Personal Need for Structure and Environmental Preference

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Abstract. This paper examines the influence of need for structure on preferences for natural environments using the Personal Need for Structure scale (PNS; Thompson, Naccarato, & Parker, 1989). Starting from the assumption that individuals are motivated to process information in a manner that matches and reinforces their needs and personality characteristics, it is hypothesized that chronic individual differences in the need for structure are linked to preferences for natural settings with varying degrees of order and human influence. In support of this hypothesis, Study 1 showed that a high need for structure was related to a higher preference for gardens as compared to natural landscapes. In addition, Study 2 showed that a high need for structure was related to a higher preference for agrarian landscapes as compared to wilderness landscapes, whereas Study 3 showed that a high need for structure was related to a higher preference for traditionally managed urban nature as compared to ecologically managed urban nature. Together, these results substantiate the importance of motivation and personality for understanding the evaluation of natural environments.

1: Introduction

Imagine you are taking a stroll through your neighbourhood on a beautiful summer evening. Like many people, you enjoy peeking at your neighbours' houses and gardens, trying to picture the kind of persons living there. Now imagine that you are walking past the following two front gardens, belonging to identical adjacent houses: One garden is neatly manicured, with well-tended perks of roses and other flowers divided by little cobblestone paths. The garden next door has a different appearance. It is completely overgrown with wild bushes and flowers, that are allowed to freely grow and blossom. What kind of persons would you think inhabit the houses belonging to these gardens? And how would you react if you found out that the neatly manicured garden belongs to an

adventurous person with an irregular life-style, while the wild garden belongs to an order-loving person with a structured life-style? Mostly likely, you would be quite surprised. After all, it seems intuitively plausible that there exists a relationship between a person's general need for order and structure and his or her environmental preference. However, while people's intuitions are often right, scientific progress has repeatedly shown that intuitions can be mistaken. It thus remains to be seen whether a psychological need for structure is indeed associated with a preference for certain kinds of natural environments. The purpose of the present paper is to verify the scientific tenability of this association.

1.1: A motivational approach to environmental preference

Developments in social and cognitive psychology provide a theoretical rationale for a relationship between a general need for structure and environmental preference. Within the last two decades and a half, there has been a growing recognition that motivational forces have a powerful influence on information processing. According to this so-called 'hot cognition' approach (Kunda, 1990; Kruglanski, 1996) individuals do not always perceive and evaluate information in a rational, analytic way. Instead, the way in which people perceive and evaluate their social and physical environment is strongly influenced by their motivational orientations.

The need for simple structure is one general epistemic motive that has been found to have profound influences on information processing. As limited information processors living in an infinitely complex and information-rich world, most people feel some desire or need to reduce information load by structuring the world into a simplified, more manageable form (Neuberg & Newsom, 1993). One way to achieve this is to create and use abstract mental representations (e.g., schemata, scripts, stereotypes) that enable clear interpretations of new information at relatively low cognitive expenses (e.g., Kunda, 1999). Although the use of simple cognitive structures may sometimes lead to inaccurate conclusions and closed-mindedness, they serve people's efficiency needs quite well, enabling them to be decisive in the face of endless possibilities.

Natural environments are a rich and evolutionarily relevant source of information. During the most part of their evolutionary history, humans have struggled to survive in complex natural settings such as savannah's and forests. Without a desire to reduce information load by seeking out natural settings that can be interpreted in a clear and unambiguous way, it would have undoubtedly been very difficult for the species to survive. Indeed, most theories on nature experience suggest that epistemic motives such as the need to understand one's environment are still the most important driving forces behind the way modern humans perceive and evaluate natural environments (Appleton, 1975; Kaplan & Kaplan, 1989). In general, natural settings with a half-open structure and a distinct focus point that are easy to comprehend are preferred over unstructured, illegible settings such as dense forests (cf. Ulrich, 1986). Thus, epistemic motives appears to play an important role in the perception and evaluation of natural environments.

1.2: The need for structure

Given the adaptive functions of understanding one's environment, it seems plausible that every human is endowed with a need for structure. Yet, this need for structure may vary substantially across situations and across persons. In some situations, e.g., when people are under stress or time pressure, or when they are fatigued, the perceived benefits of closed-mindedness may be greater than the costs of keeping an open mind (Kruglanski & Webster, 1996). But there are also more chronic, personality-based differences in the need for structure. Long before the revival of motivation in cognition research, psychologists have noticed these differences and studied them using constructs such as dogmatism (Rokeach, 1960), and intolerance of ambiguity (Frenkel-Brunswick, 1949). More recent attempts to assess chronic differences in need for structure include the Personal Need for Structure scale (Neuberg & Newsom, 1993; Thompson *et al.,* 1989) and the Need for Closure scale (Webster & Kruglanski, 1994). In general, a strong need for structure (or closure) is manifested through desire for predictability, preference for order and structure, discomfort with ambiguity, decisiveness and closed-mindedness[1] (Webster & Kruglanski, 1994).

To date, research on the need for structure has primarily focused on social information processing, such as stereotyping or spontaneous trait inferences. In principle, however, the concept of need for structure may also influence the processing of information related to non-social domains, such as natural environments. In particular, chronic individual differences in need for structure may be related to the preferred amount of order and structure in natural settings. Individuals with a high need for structure may prefer a higher amount of order and structure in natural settings than do individuals with a low desire for structure, presumably because the information contained in well-ordered settings can be easily integrated in existing schemata and thus requires a minimum of cognitive effort to understand and interpret.

Natural environments can become ordered and structured as a result of natural processes, such as the grazing of wild animals. Nowadays, however, order in natural environments is nearly always human-imposed, for example as a result of management activities such as pruning and mowing. Therefore, need for structure may not only influence the preferred degree of naturally evolved order and structure, it may also affect the preferred amount of human influence in natural settings.

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[1] Following Kruglanski e.a. (1997), the Need for Closure scale is treated in this article as largely equivalent to the Personal Need for Structure scale. However, Need for Closure/Personal Need for Structure is considered a general epistemic motive, and not, as Neuberg e.a. (1997) suggested, a directional need for a specific conclusion.

1.3: Preferences for natural environments

Research on nature preferences has shown that the degree to which a setting is ordered and influenced by humans constitutes a key dimension underlying nature perception and preference. When people are asked to categorize natural scenes, they typically put human-influenced and orderly scenes, such as parks and gardens, together in one pile, whereas they put more wild and unstructured scenes, such as forests or swamps, together in another pile (cf. Hartig & Evans, 1993). Moreover, results of preference studies indicate that categories reflecting either low or high degrees of order and human influence elicit the most individual variation in environmental preferences (Dearden, 1984; Gallagher, 1977; Kaplan & Kaplan, 1989; Orland, 1988; Strumse, 1996). These results suggest that there exist important individual differences in the preferred degree of order and human influence in natural settings.

Kaplan & Kaplan (1989) have reviewed the available evidence on group differences in nature experience. They have pointed out that differences in environmental preferences between various subcultures and ethnic groups can nearly always be interpreted in terms of differences in the preferred balance between nature and human influence. Unfortunately, the studies reviewed by Kaplan & Kaplan do not allow any firm answers concerning the cultural or ethnic variables that are responsible for these differences, because the subcultures and groups that were studied differed on more than one dimension (e.g., urbanity, age, race, income). Nevertheless, Kaplan & Kaplan's (1989) observations once again underline the importance of order and human influence as a source of variation in preferences for natural environments.

A recent line of research sheds more light on the correlates and determinants of individual variation in preferences for wild versus more structured and human-influenced natural settings (Koole & Van den Berg, forthcoming; Van den Berg, 1999; Van den Berg & Vlek, 1998; Van den Berg, De Vries & Vlek, forthcoming; Van den Berg, Vlek & Coeterier, 1998). More specifically, this research has found significant relationships between socio-demographic variables, such as age, income, education level and profession, and preferences for wild versus more human-influenced natural settings. In general, older people, people with low income and education levels, and farmers display relatively strong preferences for ordered natural settings with a high degree of human influence. By contrast, young adults, people with high income and education levels, and members of nature protection organizations display stronger preferences for wild natural settings with a low degree of human influence.

The effects of socio-demographic variables on preferences for wild and ordered natural settings might be explained in terms of cognitive variables, such as expertise and belief systems. However, a motivational explanation in terms of a chronic need for structure and order seems equally viable. All the subgroups that display strong preferences towards ordered and human-influenced nature hold a rather vulnerable position in life and society in general, and, in the case of farmers, a vulnerable or

dependent position towards nature in particular. This vulnerable position may have promoted a chronic need for structure and clarity, presumably because a structured and easily comprehensible world promotes feelings of safety and saves resources for more urgent tasks. In line with this explanation, Koole & Van den Berg (forthcoming) have recently demonstrated that students who were brought into a vulnerable position by reminding them of their own mortality, displayed stronger preferences towards ordered nature, and weaker preferences towards wild nature, than did their peers in a control group. Thus, there is some evidence that preference for order in natural environments may arise from situationally induced motivational concerns.

The influence of more chronic differences in need for structure on preference for natural environments has, tot the best of my knowledge, not yet been directly investigated. An older study by Abello & Bernaldez (1986) provides some evidence that dispositional characteristics related to need for structure may influence preference for order in natural landscapes. Abello & Bernaldez (1986) reported that people classified as 'emotionally unstable' prefer those landscapes containing structural rhythms and recurrent patterns, even sacrificing the universally accepted quality of vegetation spontaneity and vigour. As empirical studies have found that measures of emotional (in)stability (or neuroticism) are moderately positively correlated to measures of need for structure (Neuberg & Newsom, 1993), these findings are consistent with the assumption that chronic differences in need for structure are related to preferences for wild versus more human-influenced natural environments.

1.4: The present research and hypotheses

The central hypothesis that guided the present research was that people's evaluations of order and human-influence in natural environments would be influenced by chronic differences in need for structure. More specifically, it was expected that participants with a high need for structure, as compared to participants with a low need for structure, would display more favourable preferences toward human-influenced nature with a high degree of order, and less favourable preferences towards wild nature with a low degree of order. This hypothesis was tested in three studies. In each study, a Dutch translation of the Personal Need for Structure scale (PNS; Thompson *et al*., 1989) was used to assess individual differences in need for structure. This 12-item scale assesses the degree to which people are motivated to structure their world in a simple and unambiguous way (Table 1). To increase the generalizability of the present results, student samples as well as a non-student sample were examined.

Order and human influence was varied by selecting natural settings with varying signs of regulative activities, such as mowing, ploughing, horticulture, and other signs of activities that indicate human control over nature. Presence of people or urban intrusions, such as cars, houses, or factories was avoided (in Study 1 and 2) or held constant (in Study 3). This choice was based on findings that signs of urban intrusions are generally

evaluated in a negative manner (Hartig & Evans, 1993; Kaplan, Kaplan, & Wendt, 1972; Wohlwill, 1983). In Study 1, two extreme types of natural settings were investigated: gardens with a high degree of order and human influence, and natural environments with a low degree of order and human influence. Study 2 focused on large-scale natural landscapes and compared agrarian to wilderness landscapes. Study 3 focused on small-scale urban nature and compared traditionally managed urban green space to ecologically managed urban green space.

Table 1

Personal Need for Structure Scale (From Thompson et al., 1989).

1. It upsets me to go into a situation without knowing what I can expect from it.
2. I'm not bothered by things that interrupt my daily routine *(reverse-scored)*
3. I enjoy having a clear and structured mode of life.
4. I like to have a place for everything and everything in its place.
5. I enjoy being spontaneous. (*reverse-scored*)
6. I find that a well-ordered life with regular hours makes my life tedious. *(reverse-scored)*
7. I don't like situations that are uncertain.
8. I hate to change my plans at the last minute.
9. I hate to be with people who are unpredictable.
10. I find that a consistent routine enables me to enjoy life more.
11. I enjoy the exhilaration of being in unpredictable situations *(reverse-scored)*
12. I become uncomfortable when the rules in a situation are not clear

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Across the three studies, the dependent variable consisted of participants' aesthetic evaluations of simulations of various natural settings. Aesthetic evaluations are the most well-validated and widely used indicator of human-environment interactions (Daniel & Vining, 1983; Gifford, 2002). Numerous studies have shown that people are able to judge the aesthetic quality of natural landscapes intuitively, quickly and effortlessly (Gifford, 2002; Kaplan & Kaplan, 1989). Moreover, aesthetic evaluations of photographic simulations of natural environments closely match people's evaluations of real natural landscapes (Bishop & Hull, 1991).

2: Influence of PNS on Preference for Gardens and Nature (Study 1).

Natural settings may vary widely in degree of human-imposed order. Gardens are among the most ordered and human-influenced natural settings, while large-scale natural landscapes are among the wildest and least human-influenced natural settings. Both gardens and natural landscapes are typically evaluated in a positive manner (Kaplan & Kaplan, 1989). In medieval times, gardens were generally preferred over natural

landscapes, presumable because the wild and untamed natural areas outside the towns in these days were associated with danger and illness (Schama, 1990; Van den Berg & Van den Berg, 2001). Nowadays, most people tend to consider "real" nature more beautiful and attractive than completely man-made settings such as gardens. But does this observation apply to everybody? Or does preference for gardens versus real nature vary as a function of need for structure? These questions were investigated in Study 1.

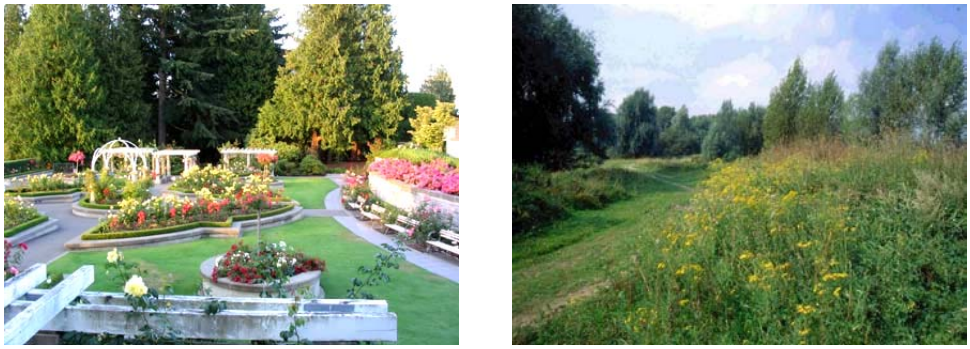

Figure 1. *Examples of a garden (left) and natural landscape (right) used in Study 1.*

2.1: Method

Participants: The sample consisted of 42 undergraduates from the University of Groningen, The Netherlands (16 males, 26 females, mean age = 21 years). Participation was voluntary, and participants received the equivalent Euro 3,50 in Dutch guilders for taking part in the study.

Stimuli: The stimulus set consisted of 30 colour slides, 15 slides depicting gardens and 15 slides depicting natural landscapes such as forests, swamps, and moors (see Figure 1 for examples). Agrarian landscapes were not included in the set of natural landscapes. All slides were taken in spring or summer and special care was taken that they were of comparable photographic quality.

Procedure and Questionnaire: The experiment was run in sessions with 1 to 3 participants. All instructions and questions were presented on Apple Macintosh computers. Slides were projected on a screen in random order that remained the same across all sessions. To mask the purpose of the experiment, the set of slides was rated in two rounds. In the first round, participants rated each slide on perceived beauty (1 = not beautiful; 9 = very beautiful). In the second round, each slide was rated on perceived degree of human influence (1 = not at all human-influenced; 9 = strongly human-influenced). After the slide ratings, participants filled out the NPS by indicating the degree to which they agreed or disagreed with each statement on a 5-point scale (1 =

strongly agree; 5 = strongly disagree). The alpha reliability coefficient for the scale was .75, M = 2.64, SD = 0.50. Finally, participants answered some questions on their age, gender and disciplinary background, and were then debriefed, paid and dismissed.

2.2: Results

Manipulation Check: Gardens were generally rated as more human influenced (M = 7.29, SD = 0.92) than natural environments (M = 2.89, SD = 0.71), $t(41) = 32.34$, $p < .001$. These results confirm that there was a large difference in perceived human influence between the two sets of natural landscapes.

Influence of PNS on beauty ratings: Participants were classified into a group with a high need for structure (N = 20) and a group with a low need for structure (N = 22) on the basis of a median split on the PNS scores. To investigate the influence of PNS on landscape preferences, participants' beauty ratings were subjected to an ANOVA with one between-subjects variable (PNS: high vs. low) and one within-subjects variable (type of environment: gardens vs. natural landscapes). This analysis yielded a significant main effect of type of environment on beauty ratings, which indicated that natural landscapes (M = 6.71, SD = 0.80) were generally rated as more beautiful than gardens (M = 5.18, SD = 1.46), F (1, 40) = 46.34, $p < .001$. In addition, the predicted interaction between need for structure and type of environment was obtained, F (1, 40) = 6.02, p < .02. As can be seen in Table 2, participants high on PNS, as compared to participants low on PNS, gave higher beauty ratings to gardens, and lower beauty ratings to natural landscapes.

Separate analyses of the beauty ratings within the two PNS groups showed that participants low on PNS displayed a highly significant preference for natural landscapes over gardens, F (1,21) = 67.52, $p < .001$. Unexpectedly, participants high on PNS also displayed a significant preference for natural landscapes over gardens, F (1, 19) = 6.17, $p < .03$, although their preference for natural landscapes was less outspoken than the preference of participants low on PNS. Furthermore, separate analyses of beauty ratings for each set of natural environments revealed that the influence of need for structure on beauty ratings was only significant for natural landscapes, F (1,40) = 5.10, $p < .03$. Need for structure did not significantly influence beauty ratings of gardens, $p > .20$. This non-significant effect was probably due to the fact that the set of gardens was more varied than the set of natural landscapes. Mean beauty ratings of the gardens varied between 2.60 for the least preferred garden and 7.07 for the most preferred garden, while mean beauty ratings of the natural settings varied only between 5.64 and 8.43. As a result, standard deviations for beauty ratings of gardens were nearly twice as high as standard deviations for natural settings, making it more difficult to obtain significant effects.

Table 2
Mean Beauty Ratings of Gardens and Natural Landscapes as a Function of Personal Need For Structure (PNS; Standard Deviations in Parentheses).

	Low PNS	High PNS
Natural Landscapes	6.97 (0.74)	6.44 (0.79)
Gardens	4.90 (1.41)	5.48 (1.49)

2.3: Discussion

The results of Study 1 provide support for a relationship between need for structure and preferences for natural environments. As predicted, individuals with a high need for structure responded more positively towards gardens, and less positively towards natural landscapes than did individuals with a low need for structure. Notably, however, participants with a high need for structure did not prefer gardens over natural landscapes, but rather displayed a less positive preference for natural landscapes than did participants with a low need for structure. This general preference for natural landscapes over gardens appears to be typical for modern Western societies, in which preferences are skewed towards naturalness and absence of human influence (cf. Van den Berg, 1999). To diminish the influence of this general preference tendency, Study 2 investigated the influence of need for structure on natural landscapes of equal size and scale, but with varying degrees of order and structure.

3: Influence of PNS on Preference for Wilderness and Agrarian Landscapes (Study 2)

Natural environments may vary in the degree to which they show signs of human activities such as ploughing, cutting and mowing. While agrarian landscapes can be seen as the ultimate product of human domestication of nature, wilderness landscapes represent the most autonomous and unspoilt type of nature. In The Netherlands, the last primal forest was turned into fertile grounds in the beginning of the 20th century. However, over the last two decades, new wilderness areas have been created to increase nature values and to fulfil recreational needs of urbanites (Peters *et al.*, 2002). As more and more agrarian fields are turned into swamps or wild forests, it becomes clear that the new wilderness areas do not appeal to all Dutch citizens equally (Metz, 1998). While many Dutch citizens seem to welcome the drastic changes in their landscape, part of the population appears to regret the loss of cultivation and order. Study 2 investigated whether these individual differences in preferences for wilderness as compared to agrarian landscape are related to differences in need for structure.

3.1: Method

Participants: The sample consisted of 42 students from the University of Wageningen, The Netherlands (22 males, 20 females, mean age = 22 years). Students participated in the study as part of a course on environmental psychology.

Stimuli: The stimulus set consisted of 20 colour slides, 10 slides depicting agrarian landscapes, and 10 slides depicting wilderness landscapes typical of nature development as it is now taking place in The Netherlands (see Figure 2 for examples). Because nature development in The Netherlands typically involves the creation of wetlands and swamps, all landscapes, including the agrarian landscapes, contained visible elements of water (ditches, pools, rivers). All slides were taken in spring or summer and special care was taken that they were of comparable photographic quality.

Procedure and Questionnaire: The experiment was run in a lecture-hall with all the participants seated at separate desks. All instructions and questions were presented in paper and pencil form. Slides were projected on a screen in random order. Participants rated each slide on perceived beauty (1 = not beautiful; 9 = very beautiful) and degree of human influence (1 = not at all human-influenced; 9 = strongly human-influenced). After the slide ratings, participants filled out the NPS by indicating the degree to which they agreed or disagreed with each statement on a 5-point scale (1 = strongly agree; 5 = strongly disagree). The alpha reliability coefficient for the scale was .90, $M = 3.04$, $SD = 0.42$. Finally, participants answered some questions on their background characteristics.

Figure 2. *Examples of an agrarian landscape (left) and a wilderness landscape (right) used in Study 2*.

3.2 Results

Manipulation Check: Agrarian landscapes were generally rated as more human influenced ($M = 6.45$, $SD = 0.96$) than natural environments ($M = 4.56$, $SD = 1.06$), $t(41) = 14.88$, $p < .001$. These results confirm that there was a significant difference in perceived human influence between the two sets of natural landscapes.

Influence of PNS on beauty ratings: Participants were classified into a group with a high need for structure ($N = 22$) and a group with a low need for structure ($N = 20$) on the basis of a median split on the PNS scores. To investigate the influence of PNS on landscape preferences, participants' beauty ratings were subjected to an ANOVA with one between-subjects variable (PNS: high vs. low) and one within-subjects variable (type of environment: agrarian vs. wilderness). This analysis yielded the predicted interaction between need for structure and type of environment, $F(1, 40) = 5.83$, $p < .02$. As can be seen in Table 3, participants low on PNS evaluated wilderness landscapes as significantly more beautiful ($M = 6.56$) than agrarian landscapes ($M = 6.02$), $F(1, 19) = 11.85$, $p < .003$. By contrast, participants high on PNS displayed a small, but non-significant preference for agrarian landscapes ($M = 6.41$) over wilderness landscapes ($M = 6.24$), $p = .49$. Separate analyses of beauty ratings for each set of landscapes revealed a non-significant effect of PNS on beauty ratings of wilderness landscapes, $p > .31$, as well as a non-significant effect of need for structure on beauty ratings of agrarian landscapes, $p > .19$.

Table 3
Mean Beauty Ratings of Agrarian Landscapes and Wilderness Landscapes as a Function of Personal Need For Structure (PNS; Standard Deviations in Parentheses).

	Low PNS	High PNS
Wilderness landscapes	6.56 (0.71)	6.24 (1.27)
Agrarian landscapes	6.02 (0.95)	6.41 (0.98)

3.3: Discussion

Study 2 provides further evidence that need for structure moderates preferences for wild vs. more human-influenced natural environments. As predicted, individuals with a low need for structure displayed a significant preference for wilderness over agrarian landscapes, while individuals with a high need for structure displayed a slight (but not significant) preference for agrarian landscapes over wilderness landscapes. These results suggest that for natural settings of comparable size and scale, need for structure may actually reverse preferences for wild and more cultivated settings. But it should be noted that, like in Study 1, wilderness areas were not disliked by individuals with a high need for structure, nor were agrarian landscapes disliked by individuals with a low need for structure. All mean beauty ratings were above the scale mean, indicating that need for

structure influenced only the relative strength of *positive* evaluations of wilderness and agrarian landscapes.

4: Influence of PNS on Preference for Traditional and Ecological Urban Nature (Study 3)

Urban nature is by tradition highly ordered and human-influenced. In The Netherlands, however, this tradition is slowly changed by new policy strategies to create ecological zones in urban areas (Koster, 2001). While the creation of ecologically valuable urban green space is mainly based on biodiversity concerns, Dutch policy makers also assume that city-dwellers prefer this type of nature to more traditionally managed nature (Stichting Recreatie, 1999). The results of Study 2 suggest that this assumption may not apply to city-dwellers with a high need for structure, who may prefer traditionally managed nature over more wild and ecologically managed nature. In Study 2, individuals with a high need for structure did not actually dislike wild nature; rather, they evaluated wild and ordered nature in an equally positive manner. But what if wilderness is created in the nearby living environment of individuals with a high need for structure? Would urbanites with a high need for structure still be equally appreciative of wild nature if it is situated at their own doorstep? Study 3 was designed to investigate the influence of need for structure on preference for wild and more ordered nature in the nearby living environment.

4.1: Method

Respondents: Respondents were recruited with the assistance of the Royal Dutch postal services, which provided a list of 300 randomly selected names and addresses in large cities (i.e., cities with 50.000 or more inhabitants) throughout The Netherlands. Sixty-nine Dutch urban residents (34 women and 35 men) completed and returned the questionnaire. This response rate of 23% might seem rather low. However, it should be considered that the questionnaire was mailed during the summer, in a period in which many people were away on vacation and hence unable to complete the questionnaire before the deadline of the study. Respondents' ages ranged between 22 and 84 years, with an average age of 44. Of the sample, 42% reported having a college degree, 51% reported having an advanced level high school degree, and 7% reported having a lower level high school degree or no high school education.

Stimuli: Respondents provided ratings of six pairs of full-colour photographs (9x7 cm) of urban settings. One photograph of each pair depicted a traditionally managed urban natural setting, whereas the other photograph depicted an ecologically managed setting (see Figure 3 for examples). The photographs were always printed at the top of each page, with the questions concerning each environment printed directly below the relevant photograph. The first pair of photographs consisted of two road sides, the second

and third pair consisted of two sets of parks, the fourth and fifth pair consisted of two park-like forests, and finally, the sixth pair consisted of two forests.

Procedure and Questionnaire: All respondents received a printed questionnaire that was sent in a sealed envelope via regular mail. In the accompanying instructions, the questionnaire was introduced as a survey on people's opinions of public green places in their nearby environment. The instructions further stated that the questionnaire was to be filled out by only one person who had to be older than 16 years. It was emphasized that respondents' answers to the questionnaire would be treated confidentially and were strictly anonymous.

The questionnaire consisted of three parts. During the first part of the questionnaire, respondents were asked to rate pairs of photos of traditional versus ecological urban nature on a number of dimensions, including perceived beauty and perceived human influence (rated on 9-point Likert scales). Respondents were instructed to imagine that they were moving to another place and had the opportunity to choose between two houses that were exactly the same except for the view from home. The view from the first house was shown in the first photograph of each pair, the view from the second house was shown in the second photograph of each pair. In this manner, respondents evaluated each of the twelve environments.

Figure 3. *Examples of a traditionally managed road side (left) and an ecologically managed road side (right) used in Study 3.*

The second part of the questionnaire contained a number of questions regarding different forestry methods. This part was unrelated to the present research and will not be discussed any further. Finally, respondents were asked to answer a number of personality

questionnaires. Embedded among these questionnaires was the PNS. The alpha reliability coefficient of the PNS in this sample was .76, $M = 2.53$, $SD = 0.39$.

4.2: Results

Manipulation Check: Traditionally managed settings were generally rated as more human influenced ($M = 6.30$, $SD = 1.62$) than ecologically managed settings ($M = 2.87$, $SD = 1.13$), $t(58) = 12.07$, $p < .001$. These results confirm that there was a significant difference in perceived human influence between the two types of urban nature.

Influence of PNS on beauty ratings: Respondents were classified into a group with a high need for structure ($N = 38$) and a group with a low need for structure ($N = 31$) on the basis of a median split on the PNS scores. To investigate the influence of PNS on environmental preference, respondents' beauty ratings were subjected to an ANOVA with one between-subjects variable (PNS: high vs. low) and one within-subjects variable (type of environment: traditional vs. ecological). This analysis yielded the predicted interaction between need for structure and type of environment, $F(1, 67) = 7.09$, $p < .02$. As can be seen in Table 4, participants low on PNS evaluated ecologically managed settings as significantly more beautiful ($M = 7.22$) than traditionally managed settings ($M = 6.78$), $F(1,33) = 4.77$, $p < .04$. By contrast, participants high on PNS displayed a marginal significant preference for traditionally managed settings ($M = 7.13$) over ecologically managed settings ($M = 6.62$), $F(1,37) = 3.38$, $p = .07$. Separate analyses of beauty ratings for each set of urban settings revealed a marginally significant effect of PNS on beauty ratings of ecologically managed settings, $F(1,67) = 3.44$, $p = .07$, and a non-significant effect of PNS on beauty ratings of traditionally managed settings, $p > .10$.

Table 4
Mean Beauty Ratings of Traditionally and Ecologically managed Urban Nature as a Function of Personal Need For Structure (PNS; Standard Deviations in Parentheses).

	Low PNS	High PNS
Ecological	7.22 (1.04)	6.62 (1.53)
Traditional	6.78 (0.87)	7.13 (0.85)

4.3: Discussion

The results of Study 3 provide further evidence that need for structure may reverse preference for wild versus more ordered natural environments. City dwellers with a low need for structure displayed a significant preference for ecologically managed urban nature over more traditionally managed nature, whereas city dwellers with a high need for structure displayed a marginally significant preference for traditionally managed urban nature over ecologically managed nature. Thus, in Study 3, respondents with a high need for structure responded more outspokenly positive towards natural settings with a high degree of order and human influence than respondents in the other two studies.

There are several differences between Study 3 and the first two studies that may explain the more outspoken preference for ordered and human-influenced natural settings by respondents with a high need for structure in this study. First of all, Study 3 used a non-student sample, which means that respondents in this study were older, and had a lower level of education than respondents in Study 1 and 2. This may have influenced results, for example because need for structure may be stronger in older persons or persons without academic training, or because need for structure may have a stronger influence on preferences of older persons or persons without an academic training. However, additional analyses showed that PNS scores did not differ significantly as a function of age or education level. Moreover, within subgroups of younger and older respondents, as well as within subgroups of respondents with an academic education level and respondents with lower levels of education, respondents with high scores on PNS consistently displayed a greater preference for traditionally over ecologically managed nature. These results suggest that the more outspokenly positive response towards ordered and human-influenced nature among respondents with a high need for structure in Study 3 as compared to the responses obtained in the other two studies cannot be explained in terms of socio-demographic differences between the samples.

Alternatively, the results of Study 3 may be explained by differences in instructions or presentation of the stimuli. The instructions of Study 3 explicitly asked respondents to evaluate natural settings as if these were views from their (future) homes. This instruction might have lead respondents with a high need for structure to become more outspoken in their evaluations by making them more aware of the negative consequences of choosing a view that does not match their needs. The presentation of stimuli in pairs of traditionally and ecologically managed settings may further have influenced results by accentuating the difference in order and human influence between the settings. Consequently, respondents may have paid more attention to this dimension in their evaluation of the settings.

Importantly, mean beauty ratings for ecologically and traditionally managed settings were well above the scale mean for both individuals with a high and low need for structure. This finding once again shows that need for structure does not lead individuals to dislike settings that are incompatible with their needs, but rather attenuates their positive evaluation of these settings.

5: General Discussion

The present study examined the relationship between need for structure and preferences for natural settings. It was hypothesized that a high need for structure is likely to be associated with a preference for ordered natural settings with a high degree of human influence, while a low need for structure was hypothesized to be associated with a preference for wild natural settings with a low degree of human influence. In this general discussion, the major findings are discussed along with their theoretical and practical implications.

5.2: Need for structure and landscape preference

Across three studies, the present research found consistent evidence that need for structure is related to people's responses to the natural environment. In particular, individuals with a high need for structure, as compared to individuals with a low need for structure, displayed more positive responses towards natural settings with a high degree of order and human influence, and less positive responses towards natural settings with a low degree of order and human influence. This tendency was demonstrated for gardens as compared to natural landscapes, for agrarian landscapes as compared to wilderness landscapes, and for traditionally managed as compared to ecologically managed urban nature. Taken together, these findings provide support for the relevance of need for structure to environmental preference across a broad variety of natural settings.

Notably, need for structure did not lead individuals to dislike or detest natural settings that were incompatible with their needs. Across all the natural settings that were studied in the present research, mean beauty ratings were well above the scale mean for both individuals with a low and a high need for structure. Thus, individuals with a low need for structure still rated ordered natural settings in a fairly positive manner, just as individuals with a high need for structure were still fairly positive about wild natural settings. These positive ratings of all natural settings seem to reflect people's well-documented love of nature (Ulrich, 1993; see also Van den Berg, Koole, & Van der Wulp, 2003). Apparently, people's love of nature can be moderated by need for structure, but need for structure does not seem potent enough to induce negative feelings towards natural environments that are incompatible with this need.

In general, participants' preferences in the present research were skewed towards naturalness and absence of human influence. This was most clearly observed in Study 1, where even the subset of individuals with a high need of structure displayed a significant preference for natural landscapes over gardens. But also in Study 2, individuals with a high need for structure tended to appreciate wild and ordered natural settings in an equally positive manner, rather than preferring ordered settings over wild settings. Only in Study 3 individuals with a high need for structure displayed a marginally significant

preference for ordered over wild settings. These findings are consistent with previous findings by Van den Berg (1999) who also found that within the Dutch population preferences are skewed towards the wild and the unordered. Only for very specific subgroups, such as farmers, Van den Berg (1999) found a significant preference for ordered natural settings over more wild and spontaneous settings.

Why would people, at least in The Netherlands, be so profusely fond of wild and unordered nature? Although the present research was not designed to answer this question, one likely explanation is that in The Netherlands, wild nature is scarce and usually situated far from urban areas and residential neighbourhoods. As a result, contact with wild nature takes place on a voluntary basis only, and individuals who may feel uncomfortable when visiting this type of nature, for example because their high need for structure makes it difficult for them to cope with lack of order and wildness, can easily avoid personal contact. At a safe distance, they can celebrate the positive qualities of wild nature, without having to cope with the challenges of actually being in or having to live close to a wild and unordered nature. Thus, one factor that may account for the general preference for wild nature among the Dutch people, is the large distance between people and wilderness, which makes it easier for people whose needs are incompatible with this type of nature to maintain a positive attitude towards wilderness.

5.2: Theoretical implications

The need for structure is theoretically defined as an epistemic motive, i.e., a motive directed at the acquisition of knowledge (Webster & Kruglanski, 1994). The present research thus highlights the importance of epistemic motivation to understanding landscape preferences. Environmental psychologists have long assumed that other epistemic motives such as the need for understanding and exploration are important determinants of landscape preferences. These needs have been considered universal, innate motives that evolved over the course of human evolution (Appleton, 1975; Kaplan, 1987; Kaplan & Kaplan, 1989). Consequently, epistemic motivates have mostly been used to explain similarities in landscape preferences, such as the finding that people across different ethnic groups and cultures tend to prefer savannah-like settings with an optimal balance between possibilities for understanding and exploration (Heerwagen & Orians, 1993).

The present research shows that epistemic motives may not only be useful to explain similarities in environmental preference, they can also be used to explain individual differences. While previous studies have shown that most people prefer savannah-like settings over settings that lack the characteristics of a savannah, the present research suggests that people with a high need for structure may prefer savannah-like settings with a high degree of human influence, such as the hilly meadows of Tuscany, over savannah-like settings with a low degree of human influence, such as the original African savannah. By contrast, people with a low need for structure may prefer the

African savannah to the Tuscan landscape. And if their need for structure is strong enough, people might even be prepared to sacrifice savannah-like characteristics in favour of a higher degree of human influence in natural environments (cf. Abello & Bernaldéz, 1986).

As was pointed out in the introduction, need for structure may not only vary across persons, but also across situations. Some situations may enhance the need for structure, and thus, temporarily increase the preferred degree of order and human influence in natural settings. Recently, Koole & Van den Berg (2003) have reported evidence that situationally induced changes in motivational orientation that presumably increase people's need for safety and structure may influence landscape preference in a manner that is similar to the influence of chronic differences in need for structure found in the present research. Future studies may extend this line of research by examining effects of other situational factors which have previously been found to influence need for structure, such as time pressure or fatigue.

By focusing on chronic differences in need for structure, the present research basically treated need for structure as a personality characteristic. As a personality characteristic, need for structure is related to other concepts, such as neuroticism (Neuberg & Newsom, 1993), which is generally considered one of the five most important personality traits. Thus, the present research not only provide support for the motivational character of preferences for wild versus more human-influenced nature, the results can also be interpreted as evidence for the importance of personality to preference for natural settings.

By showing that individual differences in preferences for natural environments are systematically related to motivation and personality, the present research further illuminates our understanding of these individual differences. Previous research has focused almost exclusively on cognitive variables such as experience and familiarity to explain individual differences in environmental preference (e.g., Kaplan & Kaplan, 1989; Wellman & Buyhoff, 1980). However, the available evidence suggests that experience and familiarity do not offer a viable explanation for individual differences in preferences for wild or human-influenced nature. Although familiarity with a specific place or region can increase (or decrease) preferences for this place or region, people who are familiar with either wild or more human influenced natural settings are not more inclined to prefer wild or human-influenced nature in general (Van den Berg *et al.*, 1998). Thus, the effects of familiarity appear to be very specific. Even so, familiarity might have a more general influence when it is considered in conjunction with other variables. As Straathof (1993) has proposed, familiarity could, for instance, influence the degree to which an environment is perceived as structured and ordered, or diminish the need to understand an environment. These altered perceptions and needs may affect the preferred degree of order in an environment. Future studies may further explore the interplay between familiarity and need for structure in individual differences in preferences for wild versus more human-influenced natural settings.

5.2 Practical Relevance

Over the past few decades, nature policy in The Netherlands and in other European countries has been influenced by two developments: First, increasing concerns over loss of biodiversity values have stimulated a new type of nature policy aimed at improving biodiversity by developing new wilderness areas, instead of merely protecting the biodiversity that is left (cf. Ministry of Agriculture, 1990; Peters *et al.*, 2002). Second, in an attempt to make nature policy more democratic, policy makers have started to recognize public values as a criterion for nature policy besides biodiversity values. In applying this criterion, however, policy makers tend to treat public values as congruent with biodiversity values. Public values are even used as a rationale for developing wilderness areas with a high degree of biodiversity not only far away from populated areas, but also close to more urbanized areas.

The results of the present research show that wild nature with a high degree of biodiversity and a low degree of order and human influence may not be universally appreciated. Citizens with a high need for structure tend to favour more traditionally managed natural settings with a high degree of human influence and, presumably, a lower degree of biodiversity. By relating preferences for ordered nature to a high need for structure, the present research speaks to the fundamental character of these preferences. Which type of nature people prefer is not, as is often thought, a matter of subjective aesthetic taste. Rather, environmental preferences are motivated by important personal needs that play a crucial role in human functioning (e.g. Kruglanski & Webster, 1994). Indeed, there are indications that people may not even be able to benefit from the restorative effects of nature if they are confronted with natural environments that exceed their preferred level of order and human influence, presumably because they cannot feel safe and secure in these environments (Ulrich, 1993; Van den Berg, 2002; Van den Berg, *et al.*, 2003). Thus, for applied purposed, it appears crucial to preserve and create natural environments with varying degrees of order and human influence in order to do justice to the widely varying preferences that exist in the population.

5.3: Limitations and Future Perspective

The present research is not without limitations. First, we examined people's evaluations of simulated rather than actual landscapes. Fortunately, people's reactions to simulated and actual environments show considerable convergence (Kaplan & Kaplan, 1989). Overall, it seems likely that the current results are not highly paradigm-specific. Second, the present research only used Dutch participants. It would be informative to extend the current analysis to other countries, especially to countries where nature is less cultivated than in The Netherlands. Finally, the present research focused mainly on order and human influence as environmental characteristics that moderates people's motivated

responses to nature. This focus is consistent with several lines of research in environmental psychology, which have pointed to human influence as one of the major dimensions that underlies evaluations of the natural environment (González Bernaldez & Parra, 1979; Kaplan & Kaplan, 1989). Nevertheless, need for structure may also interact with other characteristics that signal a lack of predictability and security, such as deflected vistas or hostility (cf. Abello & Bernaldez, 1986). Clearly, more work is necessary to understand how the need for structure may interact with various aspects of human-environment interactions.

In spite of the aforementioned limitations, the present research suggests that environmental psychology can be successfully integrated with motivational psychology and personality psychology. Environmental psychologists have often approached environmental evaluation as a purely cognitive, informational activity that functions more or less the same across different individuals (e.g. Kaplan & Kaplan, 1982; Purcell, 1986). Conversely, psychologists who study motivation and personality have paid little attention to understanding human-nature relations. The present research, however, argues that an increased cross-fertilization between research on environmental preference, motivation and personality could be very productive. Theoretically, motivation and personality likely evolved as adaptations to the risks and challenges in the natural environment (Öhman & Mineka, 2001; Sedikides & Skowronksi, 1997). Given that environmental evaluation, motivation, and personality may share a similar evolutionary history and functional basis, future theory and research are likely to gain from a continued scientific interchange.

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