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## Linking preference for environments with their restorative quality

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### Abstract

Why do people so commonly prefer natural scenes over urban scenes? Answers to this question have implications for the development and application of research on environmental aesthetics. In a series of three experiments, we studied how the need for and the likelihood of psychological restoration affected preference for a forest versus an urban centre. In this work, we treated preference as an attitude toward a behaviour that a person could perform in either environment, namely, walking for one hour. We also manipulated the need for restoration – specifically, the degree of attentional fatigue – experienced by the person just prior to the walk. The fatigue manipulation involved either scenarios or naturalistic conditions. The walk itself was simulated; we used sets of consecutive photographic slides to represent movement through the given environment. Our results were consistent across the experiments.

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The subjects expressed a more positive attitude toward walking in a forest compared to an urban centre. The difference in attitude toward the two environments was greater among subjects with a greater degree of attentional fatigue. This result apparently owes to the more positive evaluation of attentional recovery by those who were fatigued, and to the greater likelihood of attentional recovery occurring with a walk in the forest. These findings speak to the consequences of ignoring a preference for natural environments commonly expressed by members of urban populations.

**Keywords:** attentional fatigue; attitude; psychological restoration; stress

## Introduction

Adults commonly express greater liking or preference for scenes dominated by trees, water and other natural features, compared to scenes of urban areas without such natural features. This pattern of preferences appears to hold over cultures and historical periods (for reviews, see for example Ulrich 1983; Knopf 1987; Hartig and Evans 1993). Indeed, it seems that reference to this pattern has become a commonplace of the environmental-preference literature.

Why does this pattern of preferences so commonly appear? Answers to this question could have practical value. Knowledge about people's preferences helps land managers, planners, politicians and others to guide changes in the environment. Because economic and other social forces so commonly press for change away from natural conditions and toward more urban ones, some of the knowledge needed has to do with the consequences of violating people's preference for the natural. How one judges the significance of those consequences depends on the stance one takes regarding a particular theoretical claim. Environmental professionals may assign preferences substantial weight if they accept the claim that preferences reflect a person's appreciation, perhaps not conscious, for how the given environments affect his or her health and well-being (e.g. Kaplan and Kaplan 1982).

In this light, consider what Porteous (1996) wrote in his comprehensive survey of the research on environmental aesthetics:

“The assumption that preferred scenes are somehow good for us, with the corollary that disliked ones have the opposite effect, has rarely been tested. Yet it would seem especially important to discover if scenes that are ‘good to see’ are simply good aesthetically (i.e. good to think or good to feel) or whether such aesthetic satisfactions have deeper implications, such as the promotion of physical well-being and mental health” (p. 132).

In this chapter we will summarize the core findings from a series of three experiments that tested hypotheses about the preference for natural over urban environments. Our experiments addressed the need stated by Porteous, in that we investigated whether this particular pattern of preferences does have ‘deeper implications’. We sought in our measurement procedures to reach behind the global statement of preference to aspects of the experience of the environment with more direct relevance to health and well-being. Our efforts were guided in part by research on restorative environments; we considered how variation in environmental preferences may owe to varying needs for psychological restoration in combination with the possibilities for restoration seen in the given environments.

## **Theoretical and empirical foundations of the research**

All of us regularly and inevitably face a need for restoration. To meet the demands of our everyday lives, we call on a variety of resources – our physical energy, a capacity to direct attention, the support of our family and friends. As these resources diminish with use, the need to restore them may become increasingly acute. If we neglect the need for restoration and fail to restore our depleted resources, then our ability to meet further demands, our ability to act effectively, and eventually our physical and mental health, will suffer.

We will define ‘restoration’ here as the process of renewing or recovering physical, psychological and social capacities that have become depleted in meeting ordinary adaptational demands. Defined in this way, the term serves as a rubric that covers multiple processes. Those processes may become manifest in changes in emotion, physiology, cognitive capabilities, interpersonal relations and other ways. Just which restorative processes are underway in a person in a given instance will depend on the resources that the person drew on in the effort to meet foregoing demands.

Just how restoration proceeds owes in part to the characteristics of the demands faced and the individual who has faced them (Frankenhaeuser and Johansson 1986; Linden et al. 1997). Our interest in this chapter, however, lies with the sociophysical characteristics of the environments available for restoration. Put simply, restoration proceeds better in some places than in others. This is so in part, but only in part, because the individual experiences the place as less demanding. More importantly, restoration proceeds better – it is faster, perhaps more complete – in some places because they have qualities or features that promote restoration. They are pleasing to the eye. They hold our interest. We can do things in them that we like to do. And more. We can thus define ‘restorative environment’ in positive terms, as an environment that promotes, not merely permits, restoration (Hartig 2004).

Research on restorative environments complements research on the environmental conditions that present demands to people and so cause their adaptive resources and capabilities to diminish. Research on ‘environmental stress’ (Evans and Cohen 1987), has paid much attention to the settings where individuals spend most of their time, such as the workplace, and to social and physical conditions in the urban areas in which the human population has increasingly concentrated. In keeping with the complementary character of research on restorative environments and environmental stress, experimental studies of environmental influences on restoration have most commonly treated the urban environment as a source of demands, rather than as a place that can promote restoration when it is needed. As a hypothetically restorative comparison condition, these experiments have used natural environments.

The natural–urban comparison follows from theories about restorative environments, which have treated nature experience as a source of restorative benefits for people living in urbanized societies. To date, two theories have inspired most of the research on restorative environments within environmental psychology and related fields. Roger Ulrich (1983; Ulrich et al. 1991) has considered restoration, or, more exactly, stress recovery, as a kind of prolonged aesthetic response to the environment. He views humans as biologically prepared to respond positively to visible features of the environment that signal possibilities for survival. His theory emphasizes the physiological and emotional changes that can occur while viewing a scene after a situation involving challenge or threat. He proposes that perceiving particular qualities and contents in a scene can support psychophysiological stress recovery. Moderate depth, moderate complexity, the presence of a focal point, gross structural

qualities, and natural contents such as vegetation and water can evoke positive emotions, sustain non-vigilant attention, restrict negative thoughts, and so aid a return of autonomic arousal to more moderate levels (cf. Fredrickson and Levenson 1998).

In contrast, Stephen and Rachel Kaplan's attention restoration theory (1989; Kaplan 1995) has a primarily cognitive character. According to this theory, we use directed attention in everyday life to stay engaged with tasks that of themselves hold little interest. Doing this involves mental effort, as it requires inhibiting oneself from allowing attention to drift to more interesting things. The ability to maintain this effort diminishes over the time spent on-task, and 'directed attention fatigue' may then show up in, for example, greater difficulties with working well, irritability, a lack of sensitivity to the people around us, even accidents. The recovery of an ability to direct attention can occur when the person has a sense of being away from the routines in which directed attention becomes depleted, and can instead rely on effortless attention, or fascination, while performing chosen activities in the environment. This can occur readily in many natural environments, according to the Kaplans.

The experimental and quasi-experimental studies guided by one or both of these theories have rather consistently supported the idea that natural environments have a restorative advantage in comparison to urban settings (e.g. Ulrich 1979; Hartig, Mang and Evans 1991; Ulrich et al. 1991; Hartig et al. 1996; Parsons et al. 1998; Kuo and Sullivan 2001; Hartig et al. 2003; Laumann, Gärling and K.M. 2003; Van den Berg, Koole and Van der Wulp 2003). This finding holds whether a given study was carried out in field settings or with photographic simulations in a laboratory, and it holds across different populations (university students from Southern California, Northern Sweden, Norway and The Netherlands; urban public housing residents in Chicago; adults in the labour force in Southern California). The results from the various studies also show substantial concurrence across the measures of emotion, attention and physiology used to assess restoration.

The theory and empirical research just reviewed suggests that the tendency to prefer natural over urban environments has some connection to the relative restorative value of natural and urban environments. Still other studies have focused more directly on the correlation between preference for environments and their restorativeness (Purcell, Peron and Berto 2001) and on restoration as a process that mediates the relationship between an environment and liking for it (Van den Berg, Koole and Van der Wulp 2003).

What this theoretical and empirical account lacks at this point, however, is a closer specification of how natural and urban environments acquire their relative restorative value in the everyday lives of the people who could form preferences for them. Much is made of the possible innate bases for a preference for natural environments, but substantial evidence also points to the influence of personal experience, social norms and cultural values in shaping preferences (for reviews see e.g. Bourassa 1991; and Hartig and Evans 1993). This issue becomes particularly salient with a shift in focus from preference for the visual aspect of a given environment to preference for a given environment as a place in which to carry out particular behaviours and fulfil particular roles. As we indicated earlier, an increasingly large proportion of the human population has much of its day-to-day experience situated in urban areas. The majority of people living today do not reside in natural environments or go to them to perform activities required by their economic and social roles. Rather, they go to them for recreation, to gain distance from demands imposed on them in the course of fulfilling their economic and social roles within urban settings. The extensive literature on outdoor-recreation motivations speaks of the manner in which people

leave stressful cities to seek tension reduction in natural areas (Knopf 1987). Visits to these places ordinarily occur by choice, motivated by a desire for certain experiences and attended by expectations about the experiences available at the destination (cf. Ajzen and Driver 1991). They are planful movements, not random ones.

Consider it another way. The demands of everyday life and opportunities for restoration do not occur entirely at random, but are distributed in time and space, reflecting the ways in which people's everyday activity cycles become structured within urbanized societies (Hartig, Johansson and Kylin 2003). Urbanized societies, and everyday activity cycles within them, have a structure such that experiences of nature follow from experiences of demands imposed by social and economic roles and the urban environment itself. To the extent that nature experiences require movement outside of the urban area, they occur according to a plan that expresses hopes and expectations for, among other valued outcomes, psychological restoration.

We put the matter forward in this way to emphasize an important methodological issue so far little considered in the research on environmental preferences. Preference studies to date have commonly considered how preference judgments vary with environmental variations and with variations between people, but they have not as commonly considered how preference judgments vary within individuals across time states. We argue that psychological states – in particular those that reflect on the experience of stress or directed attention fatigue and on processes of restoration from those antecedents – correspond in predictable ways with physical and temporal locations in regular patterns of activity. Much as many people look forward to a relaxing evening at home after a heavy day at work, so also do many people look forward to a restorative period in a natural environment after meeting the demands of work and family life in their usual, urban or suburban surroundings. In sum, we think that particular forms of within-individual variation involving the need for and realization of psychological restoration, structured by activity patterns in urban societies, are relevant for the commonly found pattern of preference for natural over urban environments.

Departing from this theoretical and empirical background, we have in the three experiments to be discussed here addressed the following research questions:

- Do adults tend to prefer natural scenes over scenes of urban outdoor public spaces because they show better possibilities for psychological restoration?
- Do adults who have a greater need for restoration show a greater preference for natural versus urban scenes?

### **Some common methodological features of the experiments**

The details of our measurement methods and experimental procedures are given in Staats et al. (2003), Staats and Hartig (2004) and Hartig and Staats (in prep.). Here we want only to emphasize some central features of our methods. One of the main methodological strategies has involved reframing environmental preference as preference for a behaviour-in-the-environment. This is reasonable; whenever we look at a scene, we can see possibilities for behaviour. To make explicit for those expressing their preference just what behaviour they would be performing in the given environment constitutes a methodological improvement.

Given that we are actually concerned with preference for a behaviour-in-the-environment, we can then apply the expectancy-value model of attitudes toward behaviour (Fishbein and Ajzen 1975). Thus, preference is treated as an attitude toward a behaviour in an environment. That attitude is based on the likelihood that the

behaviour will have particular outcomes (what is expected, the expectancy part of the model), in combination with the evaluation of those outcomes (what is valued, the value part of the model).

In our research, we have been concerned with walking as the particular behaviour-in-environment, as it can be easily performed by most adults in most environments. The outcomes we have been interested in are restoration outcomes specified in attention restoration theory. In this chapter we will refer only to the recovery of directed attention capacity, though we have in these experiments also referred to reflection and social stimulation outcomes (see Staats, Kieviet and Hartig 2003; Staats and Hartig 2004; Hartig and Staats in prep.).

Having translated environmental preference into attitude-toward-walking-in-the-environment, the central hypotheses tested in our experiments can be stated as follows:

1. The attitude toward walking for one hour in the natural environment will be more positive than the attitude toward walking for one hour in the urban environment.

This hypothesis refers to the commonly found difference in preference between natural and urban scenes, though with the added specification of the behaviour being performed (and the duration of its performance) in the environment.

2. The difference in attitude toward walking in the natural versus the urban environment will be greater given attentional fatigue.

In other words, the need for restoration should affect the relative preferences for the two environments. Thus, we specify an interaction of environment and antecedent condition, or level of attentional fatigue.

3. The evaluation of attentional recovery is more positive given attention fatigue than in the absence of attentional fatigue.
4. Attentional recovery is expected to be more likely while walking in the natural than while walking in the urban environment.
5. The likelihood of attentional recovery should be substantially and positively correlated with attitude toward walking in both the natural and the urban environment.

Finally, with these hypotheses, we seek to ‘unpack’ preference. We go behind the attitude toward walking in the environment as an expression of environmental preference and look at the motivational bases for that behaviour.

Our three experiments had some important features in common. First, to support the test of the second hypothesis, the subjects differed in their need for restoration, framed as directed attention fatigue.

Second, in each of the experiments the subjects took a simulated ‘walk’ in a forest versus an urban centre (see Figures 1 and 2). The walk was simulated using photographic slides showing progression through the given environment, always along a trail or sidewalk. The use of simulations is common in work on environmental preferences, and ratings of preferences obtained with photographs typically correlate strongly with ratings obtained on-site (Stamps 2000). Photographic simulations have also been used in experimental comparisons of the restorative effects of natural and urban environments, rendering the different environments sufficiently well that they differentially affected self-reports of emotion and various physiological measures, such as systolic blood pressure (e.g. Hartig et al. 1996; Ulrich et al. 1991).



Figure 1. Scene from the forest walk



Figure 2. Scene from the city walk

Finally, in all three of the experiments we obtained scores for each subject on each of three measures, which we present below in the order in which they appeared in the experimental procedure.

1. *Evaluation of attentional-recovery outcomes.* Each subject rated how positively they would regard certain changes characteristic of attentional recovery that could occur with a walk in either of the environments. The changes, or outcomes, include

the following: coming to rest, renew energy, become my self again, lose all tension, order my thoughts again, put everything behind me, regain the ability to concentrate. The ‘evaluation’ score for each subject is the average of the ratings for these seven outcomes. It could range from 1 (very negative) to 7 (very positive).

2. *Attitude toward walking in the given environment.* Each subject rated how attractive, pleasant, positive and agreeable (s)he would experience an hour-long walk in the given environment. The ‘attitude’ score for each subject is the average of these four ratings. It could range from 1 (very negative) to 7 (very positive).
3. *Likelihood of realizing the attentional-recovery outcomes.* Each subject rated the likelihood that the given attentional-recovery outcomes would follow from walking for one hour in the given environment. The ‘likelihood’ score for each subject is the average of the ratings for these seven outcomes. It could range from 1 (very unlikely) to 7 (very likely).

## Experiments 1 and 2: Methods and results

The first two experiments had some distinctive features as well. Our subjects were Dutch university students (for Experiment 1,  $N = 101$ ; for Experiment 2,  $N = 106$ ). Also, we established differing needs for attentional restoration among the subjects using a scenario method; we asked them to imagine themselves as either attentionally fatigued or fully fresh and alert. Further, we used scenes of a familiar type of Dutch forest and familiar urban settings in Rotterdam to simulate the walk (described in Staats, Gatersleben and Hartig 1997). Each of our subjects gave ratings for both of these environments.

Both of these experiments used the following basic procedure. The students were randomly assigned to one of two experimental conditions, defined in terms of whether they read a scenario that described being either fresh or fatigued. After reading the assigned scenario and having been instructed to imagine themselves in the state described, fresh or fatigued, the subjects evaluated the attentional recovery (and other) outcomes of a 1-hour walk. They then took a simulated ‘walk’ through a forest or city centre by watching a series of slides. Next, they rated the likelihood of attentional recovery (and the other outcomes) given a 1-hour walk in the environment just shown. Except for the evaluation of the outcomes, they repeated this procedure for each environment, assuming throughout the given psychological state, fresh or fatigued.

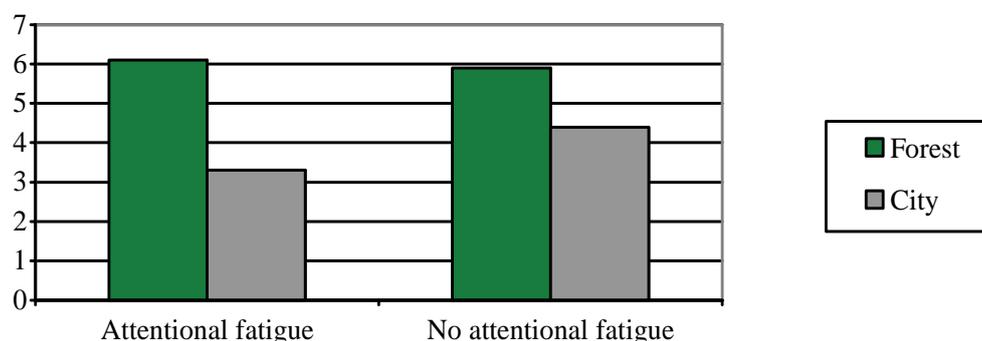


Figure 3. Attitude toward walking in the given environment as a function of the level of attentional fatigue (Experiment 1). A higher score indicates a more positive attitude

Looking at the results from Experiment 1, we can clearly see that, looking across the fatigue conditions, the attitude toward walking for one hour in the natural

environment was more positive than the attitude toward walking for one hour in the urban environment (see Figure 3). This conforms to our first hypothesis. The size of the environmental effect,  $r = 0.75$ , is very large.

In line with our second hypothesis, the difference in attitude toward forest versus city was much greater among those in the ‘Attentional fatigue’ condition than it was among those in the ‘No attentional fatigue’ condition. This interaction apparently involves a less positive attitude toward the urban environment given attentional fatigue. The size of the effect,  $r = 0.37$ , is moderately large.

Consistent with the third hypothesis given above, the attentional-recovery outcomes were evaluated more positively by those in the ‘Attentional fatigue’ condition ( $M = 6.2$ ) than by those in the ‘No attentional fatigue’ ( $M = 4.8$ ) condition. The size of the effect,  $r = 0.63$ , is large.

Consistent with the fourth hypothesis, attentional recovery was judged to be much more likely while walking in the natural ( $M = 5.8$ ) than while walking in the urban environment ( $M = 3.3$ ). Here, we have a very large effect,  $r = 0.83$ .

Finally, consistent with the fifth hypothesis, the likelihood of attentional recovery correlated substantially and positively with the attitude toward walking in both the natural environment ( $r = 0.70$ ) and the urban environment ( $r = 0.73$ ).

The results from Experiment 2 replicate closely those of Experiment 1. As shown in Figure 4, the subjects again held a more positive attitude toward walking for one hour in the natural environment than they did toward walking for one hour in the urban environment. The environmental effect is again very large,  $r = 0.67$ .

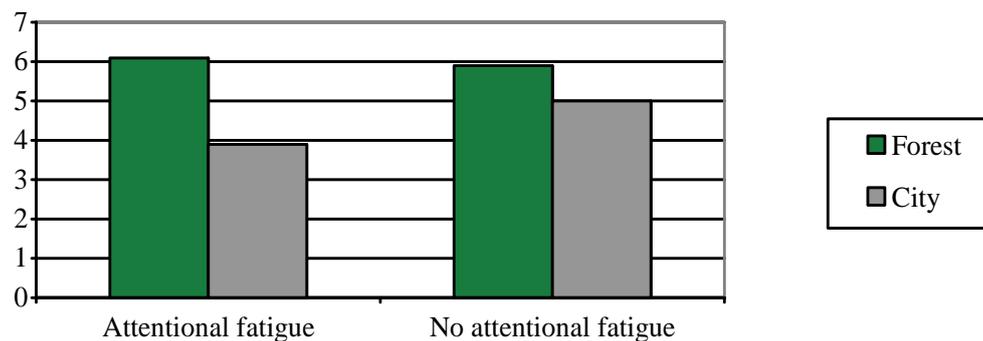


Figure 4. Attitude toward walking in the given environment as a function of the level of attentional fatigue (Experiment 2). A higher score indicates a more positive attitude

As in Experiment 1, the difference in attitude toward forest versus city was much greater among those in the ‘Attentional fatigue’ condition than it was among those in the ‘No attentional fatigue’ condition. Again, this interaction apparently involves a less positive attitude toward the urban environment given attentional fatigue. The size of the effect,  $r = 0.42$ , is again moderately large.

As in Experiment 1, the attentional-recovery outcomes were evaluated more positively by those in the ‘Attentional fatigue’ condition ( $M = 6.2$ ) than by those in the ‘No attentional fatigue’ ( $M = 5.3$ ) condition. The size of the effect,  $r = 0.48$ , is again large.

As in Experiment 1, attentional recovery was judged to be much more likely while walking in the natural ( $M = 6.0$ ) than while walking in the urban environment ( $M = 3.8$ ). Here, we again have a very large effect,  $r = 0.70$ .

Finally, as in Experiment 1, the likelihood of attentional recovery correlated substantially and positively with the attitude toward walking in both the natural environment ( $r = 0.71$ ) and the urban environment ( $r = 0.74$ ).

### Experiment 3: Methods and results

With the design of our third experiment we addressed two concerns expressed about key methodological features of the first two experiments. One of these concerns had to do with the fact that each subject rated both the walk in the forest and the walk in the urban centre. Arguably, the rating of the one environment could have affected the rating of the second environment by indicating to the subject the essence of core hypotheses and so how he or she was expected to behave (that is, an ‘experimenter demand’). To guard against this possibility, we had counterbalanced the order of presentation of the two environments, so that 50% of the subjects first rated the walk in the forest and the remaining 50% first rated the walk in the urban area. Furthermore, we conducted supplemental statistical analyses to check whether order of presentation substantially affected the ratings for the environments. The mean attitude scores for each environment were essentially the same, regardless of whether it was rated first or second. Still, to provide an additional measure of protection against the ‘experimenter demand’ argument, in the third experiment each subject provided ratings for a walk in only one of the environments.

Another concern with the first two experiments had to do with the approach taken to varying the need for restoration assumed prior to the simulated walk. Each scenario referred to a psychological state familiar to and easily imagined by the given subjects, but the procedure required them to bear that psychological state in mind while evaluating the various outcomes, expressing their attitude toward the walk, and rating the likelihood of the various outcomes. We gave the subjects reminders throughout the procedure to make their ratings while imagining themselves as fresh or fatigued. We cannot say, however, how well they followed these instructions, nor how closely their actual state at the moment corresponded to the state specified in the scenario, nor how well the ratings obtained with the scenarios would correspond to ratings that we might obtain from those subjects if they were actually as fresh or fatigued as specified. These uncertainties lead in turn to questions about the accuracy with which we have estimated the strength of the effects that we found. To address our concern in this regard, in the third experiment we used a naturalistic fatigue induction instead of scenarios. We established different restoration needs by taking the randomly assigned student subjects through the procedure in the morning before a lecture versus in the afternoon after a long lecture.

Aside from the two methodological features just discussed, the third experiment had other features which distinguished it from the first two experiments. The subjects were Swedish university students ( $N = 103$ ). Also, we used scenes of Swedish settings for the simulated walk. The subjects ‘walked’ in either a typical Swedish pine forest or in an urban location we expected to be familiar to most if not all of the subjects, an area near the centre of Stockholm. Otherwise, the methods used were essentially the same, including the measures, translated from Dutch into Swedish.

The results from Experiment 3 replicate those of Experiments 1 and 2. As shown in Figure 5, the subjects once again held a more positive attitude toward walking for one hour in the forest than they did toward walking for one hour in the urban centre. The environmental effect is again very large,  $r = 0.60$ .

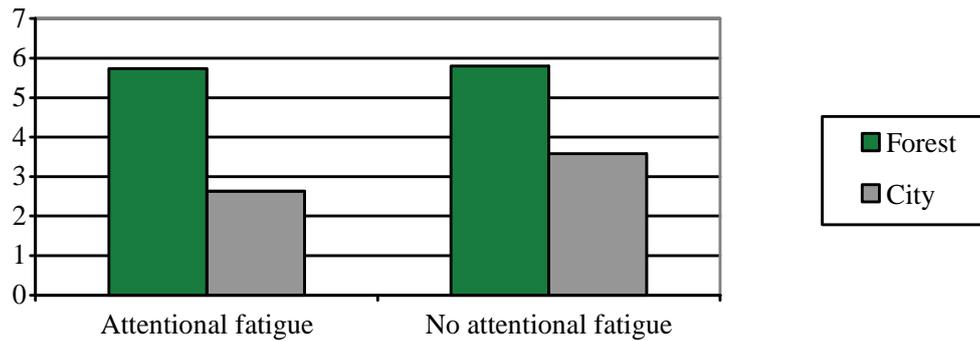


Figure 5. Attitude toward walking in the given environment as a function of the level of attentional fatigue (Experiment 3)

The difference in attitude toward the forest versus city walk was greater among those who just sat through an afternoon lecture than it was among those who completed the experiment in the morning before a lecture. As in Experiments 1 and 2, this interaction apparently involves a less positive attitude toward the urban environment given attentional fatigue. The size of the effect,  $r = 0.17$ , is, however, substantially smaller than those obtained in the earlier experiments with the scenario manipulations.

The attentional-recovery outcomes were evaluated more positively by those in the 'Attentional fatigue' condition ( $M = 5.0$ ) than by those in the 'No attentional fatigue' ( $M = 4.6$ ) condition. The size of the effect,  $r = 0.22$ , was, however, modest.

Attentional recovery was judged to be much more likely while walking in the forest ( $M = 5.3$ ) than while walking in the urban centre ( $M = 2.9$ ). Here, we again have a very large effect, essentially the same size as that observed in Experiment 2,  $r = 0.70$ .

Finally, as in Experiments 1 and 2, the likelihood of attentional recovery correlated substantially and positively with the attitude toward walking in both the forest ( $r = 0.37$ ) and the urban environment ( $r = 0.66$ ). The former association, however, was not as strong as that seen in the earlier experiments.

## Conclusions

Departing from theoretical and empirical research on environmental preferences and restorative environments, we raised two questions about the commonly described tendency for adults to prefer natural over urban scenes. First, do adults tend to prefer natural scenes over scenes of urban outdoor public spaces because they show better possibilities for psychological restoration? Second, do adults who have a greater need for restoration show a greater preference for natural versus urban scenes?

We addressed these questions with a series of three experiments. A methodological innovation in this series of experiments built on the expectancy-value model of attitudes, and involved reframing environmental preference as an attitude-toward-a-behaviour-in-an-environment. As our target behaviour we used walking for one hour, as our subjects could readily perform this behaviour in the environments under study.

In each experiment, we found a more positive attitude toward walking for one hour in a forest compared to a familiar city centre. This result echoes the results obtained in previous studies with measures of global preference. More importantly, this difference was substantially larger among those who had a greater need for restoration, either

imagined or actual. Notably, the difference in attitudes apparently became greater because the attitude toward walking in the city became less positive with attentional fatigue. Also in line with our hypotheses, this pattern of attitudes appeared to owe to the greater likelihood of restoration in the forest and the more positive evaluation of attentional recovery by those who had a greater need for restoration, either imagined or actual.

These findings extend in two important ways the available literature concerned with the relative preferences for natural and urban scenes. First, they speak to the motivational bases for global visual preferences. Those preferences may in fact have what Porteous (1996) referred to as 'deeper implications'; they may say something about how the environment affects our health and well-being.

Second, our results call attention to within-individual variation in psychological states as a source of variation in environmental preferences. Experimental and survey research on environmental aesthetics has to date ordinarily considered how preference judgments vary with environmental variations and with variations between people, but they have not as commonly considered how preference judgments vary with within-individual states. This would not necessarily be a major shortcoming if people's psychological states varied randomly over time and in ways unrelated to the environment. Yet we have argued here that some within-individual variation in psychological states occurs regularly and frequently as a function of the structure of everyday activity cycles in urbanized societies, and that those activity cycles distribute relevant psychological states in a non-random fashion across times and places, including natural and urban environments.

In this light we would do well to consider Lewis's (this volume, chapter 6) criticism of cross-cultural research on preferences. That greater liking or preference for scenes dominated by natural features has been found in different countries may have to do with the selection of samples from urban populations within those countries. Whether the study is performed in an Asian, European or American country has less relevance than whether the subjects come from an urban population or not.

In closing, we simply note that the results of our experiments may clarify for some just why many citizens prefer the preservation of local natural areas over other land uses, such as housing or commercial development. To some degree, our results suggest, their preferences reflect on their needs for psychological restoration, their positive evaluation of restoration outcomes, and their expectations about achieving restoration with a walk in a forest.

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The order of authorship is alphabetical.

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