Chapter 8
Relationships with the natural world

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Contents

1 Introduction

In Chapter 7 you explored how a sense of self might relate to the environment around it, as a whole. This chapter will focus on people's relationships with the *natural* world, although you should always keep in mind that everything you learn about will also be at work in urban environments. The reason for a focus on the natural is purely because humans (along with all othe rlife on Earth) evolved within a natural environment, so it is reasonable to expect that people are preferentially adapted to living in such environments. This means that there are a variety of behaviours and responses that are the result of evolutionary processes having shaped the human body to interact with, or solve problems in, natural settings. You might also expect human senses to be best suited to the sorts of stimuli encountered in such settings.

However, what is considered to be a 'natural' setting will to some extent depend on the culture in which a person is brought up, their personal experiences and preferences, and their knowledge of the world around them. This means that 'natural' is sometimes used to mean places that are wild and remote, far from any kind of human influence. At other times it is simply used as the opposite of 'built', so would include parks, gardens and other green spaces. For the purposes of this chapter, I will define the natural world as being those environments which have not been heavily modified by human activity (although of course you should always remember that humans are still part of the natural world!). There will still be grey areas – for example, some parts of the countryside only exist in their current form because of many years of human influence (treeless, grassy landscapes that are heavily grazed by sheep, for example). Yet these are often still seen as 'natural', in part because they have existed for so long and non-human animals have adapted to make use of them.

Why are psychologists interested in people's relationships with place? Simply because, whatever someone is doing, they are always affected by *where* they are doing it. This can be as simple as being distracted by what is going on around you: for example, what is it like where you are right now? Are you aware of noises in the background, or the activity of people around you? Are you too hot or too cold? Is your seat comfortable? Is the light bright enough to read the pages of the book, or is it reflecting off a computer screen? All these things will be

affecting your attention on the text, how easily you understand what is being said, and how well you will remember it in future.

There are also more profound things going on. Beyond the task at hand, think about how the space you are in makes you feel. As soon as you enter a place, you react to it, whether you are aware of this or not. Some of your reactions will be based on memory – what you have done in similar places before, the associations you have with that kind of place – but some will go deeper than this and be based on unlearned responses: reactions that are part of a body shaped by evolutionary processes and shared with all humans (and some of those responses are shared with other animals as well). To make this clearer, use Activity 8.1 to consider how you might respond to a specific place.

Activity 8.1   Imagine a day at the beach

Imagine that you have just arrived at the beach on a beautiful sunny day. Try to really feel that you are there. You can see other people sitting on the sand and playing in the water. You feel the warmth of the sun on your skin, along with a gentle breeze. You can hear the sounds of people laughing and talking, the seagulls overhead, and the waves lapping at the sand. You can smell the characteristic salt and seaweed tang of the ocean and, if you lick your lips, you can also taste the salt in the air. Think about how you feel imagining this scene. Think about how your body is responding, what sort of emotions you are feeling, and what aspects of the beach scene you are focusing on.

Discussion

Being in any place is an experience that involves all your senses, on both conscious and unconscious levels. While your conscious mind is thinking about going for a dip in the water, or building sandcastles, or just relaxing and enjoying the sun, you are also taking in lots of information that tells you how you should respond to that place.

In the first few seconds of being on a beach, your pupils would have constricted to reduce the amount of bright light entering your eye (and you would probably find yourself squinting if you were not wearing sunglasses), and your eyes would be scanning the horizon to assess the wider area, then looking around for areas of cover and shade. You might find that your attention has settled on anything brightly coloured (especially reds and oranges) or has lingered on anything that is green. You would have an overall impression of the sounds in the area, with snatches of conversation here and there standing out from the background noise. You would probably also find your attention coming

back to the sound of the waves – a gentle hissing sound that ebbs and flows. As you felt the warmth of the sun on your skin, the ultraviolet light (the part that triggers tanning and can give you sunburn if you get too much of it) would cause a chemical reaction in the skin that creates vitamin D, which boosts your immune system activity. Sunlight also helps to regulate your sleep–wake cycle, so you might you feel more alert, and increases the production of serotonin in the brain, so you might feel less anxious, more confident and less aggressive than you would in a less brightly lit environment.

As you will learn as you progress through this chapter, there are good reasons for these responses. They represent the ways in which the human species has undergone **adaptation** to different environments over millions of years, through a process of **natural selection**. Some responses to places do not have to be learned, as they do not come from beliefs and attitudes – they are part of the way the body reacts to specific stimuli. Even if you think of yourself as someone who hates nature, or who does not like going out in to the countryside, you will still be affected by these responses.

After reading this chapter you should be able to:

- understand the idea that some of our responses to natural environments – the result of evolutionary processes – might be ones we are born with

- appreciate the links between natural environments and human well-being, and the main theories that try to explain them

- describe different therapeutic applications of these links.

Adaptation
This refers to (a) the process of gradual change in an organism that improves its ability to survive in its environment; (b) an evolved property of an organism, the original function of which adds to its fitness.

Natural selection
The process whereby physical and behavioural characteristics which enable survival (and the genes which code for them) are passed on to descendants.

2   Responding to the natural world

One of the ways these adaptive responses can be observed is that, in general, if people are given a free choice from a selection of images (for examples, see Figure 8.1) with no other considerations, they tend to prefer images or stimuli that relate to the natural world over those that relate to the built world (reviewed by Ulrich, 1983; Knopf, 1987). In one such study (Kaplan et al., 1972), researchers showed female participants slides which had been selected to fall into four categories: entirely natural scenes, scenes showing a predominance of nature, scenes showing a predominance of human-influenced features, and scenes showing entirely human-influenced features. They found that slides from the two nature-containing categories were preferred over slides from the human influence categories, with the distributions of responses to the nature versus human influence slides being clearly distinct. Even within scenes of urban sites, preference levels increase when natural elements such as plants are added (e.g. Thayer and Atwood, 1978).

(a)   (b)

Figure 8.1   An example of (a) a 'natural' versus (b) an 'urban' scene, typical of those used in research studies

There have also been studies comparing preferences from different cultures. For example, a study comparing people living in Bali with visiting tourists (Hull and Revell, 1989) found a significant correlation in aesthetic evaluations of different scenes. While there were some cultural differences (e.g. scenes showing traditional architecture were

rated higher by the Balinese), both groups tended to rate natural scenes as preferable to urban scenes. A similar nature scene preference was found when Australian and Italian participants were compared (Purcell et al., 1994). This preference is a powerful one, and one which advertisers are starting to take notice of, so it is worth knowing about. You can investigate it in Activity 8.2.

Activity 8.2   Nature preference as an advertising tool

The next time you are watching television or reading a magazine, take note of how many of the advertisements make use of natural imagery. This might be by calling the product a natural-sounding name, or presenting a product in a natural environment. What do you think the advertisers are trying to achieve?

Discussion

Part of the reasoning is probably that it is a public relations exercise, trying to portray a company or product as being environmentally friendly, but part of it is an example of an association fallacy – if an advertiser shows natural imagery alongside a product, the overall positive effects of the imagery become associated with that product and can help to influence people to prefer it. Similarly, the effect can be used to help convince people to agree with an opinion or, as you will discover later in this chapter, to aid a therapeutic outcome.

So why do humans have this preference? You start to investigate this in Section 2.1.

2.1   Evolutionary responses

According to some researchers (Orians and Heerwagen, 1992; Wells and Evans, 2003; Falk and Balling, 2010), the preference for natural scenes is something that humans are born with (Bornstein et al., 2011) rather than something that is learned from significant others or cultural influences.

The basic idea is that, for most of human evolutionary history, people (along with all other animal species) evolved in an entirely natural environment, so most human responses developed as an adaptation to such environments (in this chapter the focus is solely on the physical

environment, but you should be aware that adaptations also occur to social environments). As you will learn in Section 4, some researchers think that many of the mental health problems that people have today might be because the modern world is artificial, and people's evolved responses are incompatible with it. Just over half of all people, more in the Western world, now live in cities or towns, and predictions suggest this figure will rise to 70 per cent by 2050 (WHO, 2014). This is not necessarily a bad thing; it is just that human evolution has not yet caught up with this change in the way people live. People's bodies have developed to deal with natural shapes and natural stimuli, and yet what they get are places like the room you are probably sitting in reading this text: an artificially lit, human-built, rectangular room, with unusual smells and textures, full of strange noises from things like heating or cooling systems, computer fans and outside traffic. Stress from being in an 'unnatural' environment and the extra resources needed to deal with unmet expectations might be involved in some of the problems you will read about later in this chapter, where Section 4 will introduce you to the idea of 'ecotherapy'.
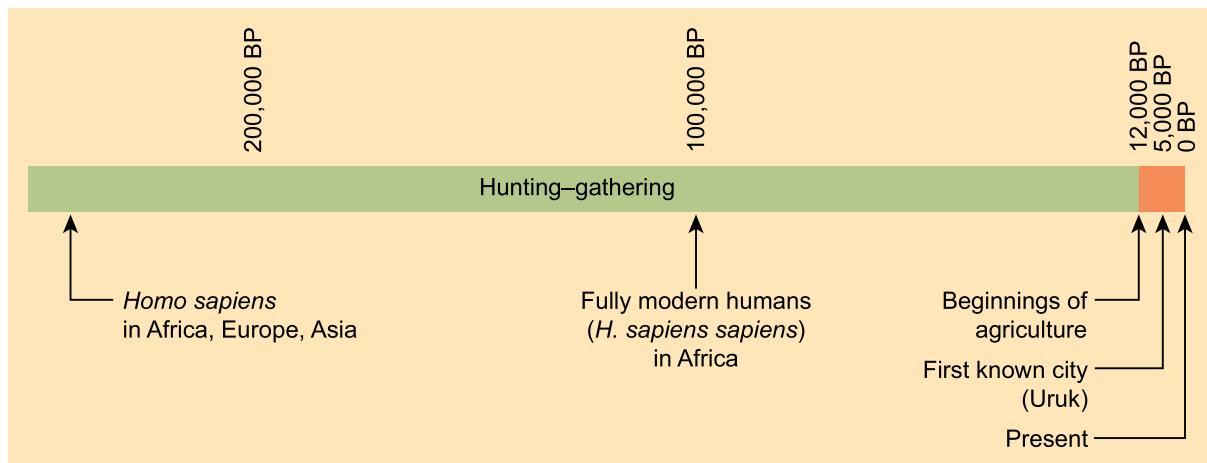

Figure 8.2   Timeline of human evolution shown as years before present (BP) (Source: based on MacLennan, 2003)

An often-used phrase from evolutionary psychology is relevant here: 'our modern skulls house a Stone Age mind' (Cosmides and Tooby, 1997, p. 85). What this means is that most human mental responses evolved during the long period (the palaeolithic) when all humans were hunter-gatherers (see Figure 8.2). Evolution being a slow process, people are still adapted to that kind of lifestyle rather than the modern lifestyles that you and I have. As time goes on this will change: as

humans continue to evolve, people might become better adapted to an urban lifestyle, with mental responses better suited to living in towns and cities. For the moment, you and I are still stuck with hunter-gatherer responses. However, you always need to remember that this is not about making any moral judgements. Although you can find a lot of writing in this area on why the modern dependence on oil or environmental degradation in the pursuit of purely human desires are 'wrong', the principles I am talking about here are amoral. It is about what humans are currently best adapted to as biological beings, not how people should or should not live.

2.2   Visual sensitivity

There is a lot of evidence to support the argument that modern humans still have the evolutionary adaptations acquired during the palaeolithic period, as hunter-gatherers. One example is visual sensitivity – the colours of light that human eyes best respond to. It is well established in biology that human eyes respond differently (i.e. are more or less sensitive) across the range of visible light (Bossomaier, 2012), and are most sensitive to green light. This may seem counter-intuitive: you may have thought of people as being more sensitive to colours such as red, as red often indicates a need for increased awareness or arousal (think of traffic lights and other warning signs, for example). Yet in terms of the kind of detail the human eye can make out, and the number of different shades that people are able to distinguish, green light is what people are most sensitive to. Specifically, human eyes are most sensitive to the colour of chlorophyll, the pigment that makes plants look green. When you think about it from an evolutionary viewpoint, this makes sense. It is thought to relate to recognition of food: the hunter-gatherer lifestyle involves collecting plants, and being able to distinguish between leaves that have different shades of green makes it easier to identify different plants. With this ability hunter-gatherers can collect those plants that they have learned are edible, and avoid those that they have learned are inedible or poisonous. This kind of colour discrimination is an example of a kind of trait which is adaptive, which would get passed on, and which humans still have today.

Biologists have also established that normal human vision is **trichromatic** (meaning three-coloured): there are three types of colour-sensitive cells (called 'cones') in the human eye, each of which

Trichromatic
In relation to the eye, having three different types of colour receptor cells (cones). One type is most sensitive to the frequency of light that humans perceive as red, the second to green, and the third to blue.

responds best to red, green or blue light. One reason humans developed cones that are most responsive to red light might be because they provided an advantage in spotting ripe fruit. Generally speaking, the cones in the eye are part of a very fast system that help people to quickly respond to significant cues in the environment. So while human eyes are most sensitive to green, they also have a fairly high sensitivity to red, so that hunter-gatherers would benefit from being able to spot ripe (i.e. the most nutritious) fruit from a distance, or distinguish warning signals from poisonous insects or animals that people would need to avoid.

One thing to bear in mind is that such sensitivity can also provide information about the environment in which a species evolved, and the evolutionary pressures that affect them. For example, bees are also trichromats, but the light spectrum which they are sensitive to is shifted compared with humans: they are not so good at seeing reds but can see much further than humans can at the violet end of the spectrum, even being able to see into the ultraviolet (Lythgoe, 1979) (Figure 8.3). This enables bees to see useful markings on plant petals, signalling where nectar sources are (Figure 8.4). Bees see things differently from the way humans do because their survival needs mean that seeing a different part of the light spectrum gives an advantage: it is adaptive for bees to see ultraviolet light, just as it is adaptive for humans to be sensitive to green light.
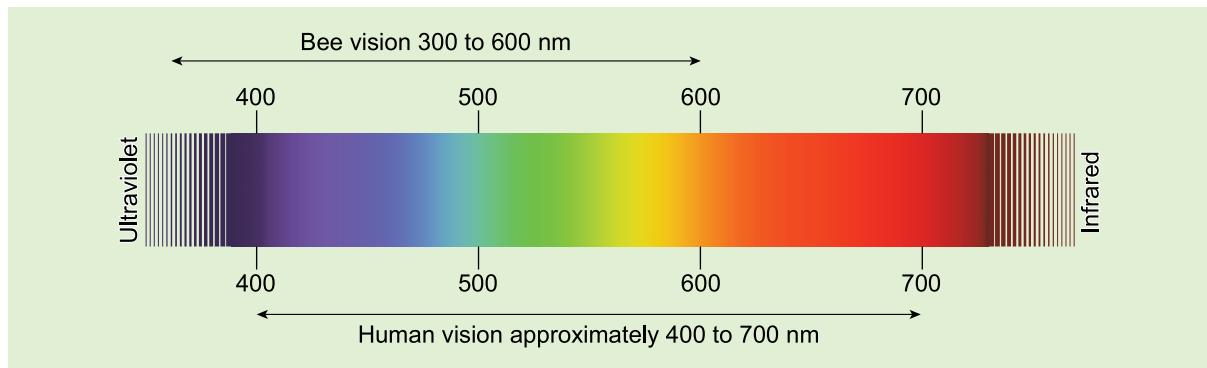

Figure 8.3   The light spectrum visible to humans and that visible to bees (nm = nanometres: 1 nm = 10–9 m or 0.000001 mm

(a)   (b)
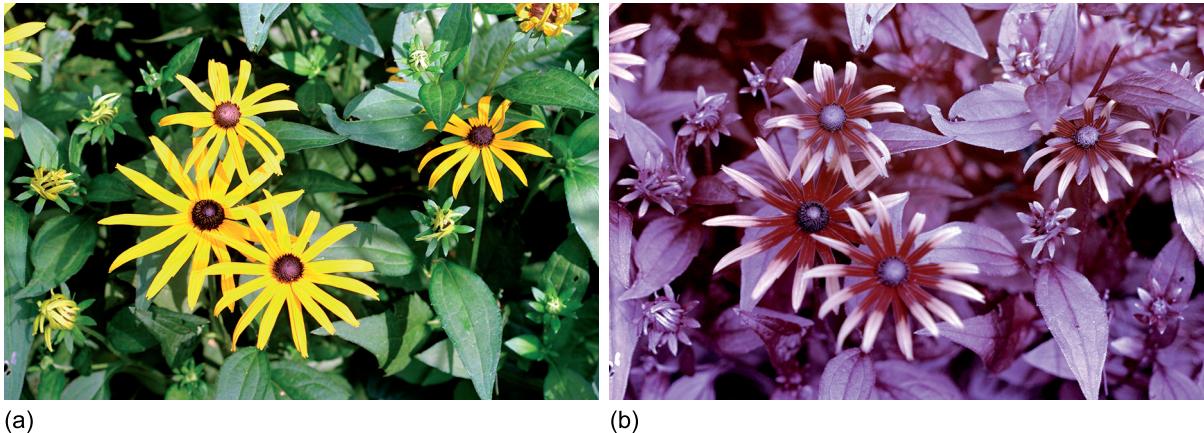
Figure 8.4   (a) How a flower looks in versus human-visible light; (b) how the same flower looks under ultraviolet light

Similarly, many fish, birds, reptiles and amphibians have evolved to be *tetrachromatic* (Bossomaier, 2012): they have four types of colour-responsive cones, the extra cone being specialised to show detail in ultraviolet light. This extra sensitivity is used to enhance motion-detection ability, as well as to determine the position of the sun behind clouds for navigation purposes. As with the example of bees, species with tetrachromatic vision evolved different visual abilities from humans because they live in very different environments from humans: being able to move freely in three dimensions in water or air, or having predators and prey that do so, means that motion-detection and navigation abilities become very important for survival.

It is worth emphasising that evolution is ongoing, even for humans, and that there are individual differences among members of the same species. In humans, some evidence is beginning to emerge of possible mutations in colour sensitivity. A small proportion of humans appear to have developed a fourth type of cone in their eyes and become tetrachromatic, and such people may be able see more subtle variations in colours than people with ordinary trichromatic vision. However, so far only one of these people has been shown to have differences in their behaviour in response to colour stimuli (Jordan et al., 2010), so the extra cone may well be non-functional in most of those who have it. However, if tetrachromatic vision proves to be advantageous it may become a new adaptation in the future of the human species. Humans are still changing, still adapting to their environment in lots of different ways.

2.3   Landscape preference

Another piece of evidence relates to the natural environment preference mentioned earlier. According to Knopf (1987), humans, given a free choice, tend to prefer natural over urban images, but there are also more specific preferences even among natural images that provide clues about the evolutionary reasons for this tendency. Look at the pictures in Figures 8.5 and 8.6. Figure 8.5 shows a type of landscape called savannah, which has grass and scattered trees. Figure 8.6 is a forest landscape, with a high density of trees. Explore these in Activity 8.3.
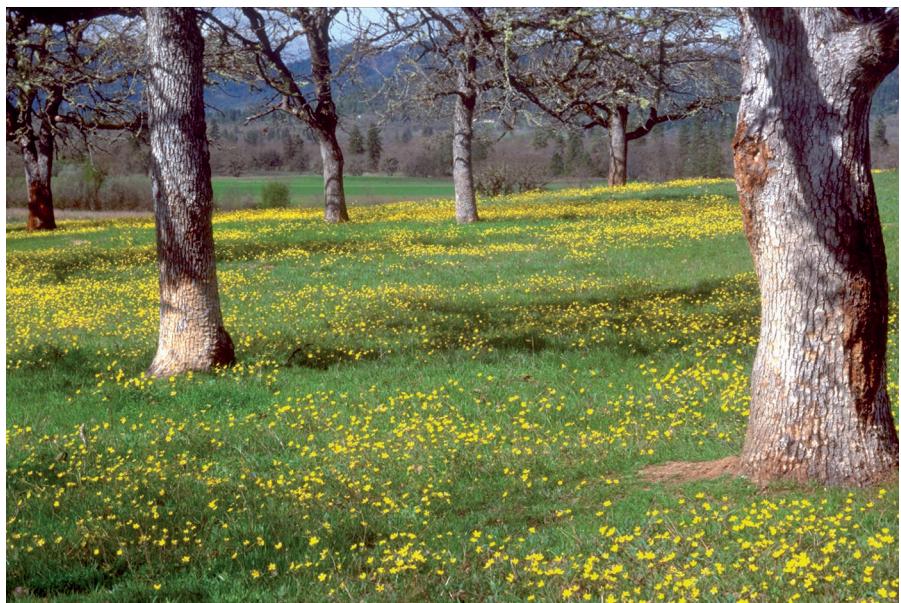
Figure 8.5   Savannah-type landscape
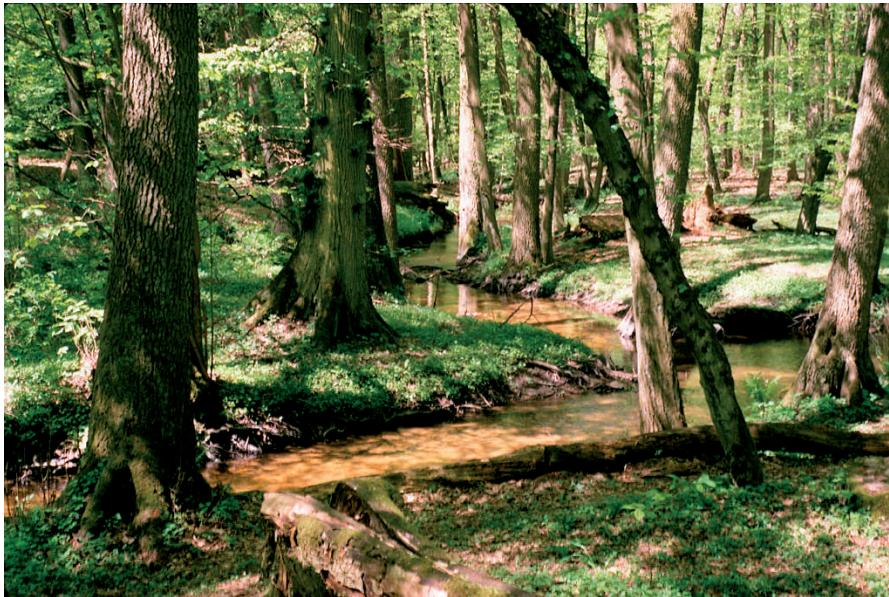
Figure 8.6   Forest-type landscape

Activity 8.3   Which landscape do you prefer?

Spend a few moments imagining that you are really standing in the scene shown in Figure 8.5. Think about how it makes you feel as you imagine this, and how it might make you feel if you were actually there. Now do the same for the scene in Figure 8.6 – imagine yourself standing there and again think about how it makes you feel. When you have done this, ask yourself whether you had an instant preference for either Figure 8.5 or Figure 8.6. Then think about what any preference might have been based on. For example, what initially drew your eye? What sorts of emotions did you associate with each scene?

Discussion

In an experimental setting (for examples, see Orians and Heerwagen, 1992; Falk and Balling, 2010), where a series of images similar to these are shown rather than just one of each, people tend to prefer the first kind of scene: natural but more open. Did that reflect your own preference? There will always be individual differences, particularly if people think about it for some time before responding (e.g. a common response to the woodland scene is 'adventurous' from people who enjoy exploring or that kind of environment-related activity), and a learned preference for familiar places can become mixed in with more basic responses (Balling and Falk, 1982).

However, on the whole, there does seem to be a tendency for people to prefer savannah-type (Figure 8.5) environments. These are relatively open and thinly wooded, and have been described as giving a feeling of freedom through being able to see far and move easily. This is also thought to have an evolutionary reason as, for most of the species' history, humans lived in what is now Africa, in environments which were very much like the savannah image. Human sensory and perceptual systems are thus best adapted to work in environments which are like the savannah. If the surroundings become more enclosed (in denser woodland or built-up cities), people tend to have more stress responses – jumping at unexpected noises that they cannot see the source of, or being startled at the sudden appearance of someone. Yet people also do not like things to be too open – landscapes which completely lack trees and vegetation feel threatening, possibly as there is no available cover to hide from predators or strangers, and fewer sources of food and other useful materials.

Remember I told you that the nature preference occurs mostly when people do not spend too long thinking about their choice? This idea is supported by measurements of physiological activity (which I will look at in more depth in Section 3.1 on restorative environments), where research shows that the response to an environment is a very fast one (Ulrich et al., 1991). Within the first second or two of seeing a picture or entering a specific place, people have an emotional response that shows up as a change in physiological arousal – for example, an increase in heart rate, or sweatier palms, or changes in electrical activity in the brain (e.g. Parsons et al., 1998). This response can be later modified by the individual's particular likes and dislikes, or memories of past experiences but, just to start with, most humans do show a positive response that again indicates they find savannah-like landscapes to be the most appealing (Taylor et al., 2005).

2.4   Fractals

There has been a lot of debate about what exactly it is that people respond to in such environments. How can people have evolved responses that 'know' the difference between 'natural' and 'artificial' when these are quite complicated terms that vary at different times in different cultures? The answer comes from a slightly more complex

idea about what it is in those landscapes that people respond to. When people talk about a preference, it usually refers to something specific, but you can also take a wider view and talk about more general aesthetics: what people tend to find beautiful or attractive, from the kinds of shapes and textures encountered in everyday life to works of art. What researchers are starting to understand is that behind many sensory-based preferences are shapes called *fractals* (Forsythe et al., 2011).

Fractal (a term invented by the mathematician Benoit Mandelbrot) refers to structures which show *self-similarity*. That is, the same patterns – in structure, motion, sound, and so on – repeat over and over again at different scales of time and space. A good example from nature is the shape of a fern 'leaf' or frond – if you zoom in to look at a small part of a fern frond, you will see a shape that is similar to the whole frond (see Figure 8.7(a)). Similarly, the way neurons in our brain grow, interconnect (see Figure 8.7(b)) and fire (Alexander and Globus, 1996) are based on fractal patterns.


(a)   (b)
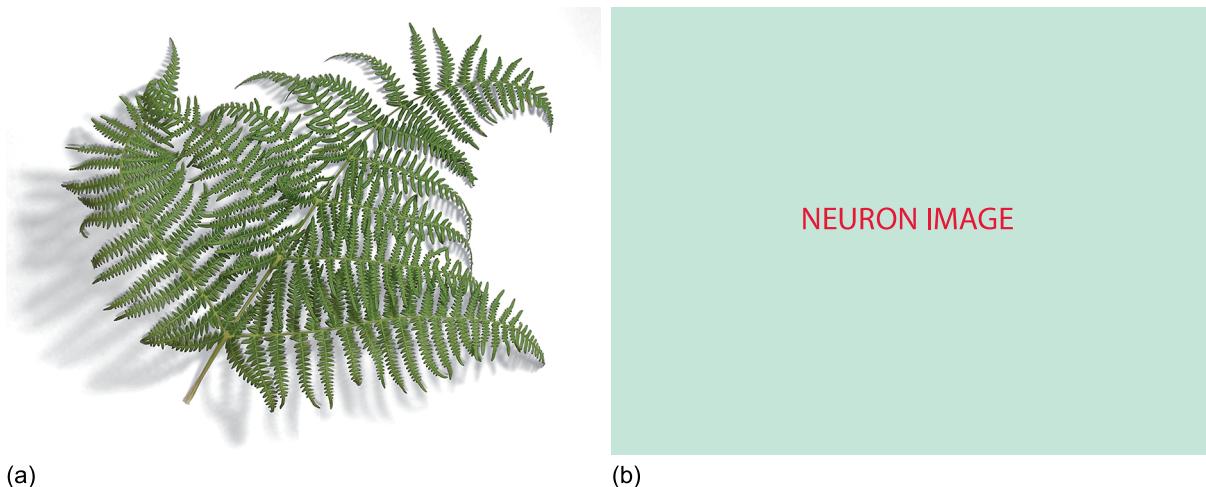
Figure 8.7   The fractal nature of (a) a fern frond; (b) neurons

Why does this help in trying to understand how people relate to the natural world? Well, studies have shown that anything that forms as the result of a natural process – the leaves of plants, the outline of an eroding shoreline, the formation of crystals (whether ice or quartz), even the way DNA arranges itself inside cells – does so in highly fractal patterns (Mandelbrot, 1982). On the other hand, most things that are built by humans are not so fractal, being made up of straight lines and blocky shapes.

Of course, it is not quite so clear cut: as with many things, there is a continuum. At one end there are things that are not at all fractal (simple geometric shapes such as squares and triangles) and at the other end are highly fractal shapes such as fern fronds and snowflakes. Figure 8.8 shows an illustration of this continuum: starting with a simple triangle (which is not fractal) on the left, this shape is modified by adding in identical but half-size triangles in the middle of each side of the original triangle. This process is repeated again, with yet smaller triangles added to each side, and again. After only three iterations, adding simple triangles, a much more complex (and highly fractal) shape that looks a bit like a snowflake emerges, as seen on the right of Figure 8.8. What studies tend to show is that people prefer (up to a point) shapes that are more fractal (e.g. Spehar et al., 2003).
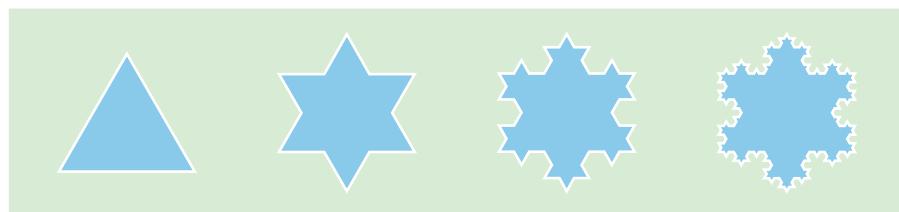
Figure 8.8   The shape increases in self-similarity (becomes 'more fractal') from left to right (Source: Wolfram MathWorld, 2014)

This means the human tendency to prefer *natural* environments may be partly due to the fractal structures of which such environments are made up. However, researchers are only just starting to investigate why humans are so attracted to fractals themselves, and at the time of writing this remains an open question.

3   Relating environmental responses to human well-being

In this section you will start to explore how the ideas above can be applied to everyday life. If humans do have preferential responses to natural (fractal) shapes, colours, textures, sounds, and so on, then this should be apparent in the way people's bodies respond to where they are and may, in turn, have an effect on their well-being.

For example, a response which involves reduced stress may decrease the risk of developing a stress-related illness. This idea is supported by evidence from a large body of empirical work published in environmental psychology and ecopsychology journals, in papers which apply the concept of restoration – 'renewing diminished functional resources and capabilities' (Hartig and Staats, 2003, p. 103) – to specific environments. A **restorative environment** is thus a place or situation that helps bring about the recovery to baseline levels of functional resources and capabilities that have been diminished through stress, overuse or understimulation. Put more simply, when you feel overwhelmed, stressed or fatigued, there are places you can go which have qualities that help you feel better, more alert and more able to cope with whatever you are doing. As you will discover – and as you might have expected from what you have already learned in this chapter – most of these places are ones which you would recognise as being 'natural' environments.

Restorative environment
A place or situation that helps bring about the recovery to baseline levels of functional resources and capabilities that have been diminished through stress, overuse or understimulation.

3.1   The restorative environment

The idea that some places might be better for one's well-being than others has been around for a long time. The first public parks were created as places for people to relax and unwind from the stresses of city living, and many different cultures consider natural environments to be calming and beneficial to health, but it took a while for psychologists to consider the idea and begin to study it.

One important study was by Roger Ulrich, a psychologist whose interest in environmental aesthetics later led him to become a healthcare design planner. This study (Ulrich, 1983) investigated whether hospital patients who had a window which looked out on to a natural view recovered faster than those who had a window which looked out on to a wall of a brick building. Compared with the

patients with the brick wall view, he found that those with the natural views needed to stay in hospital for a shorter time after their operation, took fewer painkillers, and received less negative evaluations from nurses about their condition.

Intrigued by such findings, Ulrich (1991) later ran a controlled experiment on non-patients to better understand the effects of natural views. His participants first viewed a video that was designed to be stressful and were then randomly assigned to a recovery period in which they viewed another video that showed either nature settings (vegetation or vegetation with water) or built settings lacking nature features. Throughout the study, physiological arousal readings relating to stress levels – heart rate, muscle tension, electrodermal activity and blood pressure – were measured. Ulrich's results consistently showed that recovery from stress was faster and returned closer to the baseline state in participants who viewed the nature settings rather than the built environments. When they were asked to rate their emotional states, participants who viewed the natural settings said they experienced lower levels of fear and anger, and higher levels of positive feelings, compared with participants who viewed the built environments. Many other studies have been performed with different people from different cultures and have shown similar findings, and further suggest that exposure to natural environments has a number of other beneficial effects, including improved attention (Berto, 2005) and a more positive emotional state (Hartig and Staats, 2006). More detail about such experiments is given in Box 8.1.

Box 8.1   Measuring physiological responses to different environments

In studies like that of Ulrich (1991), it is common to use physiological recording equipment to measure responses that participants may not be consciously aware of (Figure 8.9(a)). This can be done with or without additional conscious measures (e.g. a self-report questionnaire asking about their emotional state).

Typically, such studies are performed in a controlled setting. Participants are seated comfortably in a quiet room, with a video display in front of them. Once the procedure has been explained to them and they have consented to take part, the experimenter attaches the sensors that will record the desired physiological activity. For example, researchers could measure skin conductance,

which relates to how active the sweat glands in the skin are. To do this, the experimenter would attach two electrodes to the participant's skin – typically the centre part of the index and middle fingers on the non-dominant hand are used – and these would be connected to specialised equipment that measures the electrical conductivity, that is, how easily a small electrical current passes from one electrode to another (no need to worry: it is a safe procedure and the participant feels nothing!). This conductivity increases with the amount of moisture present in the skin. As the main cause of changes to such moisture is sweat gland activity, this essentially means that the conductivity increases when the participant is stressed and therefore sweats more (for this reason, it would be important to keep the temperature of the testing room constant, to eliminate that as a potential source of error). The measuring equipment records the level of conductivity throughout the experiment, allowing an accurate measure of the level of physiological arousal (stress) at different times in the experiment.

Once the electrodes are in place, some baseline measurements are taken, as everyone has different resting levels of arousal depending on individual differences and specific circumstances (e.g. a participant who drank coffee on the way to the laboratory would have higher baseline arousal than their normal level).

Participants are then shown a series of pictures in a random order. Some will show scenes of natural environments – landscapes with trees and shrubs, garden scenes, mountains, lakes, and so on – while others will show scenes of urban environments – cityscapes, towns, buildings and other human-constructed landscapes (Figure 8.9(b), (c)). The exact time each image is shown is recorded and can then be matched to the physiological data (e.g. skin conductance levels) for the same period.

Figure 8.9(d) shows an example of the kind of data recorded for an urban image followed by a nature image. When the image is first shown, participants will always show a fast increase in arousal levels. This is called the 'orienting response' and is an indication that the person is paying attention to something novel in their environment. After this, the data show a varying level of skin conductance for both images, but notice that only the nature image shows a strong decrease in skin conductance, signifying that the participant has relaxed in response to the nature image. By taking the average level seen for each type of image, and repeating measurements with different images and different participants,

researchers can get a clear picture of how stress might relate to the environment people are in.


(a)

(b)

(c)

Arousal level
(skin conductance)

2 seconds

(d)
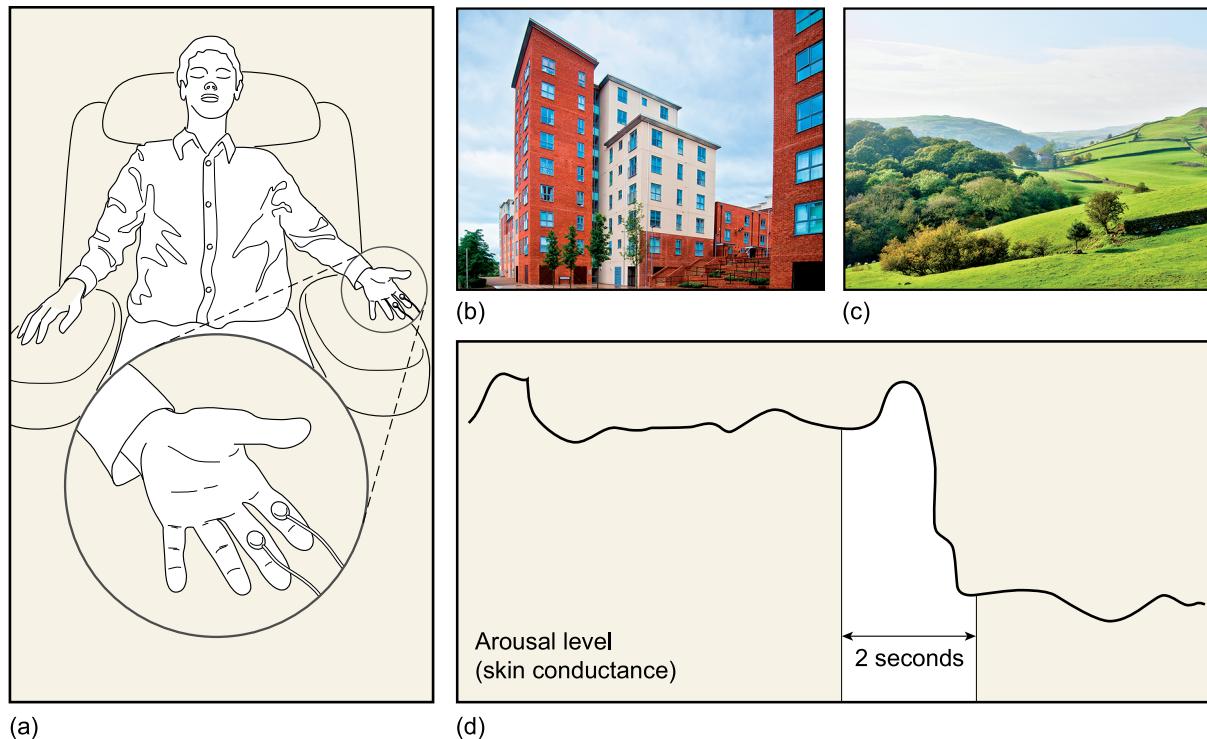
Figure 8.9   Measuring skin conductance in response to urban and nature images

Ulrich thought that all these results fitted with the evolutionary adaptation ideas that were described in Section 2.1. He called this a **psychoevolutionary theory**: people will find a place to be psychologically restorative because it has similarities with the kind of landscape in which the human species evolved. He also highlighted (Ulrich, 1979) how the primary response to an environment that people experience is an emotional one: urban landscapes are more likely to initially evoke negative emotions such as sadness, whereas natural landscapes evoke a mixture of positive emotions. Psychologists now know that this is a fast, automatic response (Korpela et al., 2002), occurring within the first few seconds of seeing or being in an environment, and one that can influence all a person's subsequent thoughts and feelings occurring in that environment. For this reason alone, psychologists need to realise the importance of place when

trying to understand human behaviour – where you are can have a powerful effect on many aspects of your everyday life.

3.2   Attention restoration theory

Similar ideas have been developed from a different perspective by two environmental psychologists, Rachel and Steven Kaplan. In their 1989 book *The Experience of Nature: A Psychological Perspective*, they described research from both psychology and architecture into how people's perceptions of the natural world could change how they were affected by it. They were interested in trying to understand what specific features of natural environments might be restorative, both to further psychology's understanding of the benefits of being in natural settings and with the idea that identifying such features might allow them to be incorporated into designed environments (e.g. urban parks, gardens, city-centre planting). They developed the **attention restoration theory (ART)** (Kaplan and Kaplan, 1989; Kaplan, 1995) to describe a process wherein people recover from **attentional fatigue** through being in an environment which includes four qualities:

- the fascination of sensory qualities that have an inherent appeal

- being away from the demands of regular life

- extent – a sense of vastness or connection between the experience of a place and a person's knowledge of the wider world

- compatibility between what a person wants to do and what they can do in that place.

The first quality should sound familiar – think back to the adaptive aspects in Section 2, where I described the kinds of sensory features relating to the environments in which humans evolved. People find such features appealing – fascinating – because they are easier to perceive with the sensory systems that humans have.

The second quality might seem obvious: ART suggests that when people are stressed, they often want to get away from the place that causes, or reminds them of, that stress. This may be part of the reason why people want to go away from home when they are on holiday.

The third quality is a more cognitive aspect – it is about how a place fits in with people's expectations of the wider environment within which it sits. So, for example, a park in the middle of a city could seem odd to you if it was obvious that it was surrounded by cars and

Attention restoration theory (ART)
A theory proposing that people recover from attentional fatigue through being in an environment which includes the four qualities of 'fascination', 'being away', 'extent', and 'compatibility'.

Attentional fatigue
A reduction in the capacity to concentrate and ignore distractions, occurring after these abilities have been used for a prolonged period of time.

buildings, or if it was full of tropical plants in the middle of a cold, wet climate. However, it would seem much more appealing if clever planting schemes had been used so that, from within, it felt like the city had gone away and you were suddenly in the middle of the countryside, perhaps normally only rarely glimpsed between tall buildings.

The fourth quality is simply a statement that there is always a subjective element – if you go to a specific place, it is usually with the intention of doing something there, whether that is swimming, reading a book or walking the dog, and you will only find a place restorative if you feel able to perform that activity there. However, even here there may be something that goes deeper into human evolutionary history:

> For some reason many people seem to experience nature as particularly high in compatibility. It is as if there were a special resonance between the natural environment and human inclinations … It is hard to avoid the conjecture that the fact that humans evolved in environments far more natural than those in which we live now has something to do with this special resonance.
>
> (Kaplan and Kaplan, 1989, p. 193)

ART is based on the idea that people have two different types of attention. One is directed attention, which is the capacity to actively inhibit competing stimuli. This is a voluntary process which requires conscious effort. It is what you use when you say you are 'concentrating' on something. The other type of attention is involuntary, a passive process which is a spontaneous orienting response to stimuli. It is what you are using when something just 'catches your eye' and you find your head has turned to look at it without you intending to do so. ART says that it is easy to overuse directed attention in our modern lives, and that overuse leads to that attentional system becoming fatigued. It is something you have probably experienced while studying for too long: you start to make mistakes, get easily distracted and find your mind wandering, and generally become irritable. What the Kaplans suggest is that a restorative environment is one which instead engages involuntary attention, giving directed attention a chance to rest. The four ART components described above can therefore be seen as qualities which

allow involuntary attentional systems to be used: fascination by actively engaging involuntary attention, and the other three denoting environment features that do not require a person to use their directed attention as much.

3.3   Perceived restorativeness

Table 8.1   PRS and RCES scale items (items marked R should be reversed when scoring)

ART component	Perceived Restorativeness Scale items	Restorative Components of Environments Scale items*
Fascination	The setting has fascinating qualities	There is plenty to discover here
	My attention is drawn to many interesting things	There are many things here that I find beautiful
	There is much to explore and discover here	There is plenty that I want to linger on here
	I would like to spend more time looking at the surroundings	This setting has many things that I wonder about
		There are many objects here that attract my attention
		I am absorbed in these surroundings
Being away	It is an escape experience	When I am here I feel free from work and routine
	Spending time here gives me a good break from my day-to-day routine	When I am here I feel free from other people's demand and expectations
		When I am here I do not need to think of my responsibility
		I am away from my obligations
Extent	There is too much going on (R)	The elements here go together.
	It is a confusing place (R)	The surroundings are coherent
	There is a great deal of distraction (R)	All the elements constitute a larger whole
	It is chaotic here (R)	The existing elements belong here

Compatibility	I have a sense that I belong here	I can handle the kinds of problems that arise
	I have a sense of oneness with this setting	I rapidly adapt to this setting
	Being here suits my personality	There is an accordance between what I like to do and these surroundings
	I could find ways to enjoy myself in a place like this	I am capable of meeting the challenge of this setting

*The RCES originally had three extra items which related to a new factor which the authors termed 'novelty', but these were shown to be unrelated to attention restoration and are usually omitted.

Source: based on Hartig et al., 1997, Table 2 and Laumann et al., 2001, Table 1

ART has been an influential theory: as well as helping researchers better understand why natural environments tend to be more beneficial than urban ones, it led to the development of two widely used psychological scales: the Perceived Restorativeness Scale (PRS) (Hartig et al., 1997) and a later refined version, the Restorative Components of Environments Scale (RCES) (Laumann et al., 2001). Table 8.1 lists the items from the two different scales. You will notice that they are broadly similar in the kinds of questions they ask. The main difference is that the RCES was expanded and rephrased to give a better relationship between how people responded and the four components specified by ART. Both scales are still used, but many psychologists now prefer the RCES to the PRS because of its better fit to the ART.

Typically, participants in a study would be shown images or videos of specific places and asked to imagine that they were standing in that place. They would then be given one of the scales and asked to respond to each item for that place such that their response described their experience of the environment. In some cases – for example, when evaluating how a park is used or the view from a planned hospital building – participants would actually be present in the place when they fill out the scale. Usually responses would be via a seven-point Likert scale – see Figure 8.10 for an example.

You should note that the PRS 'extent' items in Table 8.1 – those marked with an R – are reversed so would be scored in the opposite direction on the Likert scale, as they have been phrased to measure perceptions of a lack of extent.

	Not at all	Very little	Rather little	Neither little nor much	Rather much	Very much	Completely
There are many objects here that attract my attention	☐	☐	☐	☐	☑	☐	☐

Figure 8.10   An example of a Likert response for one of the RCES scale items

As you might expect, natural environments tend to score higher on these scales than urban environments. However, there are exceptions, as you will see in Activity 8.4.

Activity 8.4   What if I am a city person?

Think about the kinds of questions being asked in the scales in Table 8.1. Can you think of an example where you might score a natural environment low on restorativeness? What about an urban environment which you might score highly? Do you think the examples you come up with would be scored similarly by other people, or not?

Discussion

Remember that these are subjective responses, asking about *your* perceptions and ideas about a specific place. So you might score a natural environment as low because you had a bad experience in a similar natural environment, or an urban environment as high because you had positive associations with a similar urban environment. In addition, it is always worth remembering that questionnaires are open to interpretation – how a researcher interprets specific words such as 'interesting' is not necessarily the same way that each participant interprets those words. This is why questionnaires like these usually ask several questions for each measured component – the researchers hope that individual variations in meaning will have less of an effect on the overall score.

Alternatively, it might be that you have not noticed any restorative aspects of the natural environment because it is unfamiliar, or because it really does not have any! On the other hand, perhaps you are in an urban environment which does have restorative aspects, in the form of gardens and decorative features.

The fact that natural environments tend to attract higher scores is something that architects and planners take into account when designing built environments: they often incorporate natural elements into their designs. This means that restorative elements can also be found in urban ('non-natural') settings, and different buildings or different parts of a city can be scored higher or lower than each other in terms of their potential for restorativeness. For example, Karmanov and Hamel (2008) found that purely urban settings could also be seen as restorative if they included specific landmarks and a variety of natural features, and had layouts that people found interesting. Yet when they looked in more detail, beyond attentional recovery, they found that there were some intriguing differences in the effects of natural and urban environments on people's emotional states. The urban settings were only helpful in terms of reducing self-rated negative emotions such as 'anger' and 'tension'. More complex emotional states such as 'feeling depressed' were only improved by exposure to completely natural environments. This suggests that the effects of the natural world on attention might be secondary to the emotional aspects that Ulrich was interested in. It also suggests that there might be a link between a person's relationship with the natural environment and their well-being.

4   Do people have a 'need' for nature?

The ways in which natural environments are linked to improved well-being is just one aspect of the approach taken by researchers and practitioners who think that restorative environments can have a therapeutic role. A more general point is that psychologists and counsellors should consider the importance of the environment in both explaining and resolving any problems or issues that their clients might be having. If you read further on this topic, in journals and books or on the internet, you will now find that the term **ecotherapy** is widely used to describe this approach, which typically involves 'an intervention that improves mental and physical health and wellbeing by supporting people to be active outdoors' (Mind, 2013b, p. 13).

Ecotherapy
An intervention approach that aims to improve mental and physical health and well-being by supporting people to be active outdoors.

While considering the role of the environment, especially natural environments, might sound like quite a small change to the way in which psychologists view well-being and therapy, it is in many ways quite a profound statement. Think about what happens when you feel unwell, physically or emotionally: how often do you wonder whether the place you are in might be having an effect on you? Think also about what happens when someone goes to the doctor because they feel depressed: they might be given medication, invited to go to counselling, or referred to a psychologist, but they are usually then expected to return to the same place in which they developed that depressed state. If you examine the way in which mental well-being is thought about in psychology, you will rarely see much importance given to the environment, especially the natural environment. For example, in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM 5, 2013), the only explicit mention of the natural environment is having a specific phobia relating to it (see p. 859). Other references to the environment are predominantly about psychosocial stressors rather than the physical environment. The only classification in the entire DSM that could be used to refer to a lack of exposure to natural environments would be 'V62.89 Religious or spiritual problems' (p. 725), as, despite the kinds of research I have described in this chapter, feeling that a lack of nature is affecting one's well-being is still generally seen by psychologists as an idiosyncratic belief rather than a real effect.

4.1 Ecotherapy

Ecotherapists take a different view. They think of a client's relationship with the natural world as being as important to their well-being as any of their social relationships. Ecotherapists often agree with the evolutionary view that, because humans are adapted to natural environments, people often have problems in coping with urban environments (and much of modern life!). However, ecotherapists go beyond this to suggest that being in a natural environment, or at least having natural stimuli present in a non-natural environment, fulfils a basic human need. Part of this argument is based on the earlier studies I described in Sections 3.1 and 3.2, which showed that natural environments are linked with stress reduction and attention restoration, but ecotherapists also highlight apparent links between mental health and the type of environments in which people spend time. For example, Grahn and Stigsdotter (2003) found that spending time outside in open green spaces (parks, gardens, planting schemes) in urban environments was correlated with lower levels of stress in town dwellers. Furthermore, Coon et al. (2011) reviewed 11 different studies and found that the evidence suggested that physical activity in an outdoor, natural environment may be more beneficial to mental well-being than similar physical activity indoors, with participants reporting greater feelings of 'revitalization and positive engagement, decreases in tension, confusion, anger, and depression, and increased energy' (p. 1). However, they note that the duration of benefits was unknown and that biases may have existed as participants were aware of which condition they were in (indoors or outside).

Mind, the mental health charity, commissioned a large number of research projects using various forms of ecotherapy as part of a five-year project called Ecominds (Mind, 2013a). These projects were carried out by universities, community groups and charities, and within the NHS. Examples of included projects were community gardens for people with mental health issues, exercise in green spaces, and social enterprise schemes involving growing and selling vegetables.

At the end of the five-year period, a report (Bragg et al., 2013) evaluated the overall results by comparing randomly selected participants at the beginning and end of their involvement with individual projects. This involved 515 participants from 52 separate projects. Measures included self-ratings of well-being (using the Warwick–Edinburgh Mental Well-Being Scale: Tennant et al., 2007),

mood (using the Profile of Mood States: Curran et al., 1995) and self-esteem (using the Rosenberg Self-Esteem Scale which you read about in Chapter 4: Rosenberg, 1965).

What the researchers found was that over the course of the projects, mean well-being scores were significantly improved by 17 per cent, with 62 per cent of participants reporting improvements; mean mood scores significantly improved by 6 per cent, with 76 per cent of participants reporting a positive change; and mean self-esteem scores showed a significant increase of 11 per cent, with 6 per cent of participants reporting an improvement in their self-esteem.

Additionally, they asked the selected participants about their feelings of belonging to their community. At the beginning of the projects, 60 per cent of participants said they did not feel as though they belonged. At the end of the projects, 59 per cent of participants said that they now felt that they did belong.

In their conclusion, Bragg and colleagues (p. 76) write:

> The majority of Ecominds participants will leave the programme with better wellbeing and self-esteem; feel more socially included; will have gained new skills and developed healthier lifestyles; have enhanced psychological health and wellbeing; and an increased connection to nature.

> These significant improvements as a result of the Ecominds scheme all have implications for not only the mental wellbeing and resilience of individuals but also for public health and the management of natural environments.

4.2   Types of ecotherapy

Generally speaking, ecotherapy is used as an umbrella term to cover a wide range of practices, so you will find it used in different ways in the literature – the common factor is that the natural environment will always be involved. Broadly, there are four categories of ecotherapy, though be aware that there is some overlap between them. They are:

- nature as a healthcare setting
- green exercise

- horticultural therapy

- wilderness therapy.

There are also some other types, but the focus here is on relationships with place.

Nature as a healthcare setting

Based on research into restorative environments (and especially inspired by Ulrich's hospital room view study described earlier), there is increasing interest from mainstream healthcare institutions in exploring the extent to which the environment in which a person is treated has an impact on their health. Investigate this in Activity 8.5.

Activity 8.5   Designing a therapeutic space

Imagine you have been asked to design a hospital room that incorporates therapeutic, natural features. Based on what you have read about in this chapter so far, what features would you include and why?

Discussion

You may have thought of having a room with natural views (as in Ulrich's 1983 hospital study) or putting 'fascinating' images with fractal patterns on the walls to help create a more restorative environment. You may have thought about this in terms of other ART elements and also tried to make the room compatible with the patient's desires, or made it seem less hospital-like so that they had some feeling of 'escape'.

While it can be difficult to modify hospital rooms for practical and financial reasons, there have been attempts to explore such ideas. For example:

- Participants in a simulated hospital room showed a significantly increased tolerance for pain – based on the duration for which pain was tolerated, self-rated scores of pain intensity, and less change in skin conductance levels in response to the painful stimulus – when there were plants in the room than when there were no plants (Park et al., 2004).

- Two hundred and seventy-eight coronary and pulmonary patients in a residential rehabilitation centre were blindly and quasi-randomly

allocated to private bedrooms that had either a panoramic view of natural surroundings or a view blocked by buildings. Patients with unobstructed views reported better improvement in physical and mental health than patients with blocked views (although there were some unexpected gender differences, with the blocked view being associated with slower rates of improvements in physical health for women and in mental health for men). They were also more likely to spend time in their bedrooms when they wanted to be alone than the obstructed view group (Raanaas et al., 2012).

These kinds of effects – improvements in mental health, faster and more complete rehabilitation, more pain tolerance, more patient satisfaction and better behaviour – seem to relate to the presence of natural elements in the healthcare setting. While most of the studies focus on the patient's view (i.e. what they can see), there is also evidence that natural sounds are effective. For example, 60 patients under mechanical ventilation support in an intensive care unit were randomly assigned to a 'listen to nature sounds' group or a 'no sounds' control group. Throughout 90 minutes of sounds, and for at least 30 minutes afterwards, the experimental group showed significantly lower blood pressure, lower anxiety and lower agitation levels than the control group (Saadatmand et al., 2013). However, as that study compared a 'listen to sound' group with a 'no sound' group, is it possible that *any* sounds would be beneficial? Not really: it seems to depend on the type of sound. For example, Alvarsson and colleagues (2010) compared stress responses (based on how quickly measurements of electrodermal arousal returned to baseline levels after the stress of performing a mental arithmetic task) for participants listening to each of four different sounds: natural sounds (water from a fountain and tweeting birds at a low volume of 50 decibels); high noise sounds (road traffic noise at high volume of 80 decibels); low noise sounds (the same road traffic noises at low volume of 50 decibels); and ambient noise (recorded in a quiet backyard, with mostly air ventilation machinery sounds at a volume of 40 decibels). Recovery from stress was consistently faster for the natural sounds than for the other sounds.

Similar effects have been found for listening to pleasant music (e.g. Thoma et al., 2013). Thoma and colleagues found that, overall, listening to relaxing music before a stressful event resulted in a return to baseline levels of arousal that was significantly faster than for either a no-music control group or a nature sounds ('swirling water')

comparison condition. This was true according to measures of heart rate variability and stress-related chemicals in saliva, yet measures of cortisol (the concentration of which relates to levels of stress) were lowest for the nature sounds condition. The authors speculate that this might show a differential response to natural sounds versus music, as the first two measures relate to the sympathetic nervous system responses whereas the last measure relates to emotional processing. However, it is also interesting to note that there is evidence that perceptions of how pleasant ('melodic') music is relate, in part, to its fractal structure (see Section 2.4) – in terms of the difference in pitch between successive musical notes and the duration of each note (Beauvois, 2007), although Thoma and colleagues do not report data on how fractal their relaxing music was.

On a wider scale, the NHS Forest project in the UK (NHS Forest, n.d.) aims to improve the health of staff, patients and local communities by increasing access to green spaces on or near NHS-owned land. Strategies include producing maps of local walks through parks, nature trails and countryside and making these available in doctors' surgeries, and getting people involved in tree-planting schemes (in the hope that this gives them a feeling of connection to the newly produced woodland, making them more likely to spend time there). This kind of project emphasises the preventive aspects of nature benefits: using knowledge gained by psychology researchers to prevent health problems from occurring, rather than simply trying to treat symptoms or enhance recovery after people become unwell.

Green exercise

As the name suggests, this second type of ecotherapy is all about physical exercise in a natural environment. A review of studies into green exercise (Coon et al., 2011) looked at interventions which consisted of a single episode of walking or running indoors and the same activity at a similar level conducted outdoors on a separate occasion. Compared with the indoor activity, they found that exercising outdoors in natural environments was associated with greater feelings of revitalisation and positive engagement, decreases in tension, confusion, anger and depression, and increased energy. Participants also reported greater enjoyment and satisfaction with the outdoor activity and were more likely to say that they would repeat the activity at a later date.

It is also clear that how close people live to accessible green space has an impact on how much exercise they take. One study by Coombes and colleagues (2010) correlated the distance and availability of green space with the likelihood that people would achieve the 30 minutes or more of moderate activity five times a week that the NHS guidelines recommend. Unsurprisingly, they found that people said they were more likely to visit the green space the closer it was, but they also showed that people who visited the green space (especially formal parks) were more likely to do the recommended amount of exercise.

However, a later study by Mytton and colleagues (2012) found that, although people living in areas with the most accessible green space were 1.27 times more likely to do the recommended level of exercise than those in areas with the least accessible green space, the difference was explained by their involvement in gardening, maintenance and work-related activities rather than recreational ones. This suggests that what is normally thought of as 'exercise' when planning health interventions may be misleading, but does confirm that access to green space is important for encouraging physical activity.

Such findings have been acknowledged by some groups involved in environmental protection work. One example is the Conservation Volunteers' 'green gym' scheme. They train people as coordinators to run projects that have an environmental theme, based around the idea of creating, protecting and maintaining green spaces such as allotments, parks or playing fields. Volunteers of all ages are recruited locally and given training in a variety of skills ranging from gardening and clearing derelict sites to monitoring wildlife. Whatever the activity, there is a physical exercise element appropriate to the abilities of the volunteers that takes place in an outside, natural setting. According to an independent evaluation of the scheme (Yerrell, 2008), based on 52 projects around the UK, 99 per cent of participants reported enhanced health and confidence after taking part. The study estimated that environmental volunteering, including tasks such as tree planting, could be as effective as dancing, jogging, keep-fit classes or swimming in improving physical fitness. Plus, a side effect of all this activity is to create and maintain a restorative environment that will continue to benefit all who visit it.

Horticultural therapy

The third type of ecotherapy is horticultural therapy (or sometimes therapeutic horticulture), and basically consists of working with plants

in a variety of contexts. It is often used in a rehabilitation setting for people with mobility problems such as arthritis or who are recovering after surgery. As such, it can be seen as a gentle form of green exercise that focuses on fine motor skills (for tasks such as weeding, potting up seedlings, pruning, and so on) but which also involves working in an environment likely to have restorative benefits. Increasingly, the emotional and more general mental health benefits are being recognised, as the tasks involve caring for plants, nurturing and protecting them, and hopefully seeing them flourish (Clatworthy et al., 2013). Horticultural therapy is now also used to help people cope with terminal illnesses such as cancer (Wang et al., 2013) or recover from severe psychological trauma (Lorber, 2011).

However, it is worth remembering that, as with any human interaction, the situation may well be more complicated. The following paragraph is taken from an article called 'Is horticultural therapy a myth?' (Cherry Tree Nursery, 2010, p. 86) written by volunteers at a sheltered work rehabilitation project for people with severe and enduring mental illness:

> Horticulture provides the right environment, the ability to feel the wind and the sun, to listen to the birds, to watch the butterflies. It provides the opportunity to work together and meet others, and a useful environment to produce something people want to buy to help keep the project going, in fact plant sales cover half the project's running costs. However, many volunteers are not interested in plants, and this lack of interest will not necessarily change. Not everyone will stay, some are scared of plants, seeing them as something frightening, poisonous, dangerous, prickly, causing rashes or illness, something to be avoided, even dreaded. They have a lack of connection, don't like, or are afraid of, being outside, of getting their hands dirty. The project's great value, and what has helped literally save lives, is that it provides a community. Cherry Tree Nursery is like a village, somewhere people come together, learn to care for and support each other. To quote one of the volunteers 'it wouldn't matter if we made pies, it's the working together that counts'.

As you can see, while they acknowledge the importance of the physical environment, they also clearly see the social support as vital. Because of such concerns, the idea of horticultural therapy is now often

expanded to include the social aspects, and termed social and therapeutic horticulture (STH). While it is acknowledged that ideas such as social inclusion and skill acquisition are also present in other care initiatives, researchers and participants usually emphasise that the environment in which STH takes place in has a special significance:

> Clients attending STH projects valued the opportunity 'to be outside', and different clients assigned different meanings and importance to specific aspects of being outside. There was not only a sense of escape from the 'inside' and its associated restrictions, but a desire to be in the natural environment. The natural, green environment was preferred to the outdoor city environment. Some clients and staff also described a deep emotional connectedness with nature and the garden space as the embodiment of nature.
>
> (Sempik and Aldridge, 2005)

Wilderness therapy

The last type of ecotherapy is wilderness therapy, also called adventure therapy depending on the specific activities involved. There are various approaches, but most wilderness therapy programmes will include the following elements:

- The activity will take place in a natural setting, usually somewhere without much sign of human alterations to the environment (a 'wilderness').

- Participants will be given plenty of time for self-reflection. Sometimes this will include time spent completely alone in a wild space.

- Activities include physical challenges such as rock climbing, kayaking, hiking, and so on, though tailored to meet the abilities of the participants.

- Some kind of back-to-basics living is involved, such as camping, foraging for food, lighting fires and simple cooking skills.

- Interaction with a peer group takes place, and the chance to give each other informal feedback. This may take the form of group counselling, and usually also involves a trained counsellor.

This type of ecotherapy will again incorporate some aspects of green exercise and (as with horticultural therapy) encourages social interaction and support. The environment, being natural, should have a restorative effect. However, researchers think that something more is happening, relating to changes in a person's level of self-knowledge and feeling 'at one' with nature (e.g. Talbot and Kaplan, 1986). Now examine this in Activity 8.6.

Activity 8.6   Relating theory to therapy

Which components of attention restoration theory do you think apply to wilderness therapy? Does Ulrich's psychoevolutionary theory help you to understand why there might be beneficial effects from such therapy?

Discussion

You may well have answered 'all the ART components apply' and you would be right. A wilderness setting is most definitely an *escape*, as the whole point of being there is to spend some time away from urban life. As it is in a natural environment, the *fascination* component will apply (and indeed, the whole point of the solo vigil is to spend the time simply attending to the natural stimuli that are all around you). Similarly, a natural environment that is relatively unaltered by human activity should have *extent*, as all its elements developed together (through processes such as erosion, growth, geological events). Assuming you had willingly gone on a wilderness therapy trip, you would also find it *compatible* with your needs (although there may well be individual differences for this component, as it is the most subjective one – how compatible do you think you would find it if it rained constantly and you did not like getting wet?).

Psychoevolutionary theory also helps us to understand wilderness therapy, as it suggests that being in a wilderness will act to reduce stress levels and induce a positive emotional feeling. These effects will then influence all the other activities that may take place and make them feel more beneficial.

5   Summary

This chapter has considered the relationships between humans and the natural environment. The chapter started by considering the idea that human bodies have unlearned responses to different physical environments, and that these evolved (and are still evolving) in large part as adaptations to those environments. You learned how human vision is more sensitive to colours that relate to sources of food or useful vegetation, and how people tend to prefer landscapes that are similar to those in which humans spent most of their evolutionary history (i.e. savannah-like landscapes). The first section ended by exploring the notion of fractals – structures which show self-similarity on different scales – and how the presence of fractals can influence people's aesthetic preferences.

In the next section, this knowledge was applied to human well-being, considering the idea of the restorative environment – a place that has qualities which help people return to their resting state in terms of physical arousal. You learned about the two main theories in this area – psychoevolutionary theory and attention restoration theory – and how the idea of restorativeness has been measured in psychology using the Perceived Restorativeness Scale and the Restorative Components of Environments Scale.

Finally, you explored the issue of whether humans have a fundamental need to be in natural environments, at least some of the time, and the role of ecotherapy in well-being. You learned about the different types of ecotherapy – the benefits of incorporating natural stimuli into a healthcare setting, enhancing the effects of physical exercise by doing it in natural surroundings, working with plants for their therapeutic value, and the effects of being in a wilderness setting.

Taken together, you should now have a good understanding of how psychologists have explored the relationships that people have with their natural environments, and how the knowledge gained has been applied in real contexts to improve people's physical and mental well-being.

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