, not to bad experiences that have resulted in unconscious associations with sadness. Thinking of a friend who just passed away can make us sad, not because all experiences with the friend were sad experiences, but because we know he passed away.

Emotional responses learned by conditioning can occur without the involvement of the perceptual, cortical pathway, as demonstrated by some studies mentioned in the previous sections. For example, in the case of fear, sensory stimuli are sent from the thalamus to the amygdala, where the conditioned emotional associations are stored, which responds by turning on emotional reactions. Eventually, output of perceptual processing is sent to the amygdala (after some delay) and either suppresses or enhances the initial emotional response. Emotional responses due to explicit association always need the involvement of the perceptual pathway. Perceptual processes, including cognition, result in emotional memories, which in turn activate the subcortical brain regions that initiate emotional reactions. On many occasions, emotional responses are due to a mixture of implicit and explicit emotional learning. For example, if somebody becomes fearful when he sees a gun pointed at him, both the knowledge that a gun is a killing machine and unconscious associations, built up by seeing movie scenes in which guns are correlated with bad situations, may play a role.

Besides influencing which stimuli emotional responses follow, learning also influences the way emotional reactions are expressed. Ekman (1977) studied the facial expressions of Japanese and Americans who were watching an emotion-arousing movie. Their faces were secretly recorded on video. The subjects watched the movie either alone or in the presence of an experimenter in a white coat. The videotapes of the facial expressions of the emotions of the subjects were shown to uninformed observers, who coded the emotions. When watching alone, the emotions expressed by Japanese and Americans were remarkably similar. When the experimenter was present, however, the emotional expressions differed between Japanese and Americans. The Japanese smiled more, looked more polite and exhibited less diversity in emotional expressions than the Americans did. This experiment demonstrates cultural differences in the facial expressions of emotions.

Ekman (1977, 1999b) uses the term ‘display rules’ to designate the conventions and habits that regulate which expressions with which intensity are shown to whom and when in a particular culture. Individuals raised in a culture acquire these display rules. Apart from display rules, individuals in a culture differ in the

way emotions are expressed. Even in cultures that permit the free demonstration of emotions, people with a stoic attitude can be found.

Though the expression of emotions is influenced by learning, some aspects of expressions are beyond the control of most people and can hardly be influenced by learning. People can fabricate emotions, but not perfectly: some subtle muscle movements involved in facial expressions of emotions can hardly be moved voluntarily (Ekman, 1993). For many people, someone putting on a false smile typically looks like someone putting on a false smile and not like someone who is happy. Most people are not born actors. Interestingly, slow-motions of the videotapes of Ekman's experiment revealed that the Japanese watching the movie with the experimenter in the room often superimposed smiles on top of quick, initial other emotional reactions (e.g. disgust).

The third way that learning influences emotions is the manner in which emotional bodily reactions are translated into feelings. Feelings are constructed out of input from subcortical structures engaged in emotional bodily responses, as well as input from bodily states, much like perceptions are constructed out of sensory information. We use emotion concepts to construct conscious feelings out of bodily emotional responses. While the set of basic emotions is limited (six according to Ekman), there is an endless variety of emotional states, resulting from different intensities of the basic emotional reactions and different combinations of the basic emotional reactions. Therefore, there is an endless variety in the feedback from the emotional bodily reactions to the cortical areas where feelings are constructed. The concepts employed to organize emotional input into feelings are created and reconstructed by experience, just like the concepts that are employed to organize sensory information into perceptions.

Different cultures have different words for particular feelings. Having words for particular feelings may advance the discrimination between particular emotional states (Ekman, 1999b). 'Gloomy', 'miserable' and 'distressed' are three English words that are used to denote a variety of sadness (a basic emotion). 'Gloomy' refers to being sad and without hope ('The old man sat in gloomy silence after having lost all his belongings in the earthquake'); 'miserable' refers to being very unhappy or uncomfortable ('They felt miserable after the long walk in the rain and cold'); and 'distressed' refers to great worry or unhappiness, especially due to events like an attack or an accident ('The actor was distressed by the critical newspaper article'). Many words for emotions specify not only the kind of feeling, but also the kind of source of the feeling. For example, *WeltSchmerz* refers to a feeling of sadness about the woes of the world in general. Learning specific words in a specific culture helps somebody to discriminate between different instances of an

emotion, eventually an emotion occurring in a specific context, because it helps to create concepts for feelings. As is the case in perception, an individual may also develop emotion concepts that do not match with words in a specific language: an individual may recognize a special feeling without having a word to express the feeling (just as we can discriminate and recognize particular shades of blue without having words for those particular shades of blue). Emotion concepts may be related to perceptual concepts. Thus, an emotional bodily reaction may be interpreted as a particular feeling only in a specific context.

If a neural circuit coding for a particular mental emotion concept is activated *and* this neural circuit is part of the dynamic core that constitutes consciousness at a certain moment, the subject has a conscious feeling whatever the cause of activation of this circuit is. This hypothesis follows logically from the theory developed in Part 3 of this book. Thus, we can probably have feelings without having bodily emotional reactions. In that case, mental emotion concepts might be activated not under the influence of the subcortical appraisal of stimuli or of the bodily reactions involved in emotions, but because, for instance, an emotion concept is associated with perceptual concepts that get activated. However, if such a mental emotion concept is activated, it is very likely that some information is projected to subcortical regions that in turn induce a bodily emotional reaction.

11.8 Conclusion: summary of emotion theory

Figure 11 shows a conceptual model for experience, a model that combines the theories of perception and cultural influence as constructed in the previous chapters with the theory of emotion as developed in this chapter. In comparison with the previous model, four items are added: emotional appraisal, modulation of appraisal mechanism, regulation of bodily states, and bodily states and processes. In addition, the brain is divided into cortical and subcortical regions.

When a stimulus leads to sensation, the output of sensational activity in the thalamus is projected simultaneously to cortical regions and to those subcortical regions that are engaged in appraising the emotional relevance of stimuli. The emotional appraisal mechanism is equipped with some innate predispositions, that is, it reacts on some categories of stimuli with an emotional response, without any previous learning involved. In addition, the appraisal mechanism can get modulated if activated. For example, if a stimulus that is emotional relevant and a stimulus that is not emotional relevant are processed simultaneously, an association

between the two stimuli might get stored in the appraisal mechanism. In the future, the appraisal mechanism will probably respond to the latter stimulus as well.

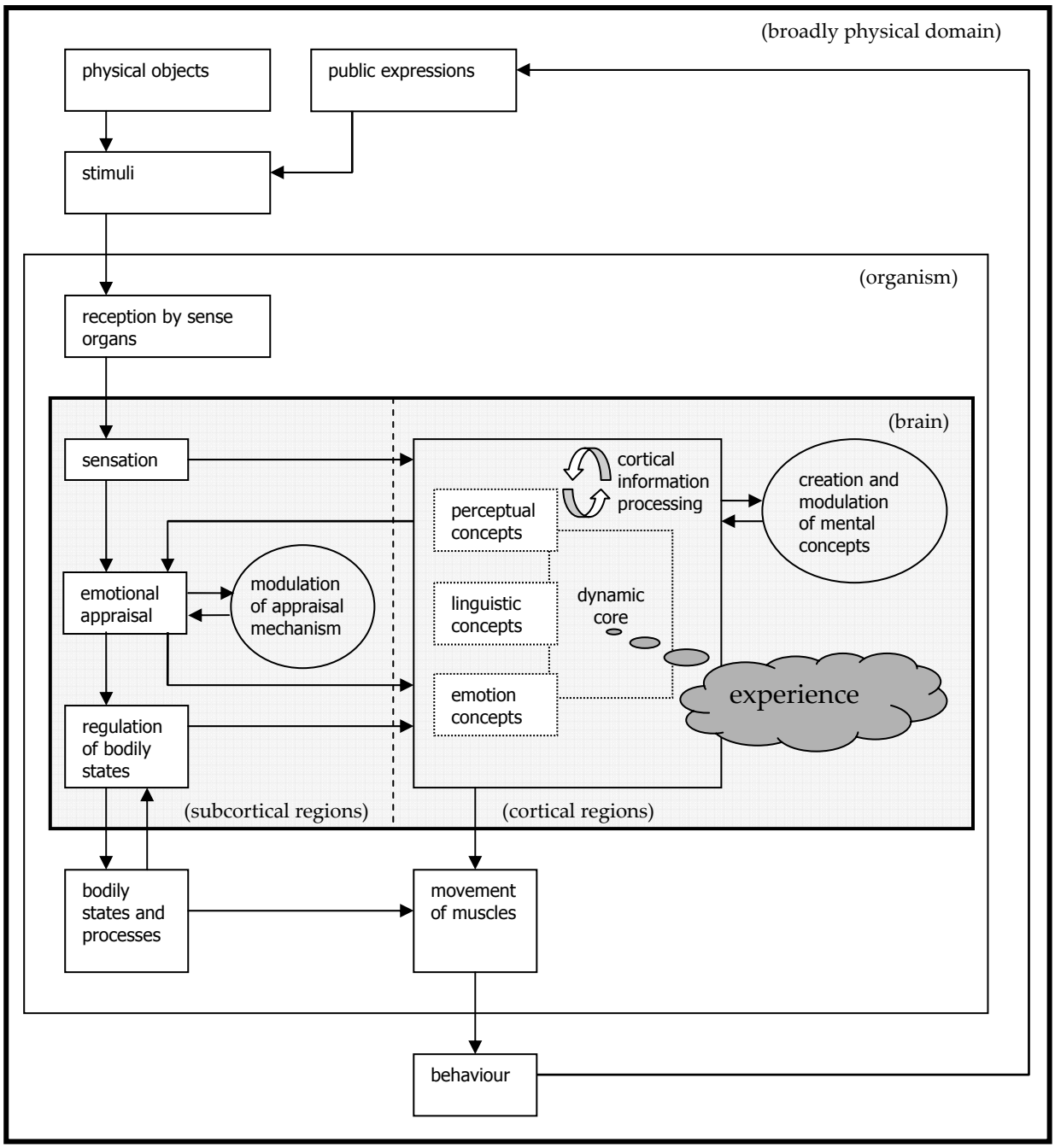

Figure 11: A conceptual model for experience

If the appraisal mechanism reacts to a stimulus, a signal is sent to subcortical regions that regulate bodily states. These regions initiate bodily emotional responses that influence bodily states and processes, such as sweating, adrenalin release, increased heart beat, etc. The regions that initiate bodily emotional responses also map bodily states and processes continuously. The processes described so far are all automatic processes we are not aware of directly, and consciousness is not

needed for these processes to occur. Before we experience feelings, output from the appraisal mechanism, and from the regions that map bodily states, is sent to particular cortical regions. In these regions, the information gets interpreted, a process in which emotion concepts are employed, into experienced feelings. The interpretation of subcortical emotional input into feelings, is equivalent to the interpretation of sensation into perception. Since the relation between bodily emotional reactions and experienced feelings is mediated by interpretation processes, there is no one-to-one fixed relation between them. A bodily fear reaction as a consequence of being in a roller coaster might get interpreted and experienced as a nice thrill.

Simultaneous with these emotion generating processes, cortical information processing takes place on the sensational information coming in from the thalamus. The output of these processes might get projected to the appraisal mechanism. As a result, the appraisal mechanism might respond, if the information from the cortical regions is detected as emotionally relevant, by initiating an emotional reaction as described above. This can happen even if the cortical information processes do not result in a conscious experience. The same cortical information processes might contribute to the way emotional bodily reactions get interpreted to conscious feelings. For example, in the case of the roller coaster, it is our knowledge, resulting from information processing giving rise to our perception of the situation, that influences the interpretation of an emotional bodily fear reaction into an experienced nice thrill.

Thus, there are different routes from stimuli to experienced feelings. Place preferences, net results of different feelings evokes by places, can therefore come into being in different ways, as will be explained in the following section.

11.9 Place preferences

According to the emotion theory developed in this chapter, landscape or place preferences can result from different principles. A main division of principles lies between innate and learned preferences. Innate does not mean that learning plays absolutely no role, but means that the emotional reaction itself is not learned. Learning may, however, influence the interpretation of an emotional reaction into a conscious feeling, and may be a precondition for being capable to execute some perceptual processing that is needed to initiate an emotional reaction. Learned preferences, on the other hand, are preferences that are acquired during the course of life. Learned preferences result from earlier emotional experiences that leave

traces in the brain, establishing a relation between certain stimuli and certain emotional reactions.

For all innate place preferences, a place contains natural triggers, that is, the place has properties that make us emotionally respond because we are genetically predisposed to emotionally respond to these properties. These bodily emotional reactions are in turn interpreted as feelings, with the help of emotion mental concepts. Innate preferences can be subdivided into strictly innate preferences and broadly innate preferences. For place preferences that are strictly innate, absolutely no perceptual processing of stimuli is needed for the emotional appraisal mechanism to turn an emotion on. Learning may eventually influence the way the bodily reaction is interpreted into a feeling, but learning is not needed for the emotion to be initiated. As I will argue in the following chapter, it is yet unknown and, in addition, highly disputable, whether humans have strictly innate landscape preferences.

Broadly innate preferences, on the other hand, are innate preferences for which some initial perceptual processing is needed before the automatic appraisal mechanism initiates an emotion. As Naccache et al. have demonstrated (see section 11.6), subliminally presented (and thus not consciously seen) threat valenced words invoke activation of the amygdala. By theoretical inference, this can be interpreted as turning on a fear reaction. The activation of the amygdala is not the result of a strictly innate appraisal mechanism: in this experiment, subjects who do not understand English will not demonstrate amygdala activation. Nor does this activation result from conditioning: it is highly unlikely that all subjects have experienced a fearful situation and have seen fear valenced words at the same moment. The most plausible explanation is that the words invoke some perceptual processing, the results of which are projected onto the amygdala, which in turn initiates the emotional reaction. Thus the amygdala does not directly respond to the input from the thalamus, but responds with an innate emotional appraisal to input from cortical regions involved in perceptual processing. The time delay between the presentation of the words and the activation of the amygdale, as recorded by Naccache et al. (around 0.800 seconds), supports this explanation (the direct emotional pathway results in a quicker activation of the amygdala). Some innate landscape preferences might be broadly innate preferences. The acquisition of some mental concepts needed for the processing of landscape stimuli might be a precondition for these preferences, but once learned, an innate appraisal mechanism does the job. Broadly innate preferences might play a role in landscape preferences. For example, if we have an innate preference for half-open landscapes, as Appleton contends (see section 4.3), it is very likely that this preference is broadly

innate. Probably, newborns will not respond to half-open landscapes, but once the mental concepts needed to discriminate half-open landscapes from other landscapes, an innate preference might be activated. The mental concepts involved will probably be acquired by every healthy human being, almost independently of individual and cultural variation.

In the case of learned place preferences, a place has properties that evoke emotional responses or even feelings without emotional bodily reactions, because we associate the properties with emotional triggers or remembered emotions. Learned place preferences can also be subdivided into unconsciously and consciously learned preferences. If the association is caused by conditioning, resulting in modulation of the emotional appraisal mechanism, it is an unconsciously learned place preference. For example, a person might like or dislike a place because at some point at his life an emotional event happened at that place. For conditioning, it is not necessary at all that the person has any conscious memory of the event. Not only the place where the event occurred, but also a place resembling properties of the place where the event occurred might initiate the emotional reaction as well. The conditioned stimulus evokes an automatic emotional bodily reaction that will be interpreted into a feeling, thus resulting in a degree of preference for a place. Without doubt, unconsciously learned place preferences play an important role, simply because conditioning happens all the time in us, and we have no way to prevent ourselves from getting conditioned.

In the case of consciously learned place preferences, a subject has explicit memories of emotional events that might be recalled when encountering a particular place. For example, a particular tree may make a person consciously think of a tree in the garden of the house she grew up in, and in turn evoke emotional bodily reactions resulting in feelings, or even directly evoke emotion concepts, thus creating feelings without emotional bodily reaction occurring. Often, consciously learned preferences and conditioned preferences come together.

To sum up, place preferences may result from four different principles: strictly innate predispositions, broadly innate predispositions, unconsciously learned predispositions or consciously learned predispositions.

We can, under the right conditions of conducting research, rely on subjects' self-reports about their place preferences. We cannot, however, rely on subjects' self-reports about why they like or dislike a place, because the strictly innate predispositions, broadly innate predispositions and unconsciously learned predispositions are inaccessible to consciousness. When interviewing people about their landscape preferences, I never heard a response like: 'I like half-open landscapes because I'm genetically predisposed to do so, as a result of these landscapes being a relatively

good environment for survival for my ancestors 600,000 years ago, from whom I inherited my genes, because of the prospect and refuge possibilities these landscapes offer.' And yet this might be the cause of the subject's preference for half-open landscapes. It follows that if we want to know the causes of landscape preferences, it will not suffice to merely interview subjects: we must not confuse self-ascribed reasons with causes.

With this reflection on the different possible backgrounds of place preferences, the construction of a fundamental theory of experience, represented by the conceptual model in the previous section, comes to an end. For the sake of clarity, I repeat that it is not a complete theory of experience. The goal of the theory of experience is to serve as a framework to reinterpret different approaches, theories and concepts in landscape research, and to draw relations between these different contributions to the understanding of landscape experience. For this goal, the theory of experience is well equipped, I believe. The theory stresses the three main factors employed in landscape experience research (i.e. biological, cultural and individual factors), gives an account of the way these factors exercise influence and identifies various relations between the pathways of these factors.

The following part of this dissertation is dedicated to the construction of a comprehensive theory of landscape experience. First, I will give an account of different approaches, theories and concepts in landscape experience research, in terms of the fundamental theory of experience (Chapter 12). Finally, I will state my comprehensive theory of landscape experience (Chapter 13).

Part 4

A COMPREHENSIVE THEORY OF LANDSCAPE EXPERIENCE

Chapter 12 An interpretation of applied landscape experience theories

12.1 Introduction

The goal of this chapter is to reinterpret the applied theories and concepts employed within the different approaches in landscape experience research (and reviewed in Chapter 4). These applied theories and concepts will be interpreted in terms of the fundamental theory of experience developed in Part 3. The conceptual model (figure 11, section 11.8) represents the fundamental theory of experience. I will employ the terms present in this model to interpret the applied theories and concepts used in the various branches of landscape experience research. An account will be given of the aspects of landscape experience as stressed within different approaches, as well as of the factors stressed to explain aspects of landscape experience. Moreover, the explanations of how the factors influence the aspects of landscape experience, as offered within the approaches, will be reviewed. The plausibility of the explanations will be discussed and gaps in the explanations stressed. The modes of doing empirical research within the different approaches will also be discussed, and occasionally suggestions for improvement will be made.

An interpretation in more fundamental terms of the applied theories and concepts in landscape experience research enhances insights into the differences between the approaches, by demonstrating which variables in the conceptual model (figure 11) are taken into account. And, importantly, interferences between different factors that influence landscape experience as stressed within the various approaches can be identified. The phenomena under study within the approaches must meet at some point or another, and hence must interfere at some stage in the processes that result in landscape experiences. Last but not least, one of the aims of the interpretation is simply to enhance our understanding of what scholars working within the approaches actually do.

From time to time I will criticize some of the claims made by landscape experience researchers. The source of this criticism is the fundamental theory of experience developed in Part 3. Hence, the criticism is a clash between two theories. One might therefore think that my critique boils down to employing a different perspective. What, then, is the justification for criticizing claims made within particular theoretical perspectives on the basis of another perspective?

The theories and concepts employed within the branches of landscape experience research on the one hand, and the fundamental theory of experience on the other, do not stand side by side. The fundamental theory explains the processes that underlie the phenomena stressed by the applied theories of landscape experience. For example, within the evolutionary approach innate predispositions that result in particular landscape preferences are posed. But the question where these predispositions reside in the brain and the question how they come to be expressed in landscape preferences are not answered. An assumption underlying the concept of sense of place is that past experiences exercise influence on present experiences. But how past experiences leave traces in the brain and by what processes these traces are expressed in present experiences is not explained. Thus, explanatory gaps are inherent in the applied theories and concepts. By focusing on the 'how' question, the fundamental theory of experience fills in this gap. It explains where innate predisposition are stored in the brain, by which processes they may result in particular preferences, and how past experiences result in modifications of brain structures that may influence present experiences. The fundamental theory – which to a great extent is based on empirical studies carried out by psychologists and neuroscientists – is therefore not another perspective, but a theory underlying the more applied theories in landscape experience research. My claim is that much is known about the processes that are left unexplained in landscape experience research on the basis of numerous studies demonstrating convincing empirical facts. A fundamental theory that explains how the processes actually work in the brain is therefore not just another perspective but a justified fundamental source for criticism.

I will interpret and discuss the evolutionary approach in the following three sections. I will then deal with the sense of place theory (section 12.5), the counter-structure theory (section 12.6) and the various contributions of sociologists and historians (section 12.7). In the conclusion (12.8), I will summarize what these approaches explain.

12.2 Evolutionarily developed landscape preferences

Environmental psychologists who adopt the evolutionary approach contend that we have inborn landscape preferences that are caused by innate emotional responses to particular properties of the physical landscape. If this claim is true, we must have an innate appraisal mechanism for certain landscape stimuli. From the emotion theory constructed in the previous chapter it follows that without innate

appraisal mechanisms for landscape stimuli, it would impossible to have innate landscape preferences. We might be genetically predisposed to respond emotionally to particular sensed properties of physical landscapes, and this predisposition might be fixed from birth in subcortical structures that automatically appraise the emotional relevance of stimuli. The innate preferences may be either strictly innate (no perceptual processing is needed for the appraisal mechanism to respond) or broadly innate (some initial perceptual processing is needed before the innate emotional appraisal reacts and some learned mental concepts are employed in this processing). The distinction between strictly and broadly innate preferences is not made by environmental psychologists.

The standard empirical research model employed by environmental psychologists who adopt the evolutionary approach consists of offering landscape stimuli to subjects and recording the preferences stated by the subjects. Stated preferences are public expressions. Environmental psychologists assume that these public expressions reflect the experiences of the subjects. In my view, this assumption is not problematic. Knowledge about relations between landscape stimuli and landscape preferences is derived from the research conducted according to this model. Environmental psychologists have found some cross-individual similarities in particular landscape preferences as responses to particular stimuli. These common preferences are theorized to be innate. Indeed, innate preferences offer a good explanation of similarities in preferences, since all humans have, to a great extent, the same genetic make-up. Applied, specific theories that explain the findings have been constructed, such as the preference matrix (Kaplan & Kaplan, 1989) and the prospect-refuge theory (Appleton, 1996). These theories explain why the landscapes that are highly preferred by most subjects were beneficial for our distant ancestors.

There are good reasons to believe that we have innate landscape preferences. First, rats that are brought up in isolation tend to avoid open spaces, thus demonstrating innate place preferences (LeDoux, 1996). Second, the environment is crucial for survival. It is therefore very likely that we have innate predispositions related to certain aspects of our environment. Third, extensive studies have demonstrated innate preferences for faces (Dooremalen, 2003: 149-152). The assumption that we have innate landscape preferences does not of course automatically lead to a justification of all claims made by environmental psychologists.

Compared to the emotion theory dealt with in the previous chapter, many processes that occur between emotional appraisal and experienced landscape preferences are bypassed by the research model and the theories employed by environmental psychologists: the outcome of emotional appraisal is projected to

areas that initiate emotional bodily reactions, the emotional bodily responses start, information about the appraisal and the bodily reactions is sent to cortical areas, where the information gets interpreted as a conscious feeling. Bypassing these processes is not problematic a priori. Every scientific act is selective: it pays attention to some processes while ignoring other processes. Of course, the mediating processes that are not studied by environmental psychologists can be sources of variance. But by studying large numbers of subjects, and applying the appropriate statistical procedures to the data obtained, systematic relations between stimuli and preferences can be found across variation. Therefore, it is not necessary to pay attention to all the processes mentioned in the emotion theory if the goal is to find commonalities in landscape preferences.

However, the lack of reflection on fundamental emotion theory may be problematic for other reasons. Both the interpretation of the empirical findings and the applied theories that explain the relations that have been found between landscapes and preferences may suffer from bypassing fundamental theory too easily. In the following section I will reflect on the interpretation of empirical findings and argue that a more sophisticated research design is needed in order to be able to convincingly make the theoretical inferences of the kind environmental psychologists usually make. In the subsequent section, I will reflect on the applied theories.

12.3 Finding innate landscape preferences: a research design

Commonalities in landscape preferences found across subjects within a particular culture and a particular geographical region may be expressions of innate preferences. However, since the subjects may to a certain extent have been exposed to the same landscape and the same culture during their courses of life these shared preferences may be an expression of commonalities in past experiences and cultural learning processes. As described in section 4.3, Balling and Falk (1982) found that young children tend to prefer Savannah-like landscapes, whereas children who are about eleven years old tend to prefer the landscape they grew up in. This is probably an expression of the mere exposure effect (see section 11.3): we tend to prefer previously seen stimuli above previously unseen stimuli. Thus, shared preferences amongst subjects in one culture and one region may be preferences that are acquired, for example through the exposure effect. Shared acquired preferences may in general be due to commonalities in conditioning and commonalities in the acquisition of conscious emotional memories.

Therefore, cross-cultural and cross-geographical studies are needed to rule out commonalities in learning as sources of shared preferences. However, environmental psychologists have seldom conducted cross-cultural research. The reasons for this are probably very understandable (lack of money being my first hypothesis). The rare cross-cultural studies that have been conducted involve only a few nations (e.g. USA and Japan), and these are in some senses relatively similar cultures (e.g. relatively high income, access to media) compared to other cultures (e.g. some of the people inhabiting Papua New Guinea). Hence, environmental psychologists run a serious risk of falsely interpreting empirically found shared preferences as innate preferences.

Some hypothesize (or even argue) on the basis of empirical findings that indicate a preference for natural landscapes amongst most subjects, that we have an innate preference for nature (e.g. Herzog, 1989, 1992; Schroeder, 1991; Ulrich, 1993; Zube, 1991). I think it highly unlikely that this hypothesis is true. First, it contradicts the findings of historians who have studied ancient stories. During the Middle Ages people disliked nature, partly because nature was unsafe (general lack of control, beasts, robbers), and partly because in Medieval culture religious myths taught people that nature was an insane, evil place, the domain of the devil (Corbin, 1989; Lemaire, 1970). Second, because it contradicts basic premises of the evolutionary approach itself. The genetic make-up of humans does not change fast. We must theorize what the benefit has been for our distant ancestors – for example a hundred thousand years ago – to explain innate preferences. In those days, the whole environment was natural. Hence, there was no evolutionary benefit at all for our ancestors to have genes that predispose for a preference for nature. The chance that those ancestors who had developed genetic preferences for nature would have survived while those who lacked such genes would have become extinct, is just as small as the chance that ancestors who had developed a genetic predisposition to like the music of the Red Hot Chilli Peppers would have survived while those who lacked this predisposition would not have survived. Ascribing the label 'innate' to empirically found preferences for nature is probably due to a lack of cross-cultural studies, and careful theoretical reflection; a lack that allows an ahistorical and ethnocentric attitude to unconsciously slip into the interpretations.

In my view, the study of innate landscape preferences could profit from an alternative research design that uses subliminally presented stimuli (as described in section 11.3). In this design, photographs from landscapes are presented to subjects for a very short time (e.g. 20 milliseconds) followed by a masking stimulus (e.g. a geometrical abstract picture that does not evoke emotions). Subjects will not have a conscious experience of the presented landscapes although automatic emotional

appraisal can still take place (innate landscape preferences are automatically appraised). The masking stimulus is followed by another picture (the target stimulus) that is presented long enough for conscious awareness (e.g. 2 seconds). Subjects are asked to indicate on a scale how beautiful they find the target stimulus. The subjects are divided into two groups. The stimulus subliminally presented to the first group is a landscape for which we, by hypothesis, have an innate preference. The stimulus for the second group is a landscape for which we have no innate preference. If the hypothesis is right, the first group will rate the target stimulus higher than the second group will (an effect of emotional priming: we tend to like a particular stimuli more if it is presented after a stimulus we rate as positive). Hence, the differences between the groups point to automatic emotional appraisal. If no group differences are found – no matter which landscapes are subliminally presented – it is very unlikely that we have innate landscape preferences.

While it is fairly safe to conclude from the absence of group differences in preferences for the target stimuli that we have no innate landscape preferences, it is premature to conclude from the presence of group differences that we have innate landscape preferences. Group differences are indications of automatic emotional appraisals. Such appraisals may be the result of innate predispositions or of the modulation of the appraisal mechanism. Therefore, cross-cultural and cross-geographical studies are still needed as a subsequent step. If the same group differences are found across different cultures and regions with different landscapes, it is highly unlikely that the differences are the result of modulation of the appraisal mechanism. The conclusion that we have innate landscape preferences is then justified.

It is possible to determine whether innate landscape preferences that are found with this procedure are strictly innate or broadly innate. Placing a transcranial magnetic stimulation (TMS) coil near the primary visual area of the subjects prevents perceptual visual processing from taking place. If TMS is used during a subliminal landscape preference study as described above, and group differences are still found, we know that the innate landscape preferences are strictly innate. If group differences are found without TMS, but not with TMS, the innate landscape preferences we can infer from these group differences are broadly innate.

Thus, my proposal for an alternative research strategy to find innate landscape preference consists of three steps: 1) a subliminal presentation experiment to determine automatic appraisal for landscapes, 2) cross-cultural studies to determine whether or not the automatic appraisal is the result of modulation of the appraisal mechanism during the course of life, and 3) another subliminal presentation experiment with TMS to determine whether the preferences that are found are

broadly or strictly innate. My hypothesis is that, following this strategy, some broadly innate landscape preferences will be found, for it is very likely that innate landscape preferences exist, and it is highly unlikely that these are strictly innate since it is unlikely that newborn infants are able to respond emotionally to landscapes.

12.4 Explanations of innate landscape preferences

Especially in the earlier years of environmental psychology, Berlyne's arousal theory was brought into play to explain innate landscape preferences (see section 4.2). Arousal is the set of bodily emotional responses that follow from emotional appraisal. According to the arousal theory, an optimal hedonic value is caused by a certain arousal level, which can be understood as a set of physical bodily reactions with a certain intensity. A problem with Berlyne's arousal theory is the lack of discrimination between positive and negative emotions. The same arousal level may be caused by a positive or a negative emotion. Landscapes that cause arousal are not always highly preferred, but may be either preferred or disliked. In addition, Berlyne's explanation of why optimal arousal causes an high hedonic value is very improbable. According to his theory, a situation that causes an optimal arousal level provides the best exercise for our cognitive capacities. Because we tend to like these kinds of situations, we want to stay engaged in them, and thus become cognitively skilled. Comparative phylogenetic research has demonstrated that the emotional system came into being at a much earlier stage in evolution than did the cognitive system. Therefore, the emotional system cannot be an adaptation to exercise cognitive capacities. The explanation Kaplan and Kaplan offer for innate landscape preferences (see section 4.4) brings about the same problem. They contend that we have an innate preference for those landscapes that best enable us to gather knowledge.

Explanations for innate landscape preferences must be much easier than the ones offered by Berlyne, and Kaplan and Kaplan. Genes that predispose for particular emotional reactions have survived in the course of evolution because those reactions have turned out to be adaptive responses to situations of life importance for the individual. Thus, innate landscape preferences are preferences for landscapes that were beneficial for our distant ancestors (but not necessarily for us, because over the last couple of thousand years humans have created artificial environments at a pace that is much faster than our genetic make-up can adapt to). From this perspective, Appleton's prospect-refuge theory makes sense. The theory

states that we prefer half-open landscapes because such landscapes offer the chance to hide and to survey the surroundings, two important factors that enhanced the survival of our ancestors. This explanation is in line with fundamental emotion research.

In addition to naturalness and half-openness, an abundance of vegetation and an abundance of water are thought to be landscape properties for which we have an innate preference (e.g. Schroeder & Daniel, 1981; Ulrich, 1981, 1983, 1993; Yang & Brown, 1992). These innate preferences are easy to explain: we need water to survive, and the presence of vegetation often indicates the presence of food, water and a place to hide. There may be other innate predispositions for landscapes not mentioned by environmental psychologists, for example because they are not easy to study with photographs representing landscapes. Acrophobia (the fear of heights) is a promising candidate: a fear of heights leads to behaviour that enhances survival.

In their theoretical contributions, some environmental psychologists make a distinction between a quick innate emotional response and a slow learned cognitive response (e.g. Ulrich, 1983). This distinction is too simple. While it is true that strictly innate emotional responses are quick responses, those learned responses that result in modulation of the appraisal mechanism (e.g. conditioning) are quick responses too. Broadly innate responses need cognitive processing and are therefore slower that strictly innate responses and conditioned responses. Another false distinction made by some environmental psychologists is that between objective preferences that are innate and subjective preferences that are learned (e.g. Shuttleworth, 1980). Two different distinctions are falsely bound together here. The question whether some preferences are objective or not is completely independent of the question whether preferences are innate and therefore universal. All preferences are subjective phenomena, because they can only exist within a subject who is experiencing those preferences and because preferences are not publicly observable (only statements about preferences and other behaviours indicating preferences are publicly observable and can be interpreted as signs of preferences). The existence of universal human preferences simply indicates that all humans share some preferences: it does not make these preferences objective. Beauty is always in the eye of the beholder. Since all human beholders belong to the same biological species, all human beholders may share some subjective phenomena, like particular experiences of beauty in response to particular stimuli.

As explained, the empirical studies of environmental psychologists do not rule out learned landscape preferences. For example, the subjects studied may prefer particular landscapes because these landscapes resemble some properties of land-

scapes they grew up in, resulting in a bond with these landscapes. Thus, a subject's sense of place may implicitly play a role in the preferences that are regarded by environmental psychologists as innate preferences. On the other hand, innate landscape preferences may be expressed in the studies of scholars who are studying landscape experiences according to one of the other approaches, without being recognized as such. For example, somebody's sense of place may partly be built on his innate preferences.

Learning can influence landscape preferences in various ways: by modulating the appraisal mechanism, by establishing perceptual processing that results in sending output to the appraisal mechanism, by influencing the way bodily emotional reactions are interpreted into conscious feelings, or by evoking emotion mental concepts directly in some situations, without any emotional bodily reaction needed. As a result, people may develop a preference for a landscape that they innately dislike. The Grand Canyon is probably a good example: it is very likely that we innately dislike this place (e.g. as a result of the lack of refuge properties and vegetation, or as a result of acrophobia), but many have learned to appreciate it very much. All these influences on landscape preferences result from earlier experiences of matterscape or earlier experiences of public expressions. In the following sections, approaches that incorporate these learning processes will be reinterpreted.

12.5 Sense of place

Sense of place is one of the core concepts used by human geographers when they expound on landscape experience. As argued before, the concept should be interpreted not as a property of places but as a property of human subjects; in other words, as someone's sense of place. Thus interpreted, the concept refers to the set of meanings, memories and feelings that a subject associates with a particular place. In terms of the fundamental theory, someone's sense of place is the specific network of mental concepts that is connected to his/her mental concept for a particular place – a network of mental concepts that specifies a place as a particular place for the subject, one that is distinct from other places. Subjects have a sense of place for a particular place as soon as specific mental concepts or specific combinations of mental concepts for the particular place have been created in their minds. The network may consist of perceptual, linguistic and emotion mental concepts, making up both episodic memories and semantic memories. By perceiving the particular place, or by thinking of it, the network of specific mental concepts, or

parts of it, may be activated, thus contributing to a specific experience of place for the subject.

Not all mental concepts that make up someone's sense of place are experienced during a particular experience of a particular place. Experiences and memories of a place may be different every time for an individual subject. And sometimes hardly any of the mental concepts that make up someone's sense of place may be part of his experience. It is not necessary at all to receive stimuli from the particular place for the mental concepts that constitute a sense of place to be activated. One may just think of the place while being elsewhere, or a sense of place may play a role in experience when seeing other places that resemble properties of a particular place, even if one is not consciously aware of this association.

Emotional components are important aspects of someone's sense of place. Emotional components can become part of someone's sense of place by either unconscious or conscious emotional learning. In the case of unconsciously learned emotional aspects of sense of place, stimuli from a place may directly (without perceptual processing) or indirectly (some initial perceptual processing is needed) activate a person's emotional appraisal mechanism, because that person has had emotional experiences at the place that resulted in the modification of his/her appraisal mechanism (conditioning). Thus, subcortical emotional appraisal leads to emotional bodily reactions, and eventually leads to emotional experiences if the emotional bodily reactions are interpreted by cortical neural circuits that code for emotion concepts, which are part of the dynamic core constituting experience. In the case of consciously learned emotional aspects of sense of place, somebody has memories of emotional events that have happened at the place or are related to the place for that person. Stimuli, then, may evoke emotional experiences not by directly turning on emotional appraisal, but by activating mental emotion concepts that might in turn activate subcortical emotional appraisal.

Generally, human geographers do not explain how a sense of place evolves; they basically (and rightly) assume that experiences of a place as well as socially mediated information about places might result in a sense of place. The fundamental theory offers an explanation: every time someone experiences a particular place the mental concepts involved in the experience might get modified, new mental concepts might get created, and pre-existing mental concepts might get associated with other pre-existing mental concepts. The neural underpinning of this process has been explained (section 9.5): the activation of neural circuits coding for mental concepts leads, mediated by the release of neurotransmitters that alter gene expression, to the strengthening of pre-existing neural connections and eventually, if

activation is repeated or lasts longer, to the establishment of new neural connections.

The best way to conduct empirical studies that are aimed at revealing somebody's or a group's sense of place and place attachment, is to combine open interviews, the interpretation of observed behaviours and the interpretation of the products of behaviours (very much like the combination of research methods used in the Rotterdam allotment garden study in Chapter 7). In this way, different kinds of public expressions are used to obtain information. The importance of combining different kinds of public expressions, revealed by different kinds of qualitative methods, lies in the fact that each kind of public expression is often selective and biased. For example, people often find it difficult to describe why a particular place is special to them. Therefore, observing their behaviour might reveal further information. In addition, components of a sense of place may be unconsciously learned components that are not directly accessible to the introspective conscious mind. On the other hand, using behavioural observations to deduce conclusions about people's experiences involves a lot of interpretation by the researcher. Confronting these deductions with texts and interviews might be of great help in checking the validity of the findings from different sources of public expressions.

In the light of this recommendation, many empirical studies that were intended to expound on sense of place are somewhat problematic, because they were based on only one kind of public expression (e.g. only written texts about a particular place). Therefore, the validity of the results might be questioned. But if conducted in a methodologically sound way, combining different methods, qualitative research is a good strategy to bring to light somebody's sense of place. However, a complete description with all details is impossible. At a first glance, one might think that even well conducted qualitative sense of place studies are merely descriptive, lacking explanatory power – and human geographers are often criticized for this by landscape experience researchers who use quantitative methods. However, I think that good studies into somebody's or a group's sense of place might explain very important aspects of landscape experience and behaviour motivated by a particular mode of experiencing places – especially in the context of landscape planning and design. The Rotterdam allotment garden study demonstrates that an image of the gardeners' senses of place explains why the gardeners are opposed to the city government's plans and why they respond in the way they do. In this case, quantitative studies (e.g. using questionnaires) would not add much, or even (if only a quantitative study were conducted) prevent a good understanding of the gardener's sense of place. Quantitative studies imply that researchers formulate

the place-meaning categories that will be studied. Thus, categories that are important for the gardeners might easily be overlooked.

In short, sense of place is a reservoir of related mental concepts – including emotional concepts – that specify a place as a particular place for the subject. During landscape experiences, some of these mental concepts may be activated and be included in the dynamic core that constitutes consciousness. In this case, the experiences are special and often very meaningful experiences, with qualities that are distinct from other landscape experiences. Emotional components and a sense of self are important aspects of the sense of place. Thus, sense of place can be considered as an individual factor that influences landscape experience.

The concept of sense of place is to a great extent complementary to the concept of innate landscape preferences: the first refers to someone's network of mental concepts related to a specific place that influences landscape experience, while the second refers to inherited emotional appraisal mechanisms that influence landscape experience. However, innate landscape preferences might play a role in someone's sense of place: for example, an innate preference for vegetation might be an initial constituent for the creation of a sense of place. But innate preferences for places are no condition at all to develop a sense of place. The other way around, someone's sense of place might alter the way a subcortically processed innate emotional response to a landscape turns into an experienced feeling or even alter the appraisal mechanism itself. Thus, people can like places because their sense of place contains positive emotional mental concepts, even for places with properties that humans are innately predisposed to dislike.

12.6 Counter-structure

The theory of counter-structure refers to the structures of leisure and tourism experiences, which are generally different from the structures of daily experiences. According to the theory, the properties of an experiential structure can be described by six parameters: the sense of time, the sense of space, the tension of consciousness, the bracketing of fundamental doubts, the sense of the body (proprioception) and the sense of sociality. These parameters may have different values for different experiences. The values of these parameters can be reinterpreted as different perceptual mental concepts that fall within different categories. These mental concepts may be employed during an experiential episode, and thus constitute particular experiences of time, space, the body, etc. Of course, we do not employ mental concepts for each of these six categories within every single mo-

ment of experiencing. For example, not every experience contains an experience of time. However, during a longer period of experiencing (an experiential episode) it is very likely that mental concepts that fall within these categories are employed every now and then. Within a particular experiential episode, then, particular mental concepts that fall within these categories may dominate. Thus, the structures of experiential episodes can be characterized by the values of the six parameters. In my opinion, this reinterpretation does not apply to the parameter tension of consciousness; I will come back to this issue later.

The counter-structure theory was not developed in the context of landscape experience research. The aim was to characterize different types of leisure and tourism experiences and to explain the differences. Nevertheless, the theory can also be used as an applied landscape experience theory. Particular landscape properties might evoke in the individual mind particular mental concepts that fall within the categories designated by the parameters. For example, hearing the waves collapsing on the beach may evoke a particular mental time concept that has the property of a more or less regular rhythm with time spaces of a few seconds. This mental time concept may dominate the person's other mental time concepts (e.g. a mental time concept associated with clocks) during his/her stay at the beach. Thus, the counter-structure theory can explain relations between particular landscape properties and particular experiences.

The set of six parameters seems to be a somewhat fuzzy set to characterize the structure of experience. For example, the parameter of sociality differs from the other parameters in that it probably involves a huge and complex collection of mental concepts that are employed for all kinds of aspects of sociality. The parameter of time on the other hand may in many experiences involve only a very limited set of relatively simple mental concepts. Moreover, the parameter tension of consciousness has a nature that is different from that of the other parameters. The tension of consciousness designates the degree of attention during an experiential episode and does not refer to a particular type of mental concept employed in an experience. The more one attends, the higher the tension of consciousness.

The dominating mental concepts for each parameter can be studied by asking people to reflect on a particular experiential episode and express the dominating senses of time, space, body, etc. After explorative qualitative research these questions can be included in questionnaires with predefined answer categories, as Elands and Lengkeek (2000) have demonstrated. This method runs the risk that the subjects studied do not remember properly the dominating mental concepts employed in their experiential episode, or that in retrospect they even ascribe mental concepts that did not play a role or played only a very minor role in their experi-

ences. An alternative method could be to ask subjects to answer questions about the mental concepts either on a regular time basis during their stay in a particular landscape (e.g. every hour) or at random moments indicated by researchers (e.g. by equipping the subjects with a device that makes a sound). A disadvantage of this method is that it directly interferes with the parameter time, since the research method provides the subjects with a sense of time.

In the allotment garden study, many of the descriptions of experiences and meanings given by the respondents can be interpreted by employing the counter-structure theory; for example, people refer to a particular sense of sociality or to a particular sense of space. Interestingly, people often opposed their allotment garden experiences to their daily experiences in the city of Rotterdam. Thus, counter-structure is not only a theoretical perspective applicable to the results of the study but also an almost explicit concept that people use to give meaning to their own allotment garden experiences. I argued before that we probably do not have an innate preference for nature, even though most people in the Western world have a preference for nature. The preference for nature might be explained by the fact that nature offers excellent opportunities for counter-structural experiences amongst Westerners. Probably, natural places evoke experiences in which the values of the parameters vary from the values that these parameters have during our daily lives.

It is very likely that there is some overlap between those phenomena that are stressed by the concepts of counter-structure, sense of place and innate landscape preferences. Someone's sense of place might be partly constituted by mental concepts that are designated by particular values for the parameters. For example, a special sense of sociality, other than in the city, is for many allotment gardeners an important constituent of their sense of place. Innate landscape preferences that evoke emotional responses can interfere with the tension of consciousness: people tend to focus with increased attention on those stimuli that evoke emotional reactions.

Importantly, scholars who employ the concepts of sense of place and counter-structure in their studies do not argue that landscape experience is the product of individual factors exclusively. On the contrary, social influences on sense of place and counter-structure are stressed extensively in their works. Nevertheless, the concepts primarily designate properties of the individual mind. Subsequently, these properties are open to the influences of social processes and structures. In the following sections, approaches in landscape experience research that emphasize social influences will be reinterpreted.

12.7 Social influences: sociological, historical and images of nature approach

While sociologists, anthropologists and historians who study phenomena that are relevant to landscape experience emphasize different aspects in their studies and use different methods, they all study social influences on landscape experience. The images of nature approach is an example of an applied social theory developed especially in the context of landscape experience. While innate landscape preferences, sense of place and counter-structure are core concepts in explicit applied theories that stress aspects of landscape experience, in my review of historical, anthropological and social approaches (sections 4.8 and 4.9) I did not mention such explicit theories. The reason is that historical and sociological theories and studies that are relevant to the study of landscape experience primarily stress social processes. Landscape experience – the subject of this dissertation – is an individual, subjective phenomenon. Theories and studies that describe and explain social processes do not belong to the phenomenon of landscape experience. Understanding social processes is irrelevant to the goal of this dissertation, which is to construct a comprehensive theory of landscape experience. Although social processes are not directly relevant, the influence these processes exercise on landscape experience is relevant. The problem how such social phenomena as communication between two people can influence landscape experience is not stressed in social studies: it is (rightly) assumed that there is such an influence. Therefore, instead of describing specific social and historical theories, I have identified some themes that describe social phenomena or processes that are likely to influence landscape experience. As a consequence, this section is somewhat different from the previous sections: except for the images of nature approach, no specific theories will be reinterpreted. I will give a general account of the problem how social processes can influence the subjective, individual phenomenon of landscape experience. In addition, I will reinterpret the study of social trends and the images of nature approach.

I explained in Chapter 10 the way social phenomena can influence experience. The core concept employed in this explanation – public expressions – refers to materialized expressions (e.g. bodily behaviours, utterances, written texts, paintings, TV programmes) that reflect the contents of the mind of the producers of those expressions. If someone encounters public expressions, stimuli cause sensations, which in turn are interpreted by other subjects employing their mental concepts. If activated, mental concepts may get modified and new mental concepts may get created. The neural underpinning of this process is explained in section 9.5. Social influence on experience exists only if neural circuits that code for mental concepts get modified as a consequence of experiencing public expressions. As a

result of the modification of mental concepts, future experiences of landscape might have a different quality if the modified mental concepts play an inferential role in those experiences. A discourse is a collection of related public expressions – related because, for example, they are produced by a particular group of people (e.g. the allotment gardeners in Rotterdam).

On the one hand, utterances and written texts in natural language are nothing but public expressions, in so far as the basic way of affecting the mental concepts of a subject is covered by the explanation above. On the other hand, natural language has some special qualities that other kinds of public expressions (e.g. body language and pictorial language) do not have. However, it is hard to describe these qualities; perhaps they are a combination of great freedom of expression and great precision of expression. Human subjects have developed relatively big brain regions in which to process natural language (see section 10.7).

For many people who are experiencing the Grand Canyon, it presumably makes a great difference that they have heard and seen on TV or read in a book that the walls of the Grand Canyon reveal two billion years of geological history (and that they have previously acquired by social learning all the concepts that are needed to understand the expression 'geological history'). In this case, encountering public expressions results in the establishment of new networks of mental concepts. The mental concepts for Grand Canyon, geological history and two billion years will be connected as a result of the simultaneous activation of these mental concepts under the influence of the interpretation processes in the mind of the subject. If the subject visits the Grand Canyon, the set of mental concepts employed in his/her experience probably includes this network created as a result of encountering public expressions, and therefore the quality of his/her experience is different.

Before interpreting in terms of the fundamental theory how social trends, such as globalization or the rise of modernity, can influence the way a subject experiences landscape, I will briefly analyse what the concept of social trend may refer to. A social trend is a systematic (as opposed to a random) component of changes in society in time. For example, globalization means that of all actions of all members of especially western cultures, a higher percentage are actions that involve the worldwide exchange of people and products (including public expressions). In the discussion of the ontological status of cultural phenomena (section 10.6), I assumed that cultural phenomena are real and higher-order properties of interactions between people. Globalization may be seen as such a higher-order property.

Identifying social trends as such does not explain much in the context of the way people experience the landscape in a direct way. However, studies that expound on social trends point to systematic changes in the kind of public expressions en-

countered and thus to the kind of social influences people are exposed to. Indirectly, then, a social trend may shed light on systematic differences of commonalities in the mental structures of subjects at two different points in time.

Historians who are studying the meanings ascribed to landscape or particular landscapes in a particular time-frame and culture, or the changes in these meanings over time, study specific sets of historical sources, mainly writings. They use these sources to reconstruct a particular set of meanings supposedly given to a specific place or a category of landscapes by a specific culture in a specific time-frame. In terms of the fundamental theory they reconstruct commonalities in mental concepts that are shared by members of the specific culture by studying a specific set of public expressions. These insights contribute to our understanding of landscape experience in the sense that they help us to theorize about whether or not contemporary predispositions that play a role in landscape experience are a result of social influence. Historical studies can be used as a form of cross-cultural research. I gave an example of this contribution in my criticism of those environmental psychologists who argue that we have an innate preference for natural landscapes. Historians can be criticized for being very interpretative. On many occasions they simply have to in order to make a story out of the available empirical material. But this is no reason to dismiss all claims made by historians. If many sources depict wild nature as awful, dangerous, ugly, evil and insane, as many Medieval writings do, the claim that people in those days did not like wild nature is justified.

After this discussion of social influences on landscape experience in general and the contribution of the study of social trends and history to our understanding of landscape experience, I will discuss and interpret a specific applied social approach that is highly relevant for explaining landscape experience: the images of nature approach. Images of nature are more or less durable sets of meanings ascribed to nature. In other words, they are the networks of mental concepts related to the concept of nature. The concept of images of nature contains more connotations than just these networks of mental concepts. It is assumed that these images are to a great extent the result of social influences, in other words, of encountering public expressions. As a result, within a society there exist commonalities between subjects. Thus, the concept denotes commonalities in the networks of mental concepts related to nature. But, as the empirical studies have shown, these are not commonalities shared by all members of society. Instead, different images of nature exist, or in the terms employed in section 10.6, different cultural modal contents of nature exist.

In most studies, images of nature are reconstructed on the basis of questionnaires or qualitative interviews. Thus, on the basis of the public expressions of the subjects who expound on the meanings they ascribe to nature and some more or less similar patterns in the answers, subjects are grouped together. However, by using this method it remains unknown whether or not images of nature are effects of social influence, because the social processes that cause these effects are not studied. Images of nature are assumed to play a role in the way people experience nature, respond to nature and take their positions in nature policy. However, these effects of images of nature are never seriously studied.

In most sociological studies either social structures and processes are studied and the influences on individual minds are posited without being studied (e.g. in studies of social trends), or the contents of the minds of subjects are studied and these contents are assumed to be effects of social processes and structures that are not studied (e.g. the images of nature approach). In both cases, social influence on the mind is assumed and not studied.

Because the modification and creation of mental concepts due to encountering public expressions interferes with the existent complex networks of mental concepts, which are also influenced by individual past experiences and genetically determined predispositions, the idea that landscape experience is a product of culture is too simple. Likewise, the influence of a given set of public expressions varies from individual to individual. Thus, in order to study the influence of a given set of social processes on a particular sample of subjects, both the subjects and the social processes must be studied. Nevertheless, for some properties of landscape experiences it is safe to conclude that social influence plays a great role without studying both social processes and the contents of minds. If subjects in one country systematically, and with only a few exceptions, prefer particular landscape properties while subjects in another country dislike the same landscape properties, one can safely say that social influences are at work.

Social influences on landscape experience may interfere with the other influences mentioned in previous sections. Social influences may reinforce or even change innate landscape preferences. For example, in many cultures myths are created around the beauty of water. Thus, an innate preference for water is probably reinforced in social processes. Perhaps humans have an innate aversion to the Grand Canyon. Encountering the Grand Canyon, then, results in aversive bodily emotional reaction. Social influences may affect the way these bodily reactions are interpreted, thus becoming a positive sensation for the subject. In addition, social processes can greatly affect somebody's sense of place. For example, most people in the West have a sense of Mount Everest, even though they have not been there.

This sense is created entirely on the basis of public expressions (but is not determined by these expressions; it also depends on the way these public expressions are interpreted by the individual and on the mental structures already apparent in the mind of the individual). Moreover, social influences interfere with the mental concepts that constitute the values of the parameters mentioned by the counter-structure theory. The socially acquired knowledge that the Grand Canyon's deepest layers consist of two-billion-year-old rock might evoke a sense of cosmic time for somebody who is experiencing the place.

12.8 Conclusion

In this chapter, I have interpreted the theories and concepts employed in studies of landscape experience and in studies that are relevant to understand landscape experience in terms of the general theory of experience as constructed in Part 3. To my opinion, any theory of landscape experience must relate particular matterscape properties to particular mindscape properties. Moreover, any scientific theory must explain something. Taking these restrictions together, theories of landscape experience must explain particular relations between particular matterscape properties and particular mindscape properties. From this point of view I will compare, in terms of the fundamental theory, the structures of the explanations offered by the different theories of landscape experience that are interpreted in this chapter. Encountering a particular landscape may result in a particular landscape experience because:

- Evolutionary approach: particular categories of matterscape stimuli evoke particular emotional bodily responses in all subjects, due to innate properties of the emotional appraisal mechanisms. This results in particular landscape preferences that are net sums of the interpretations of subcortical and bodily emotional responses projected to cortical regions, where these responses get interpreted by employing emotion concepts. The innate predispositions are the product of evolution.
- Sense of place: particular matterscape stimuli from particular places evoke particular networks of mental concepts related to this particular place. These mental concepts cause particular experiences for particular subjects. In addition, the stimuli may cause the appraisal mechanism to respond, due to its innate properties and particular modifications. The networks of mental con-

cepts and the modifications of the appraisal mechanism are the product of past experiences, of both matterscape and public expressions.

- Counter-structure: particular matterscape stimuli evoke particular mental concepts denoting particular senses of space, time, sociality, the body, and fundamental doubts, and a particular degree of attention. The mental concepts are the product of past experiences of both matterscape and public expressions.
- Images of nature: particular categories of matterscape stimuli, namely stimuli from natural (as opposed to cultural) elements in landscapes, evoke particular networks of mental concepts for particular groups of people. The mental concepts are the product of past experiences of public expressions.
- Sociology/anthropology/history: particular matterscape stimuli evoke particular mental concepts for particular groups of people. The mental concepts are the product of past experiences of public expressions.

A division into biological, cultural and individual factors influencing landscape experience is a satisfying way to categorize different existing theoretical approaches to the phenomenon of landscape experience. However, on a more fundamental level of expounding on the processes resulting in landscape experience, another division covers the explanations offered by the different approaches. Three key variables are crucial to reinterpret the approaches on the process level. Properties of a particular landscape experience are influenced by (1) the properties of matterscape stimuli, (2) the properties of the mental concepts employed in processing those stimuli, and (3) the automatic emotional appraisals in response to those stimuli. In other words, if we were to know the states of these variables at a particular moment, we would have covered all explanations offered by the different approaches that are reinterpreted in this chapter.

While the explanations offered by the approaches are different, there is some – but not very much – overlap. For example, the innate properties of the emotional appraisal mechanism may directly contribute to somebody's sense of place. The phenomena under study within the approaches interfere in many ways. For example, the way the innate properties of the emotional appraisal mechanism are expressed as landscape preferences may be highly influenced by past experiences of matterscape and public expressions. Thus, the phenomena under study within the different approaches come together in the processes constituting landscape experience. Therefore, a comprehensive theory of landscape experience that embraces the explanatory contributions from the approaches is possible, as will be demonstrated in the following chapter.

Chapter 13 A comprehensive theory of landscape experience

13.1 Introduction

In this chapter, I will describe a comprehensive theory of landscape experience that embraces different theories and concepts as developed within the different approaches in landscape experience research, and explains how the process of experience works. No new arguments will be developed in this chapter. All major claims will be repetitions of claims made elsewhere in this book. Things will be put together, framed by the goal of giving an explanation of the processes resulting in landscape experiences and the factors influencing these processes.

In the following section, I will restate the most important assumptions and insights that underlie the theory and briefly explain the conceptual model that reflects the theory and contains the variables employed in the comprehensive theory of landscape experience. The explanation of the theory follows in the subsequent four sections. The explanation is divided into an explanation of the processes mediating between matterscape and public expressions, and sensations (13.3), and explanations of the processes that mediate the influence of biological factors (section 13.4), individual factors (13.5) and social factors (13.6) on landscape experience. In the conclusion (13.7), some implications of the theory will be stated.

To illustrate the theoretical explanations, I will refer to the experiences of Mr Gardner – a fictitious person who resembles a typical older generation allotment gardener in Rotterdam (see Chapter 7). Mr Gardner has had his allotment garden for many years. In it, he has built a little summer house in which he and his wife live during the summer. He likes to maintain his garden and he likes the social life in the complex.

13.2 Theoretical foundations

I take it for granted that there is a reality outside our minds that has properties that are independent of our minds. Although this is a metaphysical assumption, it is not just an assumption of equal value amongst other possible assumptions on this topic. It is not a matter of my taste: it is the only assumption that works, the only one that enables us to explain the world as we experience it. Reality consists of material objects, states, events and properties, and of states, events and properties

that supervene on material objects, states, events and properties. Consciousness supervenes on neural processes. In other words, a particular experience (the content of consciousness at a certain point in time) is a higher-order phenomenon of particular neural processes. A higher-order phenomenon is a new phenomenon that exists on a higher level of reality; it is thus irreducible to lower subvening levels of reality. Subjectivity is an example of a higher-level property of experience. The assumption that experiences are higher-level phenomena is in line with everything we know about the brain and about consciousness. In principle, it is not impossible – taking gaps in current knowledge into account – that experiences are not higher-level phenomena but are reducible to neural processes. But within this view (reductionistic materialism) it is hard if not impossible to give an account of the distinctive properties of experiences: continuous, structured, processes of subjective qualitative unity, coming in a mood, with a centre and periphery of attention and with a Gestalt structure. Other views on the relation between consciousness and the material world are implausible.

The comprehensive theory of landscape experience represented by the conceptual model in figure 11 is in line with these theoretical foundations. The theory is based on many different arguments made in the preceding chapters. The plausibility of these claims is, wherever possible, demonstrated by means of the empirical results of studies conducted by neuroscientists and psychologists.

Matterscape and public expressions are material phenomena. Matterscape is the landscape as it exists in material reality. Public expressions are behaviours or products of behaviours that express thoughts or experiences. If stimuli that originate from matterscape or public expressions affect the senses, sensations occur. Information from sensations is simultaneously projected to the subcortical emotional appraisal mechanism and to cortical areas. If the emotional appraisal mechanism responds to the stimuli, output is sent to subcortical regions that map and regulate bodily states and processes. This leads to adjustments of bodily states and processes. Information about bodily states and processes is sent back to the subcortical regions that map and regulate these states and processes. Information from the appraisal mechanism and from the regions regulating bodily states and processes is projected to particular cortical regions. In these regions, the information is organized by emotion concepts that are coded for by neural circuits. As a result of being activated, the appraisal mechanism may be modulated. The projection of sensational information to cortical regions results in cortical information processing, in which perceptual and/or linguistic concepts are employed to organize the information. Those activated cortical neural circuits and those neural processes in the thalamus that are engaged in the dynamic core at a particular moment

constitute mindscape – an experience of landscape – consisting of conceptual content (constituted by activated neural circuits in the cortex) and sensational content (constituted by neural activity in the thalamus). Moreover, the outcomes of different stages of information processing can be projected to the appraisal mechanism, which may respond to it by initiating a bodily emotional reaction. These phenomena and processes will be explained in more detail in the subsequent sections.

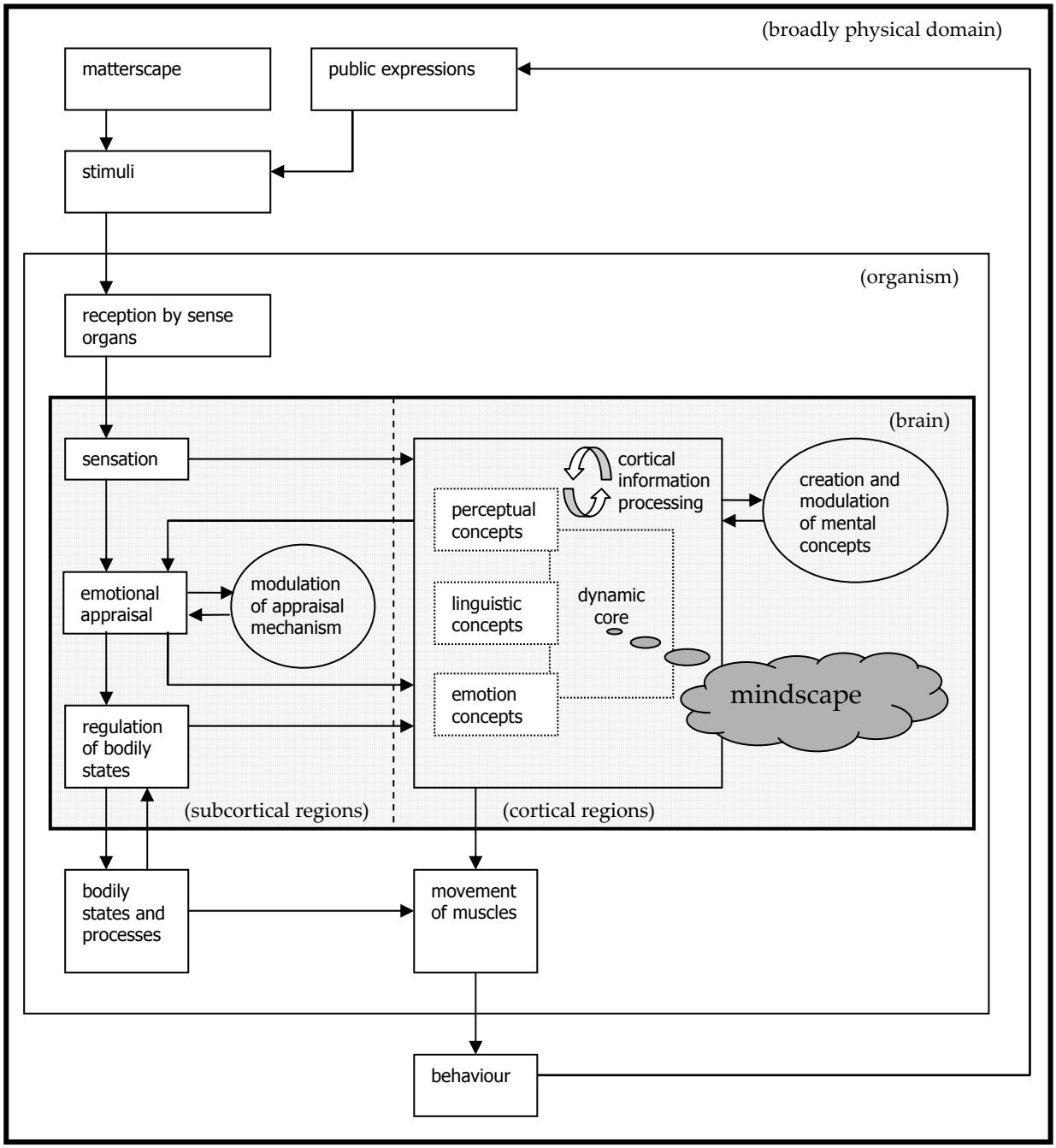

Figure 11: Conceptual model for a comprehensive theory of landscape experience

13.3 From matterscape and public expressions to sensation

Matterscape is the physical landscape, which consists of physical entities and events that have properties that are independent of ways of perceiving and knowing. Matterscape exists objectively. Due to purely physical processes, information about these entities and events in matterscape affects the senses. For example, light – which consists of a spectrum of different wavelengths – falls on a tree. The tree absorbs particular light waves and reflects other light waves. Stimuli that contain information inherent in these physical processes may affect the senses of an individual. The senses transform the stimuli, which consist of physical energy, into electrochemical energy and send it to the brain. The energy enters the brain in the thalamus. The information from different senses is sent to different nuclei in the thalamus. Sensation is neural activity in the thalamus that contains information as a result of input from the senses.

The information inherent in sensation is not identical to the qualities of the tree. The qualities of the tree influence the qualities of the information, but two different transformation processes stand between the tree and sensation; in addition, factors other than the qualities of the tree also influence these processes. First, the information inherent in the physical processes that result in stimuli are transformations of some but not all qualities of the tree. Properties of the light coming from the tree and affecting the eyes are not determined by the qualities of the tree only, but also by the qualities of the light source, the qualities of the medium in which the light travels, etc. Second, the physical energy of the stimuli is transformed by the senses into sensations. Sensation is determined not only by the qualities of the stimuli but also by the qualities of the senses. Our eyes are sensible to light with particular wavelengths only, while our ears are capable of detecting sounds waves between 20 and 20,000 Hertz. The detection capacities of the senses differ across individuals. Due to these transformation processes, the information inherent in sensation is purely symbolic for the interpreting subject. In other words, sensations are potential collections of signs of physical entities, states and processes.

In semiotics (the study of signs and their meanings), a distinction is made between natural signs and conventional signs. Natural signs are signs caused by purely physical processes that can be described by natural laws. For example, smoke can be a natural sign of fire if the smoke is caused by the fire, since in this case the sign is caused by physical processes that are independent of our interpretations. Conventional signs, on the other hand, are signs that rest on conventions, that is, they are more or less contingent rules made by a group of people. The word ‘tulip’ is a sign for a particular flower only because the Anglo-Saxon community

has decided so and constantly reinforces this decision by using the same word when referring to the particular flower. Placed within this distinction, sensations are 100 per cent natural signs, because sensations result from physical processes (including chemical and biological processes) that are independent of our interpretation and out of reach of the direct voluntary control by the subject. Of course, we can exercise indirect influence on our sensations, for example by closing our eyes, but we are unable to influence directly the transformation processes that mediate between physical entities and sensations at free will. If we look in another direction or close our eyes, we change the conditions in which the transformation processes occur and not the processes themselves.

Sensations are collections of potential natural signs for subjects. In addition, psychologically healthy humans are, at least in most situations, naturally inclined to take sensation for granted as being natural signs of an external reality. This may seem a logical consequence of sensation being natural signs, but it is not. It is conceivable that sensations are natural signs but that they are not taken for granted as natural signs by humans. Some hardcore or radical constructionists explicitly claim that reality is a social construction. Thus, their explicit doctrine contradicts my claim that sensations are taken for granted as natural signs by the interpreting subject. However, their behaviour does not. No matter how radical a constructivist may be, he will leap out of the way if he sees a car speeding straight towards him, thus demonstrating that he treats his sensations as natural signs, contradictory to his doctrine. This is one of the reasons why radical constructivists do not deserve belief: the huge gap between their doctrine and their behaviour turns them into living refuters of their own claims. I do not know if our inclination to treat sensations as natural signs that refer to an external reality may be innate, learned or a combination of innate predispositions and learning (and I do not even know if this is something we can know). But whatever the origin, at a certain early point in our lives it is our default position to do so, and explicit ideas about metaphysics or ontology do not interfere with this position on most occasions, such as when spontaneous behaviour occurs.

Thus, if Mr Gardner sits in his garden and looks at a tree, his sensations are the result of physical processes that are outside the domain of phenomena that are influenced by any subjective state. The quality of his sensations is not affected by whether or not he pays attention to his sensations coming from the tree, how he feels at this particular moment, or whether or not he is convinced of the existence of a reality external to his mind. However, subjective states can greatly influence the experiences he constructs out of his sensations after different stages of information processing.

The stimuli that lead to sensations can result from, besides matterscape, public expressions (behaviours and products from behaviours that contain expressions of experiences or thoughts), as figure 11 depicts. Public expressions – for example written texts, utterances or bodily behaviours – are purely physical. For the processes explained in this section it does not make any difference whether stimuli result from matterscape or from public expressions: both result in sensations that are due to physical processes. Of course, the sources of the stimuli differ and therefore the qualities of the stimuli differ; however, the transformation processes that mediate between the source of the stimuli and the sensations resulting from stimuli do not differ. Moreover, the way stimuli get processed in later stages of information processing in the brain differs between stimuli that result from matterscape and those that result from public expressions. These differences are due to different mental concepts being employed in information processing as a response to differences in the qualities of sensations from either matterscape or public expressions. It is noteworthy that some physical entities can belong to both matterscape and public expressions. For example, Mr Gardner's garden belongs to matterscape and is also an expression of some of Mr Gardner's ideas about gardening and preferences for particular garden designs.

It is important to distinguish public expressions from other objects that may be the causes of stimuli. There are two reasons for this. First, public expressions are the vehicles for social influences on experiences. Without public expressions – produced by one person, encountered by another person and interpreted by that person as being a public interpretation – no information can be transmitted (albeit in a transformed mode) from one person to another, for individual minds are not directly accessible to each other. Second, and as a consequence of the previous argument, every way of doing landscape experience research regardless of the research design rests ultimately on public expressions as an empirical basis. These public expressions are taken as signs of experiences by landscape experience researchers. By implicit or explicit theoretical inferences, statements about experiences are abstracted from public expressions of the subjects studied.

I think that most landscape experience researchers would agree with the explanation of sensation employed in this section. The explanation does not pose serious problems for any of the approaches in landscape experience research, for most researches simply take it for granted that information about the external world enters the brain, without questioning which processes take place.

To conclude, we do not have images or representations of the external world. All information that enters the brain and consciousness that supervenes on neural activity is symbolic, referring to the external world. Therefore, our experiences that

are built upon sensations have a symbolic relation to the external world. The information entering the brain in the thalamus is not contingent, not dependent on subjective states and not dependent on socially transmitted ideas, since sensation is caused by purely physical processes. If the thalamus gets activated by input from the senses, it projects information to different regions in the brain simultaneously. Information is sent to subcortical brain regions that initiate emotional reactions and to cortical brain regions that play a role in perception and cognition.

13.4 Biological factors

Information is directly projected from the thalamus to particular subcortical regions, where immediate, automatic and unconscious emotional appraisal (judgement of the information for its emotional relevance) takes place. The appraisal mechanism is predisposed from birth to react to some categories of stimuli, without any previous learning involved. These stimuli are natural triggers. Humans have various basic emotions, for example fear, sadness, happiness and anger. For fear, the subcortical appraisal region is the amygdala; for other emotions, different subcortical regions might play a role in emotional appraisal.

If the emotional appraisal mechanism detects stimuli of emotional relevance, it projects information onto other subcortical regions, which initiate emotional bodily reactions, such as increased heart beat and sweating. These emotional bodily reactions are to a great extent innate reactions and they can vary in intensity. For emotional bodily reactions to natural triggers to occur, no previous perceptual processing in the cortex is needed. However, for emotional bodily reactions to turn into experienced feelings, processing in the cortex is a condition. The emotional appraisal structures and the structures that initiate emotional bodily reactions and map the bodily conditions project information onto cortical structures, where the information about appraisal and bodily states is interpreted with the help of emotion mental concepts. This eventually leads to experienced feelings if the activated cortical neural structures coding for emotion mental concepts are part of the dynamic core that constitutes consciousness. The net sum of all experienced positive and negative feelings in response to landscapes is the degree of landscape preference, which is a property of a subject's mindscape.

In landscape experience research, the term biological factors (or evolutionary factors) refers to innate emotional responses to matterscape properties that result in landscape preferences that are to a great extent shared by all humans (since the genetic make-up of all humans is very similar). That is, our genetic make-up results

in innate emotional appraisals for particular categories of matterscape stimuli. If innate landscape preferences were strictly innate – that is, if we could emotionally react to certain matterscape stimuli without any initial perceptual processing – the processes described thus far could account for these preferences. However, it is unlikely that we have strictly innate landscape preferences. Although theoretical arguments cannot rule out the possibility of strictly innate landscape preferences, it is hard to imagine that newborn babies, having had no opportunity to develop perceptual mental concepts, can react by pure innate responses to such complicated stimuli-fields as landscapes.

However, we cannot conclude from the probable non-existence of strictly innate landscape preferences that there are no innate landscape preferences. We probably have broadly innate landscape preferences: caused by innate emotional appraisals to matterscape stimuli that need some initial perceptual processing to turn on emotional reactions. In the case of broadly innate landscape preferences, information is projected from the thalamus to cortical regions. In these regions the information is organized and interpreted with the assistance of mental concepts. For these processes to occur it is not necessary that the subject is consciously aware of the stimuli. The outcome of this perceptual processing is subsequently projected to the subcortical emotional appraisal regions. Thus, emotional appraisal is not based on the information coming from the thalamus directly (as with strictly innate preferences) but on information perceptually processed in the cortex. For all other processes, broadly and strictly innate landscape preferences come into existence in the same way. Learning is a prerequisite for broadly innate landscape preferences to occur. 'Learning' and 'innate' seem to be contradictory, but what is learned is not the emotional appraisal or the emotional reactions, but only some relatively simple mental concepts that are employed to organize information in such a way that the innate appraisal mechanism can initiate the inborn chain of events that result in landscape preferences.

We have innate landscape preferences because for our distant ancestors (and perhaps even for pre-human mammals) it was beneficial to have those preferences. Some environments are better for survival than others. Ancestors who possessed those genes that express themselves in preferential dispositions for landscapes that enhance survival would have had a bigger chance of surviving long enough to reproduce and thus pass on their genes to future generations. We inherited innate landscapes preferences, whether or not these preferences still promote our survival.

Some environmental psychologists who adopt the evolutionary approach claim to have demonstrated innate landscape preferences. Generally, their research

strategy is to relate presented matterscape stimuli with stated preferences and to infer innate landscape preferences from commonalities in stated preferences. According to their findings, we have innate preferences for half-open landscapes, landscapes with vegetation, landscapes with water, and natural landscapes. Although these findings point to innate landscape preferences, they do not prove the existence of innate preferences, since there is a lack of cross-cultural studies devoted to this topic. An innate preference for nature is very unlikely, since in many periods in human history people disliked nature and since being predisposed to like nature was not beneficial for our distant ancestors at all (long ago, every landscape was natural). It is very plausible that we have an innate preference for such landscape properties as half-openness and an abundance of vegetation and water.

Mr Gardner may have an innate preference for half-open landscapes, but this preference is not the result of any learning processes in his life. Although this preference is innate, Mr Gardner would not have reacted to half-open landscapes with a positive emotional response as a newborn infant. First, he had to acquire the mental concepts that are needed to be able to discriminate half-open landscapes from other landscapes. If we were to remove Mr Gardner's cortex but leave his subcortical brain structures intact, he would no longer be able to prefer half-open landscapes. Although he would still have an innate predisposition to like half-open landscapes, this predisposition would not be expressed because he would lack the ability to execute the initial perceptual transformation of the incoming stimuli that would be needed to activate his appraisal mechanism containing the predisposition.

Mr Gardner's innate preferences for vegetation, water and half-open landscapes may contribute greatly to his appreciation of his garden and the whole allotment garden complex: there are ponds and vegetation everywhere, and the complex has a variety of open spaces – like lawns and paths – and objects, like trees and little houses. And, perhaps, the garden union's rule that hedgerows must be cut when they reach a certain height (around 80 centimetres) is a social expression of an innate preference for half-open landscapes. Although innate preferences may be causes amongst other (non-innate) causes for Mr Gardner's appreciation of the place, he is probably not aware of these causes. Built-in predispositions in the appraisal mechanism are inaccessible to consciousness. Thus, he cannot track down these causes by introspection only. At best, Mr Gardner can reconstruct the fact that he has preferences for half-open landscapes by making theoretical inferences from having regular good feelings in half-open landscapes (thus demonstrating a talent to become an environmental psychologists). Therefore, we cannot always rely on self-reports (a form of public expressions of the contents of one's

experiences) if we want to know why people like certain places. As a consequence, quasi-experimental studies can add new knowledge to those studies that rely on self-reports.

The mental concepts needed for broadly innate preferences are mental concepts that are shared by every healthy subject: virtually everybody can discriminate open landscapes from non-open landscapes, and virtually everybody can recognize vegetation and water. The mental concepts needed for discrimination of half-open landscapes are acquired as a result of a very normal universal human mental development that results from repeated confrontations with universal environmental circumstances. The same holds for the emotion mental concepts that are needed to process the information projected to the cortex by the subcortical regions that play a role in bodily emotional reactions: because all normal humans have the same basic emotional bodily reactions from time to time, it is very likely that all humans develop emotion concepts that are very much alike. The term biological factors is justified for these landscape preferences since the mental concepts that are involved in broadly innate landscape preferences are, though learned, to a great extent similar across subjects.

Apart from innate landscape preferences there are unconsciously and consciously learned landscape preferences. Amongst other topics, learned preferences will be attended to in the following two sections.

13.5 Individual factors

The term individual factors (or personal factors) denotes influences on landscape experiences resulting from past experiences. In empirical studies it is hard to discriminate between individual factors and social factors, for both influence landscape experience due to changes in the structure of the mind as a consequence of earlier experiences (or, possibly, of unconscious information processing). Conceptually, however, discrimination is not problematic. Individual factors are influences on the structure of the mind as a consequence of earlier experiences or unconscious information processing of matterscape stimuli. Social factors are influences on the structure of the mind as a consequence of earlier experiences of stimuli originating from public expressions of mindscapes. The difference between individual and social factors lies in the source of the stimuli and the kind of mental concepts employed to organize those stimuli by subjects affected by them.

Past experiences of landscape or information processing of matterscape stimuli that is not directly experienced can influence current landscape experiences in two

fundamentally different ways: by modulating the emotional appraisal mechanisms, or by creating and modulating mental concepts (the two ovals in the conceptual model).

In the case of modulating the appraisal mechanism, a new stimulus gets unconsciously associated with a natural trigger. This leads to the creation of new neural connections in the subcortical appraisal regions. For example, we may have an innate fear reaction to loud, unexpected noises. For a subject, a place where he once heard a loud, unexpected noise that resulted in a fear reaction might become unconsciously associated with fear. 'Unconsciously' refers to the association: the noise and the place may be consciously experienced, but the association between the two is materialized in the form of new neural connections in subcortical regions that do not constitute consciousness. The association cannot be retrieved in consciousness. Even if the event is forgotten the association might still exist. Encountering the place might then cause a fear reaction without any conscious memory of the previous event. The appraisal mechanism will react to the new stimulus (a learned trigger) as well.

Probably there are many categories of stimuli to which each of us reacts emotionally as a result of acquired associations between these stimuli and natural triggers, because many emotional reactions occur during the course of our lives. Mr Gardner's garden might be a rich world of many learned emotional stimuli for him, for he has had many different emotional reactions in his garden during all the years he has been there.

The unconscious association of new stimuli with emotional responses may greatly affect landscape preferences. These associations can interfere with innate landscape preferences. We may have an innate preference for landscapes with water, but somebody who once almost drowned might dislike landscapes with water even if he has forgotten his near-drowning.

Besides affecting the appraisal mechanism, individual factors also influence landscape experience by modifying and creating mental concepts. Mental concepts are conditions for having meaningful landscape experiences. Without mental concepts, incoming stimuli that result in sensations or projections from the subcortical emotional reaction regions to the cortex would not become organized. The subject would have a chaotic experience, one without perception and without feeling. Differences in activated mental concepts result in different experiential qualities, as the ambiguous figures (section 8.2) demonstrate. Incoming stimuli being constant, our experience changes as a result of the mental concepts employed for organizing stimuli.

Mental concepts are employed when we have an experience of a landscape. Existing neural connections become stronger and new neural connections are established as the neural circuits constituting mental concepts are activated. Thus, mental concepts change under the influence of the experience. A later experience will have a different quality as a consequence of the change under the influence of earlier experiences if the changed mental concepts are employed during that later landscape experience. During the course of life, subjects develop thousands and thousands of different mental concepts. In one experience many different mental concepts can play an inferential role.

Although it probably impossible to come up with an indisputable typology of mental concepts, some distinctions can be made. In the theory explained in this chapter, a distinction is made between perceptual, linguistic and emotion mental concepts. Perceptual mental concepts can be subdivided into concepts employed in organizing inputs from different senses (visual concepts, auditory concepts, etc.). Perceptual concepts may be placed in a spectrum from lower-order concepts that are employed in early stages of perceptual processing – such as visual concepts for forms or colours – and higher-order concepts that are employed in later stages of perceptual processing, such as visual concepts for trees or cars. Generally, lower-order concepts play a role in many different experiences, while higher-order concepts play a role in a fewer number of different experiences. Furthermore, we can distinguish between mental concepts for categories of objects or experiential states – such as concepts for trees or for sadness – and concepts for very specific objects or experiential states, such as a concept for a specific tree or for a specific feeling of sadness.

Mental concepts are related to each other, thus making up networks of mental concepts. The hippocampus plays a crucial role in establishing connections between different mental concepts, especially between mental concepts that are constituted by neural circuits in different brain regions (e.g. visual form concepts, visual colour concepts, higher-order visual concepts, emotion concepts and linguistic concepts are stored in distinct, specialized brain regions). If particular stimuli lead to the activation of neural circuits coding for a specific concept, all kind of other concepts related to this specific concept might get employed as well, resulting in the experiencing of all kinds of associations, memories and feelings. In each case, not all mental concepts get employed if a mental concept they are connected with is employed. Furthermore, only the mental concepts that are employed and are part of the dynamic core at a particular moment attribute to the conceptual content of an experience. Although within Mr Gardner's mind many mental concepts are related to his mental concept for his garden, not all of them are experi-

enced each time he sees his garden. His network of mental concepts for the allotment garden complex is his sense of place for the garden complex. Probably, perceiving his garden generally evokes particular mental concepts for time, space, his body, sociality, the bracketing or admission of particular fundamental doubts, and a particular intensity of attention. If so, the place evokes a particular counterstructure for Mr Gardner.

Although each of us has specialized mental concepts for categories of landscapes that may play a role in particular landscape experiences, the mental concepts employed in a particular experience of a particular place can principally be any concept in the mind of the subject. For example, very general mental concepts for colours are employed by Mr Gardner in any visual experience of his garden. Mental concepts that on first sight do not have anything to do with landscapes may still be employed in a landscape experience. For example, if Mr Gardner has often seen a specific bird sitting in a tree in his garden, his mental concept for the bird may be connected with his mental concept for the tree. Seeing the tree without the bird may still result in activation of his concept for the bird. Although the bird is not there, Mr Gardner has an experience of the bird, albeit not a perceptual one. The difference between actually seeing a bird and having an experience of the bird without actually seeing it lies in sensations. Experiencing the bird on the basis of seeing consists of sensational and conceptual content, while experiencing the bird without actually seeing it consists of conceptual content only.

The mental concepts that play a role in experiences of landscape are not necessarily formed and created under the influence of past experiences of landscapes. They may result from past experiences of other objects. For example, Mr Gardner's mental concept for blue may play a role in his experience of the pond of his neighbouring gardener, and he may have formed this mental concept as a baby, while looking at the blue wallpaper in his room. Mental concepts are employed not only in perceiving but also in imagining or dreaming, which also may result in the modulation of the concepts.

The total structure of mental concepts of each subject is definitely unique, because mental concepts are formed and modulated under the influence of past experiences, and each person has a different history of experiences. The mental concepts of subjects and the way they are created and modulated is therefore a source of variation in the way subjects experience a given landscape. Nevertheless, similarities across subjects can be found as well. Similarities in mental concepts can result from being exposed to similarities in stimuli that originate in matterscape: each of us has mental concepts for up and down, since across all variance in stimuli there is on many occasions systematic variance between up and down. Another

source of similarities in mental concepts across subjects is social influence on mental structures.

13.6 Social factors

The term social factors (or cultural factors) in landscape experience research designates the influence of social interaction or culture on the way people experience the landscape. The influence of social interaction – that is, any instance of communication in any kind of language between two or more people – is mediated by the same processes as explained in the previous section: sensation leads to neural activation in circuits that code for particular mental concepts, which, in turn, may result in the strengthening of pre-existing concepts, the modulation of mental concepts and their mutual connections, and the creation of new mental concepts, because neural activation alters the genetic expression of neurons in such a way that existing synaptic connections become stronger or new synaptic connections are built. Alteration of the mental concepts influences future landscape experiences, if the altered concepts play an inferential role in the processing of incoming stimuli from matterscapes. Many mental concepts of subjects are probably influenced to a great extent by communication.

Unlike personal factors, the modulation and the creation of mental concepts is triggered not by matterscape stimuli but by stimuli that originate in public expressions. Public expressions are behaviours and products from behaviours that contain expressions of experiences or thoughts in some kind of language (e.g. natural language, pictorial language or body language). Public expressions are instances of communication. A picture of the Grand Canyon, a TV documentary of a Mount Everest expedition, a book about gardening, an allotment garden shaped by its owner, a little chat with the neighbour about a beautiful tree – these are all examples of public expressions.

Public expressions are material objects and events. However, they are not 'ordinary' material objects and events: they are material objects and events that are to some extent expressions of experiences or thoughts. The properties of material objects and events belonging to the category public expressions are never fully shaped by the intentions of the creator. For example, the way Mr Gardner's garden looks is not a pure expression of the ideas of Mr Gardner but is also influenced by all kind of other processes, such as the growth of plants, the rhythm of the seasons, the money available to invest in the garden, etc. Even the expression of experiences

in natural language depends to some extent on the existence of words, the conventions that regulate ways of expressing things, etc.

What happens if a subject encounters public expressions? Imagine that one evening Mr Gardner takes a stroll through the allotment garden complex and passes the garden of a relatively new member of the garden union. The new owner does not maintain his garden perfectly well, as most garden owners of the older generation do, but lets the natural processes run more freely. As a result, the plants are not clipped but grow wildly, many weeds are not removed, the grass grows pretty high, and the shapes in the garden are a bit fuzzy. When Mr Gardner looks at this garden, stimuli affect his eyes that lead to sensations that subsequently get processed by employing many mental concepts, resulting in his perception of the garden. Mr Gardner experiences the forms, the plants, the grass, the way things grow, etc. Probably, but not necessarily, Mr Gardner experiences not only the garden and its properties but also a way of gardening. That is, he interprets the garden as reflecting the owner's thoughts, opinions and intentions that are related to gardening, all of which are experiential phenomena that exist within the owner's consciousness. The activation of his mental concepts involved in his perception of the garden in turn leads to the activation of his mental concepts of ideas about gardening. In semiotic terms, the perception of the garden is a sign for an idea about gardening for Mr Gardner. At that moment the garden is a public expression for him, a communication vehicle conveying thought from one mind to another. Mr Gardner experiences the garden as an expression of ideas and reconstructs some ideas on gardening of the owner.

Of course, a garden may be a very imprecise communication vehicle relative to natural language. Perhaps Mr Gardner reconstructs the owner as an eco-freak, based on his interpretation of the garden as being a public interpretation of the owner, while the owner in fact really likes to maintain his garden but has been in hospital for the last two months. Whether or not Mr Gardner's interpretation of the ideas of producer of the public interpretation matches the ideas of the producer, as soon as Mr Gardner experiences the garden as being a public interpretation, social influence just happens. Perhaps he develops new mental concepts that reflect eco-freak ways of gardening. Perhaps his mental concepts that contain his own ideas about gardening will be affected. Anyway, the mental concepts employed in his thinking about ways of gardening will at least slightly change, since activation leads to the alteration of mental concepts. How his mental concepts will change is pretty unpredictable in this case, but that they will change is a fact.

Natural language is for many purposes probably the most precise means of expressing the contents of consciousness. Moreover, many social influences result

from public expressions in natural language. Apart from that, humans have specialized brain regions for processing language. All this is reason enough to pay special attention to social influence that results from expressions in natural language.

Mr Gardner reads a book about plants. He is especially interested in a chapter on a plant that he finds beautiful and that grows in his garden. He reads a passage stating that this plant has been a symbol of a very famous royal family for ages. When he reads the passage, stimuli lead to sensations, which lead to initial visual processing in the cortex. The outcome of this processing is projected to Wernicke's area, which contains mental concepts for words, or linguistic mental concepts. If he did not read but rather heard the passage, the outcome of initial auditory processing was projected to Wernicke's area. If there were no further cortical processing, Mr Gardner would only recognize the words as being particular words but would not be able to grasp their meaning. The activation of the specific linguistic mental concepts subsequently leads to the activation of all or a part of his mental concepts for the specific plant that the word denotes. Once these mental concepts are activated and form part of the dynamic core that constitutes his experience, he understands the word. Thus, by reading the passage, the activation of mental concepts for the plant and for the royal family might result in the creation of connections between the two networks of mental concepts. Some of his mental concepts for the royal family might become a part of his network of mental concepts for the plant. In the terms employed by Eco (section 10.5), his cognitive type for the plant has changed. Next time he sees the plant, he may have an experience of which being a symbol of a famous royal family is an aspect. Thus, Mr Gardner's experience has changed as a result of reading the book.

Having explained the general social influences that may affect landscape experiences and that are mediated by the alteration of mental concepts, some fine-tuning of the results of social influences is needed. Not only perceptual concepts or mental concepts resembling knowledge might be affected by social influence, but so too might emotion concepts that are part of the network of concepts for an object. If Mr Gardner really likes this particular royal family, a positive emotion mental concept that is part of his cognitive type for the royal family might become part of his cognitive type for the plant. Encountering the plant might then result in the activation of this positive emotion concept and in a positive feeling being an aspect of his experience, and perhaps even result in positive emotional bodily reactions if the activation of this emotion concept leads to the projection of information to the subcortical regions that turn on these bodily responses.

Social influence may lead to a gradual adjustment of the networks of mental concepts (cognitive types) for particular phenomena for the members of a culture. It would be wrong to state, however, that social influences always and necessarily result in an adjustment of cognitive types, that is to commonalities in the networks of mental concepts of different individuals. First, no two individual subjects are exposed to exactly the same public expressions during their lives. Second, the way a given set of public expressions influences the mental concepts of a subject may differ from individual to individual: it depends on, for example, the mental structures the subject has already acquired. Social influences can also result in differences between subjects in the way a given matterscape is experienced.

Nevertheless, social influences lead to some commonalities in the networks of mental concepts of different subjects belonging to a particular culture. No matter how individuals differ in the network of mental concepts that make up their ideas of nature, and no matter how individuals differ in their past experiences of public expressions of nature, nobody's network of mental concepts that makes up his cognitive type of nature is such that a car belongs to the category of nature. That a car does not belong to nature is a commonality in the networks of the mental concepts for nature in Western culture. In other words, it is an aspect of the cultural core content of nature. While an enormous number of public expressions of nature are produced in Western societies, with an incredible variation in content, they share the fact that they expound on nature in such a way that a car does not belong to nature. Most public expressions state this implicitly rather than explicitly; it is inherent in many public expressions of nature. Public expressions may influence the mental structures of subjects experiencing them not only by stating things but also by not stating things.

The public expressions that some groups of people within a culture encounter may be systematically different from the public expressions that other groups encounter. There are systematic differences between the conversations of Mr Gardner with his fellow gardeners and the communication between ecologists, although both sets of public expressions contain a lot of thoughts about aspects of nature. The process of the gradual adjustment of the cognitive types of the gardeners and of the ecologists may thus result in different commonalities in their networks of mental concepts for nature. The term 'cultural modular content' designates these within-group commonalities that differ from commonalities within other groups. The images of nature are examples of different cultural modular contents for nature. It is not a wild guess to assume that an average ecologist has an image of nature that is close to the wild side of the spectrum of

images, while an average allotment gardener in Rotterdam has an image closer to the functional side.

In short, social influence on landscape experience is caused by experiencing public expressions. All the mental concepts employed while interpreting public expressions will be altered as a consequence of being activated. If any of these mental concepts plays a role in a future experience of matterscape, this experience is socially influenced, for the alteration of a mental concept results in different qualities of the experience.

13.7 Conclusion: the genesis of a mindscape

Mindscapes – or landscape experiences – are individual, subjective constructions, created upon matterscape stimuli, that are processed by the appraisal mechanism and mental concepts. All processes expounded upon in the preceding sections finally result in a mindscape that has particular qualities. These qualities depend on the qualities of those sensations and the qualities of those mental concepts that are engaged in the dynamic core, constituting consciousness, at a particular moment. The mental concepts organize the sensational input and the information projected from subcortical structures that are engaged in emotional bodily responses and mapping bodily states and processes.

The theory describes the processes that cause landscape experience and its qualities, and as such does not expound on the contents of particular landscape experiences. Key factors that influence the qualities of mindscapes are the properties of matterscape stimuli, the properties of the appraisal mechanism and the properties of mental concepts (perceptual, linguistic and emotion concepts). The properties of the appraisal mechanism are influenced by the genetic make-up and by past experiences of matterscape. The properties of mental concepts are influenced by past experiences of matterscape and public expressions.

The three basic factors that influence landscape experience, as formulated by Bourassa, can be reinterpreted in these terms. The biological factors in landscape experience research are the genetically determined properties of the appraisal mechanism. The cultural factors are the influences of past experiences of public expressions on the properties of mental concepts. The individual factors are the influences of past experiences of matterscapes on the properties of the appraisal mechanism and the properties of mental concepts. These factors exercise influence on landscape experience by leaving traces in the brain, thus affecting neural processes that in the end result in experiences.

Of course, the theory described in this chapter includes more factors that influence a particular landscape experience than just the key factors (i.e. matterscape stimuli, appraisal mechanism, mental concepts). Landscape experience, for example, is also influenced by the properties of the senses that convert the physical energy of the incoming stimuli into electrochemical energy that enters the brain, and by the way bodily states and processes are affected by emotional responses to stimuli. But these factors are to a great extent constant across subjects and during the course of life. These factors are therefore less interesting to study than the key factors, because the key factors provide the biggest sources of variance in landscapes experiences. In addition, the key factors cover the different approaches in landscape experience research. That is, the phenomena under study within these approaches influence landscape experience because they affect the states of the appraisal mechanism and the mental concepts.

Chapter 14 Conclusions and discussion

14.1 The production of mindscapes

Mindscapes are produced by subjects. A mindscape – an experience of landscape – is not a passive encountering of a given world, but an active construction created by the complex neural processing of matterscape stimuli that results in an experience that supervenes on a dynamic core of cortical neural activity. The qualities of mindscapes, higher-order products of active brains, depend greatly (but not exclusively) on the properties of the incoming matterscape stimuli, the properties of the appraisal mechanism and the properties of the mental concepts employed. Moreover, mindscapes are symbolic constructions, since the sensations resulting from incoming matterscape stimuli are purely symbolic with respect to the properties of matterscape.

The idea that mindscapes are precise images of matterscape, or possibly precise perceptual images of matterscape with some valuations and feelings added, is completely false. Even the idea that landscape experiences are representations of matterscapes that have qualities corresponding with matterscape properties is not justified. Landscape experiences are subjective presentations that are created out of stimuli that affect our senses, being natural signs of matterscapes and taken automatically for granted as natural signs by the interpreting subject. On most occasions we use those presentations as representations. This behavioural inclination does not, however, turn the presentations into representations. It is just our predisposition to employ presentations this way simply because it is the only choice we have in order to cope with the world (and this is metaphorically speaking, because it is not really a choice but an inclination). And on many occasions it works well enough to cope with the world. This may seem to be miraculous, but it is less of a miracle than the miracle of us being alive: if the brains of our ancestors had in the course of evolution developed in such a way that their presentations were not good enough to cope to a certain extent with the world, our ancestors would have become extinct and we would not exist.

Mindscapes are not social constructions. Social phenomena do not experience; only individual subjects do. Mindscapes may be greatly affected by social influences that are constituted by fluxes of creating and interpreting public expressions. These processes result in alterations of mental concepts. The fact that mindscapes are socially influenced does not make them social constructions.

We cannot conclude from the fact that mindscapes are subjective and symbolic constructions that these constructions are fully contingent. Of course, in the end one might argue that everything is contingent. It is at least conceivable that the big bang could have been different and that the universe resulting from it could have had different qualities. It is conceivable that biological evolution could have resulted in humans having senses with properties other than our senses. But since we know that our senses are the way they are, there is no more contingency in the way our senses convert stimuli into sensations. And given that the external world has particular properties, there is no or hardly any contingency in human subjects creating particular mental concepts, such as mental concepts that discriminate between up and down or mental concepts that discriminate between water and non-water. Given that within contemporary Western culture nature is often promoted as beautiful and valuable, there is not much contingency in an average subject having preferences for natural landscapes, as opposed to a subject who grew up in a medieval European society.

On the other hand, some aspects of mindscapes are contingent in the sense that these aspects are not predictable for us. Whether a particular subject likes landscapes with water or not is contingent for us, since we do not know the past experiences of matterscape and public expressions of this subject and the way these experiences have affected his networks of mental concepts and his emotional appraisal mechanism. Perhaps at a very young age the subject experienced the trauma of almost drowning in a lake and has now forgotten the event, while an association between water and fear has been established in his appraisal mechanism and evokes a fear response to landscapes with water. Our capacities to predict the qualities of somebody's mindscape are seriously limited because we cannot observe somebody's past experiences of matterscapes and public expressions.

Moreover, we cannot conclude from the fact that mindscapes are subjective and symbolic constructions that these constructions are fully under voluntary control. We cannot deliberately control the subcortical neural processes that initiate emotional responses. We cannot choose to construct an experience of a lake out of matterscape stimuli coming from a tree. We cannot prevent ourselves from discriminating between trees and houses. On the other hand, some aspects of mindscape can be affected by voluntary action. For example, we can choose to pay attention to a part of a stimulus field.

In section 2.7 the question was raised whether matterscape, powerscape and mindscape belong to different ontological categories. The arguments made at various places in this dissertation provide an answer. Matterscape – the landscape

as it exists in physical reality – and mindscape – the landscape as it is experienced – belong to different ontological categories. As argued in section 8.8, experience is a higher-order property of a particular type of neural process, one that involves new ontological qualities such as subjectivity. Experience is constituted by material processes, but is a supervening phenomenon that exists on a new ontological level. Hence, matterscape and mindscape belong to different ontological categories. Does powerscape – the landscape as it exists in social reality and that consists of implicit and explicit rules that regulate the behaviour of people, – belong to another distinctive ontological category? The arguments made in section 10.6 suggest that this is indeed the case. Powerscape is not reducible to the rules that are inherent in series of public expressions and in the minds of people belonging to a society. Powerscape is a higher-order property that supervenes on those rules. Thus, powerscape (a cultural phenomenon) belongs to an ontological category distinctive from the ontological categories to which matterscape and mindscape belong.

14.2 Limits and benefits of the comprehensive theory of landscape experience

The theory of landscape experience constructed in this book is not comprehensive in the sense that it embraces all the phenomena that exercise influence on landscape experience. Scientific concepts such as motivation, will and imagination that denote phenomena that might affect mindscapes are not stressed. However, the theory is comprehensive relative to the theories of landscape experience as developed within the different approaches, since it covers the factors and explanations employed within the theories reviewed. The theory can probably be expanded in order to cover more scientific concepts denoting real phenomena that influence mindscapes.

The major contribution of the comprehensive theory of landscape experience to the understanding and study of landscape experience lies in the fact that it provides an account of the processes that underlie experience and influences on experiences. By focusing on the 'how' question, the theory fills in some gaps in the explanations offered by the different disciplinary contributions. For example, the theory explains how somebody might develop a sense of place in the course of his life, how culture might affect experience and how innate predispositions might affect landscape preferences.

Bourassa's tripartition into biological, individual and cultural factors that influence landscape experience does not break down the disciplinary borders; on the contrary, it points to these borders. The comprehensive theory of landscape experi-

ence integrates these factors into one theory by giving an account of the processes that underlie these factors. Thus, the theory offers a framework for relating the contributions of different disciplines. Moreover, the theory reveals that the factors that are stressed within different contributions interact in many ways before experiences come into being. The theory can be used as a framework for interpreting the results of empirical studies and as a framework to set up empirical studies. However, the theory does not predict anything about the contents of mindscapes. It describes processes and as such offers a template to be filled in with the results of empirical data concerning the contents of mindscapes.

Some suggestions for landscape experience research can be derived from the theory and from the contents of this book. First, landscape experience research would benefit greatly by taking into account knowledge obtained by more fundamental sciences. Especially in the neurosciences and psychology many empirical studies and theories shed light on processes that underlie the construction of landscape experiences. Being poorly theoretically informed might have a negative impact on setting up empirical studies and interpreting results in a good way. Often, in landscape experience research, too much emphasis is laid on the production of empirical results at the cost of investing time in creating a good theoretical framework to guide research and interpretation.

Second, the study of innate predispositions that affect landscape preferences could be revived. These innate predispositions are not much studied these days, probably because it seems to be established knowledge which innate predispositions for landscape preferences we have. However, the existing empirical studies are not conclusive on this point, although they do provide welcome hypotheses. The research strategy described in section 12.3 could be employed to enhance insights into these innate predispositions.

Third, cross-cultural research – which is seldom conducted by landscape experience researchers – could add important new insights. Both similarities across cultures that indicate universal human commonalities in landscape experience and differences between cultures that indicate cultural influences are interesting. Ekman's cross-cultural research projects on emotions (see Chapter 11) are good examples. His studies have revealed human universals in the form of a limited set of basic emotions as well as cultural differences in the form of the way emotions are expressed in social contexts.

Fourth, the problem of social influences on landscape experience deserves attention. Empirical studies that stress these influences generally either expound on social processes and structures and assume experiences to be influenced in a particular way by these processes and structures, or expound on experiences and

assume these experiences to be consequences of social structures and processes (the study on images of water, described in Chapter 6, is an example). Studying both social structures and processes, and experiences, in order to identify relations based on empirical data, instead of being based on assumptions, would probably enhance our understanding of social influence on experience. A fifth suggestion for landscape experience research will be stressed in the following section.

14.3 Oppositions, paradigms and interdisciplinarity

Cross-disciplinary debates amongst those who are studying landscape experience, in so far as such debates exist, are not very fruitful or vivid. Scientists who adopt a particular approach do not neglect contributions to the understanding of landscape from other approaches. However, if studies from other approaches are mentioned, these studies are commented upon in a way that seems to be motivated more by affirmation of one's own approach and consolidation of one's own position than by taking other approaches seriously as valuable inputs for cross-disciplinary debates.

In these debates, some persistent oppositions recur. For example, nature versus nurture, innate versus learned, experiential commonalities versus differences, generic knowledge versus contextual knowledge, quantitative versus qualitative studies, and explanatory versus descriptive studies. From a scientific point of view it is not a problem to be selective. It is for example perfectly justifiable to focus on innate predispositions that play an inferential role in landscape preferences.

However, it is very problematic if this choice is subsequently presented in debates in terms of oppositions – in terms of 'either/or' thinking. Landscape experiences result from both nature and nurture; both innate and learned predispositions contribute to landscape experiences; there are both commonalities and differences across cultures and individuals to be found; both generic and contextual knowledge contributes to our understanding of landscape experience; some aspects of landscape are better studied by a quantitative approach, while other aspects are better studied by a qualitative approach; and both explanatory and descriptive studies may obtain valuable insights.

Oppositions often get coupled together in scientific debates on landscape experience. Of course, in scientific practices some of these oppositions often covary. For example, studying innate predispositions often goes with adopting a quantitative approach. But these oppositions are not coupled by necessity. Cultural and individual differences can be studied by a quantitative approach as well. And on

the theoretical level, it is arguable that our greatest evolutionary benefit is our innate capacity to learn.

I do not think that scholars who study landscape experience explicitly believe in these oppositions and bonds between these oppositions by necessity (e.g. that landscape experience is an expression of either innate or learned predispositions). But this kind of oppositional thinking lurks implicitly in the background of cross-disciplinary debates, thus frustrating fruitful cross-disciplinary exchange of knowledge. Breaking down these barriers would greatly advance the scientific study of landscape experience. I hope this dissertation contributes to that, both as a source of inspiration and as a substantial theory that demonstrates inferences between the different phenomena that are studied within the different approaches. For example, I argued that some predispositions to react emotionally to particular categories of matterscape stimuli are probably universal, but that the way these innate predispositions are expressed in landscape preferences may vary across cultures and across individuals. Sticking to the kind of oppositional thinking mentioned above frustrates the insights into the processes that constitute landscape experiences and thus needlessly limits scientific understanding.

Perhaps oppositional thinking is an expression of a basic paradigmatic divide that exists everywhere in the social sciences, namely the divide between positivist and constructivist paradigms. A paradigm is to be understood here as a related set of ontological and epistemological assumptions and basic theoretical foundations that underlie scientific practices. I will not expound at length on these paradigms, but simply state some core assumptions. Generally, within positivist paradigms it is held that there is a world out there, that we can observe facts about real phenomena in this world, and that we can obtain generic knowledge about causal relations between real phenomena. Applied to the social sciences, positivists think it is possible to obtain generic knowledge of the causes of human behaviours and experiences. Within constructivist paradigms it is assumed that the way people experience the world is highly influenced if not determined by categories that depend on culture, and that generic knowledge about a reality out there, including causal relationships, is impossible.

I think that nothing is gained by thinking in terms of this divide. Employing this divide in the judgement of the plausibility of knowledge obtained in scientific studies too easily results in not taking seriously those studies conducted within the other paradigmatic tradition. Even hardcore constructivists who explicitly state that reality is a social construction as an assumption underlying their empirical studies, write down observations that make sense only if it is assumed that they

are about real phenomena out there. Even hardcore positivists cannot seriously deny that there is cultural influence on human behaviour and experience.

Whether one labels oneself as constructivist or positivist, some assumptions are necessary to conduct good social scientific (including psychological) empirical studies, whether explicitly embraced or not. First, there is a world out there with real phenomena including people and their behaviours and experiences. Second, we can obtain factual knowledge about at least some of these real phenomena. Third, it is a matter of fact (we can observe it) that human behaviour and experience can be highly influenced by culture. Fourth, whether observed facts are generic facts in the sense of pointing to universals in human behaviour and experience, or contextual facts pointing to cultural backgrounds of human behaviour and experience, remains to be seen: further empirical studies, and not assumptions, must be employed to find out. Fifth, every scientific practice is highly selective by necessity. Sixth, being aware of the selections made is very important when it comes to the interpretation of empirical results.

Of course the paradigmatic divide often goes with other divides: scholars who label themselves as positivists are generally keen on finding generic facts, while scholars who adopt a constructivist approach are generally keen on stressing contextual influences. However, this is primarily a matter of selection of the object of study, a selection that is not necessarily dictated by the paradigm. Interdisciplinary thinking in science can greatly benefit from simply neglecting paradigmatic oppositions, especially those that are employed in rhetoric rather than in practice. Instead, let the object of research, assumptions about the world that are necessary for social scientific studies, and the empirical results of well-conducted research be the guides of interdisciplinary projects.

14.4 Spatial policy and planning, and landscape experience research

Spatial policy and planning problems that are related to the way people experience the landscape remained outside the core focus in this dissertation. There was no systematic analysis of these kinds of problems. In addition, the theory of landscape experience constructed in this book does not expound on how particular matterscapes are perceived and valuated: the theory describes the processes that bring about landscape experiences. Nevertheless, some indications for landscape policy and planning can be discussed, on the basis of the theory and the empirical studies.

Landscape policy and planning consists of many different practices in different contexts, varying for example from setting up a national spatial nature policy plan

to studying the possibilities for building new houses in Rotterdam on the site of an allotment complex. As a consequence, one overall framework that states how scientific studies on landscape experience may contribute to policy and planning cannot be given. Instead, taking the specific context into account enhances the formulation of scientific studies that provide insights that are welcomed by policy makers and planners. For example, if the aim is to monitor changes in landscape preferences as a result of changes in matterscapes over time, BelevingsGIS (Chapter 5) may be a helpful research instrument. If the aim is to enhance communication about nature policy with stakeholders, the images of nature approach (applied in Chapter 6 to images of aquatic nature) may provide valuable insights. If the aim is to establish the impact of a particular plan on a particular group of stakeholders, an anthropological study (see Chapter 7 for an example) may greatly contribute to spatial policy-making and planning. As demonstrated throughout this dissertation, there are many different ways of conducting landscape experience research that stress different aspects of landscape experience and expound on different influences on experiences. In other words, different modes of research are available for different policy and planning practices.

In the Netherlands, most applied landscape experience research that is motivated by spatial policy and planning practices is financed by national governmental bodies, such as the Ministry of Agriculture, Nature and Fisheries. Most money is invested in landscape experience studies on a national scale, such as BelevingsGIS, which predicts the average landscape preferences as a response to properties of matterscape. This may seem very logical, but there is a scale problem: nobody experiences the Dutch landscape on a national scale. Instead, particular people experience particular places. For example, in the Rotterdam allotment garden case-study, it was demonstrated that the allotment gardens have very distinctive experiential qualities for the gardeners and that these qualities depend on the social practices and the personal histories of these gardeners. For landscape experience studies on a national scale, selections and aggregations must be made that often, and perhaps necessarily, disregard those peculiarities. Suggestions for the improvement of the average experiential qualities of the Dutch landscape for the average Dutch citizen can therefore not replace suggestions for improvement of the experiential qualities of particular places for those people who frequently encounter these places. As a consequence it would be wise for national governmental bodies that are interested in the way people experience the landscape not to invest in national scale studies only, but to invest also in studies that are devoted to the scale on which landscapes are actually experienced, for it is on this scale that problems related to landscape experience arise.

Related to the scale issue, there is a tendency amongst policy makers to invest especially in studies that promise generic knowledge. This may be a problem because on many occasions those experiential aspects that are causes of political conflict may be aspects that are not covered by generic knowledge, as was the case in the Rotterdam allotment garden case-study. This study may be merely descriptive and therefore (according to some views on the aims of science) be less interesting than studies that expound on generic aspects of landscape experience from a scientific point of view. From a political point of view, however, the study provides a good picture of the background of the problems the gardeners have with the plans of the city government. Moreover, from this study generic hypotheses can be derived; for example, the more social practices and individual histories are related to places, the greater the resistance to spatial plans that propose drastic changes to these places.

In addition, some Dutch policy makers who invest in landscape experience research and want generic knowledge of landscape experience tend to ask for a special kind of generic knowledge, that is, generic knowledge of universal and fixed relations between matterscape properties and qualities of mindscapes. However, this is just a subset of generic knowledge of landscape experience. Generic knowledge can in principle be obtained within any of the approaches to landscape experience described in this dissertation. For example, from the images of nature approach, one can derive the generic and testable hypothesis that people who hold a wild image of nature tend to support more than average nature policy that is directed at the creation of big and self-regulating natural sites.

In this respect, the comprehensive theory of landscape experience constructed in this dissertation consists of generic knowledge only. The processes that explain how landscape experiences come into being are processes that take place in the same way in every neurologically normal human subject. The theory explains both how experiential commonalities and how experiential differences can occur. Of course, a more detailed account of the underlying processes is possible. For example, many more details about visual processing are known than are described in this theory. The level of detail chosen has much to do with the task to give an account of the different theories of landscape experience. For this task a more detailed level of explaining visual processing is not necessary. On some points a more detailed explanation is not possible simply because some questions cannot be answered yet. For example, there is no conclusive evidence of the way in which consciousness and the brain are related. At some point or another, explanation comes to an end.

References

Achterberg, W. (1994). *Samenleving, natuur en duurzaamheid: een inleiding in de milieufilosofie*. Assen: Van Gorcum.

Agnew, J. (2001). The new global economy: time-space compression, geopolitics, and global uneven development. *Lecture presented at the Center for Globalization and Policy Research, UCLA*.

Alexander, S. (1920). *Space, time and deity: the Gifford lectures at Glasgow 1916-1918 Volume I*. London: Macmillan.

Alter, T. (2002). Qualia. In L. Nadel (Ed.), *Encyclopedia of cognitive science* (article 204). London: Macmillan Publishers.

Alterra. (2000). Kubieke landschappen kennen geen grenzen. In *Jaarboek*. Wageningen: Alterra.

Antony, M. V. (1999). Outline of a general methodology for consciousness research. *Anthropology and Philosophy, 3*(1), 43-56.

Appleton, J. (1975). *The experience of landscape*. London: Wiley.

Appleton, J. (1984). Prospects and refuges revisited. *Landscape Journal, 8*, 91-103.

Appleton, J. (1996). *The experience of landscape*. Chichester etc.: Wiley.

Arler, F. (2000). Aspects of landscape or nature quality. *Landscape Ecology, 15*, 291-302.

Arnold, M. (1960). *Emotion and personality*. New York: Columbia University Press.

Assche, K. van. (2000). *Ruimtelijke identiteit en de nieuwe stad*. Wageningen: Wageningen Universiteit.

Assche, K. van. (2004). *Signs in time*. Wageningen: Wageningen Universiteit.

Assche, K. van, & Jacobs, M. H. (2003). Kwaliteit als crisisproduct. *Rooilijn, 5*, 254-258.

Baars, B. J. (1988). *A cognitive theory of consciousness*. Cambridge: Cambridge University Press.

Baars, B. J. (1996). Understanding subjectivity: global workspace theory and the resurrection of the observing self. *Journal of Consciousness Studies, 3*(3), 211-216.

Baars, B. J. (1997). In the theatre of consciousness. *Journal of Consciousness Studies, 4*(4), 292-309.

Balling, J. D., & Falk, J. H. (1982). Development of visual preference for natural environments. *Environment and Behavior, 14*, 5-28.

Berkeley, G. (1983/1713). *Treatise concerning the principles of human knowledge*. Indianapolis: Hackett Publishing Co.

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

Berlyne, D. E. (1973). The vicissitudes of aplopathematic and thelematoscopic pneumatology (or the hydrography of hedonism). In D. E. Berlyne & K. B. Madsen (Eds.), *Pleasure, reward, preference: their nature, determinants, and role in behavior* (pp. 1-33). New York, London: Academic Press.

Berlyne, D. E. (1974). New environmental aesthetics. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: steps toward an objective psychology of aesthetic appreciation* (pp. 1-25). New York etc.: John Wiley & Sons.

Block, N. (1991). Evidence against epiphenomenalism. *Behavioral and Brain Sciences, 14*, 670-672.

Block, N. (1993). Review of Dennett: consciousness explained. *Journal of Philosophy, 4*, 181-193.

Block, N. (1994). Consciousness. In Guttenplan (Ed.), *A companion to philosophy of mind* (pp. 210-219). Oxford: Blackwell.

Block, N. (1995a). How many concepts of consciousness? *Behavioral and Brain Sciences, 18*, 227-247.

Block, N. (1995b). On a confusion about a function of consciousness. *Behavioral and Brain Sciences, 18*(2), 227-247.

Bloom, P. (2004). Children think before they speak. *Nature, 430*, 410-411.

Bonnes, M., & Secchiaroli, G. (1995). *Environmental psychology: a psycho-social introduction*. London, Thousand Oaks, New Delhi: Sage Publications.

Boorstin, D. J. (1963). *The image, or, what happened to the American dream*. Harmondsworth: Penguin books.

Born, R. J. G. van den., Lenders, R. H. J., Groot, W. T. de, & Huijsman, E. (2001). The new biophilia: an exploration of visions of nature in western countries. *Environmental Conservation, 28*(1), 65-75.

Bourassa, S. C. (1990). A paradigm for landscape aesthetics. *Environment and Behavior, 22*(6), 787-812.

Bourassa, S. C. (1991). *The aesthetics of landscape*. London, New York: Belhaven Press.

Brinda, D. (1970). Emotion and behaviour theory: Current research in historical perspective. In P. Black (Ed.), *Physiological correlates of emotion* (pp. 3-20). New York, London: Academic Press.

Britten, K., Shadlen, M., Newsome, W., & Movshon, A. (1992). The analysis of visual motion: a comparison of neuronal and psychophysical performance. *Journal of Neuroscience, 12*, 4745-4765.

Broad, C. D. (1925). *Mind and its place in nature*. London: Routledge.

Bruner, J. (1990). *Acts of meaning*. Cambridge, London: Harvard University Press.

Buijs, A. E. (2000). Natuurbeelden van de Nederlandse bevolking. *Landschap, 17*(2), 97-112.

Buijs, A. E., Jacobs, M. H., Verweij, P., & Vries, S. de. (1999). *Graadmeters beleving: theoretische uitwerking en validatie van het begrip 'afwisseling'*. Wageningen: Staring Centrum.

Buijs, A. E., & Kralingen, R. B. A. S. (2003). *Het meten van beleving: inventarisatie van bestaande indicatoren en meetmethoden*. Wageningen: Alterra.

Buijs, A. E., & Filius, P. (1998). *Natuurbeelden in de praktijk: de invloed van natuurbeelden en natuurvisies op gedrag en mening over het beleid.* Wageningen: IBN/Staring Centrum.

Buijs, A. E., & Volker, C. M. (1997). *Publiek draagvlak voor natuur en natuurbeleid*. Wageningen: Staring Centrum.

Burmil, S., Daniel, T. C., & Hetherington, J. D. (1999). Human values and perceptions of water in arid landscapes. *Landscape and Urban Planning, 44*, 2-3.

Campbell. L. (1997). The Sapir-Whorf hypothesis. Retrieved 10-6, 2004, from http://venus.va.com.au/suggestion/frames.html

Casey, S. (1997). *The fate of place: a philosophical history*. Berkeley, Los Angeles, London: University of California Press.

Castells, M. (2000a). *The rise of the network society (Volume I). The information age: economy, society and culture.* Oxford: Blackwell Publishers.

Castells, M. (2000b). *The power of identity (Volume II). The information age: economy, society and culture.* Oxford, Malden: Blackwell Publishers.

Chalmers, D. J. (1995a). Facing up to the problem of consciousness. *Journal of Consciousness Studies, 2*(3), 200-219.

Chalmers, D. J. (1995b). The puzzle of conscious experience. *Scientific American, 273*(6), 80-86.

Chalmers, D. J. (1997). Moving forward on the problem of consciousness. *Journal of Consciousness Studies, 4*(1), 3-46.

Chalmers, D. J. (1998). On the search for the neural correlates of consciousness. In S. R. Hameroff, A. W. Kaszniak & A. C. Scott, *Towards a science of consciousness II: the second Tucson discussions and debates (complex adaptive systems)* (pp. 219-230). Cambridge: MIT Press.

Chalmers, D. J. (2003). Consciousness and its place in nature. In S. Stich & F. Warfield (Eds.), *Blackwell guide to the philosophy of mind* (pp. 102-142). Malden, etc.: Blackwell.

Chandler, D. (1995). *The act of writing*. Aberystwyth: University of Wales.

Churchland, P. S. (1986). *Neurophilosophy: toward a unified science of the mind - brain*. Cambridge: MIT.

Clamp, P., & Powell, M. (1982). Prospect-refuge theory under test. *Landscape Research, 7*, 7-8.

Coates, P. (2004). William Sellars, perceptual consciousness and theories of attention. *Essays-in-Philosophy, 5*(1). Retrieved 14-1, 2005, from www.humboldt.edu/~essays/coates.html

Coeterier, J. F. (1987). *De waarneming en waardering van landschappen.* Wageningen: Landbouwuniversiteit.

Coeterier, J. F., Haar, M. A. van der, & Langezaal-Van Swaay, A. M. (1986). *De beleving van water in de Krimpenerwaard*. Utrecht: Studiecommissie Waterbeheer Natuur, Bos en Landschap.

Cohen, E. (1979). A phenomenology of tourist experiences. *Journal of the British Sociological Association, 13*, 179-201.

Conrad, P. (1999). *De metamorfose van de wereld*. Amsterdam: Anthos.

Corbin, A. (1989). *Het verlangen naar de kust*. Nijmegen: Sun.

Crick, F., & Koch, C. (1990). Towards a neurobiological theory of consciousness. *Seminars in the Neurosciences, 2*, 263-275.

Crick, F., & Koch, C. (1998). Consciousness and neuroscience. *Cerebral Cortex, 8*, 97-107.

Critchley, H., Mathias, C. J. & Dolan, R. J. (2001). Neuroanatomical basis for first and second-order representations of bodily states. *Nature Neuroscience, 4*, 207-212.

Critchley, H., Mathias, C. J. & Dolan, R. J.. (2002). Fear conditioning in humans: the influence of awareness and autonomic arousal on functional neuroanatomy. *Neuron, 33*, 653-663.

Crompton, J. L. (1979). Motivations for pleasure vacation. *Annals of Tourism Research, 4*, 184-194.

Damasio, A. R. (2001). *Ik voel dus ik ben*. Amsterdam: Wereldbibliotheek.

Damasio, A. R., Damasio, H., & Hoesen, G. H. van. (1982). Prosopagnosia: anatomic basis and behavioral mechanisms. *Neurology, 32*, 331-341.

Daniel, T. C. (2001). Whither scenic beauty? Visual landscape quality assessment in the 21st century. *Landscape and Urban Planning, 54*(1-4), 267-281.

Darwin, C. (1965/1872). *The expression of emotions in man and animals*. Chicago: Chicago University Press.

Dearden, P. (1987). Consensus and a theoretical framework for landscape evaluation. *Journal of Environmental Management, 34*, 267-278.

Debener, S., Herrmann, C., Kranczioch, C., Gembris, D., & Engel, A. K. (2003). Top-down attentional processing enhances auditory evoked gamma band activity. *Neuroreport, 14*(5), 683-686.

Dennett, D. (1988). Quining qualia. In A. Marcel & E. Bisiach (Eds.), *Consciousness in modern science* (pp. 42-77). Oxford: Oxford University Press.

Dietvorst, A. G. J. (2001). *Het toeristische landschap tussen illusie en werkelijkheid*. Wageningen: Wageningen Universiteit.

Dooremalen, H. (2003). *Evolution's shorthand: a presentational theory of the phenomenal mind.* Nijmegen: Katholieke Universiteit Nijmegen.

Eccles, J. (1986). Do mental events cause neural events analogously to the probability fields of quantum mechanics? *Proceedings of the Royal Society London, B227*, 411-438.

Eco, U. (1997). *Kant en het vogelbekdier*. Amsterdam: Bert Bakker.

Edelman, G. M. (1993). *Klare lucht, louter vuur: over de stoffelijke oorsprong van denken en bewustzijn.* Amsterdam: Bert Bakker.

Edelman, G. M. & Tononi, G. (2000). A universe of consciousness: how matter becomes imagination. New York: Basic books.

Edwards, B. (1998). Charting the discourse of community action: perspectives from practice in rural Wales. *Journal of Rural Studies, 14*(1), 63-77.

Ekman, P. (1977). Biological and cultural contributions to body and facial movement in the expression of emotions. In J. Blacking (Ed.), *Anthropology of the body* (pp. 34-84). London: Academic Press.

Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion, 6*, 169-200.

Ekman, P. (1993). Facial expression and emotion. *American Psychologist, 48*(4), 384-392.

Ekman, P. (1999a). Basic emotions. In T. Dalgleish & M. Power (Eds.), *Handbook of cognition and emotion* (pp. 45-60). Sussex: John Wiley & Sons.

Ekman, P. (1999b). Facial expressions. In T. Dalgleish & M. Powell (Eds.), *Handbook of cognition and emotion* (pp. 301-320). Sussex: John Wiley & Sons.

Ekman, P., & Friesen, W. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology, 17*(124-129).

Elands, B., & Lengkeek, J. (2000). *Typical tourists: research into the theoretical and methodological foundations of a typology of tourism and recreation experiences*. Wageningen: Wageningen University.

Elbersen, B. (2001). *Nature on the doorstep: the relationship between protected natural areas and residential activity in the European countryside.* Utrecht: University Utrecht.

Engel, A. K., Fries, P., & Singer, W. (2001). Dynamic predictions: oscillations and synchrony in top-down processing. *Nature Reviews Neuroscience, 2*, 704-716.

Farah, M. (1994). Visual perception and visual awareness after brain damage: a tutorial overview. In C. Umilta & M. Moscovitch (Eds.), *Consciousness and unconscious processing: attention and performance 15* (pp. 37-76). Cambridge: MIT Press.

Faye, J. (2002). Copenhagen interpretation of quantum mechanics. *The Stanford Encyclopedia of Philosophy.* Retrieved 25-8, 2003, from plato.stanford.edu /entries/qm-copenhagen

Fest, J. (1988). *Tegenlicht. Een Italiaanse reis*. Amsterdam: Arbeiderspers.

Flanagan, O. J. (1991). *The science of the mind*. Cambridge, London: the MIT Press.

Flyvberg, B. (2000). *Ideal theory, real rationality: Habermas versus Foucault and Nietsche.* Paper presented at the political studies association UK 50th annual conference, 10-13 April, London.

Fodor, J. A. (1976). *The language of thought*. New York: Crowell.

Foucault, M. (1971). *De orde van het spreken*. Meppel, Amsterdam: Boom.

Foucault, M. (1972). *The archeology of knowledge*. London: Tavistock.

Foucault, M. (1998). The ethic of care for the self as a practice of freedom. In J. Bernauer & D. Rasmussen (Eds.), *The final Foucault* (pp. 1-20). Cambridge: MIT Press.

Fries, P., Reynolds, J., Rorie, A., & Desimore, R. (2001). Modulation of oscillatory neuronal synchronization by selective visual attention. *Science, 291*, 1560-1563.

Fries, P., Roelfsema, P. R., Engel, A. K., Konig, P., & Singer, W. (1997). Synchronization of oscillatory responses in visual cortex correlates with perception in interocular rivalry. *PNAS, 94*(23), 12699-12704.

Geertz, C. (1973). *The interpretation of cultures*. New York: Basic Books.

Gendlin, E. T. (1962). *Experiencing and the creation of meaning: a philosophical and psychological approach to the subjective*. New York: The Free Press of Glencoe.

Giddens, A. (1991). *Modernity and self-identity: self and society in the late modern age.* Cambridge: Polity Press.

Gieryn, T. F. (2000). A space for place in sociology. *Annual Review of Sociology, 26*, 463-496.

Gifford, R. (1987). *Environmental psychology: principles and practices*. Newton: Allyn and Bacon.

Giorgis, S. (1995). *Rural landscapes in Europe: principles for creation and management*. Strasbourg: Council of Europe.

Glynn, I. (2001). An intriguing door. *Nature, 683*.

Graaff, R. de, Reinhard, S., & Vreke, J. (2002). *Belevingsgraadmeters*. Den Haag: Landbouw Economisch Instituut.

Gray, C., & Singer, W. (1989). Stimulus-specific neuronal oscillation in orientation columns of cat visual cortex. *PNAS, 94*, 12699-12704.

Greenfield, S. (1995). *Journey to the centers of the mind*. New York: WH Freeman.

Greenfield, S. (2000). *The private life of brain: emotions, consciousness, and the secret of the self*. London: Wiley.

Gregory, R. (1998). Brainy mind. *British Medical Journal, 317*, 1693-1695.

Griffiths, P. E. (1999). Thinking about consciousness. *Nature, 397*, 117-118.

Grill-Spector, K., & Malach, R. (2004). The human visual cortex. *Annual Review of Neuroscience, 27*, 649-677.

Groot, W. T. de. (1999). *Van vriend naar vijand naar verslagene en verder*. Nijmegen: Nijmegen University Press.

Groot, W. T. de, & Born, R. J. G. van den. (2003). Visions of nature and landscape type preferences: an exploration in the Netherlands. *Landscape and Urban Planning, 63*, 127-138.

Gunn, C. (1988). *Vacationscape: designing tourist places*. New York: Van Nostrand Reinhold.

Habermas, J. (1984). *The theory of communicative action I: reason and the rationalization of society.* London: Heinemann.

Habermas, J. (1993). *Justification and application*. Cambridge: MIT Press.

Habiforum. (2004). Homepage. Retrieved 14-1, 2004, from www.habiforum.nl

Habiforum, & RMNO. (2000). *Nova Cura: over meervoudig ruimtegebruik*. Utrecht: Lemma.

Hammersly, M. (1997). On the foundations of critical discourse theory. *Language and Communication, 17*(3), 237-248.

Hammitt, W. E., Patterson, M. E., & Noe, F. P. (1994). Identifying and predicting visual preference of southern Appalachian forest recreation vistas. *Landscape and Urban Planning, 29*, 2-3.

Hardcastle, V. G. (1996). *Locating consciousness*. Philadelphia: John Benjamins.

Hartmann, N. (1940). *Der Aufbau der realen Welt: Grundriss der allgemeinen Kategorienlehre.* Berlin: Walter De Gruyter.

Hartmann, N. (1952). *New ways of ontology*. Westport, Connecticut: Greenwood Press.

Harvey, D. (1989). *The condition of postmodernity: an inquiry into the origins of cultural change*. Oxford: Blackwell.

Hauser, M., Chomsky, N., & Fitch, W. (2002). The faculty of language: what is it, who has it, and how did it evolve? *Science, 298*, 1569-1579.

Heil, J. (1998). *Philosophy of mind, a contemporary introduction*. London: Routlegde.

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

Herzog, T. R. (1992). A cognitive analysis of preference for urban spaces. *Journal of Environmental Psychology, 12*, 237-248.

Hespos, S. J., & Spelke, E. S. (2004). Conceptual precursors to language. *Nature, 430*, 453-456.

Hillier, J. (2003). 'Agon'izing over consensus: why Habermasian ideals can not be 'real'. *Planning Theory, 2*(1), 37-59.

Hippocrates. (400 BC). *On injuries of the head (translation by F. Adams)*. Retrieved 15-6, 2003, from http://classics.mit.edu/Hippocrates/headinjur.html

Hirsch, E., & O' Hanlon, M. (1996). *The anthropology of landscape*. Oxford: Clarendon.

Honderich, T. (1996). *Consciousness as existence*. Retrieved 23-9, 2002, from http://www.ucl.ac.uk/~uctytho/ted4.htm

Horgan, J. (2000). *Freud is niet dood: het blijvend raadsel van het menselijk brein.* Amsterdam: Ambo.

Howard, R. (1987). *Concepts and schemata*. London: Cassell Educational.

Howarth, D. (2000). *Discourse*. Buckingham, Philedelphia: Open University Press.

Huemer, M. (2004). Sense data. *Stanford Encyclopedia of Philosophy*. Retrieved 6-7, 2004, from http://plato.stanford.edu/entries/sense-data/

Hurley, S. L. (1998). *Consciousness in action*. Cambridge, London: Harvard University Press.

Ieders Land. (2002). *Homepage*. Retrieved 20-12, 2004, from www.iedersland.nl/index.htm

Isenberg, N., Silbersweig, D., Engelien, A., Emmerich, S., Malavade, K., Beattie, B., et al. (1999). Linguistic threat activates the human amygdala. *PNAS, 96*(18), 10456-10459.

Jackson, F. (1982). Epiphenomenal qualia. *Philosophical Quaterly, 32*, 127-136.

Jacobs, M. H. (1999). Zee van vrijheid. *Vrijetijdstudies, 17*(3), 5-20.

Jacobs, M. H. (2000). De ervaring van het landschap in het tijdperk van draagvlak, tweedeling en oppervlakkigheid. In Habiforum & RMNO (Eds.), *Nova Cura: over meervoudig ruimtegebruik* (pp. 58-71). Utrecht: Lemma.

Jacobs, M. H. (2001). De kracht van de verbeelding: op zoek naar het waarachtige landschap. In J. Lengkeek & L. Boomars (Eds.), *Producten van verbeelding* (pp. 23-33). Wageningen: Wageningen Universiteit.

Jacobs, M. H. (2002). *Landschap3: het ware, juiste en waarachtige landschap*. Wageningen: Alterra.

Jacobs, M. H. (2004). Metropolitan matterscape, powerscape and mindscape. In G. Tress, B. Tress, B. Harms, P. Smeets & A. van der Valk (Eds.), *Planning metropolitan landscapes* (pp. 26-38). Wageningen: Delta series.

Jacobs, M. H., Berg, A. E. van den, Langers, F., Kralingen, R. B. A. S., & Vries, S. de. (2002). *Waterbeelden: een studie naar de beelden van waternatuur onder medewerkers van Rijkswaterstaat.* Wageningen: Alterra.

Jacobs, M. H., & Klijn, J. A. (2003). Gamma-onderzoek en het natuurplanbureau. In J. Luttik, A. Reinhard, M. H. Jacobs & J. A. Klijn (Eds.), *Strategische voorraden. Boek 3 van de overzichtstudies van het onderzoeksprogramma gamma-groen* (pp. 83-115). Den Haag, Wageningen: Lei, Alterra.

Jacobs, M. H., & Molen, D. van den (2002). Beelden van waternatuur. *H2O: Tijdschrift voor Watervoorziening en Waterbeheer, 35*(17), 15-17.

James, W. (1950/1890). *The principles of psychology I*. Dover, New York: Dover Books.

Jensen, R. (1999). *The dream society*. Hill: McGraw.

Johansson, I. (2001). Hartmann's nonreductive materialism, superimposition, and supervenience. *Axiomathes: an International Journal in Ontology and Cognitive Systems, 12*, 195-215.

Jolij, J., & Lamme, V. (2005). Repression of unconscious information by conscious processing: Evidence from affective blindsight induced by transcranial magnetic stimulation. *PNAS, 102*(30), 10747-10751.

Kandel, E. R. (2001). The molecular biology of memory storage: a dialogue between genes and synapses. *Science, 294*(5544), 1030-1038.

Kandel, E. R., Schwartz, J. H., & Jessell, T. M. (1995). *Essentials of neuroscience and behavior*. Norwalk: Appleton and Lange.

Kandel, E. R., & Squire, L. R. (2000). Neuroscience: breaking down scientific barriers to the study of brain and mind. *Science, 290*(5494), 1113-1120.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: a psychological perspective*. Cambridge, etc.: Cambridge University Press.

Kaplan, R., Kaplan, S., & Brown, T. (1989). Environmental preference: a comparison of four domains of predictors. *Environment and Behavior, 21*(5), 509-530.

Kaplan, S. (1987). Aesthetics, affect, and cognition: environmental preferences from an evolutionary perspective. *Environment and Behavior, 19*(1), 3-32.

Kaplan, S., & Kaplan, R. (1983). A model of person-environment compatibility. *Environment and Behavior, 15*, 311-332.

Keulartz, J., Swart, S., & Windt, H. van de. (2000). *Natuurbeelden en natuurbeleid: theoretische en empirische verkenningen*. Den Haag: NWO.

Keulartz, J., Windt, H. van de, & Swart, S. (2004). Concepts of nature as communicative devices: the case of Dutch nature policy. *Environmental Values, 13*, 81-99.

Kim, J. J. (1998). *Mind in a physical world: an essay on the mind-body problem and mental causation*. Cambridge: The MIT Press.

Kim, J. J. (1999). Making sense of emergence. *Philosophical Studies, 95*, 3-36.

Kleinginna, P., & Kleinginna, A. (1981). A categorised list of emotional definitions, with suggestions for a consensual definition. *Motivation and Emotion, 5*(4), 345-379.

Koch, C., & Crick, F. (2001). The zombie within. *Nature, 411*, 893.

Kockelkoren, P. J. H. (1992). *Natuur van de goede verstaander.* Enschede: TU Twente.

Kriegel, U. (2004). Perceptual experience, conscious content, and non-conceptual content. *Essays-in-Philosophy, 5*(1), 1-14.

Langers, F., Jacobs, M. H. & Kralingen, R. B. A. S. van. (2002). *Waterbeelden: studie naar de beelden van water onder de Nederlandse bevolking*. Wageningen: Alterra.

LeDoux, J. (1996). *The emotional brain: the mysterious underpinnings of emotional life*. New York: Touchstone.

LeDoux, J. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience, 23*, 155-184.

Lefebvre, H. (1991). *The production of space*. Oxford: Blackwell Publishers.

Lehman, D. R., Chiu, C.-Y., & Challer, M. (2004). Psychology and culture. *Annual Review of Psychology, 55*, 689-714.

Leibniz, G. (1973/1787). Monadology. In M. Morris & G. Parkinson (Eds.) (1987), *Leibniz: philosophical writings* (pp. 179-194). London: J. M. Dent and Sons.

Lengkeek, J. (1994). *Een meervoudige werkelijkheid: een sociologisch-filosofisch essay over het collectieve belang van recreatie en toerisme.* Wageningen: Wageningen Universiteit.

Lengkeek, J. (1996). On the multiple realities of leisure: a phenomenological approach to the otherness of leisure. *Loisir et Société/Society and Leisure, 19*(1), 23-40.

Lengkeek, J. (2001). De culturele en emotionele betekenis van water. In J. G. de Wit, H. Snijders & F. Duijnhouwer (Eds.), *Over stromen: kennis- en innovatieopgaven voor een waterrijk Nederland* (pp. 11-34). Den Haag: NRLO

Leon, D. de. (2001). The qualities of qualia. *Communication and Cognition, 34*(1/2), 121-138.

Lieberman, P. (2002). On the nature and evolution of the neural bases of human language. *Yearbook of Physical Anthropology, 45*, 36-62.

Llinas, R., Ribary, U., Contreras, D., & Pedroarena, C. (1998). The neuronal basis for consciousness. *Philosophical Transactions of the Royal Society London Series B London, 353*, 1841-1849.

Loar, B. (1990). Phenomenal states. *Philosophical Perspectives, 4*, 81-108.

Lormand, E. (1996). *Consciousness*. Draft for Routledge encyclopedia of philosophy. Retrieved 26-11, 2005, from http://www-personal.umich.edu/~lormand/phil/cons/consciousness.htm

Luhmann, N. (1995). *Social systems*. Stanford: Stanford University Press.

Luijpen, W. (1964). *Existentiële fenomenologie*. Utrecht, Antwerpen: Aula.

MacFarlane, R. (2000). Managing whole landscapes in the post-productive rural environment. In J. Benson & M. Roe (Eds.), *Landscape and sustainability* (pp. 129-156). London: Spon.

Maguire, E. A., Gadian, G. G., Johnsrude, I. S., Good, C. D., Ashburner, J., Frackowiak, S. J., Frith, C. D. (2000). Navigation-related structural change in the hippocampi of taxidrivers. *PNAS, 97*(8), 4398-4403.

Mansvelt, J. D., & Lubbe, M. J. van de. (1999). *Checklist for sustainable landscape management*. Amsterdam: Elsevier.

Maund, B. (2003). *Perception*. Chesham: Acumen Publishing Limited.

McGaugh, J. (2004). The amygdala modulates the consolidation of memories of emotionally arousing experiences. *Annual Review of Neuroscience, 27*, 1-28.

Meadows, D. H., Meadows, D. L., & Randers, J. (1972). *The limits to growth: a report for the club of Rome's project on the predicament of mankind*. New York: Universe Books.

Miller, E., Nieder, A., Freedman, D., & Wallis, J. (2003). Neural correlates of categories and concepts. *Current Opinion in Neurobiology, 13*, 198-203.

Ministerie van Landbouw, Natuurbeheer en Visserij (2000). *Natuur voor mensen, mensen voor natuur: nota natuur, bos en landschap in de 21e eeuw*. Den Haag: Ministerie van Landbouw, Natuurbeheer en Visserij.

Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu. (2001). *Ruimte maken, ruimte delen: vijfde nota over de ruimtelijke ordening 2000/2020*. Den Haag: Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu.

Ministry of Agriculture, Nature Management and Fisheries. (2000). *Nature for people, people for nature*. Den Haag: Ministry of Agriculture, Nature Management and Fisheries.

Miyashita, Y. (2004). Cognitive memory: cellular and network machineries and their top-down control. *Science, 306*(5693), 435-440.

Morris, J. S., Öhman, A., & Dolan, R. J. (1998). Conscious and unconscious learning in the human amygdala. *Nature, 393*, 467-470.

Morris, J. S., Öhman, A., & Dolan, R. J. (1999). A subcortical pathway to the right amygdala mediating "unseen" fear. *Neurobiology, 96*(4), 1680-1685.

Morrisj, J. S. (2002). How do you feel? *Trends in Cognitive Sciences, 6*(8), 317-319.

Murphy, A. P. (1996). *The meaning of wilderness (landscape, aesthetics, solitude).* Columbus: Ohio State University.

Naccache, L., Gaillard, R., Adam, C., Hasboun, D., Dehaene, S., & Cohen, L. (2005). A direct intracranial record of emotions evoked by subliminal words. *PNAS, 102*(21), 7713-7717.

Nagel, T. (1974). What is it like to be a bat? *The Philosophical Review, LXXXIII*(4), 435-450.

Nardon, N., & Berg, A. van den. (2001). *Research on landscape perception and environmental quality in France*. Wageningen: Alterra.

National Park Service. (1998). *Yellowstone, official map and guide.*

Natuurbeschermingsraad. (1993). *Natuur tussen de oren: natuur- en landschapsbeelden en hun rol bij de ontwikkeling en vormgeving van beleid.* Utrecht: Natuurbeschermingsraad.

Newsome, W., Britten, K., & Movshon, A. (1989). Neural correlates of a perceptual decision. *Nature, 341*, 52-54.

Nohl, W. (2001). Sustainable landscape use and aesthetic perception: preliminary reflections on future landscape aesthetics. *Landscape and Urban Planning, 54*(1-4), 223-237.

Nørretranders, T. (2000). *Het bewustzijn als bedrieger: een mythe ontrafeld.* Amsterdam: Arbeiderspers.

NRLO (Nationale Raad voor Landbouw Onderzoek). (1998). *Groene ruimte op de kaart. Kennis- en innovatieagenda: ambities voor de 21e eeuw*. Den Haag: NRLO.

Orians, G. (1980). Habitat selection: general theory and applications to human behaviour. In J. S. Lockard (Ed.), *The evolution of human social behaviour* (pp. 86-94). New York: Elsevier.

Orians, G. (1986). An ecological and evolutionary approach to landscape aesthetics. In E. C. Penning-Rowsell & D. Lowenthal (Eds.), *Landscape meanings and values* (pp. 3-25). Londen etc.: Allen and Unwin.

Parsons, R., & Daniel, T. C. (2002). Good looking: in defense of scenic landscape aesthetics. *Landscape and Urban Planning, 60*, 43-56.

Peacocke, C. (1992). *A study of concepts*. Cambridge: MIT Press.

Penrose, R. (1994). Mechanisms, microtubules and the mind. *Journal of Consciousness Studies, 1*(2), 241-249.

Peters, P. & Schwarz, M. (2000). Ruimte en tijd in meervoud. In RMNO & Habiforum (Eds.), *Nova Cura: over meervoudig ruimtegebruik* (pp. 26-43). Utrecht: Lemma.

Pine, J. B., & Gilmore, J. H. (1999). *The experience economy: work is theatre and every business a stage*. Boston: Business School Press.

Pinker, S. (1995). *Het taalinstinct: het taalscheppende vermogen van de mens*. Amsterdam, Antwerpen: Contact.

Place, U. (1956). Is consciousness a brain process? *The British Journal of Psychology, 47*, 44-50.

Pløger, J. (2004). Strife: urban planning and agonism. *Planning Theory, 3*(1), 71-92.

Poeppel, D., & Hickok, G. (2004). Towards a new functional anatomy of language. *Cognition, 92*(1-2), 1-12.

Porteous, J. D. (1996). *Environmental aesthetics: ideas, politics and planning*. London: Routledge.

Purcell, A. T., & Lamb, R. J. (1998). Preference and naturalness: an ecological approach. *Landscape and Urban Planning, 42*(1), 57-66.

Putnam, H. (1975). *Mind, language and reality (Volume 2)*. Cambridge: Cambridge University Press.

Pyne, S. J. (1998). *How the Canyon became Grand: a short history*. New York etc.: Penguin group.

Rees, G., Kreiman, G., & Koch, C. (2002). Neural correlates of consciousness in humans. *Nature Reviews Neuroscience, 3*, 261-270.

Reid, T. (1970). *An inquiry into the human mind*. Chicago: University of Chicago Press.

Relph, E. (1976). *Place and placelessness*. London: Pion.

RIVM (Rijksinstituut voor Milieu). (1998). *Leefomgevingsbalans: voorzet voor vorm en inhoud*. Bilthoven: RIVM.

RLG (Raad voor het Landelijk Gebied). (1999). *Made in Holland. Advies over landelijke gebieden: identiteit en verscheidenheid*. Amersfoort: RLG.

Rodriguez, E., George, N., Lachaux, J.-P., Martinerie, J., Renault, B., & Varela, F. J. (1999). Perception's shadow: long-distance synchronization of human brain activity. *Nature, 397*, 430-433.

Roos-Klein Lankhorst, J., Buijs, A. E., Berg, A. E. van den, Bloemmen, M. H. I., Vries, S. de, & Schuiling, R. (2002). *Belevingsgis versie oktober 2001: een compleet overzicht van het Belevingsgis met achtergrondinformatie*. Wageningen: Alterra.

Roos-Klein Lankhorst, J., Vries, S. de, Buijs, A. E., Berg, A. E. van den, Bloemmen, M. H. I., & Schuiling, C. (2004). *Belevingsgis versie 2: waardering van het Nederlandse landschap door de bevolking op kaart*. Wageningen: Alterra.

Ross, G. F. (1994). *The psychology of tourism*. Melbourne: Hospitality Press.

RBAL (Rudall Blanchard Associates Limited). (1994). Brent Spar abandonment impact hypothesis. Retrieved 2-10, 2003, from http://archive.greenpeace.org/comms/brent/bshyp.html#SYNOPSIS.

Russell, B. (1921). The analysis of mind. London: Allen & Unwin.

Sacks, O. (1985). *The man who mistook his wife for a hat and other clinical tales*. New York: Summit.

Sacks, O. (1995). Wel en niet zien. In O. Sacks (Ed.), *Een antropoloog op Mars: zeven paradoxale verhalen* (pp. 129-176). Amsterdam: Meulenhof.

Saegert, S., & Winkel, G. (1990). Environmental psychology. *Annual Review of Psychology, 41*, 441-477.

Saldanha, A. (1999). Globalisering, mediacultuur en het begrip plaats. Retrieved 28-3, 2002, from http://gopher.ulb.ac.be/~jteurlin/Publications/Arunreceptie.html

Sapir, E. (1929). The status of linguistics as a science. *Language, 5*, 207-214.

Sauvé, K. (1999). Gamma-band synchronous oscillations: recent evidence regarding their functional significance. *Consciousness and Cognition, 8*, 213-223.

Schama, S. (1995). *Landschap en herinnering*. Amsterdam, Antwerpen: Uitgeverij Contact.

Schouten, M. G. C. (2001). *De natuur als beeld in religie, filosofie en kunst*. Utrecht: KNNV Uitgeverij.

Schreyer, R., & Driver, B. L. (1989). The benefits of leisure. In E. L. Jackson & T. L. Burton (Eds.), *Understanding leisure and recreation: mapping the past, charting the future* (pp. 358-419). Venture: State College.

Schroeder, H. W. & Daniel, T. C. (1981). Progress in predicting the perceived scenic beauty of forest landscapes. *Forest Science, 27*, 71-80.

Schrödinger, E. (1935). Die gegenwärtige Situation in der Quantenmechanik. *Naturwissenschaften,* 23, 807-812; 823-828; 844-849.

Schroeder, H. W. (1991). Preference and meaning of arboretum landscapes: combining qualitative and quantitative data. *Journal of Environmental Psychology, 11*, 231-248.

Schutz, A. (1990). *Collected papers I: the problem of social reality*. 's-Gravenhage: Martinus Nijhoff.

Searle, J. R. (1992). *The rediscovery of the mind*. Cambridge, London: The MIT Press.

Searle, J. R. (1997). *The mystery of consciousness*. New York: The New York Review of Books.

Searle, J. R. (2000). Consciousness. *Annual Review of Neuroscience, 23*(1), 557-578.

Shafer, E., Hamilton, J., & Schmidt, E. (1969). Natural landscape preferences: a predictive model. *Journal of Leisure Research, 1*(1), 1-9.

Siewert, C. (2003). Consciousness and intentionality. Retrieved 12-7, 2003, from http://plato.stanford.edu/entries/consciousness-intentionality/

Shuttleworth, S. (1980). The evaluation of landscape quality. *Landscape Research, 5*, 14-20.

Simons, D., & Chabris, C. (1999). Gorillas in our midst: sustained inattentional blindness. *Perception, 28*, 1059-1074.

Smart, J. (1959). Sensations and brain processes. *Philosophical Reviews, 68*, 141-156.

Sperber, D., & Wilson, D. (1998). The mapping between the mental and the public lexicon. In P. Carruthers & J. Boucher (Eds.), *Thought and language* (pp. 184-200). Cambrigde: CUP.

Steinmetz, P., Roy, A., Fitzgerald, P., Hsiao, S., & Johnson, K. (2000). Attention modulates synchronized neuronal firing in primate somatosensory cortex. *Nature, 404*, 187-190.

Stopfer, M., Bhagavan, S., Smith, B., & Laurent, G. (1997). Impaired odour discrimination on desynchronization of odour-encoding neural assemblies. *Nature, 390*(70-74).

Strawson, P. F. (1992). *Analysis and metaphysics*. Oxford: Oxford University Press.

Thayer, R. L. (1976). Visual ecology: revitalizing the aesthetics of landscape architecture. *Landscape, 20*, 37-43.

Thomas, N. J. T. (1998). *Imagination, eliminativism, and the pre-history of consciousness.* Paper presented at the Towards a Science of Consciousness (Tucson III) Conference.

Tononi, G., & Edelman, G. M. (1998). Consciousness and complexity. *Science, 282* (5395), 1846-1851.

Tress, B. & Tress, G. (2001). Capitalizing on multiplicity: a transdisciplinary approach to landscape research. *Landscape and Urban Planning, 57*, 143-157.

Tuan, Y.-F. (1974). *Topophilia: a study of environmental perception, attitudes, and values*. Englewood Cliffs, New Jersey: Prentice-Hall Inc.

Turner, M. (1992). Design for a theory of meaning. In W. Overton & D. Palermo (Eds.), *The nature and ontogenesis of meaning* (pp. 91-107): Lawrence Erlbaum Associates.

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 the natural environment* (Vol. 6, pp. 85-125). New York: Plenum Press.

Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 73-137). Washington DC: Island Press.

Urry, J. (1990). *The tourist gaze: leisure and travel in contemporary societies*. London: Sage Publications.

Urry, J. (1995). *Consuming places*. London, New York: Routledge.

Usher, M., & Donnelly, N. (1998). Visual synchrony affects binding and segmentation in perception. *Nature, 394*, 179-182.

Vries, S. de, & Gerritsen, E. (2003). *Van fysieke kenmerken naar landschappelijke schoonheid*. Wageningen: Alterra.

Vroom, M. J. (2005). Lexicon van de tuin- en landschapsarchitectuur. Wageningen: Blauwdruk.

Whalen, P., Rauch. S. L., Etcoff, N. L., McInerney. S. C., Lee, M. & Jenike, M. A. (1998). Masked representations of emotional facial expressions modulate amygdala activity without explicit knowledge. *Journal of Neuroscience, 18*, 411-418.

Whorf, B. L. (1940). Science and linguistics. *Technology Review, 42*(6), 229-231, 247-228.

Wieser, S., & Wieser, H. G. (2003). Event-related brain potentials in memory: correlates of episodic, semantic and implicit memory. *Clinical Neurophysiology, 114*, 1144-1152.

Wohlwill, J. F. (1976). Environmental aesthetics: the environment as source of effect. In I. Altman & J. F. Wohlwill (Eds.), *Human behaviour and environment* (Vol. 1, pp. 37-86). New York: Plenum.

Wolfe, M. J. (1999). *The entertainment economy: how mega media-forces are transforming our lives.* New York: Crown Publishing Group.

World Conservation Monitoring Centre. (2000). *Homepage*. Retrieved 25-6, 2001, from www.wcmc.org.uk

Yang, B. E. & Brown, T. J. (1992). A cross-cultural comparison of preferences for landscape styles and landscape preferences. *Environment and Behavior, 24*(4), 471-507.

Zajonc, R. (1980). Feeling and thinking: preferences need no interferences. *American Psychologist, 39*, 117-123.

Zihl, J., Cramon, D. von, & Mai, N. (1983). Selective disturbance of movement vision after bilateral brain damage. *Brain, 106*, 313-340.

Zoest, J. G. A. van. (1994). *Landschapskwaliteit: uitwerking van de kwaliteitscriteria in de nota landschap*. Wageningen: DLO-Staring Centrum.

Zube, E. H. (1991). Environmental psychology: global issues, and local landscape research. *Journal of Environmental Psychology, 11*, 321-334.

Zweers, W. (1995). *Participeren aan de natuur: ontwerp voor een ecologisering van het wereldbeeld*. Utrecht: Van Arkel.

Samenvatting

Het onderzoek naar landschapsbeleving vindt plaats binnen verschillende disciplines, waarbinnen uiteenlopende, zeer selectieve theoretische en empirische benaderingen worden gehanteerd. Terwijl elk van deze benaderingen op zichzelf zinvol lijkt, vindt tussen deze disciplines nauwelijks serieuze uitwisseling van inzichten plaats. In dit proefschrift ontwikkel ik een overkoepelende theorie voor landschapsbeleving, die de bestaande benaderingen omvat. De centrale vraag daarbij is via welke processen ervaringen van landschappen tot stand komen (hoofdstuk 1).

In debatten wordt de term 'landschap' op verschillende wijzen gebruikt, wat tot verwarring leidt. Om meer duidelijkheid te scheppen, maak ik onderscheid in drie verschijningsvormen van het landschap. Ten eerste *matterscape*, het landschap zoals dat bestaat in de fysieke realiteit, bestaande uit fysieke objecten en processen. Uitspraken over matterscape zijn geldig als ze waar zijn. Ten tweede *powerscape*, het landschap zoals dat bestaat in de sociale realiteit, bestaande uit normen voor het gedrag van mensen met betrekking tot de omgeving. Uitspraken over powerscape zijn geldig als ze juist zijn. Ten derde *mindscape*, het landschap zoals dat bestaat in de innerlijke realiteit, het landschap zoals dat beleefd wordt door een individu. Uitspraken over mindscape zijn geldig als ze waarachtig zijn. Deze driedeling wordt toegepast in een analyse van drie debatten (over de Brent Spar, over meervoudig ruimtegebruik, en over landschapskwaliteit), waarbij ik een aantal drogredenaties blootleg (hoofdstuk 2).

De huidige westerse maatschappij wordt door sommige wetenschappers en filosofen getypeerd als de belevenismaatschappij. Sociale tradities hebben minder invloed op het leven van individuen dan voorheen; mensen maken hun keuzen meer vanuit hun eigen belevingswereld, en zijn op zoek naar boeiende ervaringen. Dit heeft gevolgen voor de wijze waarop we naar de omgeving kijken: esthetische waarden worden belangrijker. Mooie landschappen worden beschermd en zijn toeristische trekpleisters: honderd vijftig jaar geleden bezochten ongeveer nul mensen per jaar de Grand Canyon, momenteel ongeveer vijf miljoen. Er ontstaat een landschapsbelevingsindustrie, nationale parken, toeristische organisaties, overheden, enzovoorts, die bepaalde landschapservaringen van de hand willen doen en het gedrag van bezoekers willen reguleren. Overheden, zeker in Nederland, stellen belevingswaarden van het landschap tot inzet van hun beleid (hoofdstuk 3).

Binnen verschillende disciplines die zich met landschapsbeleving bezig houden zijn onderzoeksbenaderingen ontwikkeld, die verschillen wat betreft de aspecten van landschapsbeleving die worden benadrukt, de aandacht voor mogelijke factoren die landschapsbeleving kunnen beïnvloeden, en de theorieën die verklaren waarom bepaalde factoren bepaalde aspecten van landschapsbeleving beïnvloeden. Ik laat deze verschillen zien in een bespreking van de evolutionaire benadering in de omgevingspsychologie, de geografische benadering, het natuurbeeldenonderzoek, de historische benadering, sociologische en antropologische benaderingen, en benaderingen in het vrijetijdsonderzoek. Hiermee komt de selectiviteit van de afzonderlijke benaderingen aan het licht. Het landschapsbelevingsonderzoek is in te delen in benaderingen die zich richten op respectievelijk evolutionaire, sociale en persoonlijke factoren. Aan de vragen wat landschapsbeleving is en hoe het werkt, hoe deze factoren landschapsbeleving precies beïnvloeden, en hoe deze factoren met elkaar kunnen interfereren is nauwelijks aandacht besteed. Het gevolg is dat een overkoepelend begrip van de werking van landschapsbeleving ontbreekt (hoofdstuk 4). In de volgende drie hoofdstukken worden empirische studies besproken die volgens verschillende benaderingen zijn verricht.

BelevingsGIS is een mathematisch model dat de gemiddelde landschapswaardering van Nederlandse burgers voorspelt op grond van de fysieke kenmerken van het landschap zoals die worden gerepresenteerd in geografische informatiesystemen (GIS). Het model is via aantal stappen tot stand gekomen. Ten eerste zijn op grond van literatuurstudie theoretische indicatoren vastgesteld waarmee landschapswaardering kan worden voorspeld. Het gaat dan om voornamelijk evolutionaire factoren, omdat die indicatoren geven die voor iedereen ongeveer hetzelfde werken. Ten tweede worden de theoretische indicatoren vertaald in mathematische parameters, die op grond van GIS-data een voorspelling opleveren voor de bijdrage aan landschapswaardering. Ten derde worden de parameters samengevoegd, zodat de gemiddelde landschapswaardering wordt voorspeld. Tenslotte wordt het model gevalideerd door de voorspelde landschapswaardering te vergelijken met de door burgers geuite landschapswaardering voor bepaalde landschappen. Na een aantal verbeteringen bereiken de onderzoekers een voorspellingswaarde van 47%. Met belevingsGIS kan een kaart worden gemaakt die de gemiddelde voorspelde landschapswaardering als gevolg van de kenmerken van het fysieke landschap laat zien. Het kan worden gebruikt om te achterhalen of de waardering in de tijd toe- of afneemt, waarmee beleid dat is gericht op landschapskwaliteit kan worden geëvalueerd (hoofdstuk 5).

Beelden van waternatuur zijn min of meer duurzame betekenissen die mensen toekennen aan waternatuur. In de maatschappij bestaan verschillende beelden

naast elkaar. In een onderzoek naar beelden van waternatuur hebben 625 medewerkers van Rijkswaterstaat een enquête ingevuld waarin zij aangaven in hoeverre zij het eens of oneens waren met stellingen als: 'een gegraven kanaal is geen echte natuur' of 'de zee is het mooist als je geen invloeden van de mens ervaart'. Door middel van statistische bewerkingen over de antwoordpatronen van de respondenten zijn vijf verschillende beelden van waternatuur achterhaald, die liggen op een spectrum van wilde waternatuur (alleen waternatuur die niet door de mens is beïnvloed is echte natuur, we moeten van de natuur afblijven) tot functionele waternatuur (ook door de mens gemaakte waternatuur is echte natuur, we mogen natuur gebruiken ten nutte van de mens). Inzicht in deze beelden is met name van belang in communicatieprocessen: als mensen dezelfde term ('waternatuur') gebruiken, maar daar andere betekenissen aan koppelen (beelden van waternatuur), dan is begripsverwarring een logische maar onwenselijke consequentie (hoofdstuk 6).

Het Rotterdamse stadsbestuur besloot in 2001 een aantal volkstuincomplexen in het gebied Zestienhoven op te heffen, zodat er plaats kwam voor woningen en bedrijven. De volkstuinders reageerden met felle protesten. In deze context heb ik onderzoek gedaan naar de rol die de omgeving speelt in de persoonlijke en sociale identiteitsvorming. Voor de meeste tuinders betekent de omgeving rust, natuur, sociale contacten, veiligheid, gezondheid, ontsnapping aan het stadsleven, ruimte voor hobby's, en herinneringen. Veel tuinders hebben kleine huisjes in hun tuintjes gebouwd, waar ze gedurende de lente- en zomermaanden permanent leven en waar ze hun kinderen hebben grootgebracht. Voor hen is het tuintje een belangrijk deel van henzelf geworden. Veel tuinders voelen een sterke onderlinge verbondenheid, een sociale identiteit die gevormd is in de volkstuincomplexen: zij spreken voortdurend over 'wij' (de tuinders) versus 'zij' (de buitenwereld). Binnen de groep tuinders bestaan weer verschillende sociale identiteiten, met name gekoppeld aan generatieverschillen. De oudere generatie houdt van het sociale leven op de plek, en vindt dat de tuintjes piekfijn verzorgd moeten zijn. De jongere generatie is minder gehecht aan het sociale leven, en vindt spontane groei boeiend (hoofdstuk 7). In de volgende vier hoofdstukken ontwikkel ik een fundamentele theorie over beleving, waarbij ik aandacht besteedt aan de relatie tussen beleving en hersenactiviteit, perceptie, de relatie tussen cultuur en beleving, en emotie.

Beleving, de inhoud van bewustzijn, is een continu intentioneel gestructureerd proces van kwalitatieve en subjectieve eenheid, met een gemoedstoestand, een Gestaltstructuur en een centrum en periferie van aandacht. Bewustzijn en hersenactiviteit hebben ongetwijfeld met elkaar te maken, maar de relatie tussen beide is filosofisch problematisch. In de bewustzijnsfilosofie bestaan dan ook verschillende

visies op deze relatie. De verschillende dualistische visies (bewustzijn en hersenactiviteit zijn verschillende substanties) op deze relatie verwerp ik. Tevens acht ik van de monistische visies (er is maar een substantie) idealisme, de twee-aspecten theorie en eliminatief materialisme zeer onwaarschijnlijk. Hoewel ik reductionistisch materialisme niet onmogelijk acht, pleit ik voor een andere, niet-reductionistisch vorm van materialisme, die de superveniëntie-visie wordt genoemd. Binnen deze visie wordt bewustzijn als hogere-orde eigenschap van hersenactiviteit gezien, niet te reduceren tot, maar wel gerealiseerd door hersenactiviteit (hoofdstuk 8).

Bij landschapsbeleving gaat het primair om perceptie, een vorm van bewustzijn waarbij objecten en processen uit de buitenwereld worden beleefd. Als de zintuigen prikkels uit de buitenwereld opvangen, sturen ze signalen naar de hersenen, wat leidt tot sensatie. Dit is ruwe, ongeorganiseerde informatie. Voordat sensatie leidt tot perceptie, vindt een complex, voornamelijk onbewust, informatieverwerkend proces plaats, waarbij de informatie wordt georganiseerd door middel van reeds in de psyche aanwezige mentale concepten. Deze mentale concepten worden gecodeerd door neurale circuits. Deze circuits worden gevormd en veranderen door eerdere activering van hersencellen: dit leidt tot het vrijkomen van neurotransmitters, wat de genexpressie van hersencellen op zo'n manier beïnvloedt dat bestaande verbindingen tussen hersencellen worden versterkt en nieuwe verbindingen worden gevormd. Op deze wijze kunnen ervaringen uit het verleden de beleving in het heden beïnvloeden. Niet alle hersenprocessen correleren met beleving: van veel processen kunnen we ons onmogelijk bewust worden. Beleving wordt geconstitueerd door die hersenprocessen in de cortex en thalamus die op een bepaald moment deel uitmaken van de dynamische kern (dynamisch wil in dit verband zeggen dat de verzameling van hersengebieden die onderdeel uitmaakt van de dynamische kern kan variëren in de tijd). Perceptie wordt gerealiseerd door hersenprocessen die verenigd zijn in de dynamische kern, en bestaat uit sensationele (veroorzaakt door prikkels uit de buitenwereld) en conceptuele (gevormd door eerdere ervaringen) inhoud (hoofdstuk 9).

Cultuur beïnvloedt de individuele belevingswereld, waarbij natuurlijke taal een belangrijk medium voor beïnvloeding is. Woorden hebben een extensie: de verzameling fenomenen waarnaar een woord refereert, die cultureel is bepaald. Woorden hebben ook een intensie: de verzameling mentale concepten die een individu koppelt aan een woord. Als de intensie van een individu niet klopt met de cultureel bepaalde extensie (bijvoorbeeld: iemand gebruikt het woord 'boom' voor een auto) volgt in de regel correctie (de persoon wordt verteld dat het ding waarnaar hij wijst een auto is). Op deze wijze worden de intensies van individuen afgestemd

op de extensie, in ieder geval tot de mate dat betekenisvolle communicatie mogelijk is. In publieke expressies in natuurlijke taal, dat wil zeggen talige uitingen van mensen, kunnen de mentale concepten die door het individu, dat deze expressies waarneemt, aan de geuite woorden verbonden worden, veranderen en met elkaar verbonden worden doordat ze gelijktijdig worden geactiveerd. Aangezien mentale concepten de belevingswereld structureren, kan cultuur op deze wijze de individuele beleving beïnvloeden (hoofdstuk 10).

Emoties zijn gedurende de evolutie ontstaan als automatisch verlopende lichamelijke reacties op situaties die van belang zijn voor overleving. Daarvoor is een bewuste ervaring van de situatie niet nodig. Bewuste gevoelens ontstaan als de emotionele reacties worden geïnterpreteerd met behulp van emotie-concepten. Op sommige prikkels reageren we met een emotionele reactie, zonder dat we dat geleerd hebben. Eerdere ervaringen kunnen resulteren in emotionele reacties op andere prikkels, die onbewust geassocieerd worden met emotioneel relevante prikkels. Leerprocessen kunnen daarnaast van invloed zijn op de wijze waarop lichamelijke emotionele reacties worden geïnterpreteerd tot gevoelens. Perceptuele processen kunnen de lichamelijke emotionele reacties beïnvloeden, doordat signalen uit de corticale hersengebieden waarin perceptie plaatsvindt worden gezonden naar de subcorticale hersengebieden die emotionele reacties in gang zetten (hoofdstuk 11). Met behulp van de theorie die is ontwikkeld in de hoofdstukken 8 tot en met 11 kunnen de verschillende benaderingen in het landschapsbelevingsonderzoek worden geïnterpreteerd.

Volgens de evolutionaire benadering in de omgevingspsychologie beschikken mensen over aangeboren landschapsvoorkeuren. Dit betekent dat de hersengebieden die emotionele reacties in gang zetten kunnen reageren op bepaalde landschapsprikkels zonder dat daar leerprocessen voor nodig zijn geweest. Met het concept *sense of place* bedoelen humaan geografen de binding die mensen met een bepaalde plek kunnen opbouwen. Iemands sense of place bestaat uit netwerken van mentale concepten die uniek zijn voor een bepaalde plek. Volgens de contrastructuur-theorie, ontwikkeld binnen de vrijetijdswetenschappen, wordt de belevingswereld gestructureerd door bepaalde ervaringen van tijd, ruimte, socialiteit, het eigen lichaam, twijfel, en een bepaalde intensiteit van aandacht. Bepaalde landschappen kunnen een bepaalde belevingswereld oproepen doordat ze typerende mentale concepten voor tijd, ruimte, enzovoorts, activeren. Natuurbeelden zijn min of meer duurzame, vooral cultureel aangeleerde betekenissen. Dit zijn mentale concepten die men koppelt aan natuur, en die zijn gevormd op grond van eerdere ervaringen van publieke expressies over natuur. Volgens sociologen, antropologen en historici is de wijze waarop wij landschappen ervaren sterk afhanke-

lijk van de cultuur waarin we leven. Omdat mensen in verschillende culturen in aanraking komen met verschillende publieke expressies, ontstaan culturele verschillen in de netwerken van mentale concepten die mensen gedurende hun leven opbouwen (hoofdstuk 12). In het volgende hoofdstuk wordt theorie over landschapsbeleving beschreven, die deze benaderingen omvat.

Als de zintuigen prikkels afkomstig van het fysieke landschap of van publieke expressies opvangen, volgen sensaties (neurale activiteit in de thalamus). Deze informatie wordt gelijktijdig geprojecteerd naar subcorticale hersengebieden, waar emotionele reacties in gang worden gezet, en naar corticale hersengebieden, waar informatieverwerking plaatsvindt die leidt tot perceptie. Als de informatie door de subcorticale hersengebieden als emotioneel relevant wordt beoordeeld, dan volgt een automatische lichamelijke emotionele reactie. Informatie over de lichamelijke emotionele reactie, en de emotionele beoordeling, wordt geprojecteerd naar corticale hersengebieden, waar deze informatie door middel van emotie-concepten wordt geïnterpreteerd tot een gevoel. De projectie van sensatie-informatie naar corticale hersengebieden leidt tot interpretaties waarbij perceptuele concepten (in het geval van landschapsprikkels), of linguïstische concepten (in het geval van publieke expressies), de binnenkomende informatie organiseren. Informatie van deze interpretatieprocessen wordt geprojecteerd naar de subcorticale gebieden waar emotionele beoordeling plaatsvindt, en kan het verloop van emotionele reacties beïnvloeden. Landschapsbeleving wordt geconstitueerd door sensaties en geactiveerde neurale circuits die coderen voor perceptuele concepten en emotieconcepten die onderdeel zijn van de dynamische kern op een bepaald moment (hoofdstuk 13).

Mindscapes, belevingen van landschappen, zijn subjectieve constructies, bepaald door de aard van de binnenkomende stimuli, de aangeboren eigenschappen van de emotionele beoordelings-mechanismen (evolutionaire factoren), alsmede de aangeleerde eigenschappen van dit mechanisme (persoonlijke factoren), en de eigenschappen van de mentale concepten die zijn geactiveerd. De mentale concepten zijn gevormd onder invloed van eerder ervaringen van publieke expressies (culturele factoren) en landschappen (persoonlijke factoren). De opposities die in theoretische debatten over landschapsbeleving vaak voorkomen zijn schijntegenstellingen: aangeboren en aangeleerde kenmerken spelen een rol, er zijn overeenkomsten en verschillen tussen mensen wat betreft de wijze waarop zij een gegeven landschap beleven, enzovoorts. Het laten varen van deze schijntegenstellingen zou het onderzoek naar landschapsbeleving ten goede komen (hoofdstuk 14).

About the author

Maarten Hubert Jacobs (June 24th, 1972, Eindhoven) completed gymnasium in 1990. Subsequently, he studied bioprocess technology at Wageningen University for one year, only to figure out he had no feel for micro-organisms. He switched to landscape architecture. After a few good years he gradually discovered he was much more interested in the arguments for making spatial designs than in the practice of designing (and to be honest, he was not a talented designer either). He took a one year break to contemplate how to proceed, and took various jobs as factory laborer, installer of wooden floors, and salesman. He returned to Wageningen University to complete his master's in Recreation and Tourism in 1999. He started as a researcher at Alterra, being involved in the study of landscape experience. During this work, he found that the study of landscape experience suffers from the poor theoretical reflection in this field of research. To his great delight, he was offered a part-time PhD-position in 2001, at the Social Spatial Analysis Chair group of Wageningen University. The aim of this research was to improve theory in landscape experience research, by relating different disciplinary contributions. He continued working at Alterra as well. In 2006, Maarten was appointed as a lecturer at the same Chair group. Currently, he is dedicated to basic theory of experience, and the study of landscape experience and tourist experience.