Individual differences in the aesthetic evaluation of natural landscapes

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Chapter 4

Nature Images, Environmental Beliefs, and Group Differences in the Evaluation of Natural landscapes[1]

Throughout history, wilderness and rural landscapes have been evaluated in dual and opposed ways. Some people have regarded wilderness landscapes as 'waste land', filled with threats, while praising rural landscapes for their usefulness and orderliness. Conversely, others have regarded wilderness landscapes as a divine place of bliss and harmony, while criticizing rural landscapes for their lack of natural values. Although the relative importance of pro-rural orientations and pro-wilderness orientations may vary over time and across cultures, historians have emphasized that both orientations have always co-existed within different time periods and cultures (e.g., Nash, 1982; Thomas, 1983; Tuan, 1974; Schama, 1995).

As the most important difference between wilderness and rural landscapes concerns their degree of human influence, these historical accounts suggests that people may differ in their appreciation of human influences in natural landscapes. Consistent with this interpretation, there is accumulating empirical evidence for the existence of individual differences in the preferred balance between spontaneous and human-influenced processes in natural landscapes (e.g., Dearden, 1984; Fenton, 1985; González Bernaldez & Parra, 1979; Kaplan & Herbert, 1987; Orland, 1988; Schroeder, 1983; Zube, 1974, see also Chapter 2). Farmers, for instance, have been found to favor natural landscapes with a high degree of human influence, while members of environmental interest groups have been found to favor natural landscapes with a low degree of human influence.

In historical accounts, individual differences in preferences for natural landscapes are often explained in terms of people's 'nature images' and environmental beliefs', i.e., their descriptive and normative cognitions regarding the relationship between nature and humans (see also Achterberg, 1994; Rodman, 1983). High preferences for wilderness landscapes have been related to anthropocentric images and beliefs that view nature as subordinate to humans. High preferences for rural landscapes have been related to ecocentric images and beliefs that view humans as part of nature. As nature

[1] This chapter is based on Van den Berg, De Vries & Vlek (1998)

images and environmental beliefs are generally believed to reflect people's lifelong experiences with nature, this explanation implies that individual differences in preferences for natural landscapes are caused by relatively chronic factors.

In planned-change situations, however, explanations of individual differences in landscape preferences in terms of contextual factors are often equally plausible as explanations in terms of chronic factors. In Chapter 2, for example, it was found that farmers' landscape preferences were positively related to perceived degree of human influence, while landscape preferences of rural residents and visitors were negatively related to perceived degree of human influence. Because these group differences were found in a planned-change situation, they may reflect chronic influences of nature images or environmental beliefs, but they may also reflect temporary influences of the context of planned change. As was pointed out in Chapter 2, the context of planned change may have induced farmers to let economic or political interests 'sneak' into their preference judgments.

Because in many naturally occurring situations both chronic and contextual influences may underlie individual differences in preferences for natural landscapes, systematic research is needed to disentangle the relative contributions of chronic and contextual factors. The present study examined group differences in preferences for natural landscapes in a neutral context. Thus, an attempt was made to minimize the influence of contextual factors, in order to gain more insight into the role of more chronic factors. Furthermore, the present study sought to extend previous research by investigating the role of nature images and environmental beliefs in group differences in preferences for natural landscapes.

Nature Images

Nature images can be defined as cognitive structures that represent perceptions and prior knowledge of natural landscapes (cf. Kaplan, 1983). They refer, in other words, to people's conceptions of what nature is. Thus far, nature images have mostly been studied in an indirect manner via preference judgments (e.g., Herzog, 1989; Kaplan, 1985; Kaplan & Kaplan, 1989; Kent, 1993; Strumse, 1994). Underlying this general practice is the assumption that people's cognitive responses to nature are to a large extent dependent on affective evaluations (e.g., Kaplan, 1987; Ulrich, 1983). However, there exists substantial evidence that cognition and affect are separate and partially

independent systems (Zajonc, 1980, 1984). For example, it has been found that dimensions generated by similarity judgments of objects are independent of the dimensions generated by comparisons of preferences among these objects (Cooper, 1973). Findings such as these suggest that cognitive and affective responses to landscapes should be studied in their own right, and that more insight is needed into possible relationships between these two kinds of responses.

Several studies have investigated nature images in a relatively independent manner via similarity or prototypicality ratings of landscape photographs (e.g., Fenton, 1985; Purcell, 1986, 1987, 1992). The results of these studies have consistently identified human influence, or the usefulness of the natural environment to humans, as an important perceptual dimension. These findings are in agreement with descriptive analyses of nature images which have characterized nature images in terms of their position on a dimension ranging from anthropocentric to ecocentric (e.g., Natuurbeschermingsraad, 1993). Generally, individuals can be assumed to have an anthropocentric nature image when they perceive landscapes that are useful to humans as relatively typical examples of nature, while individuals can be assumed to have an ecocentric image when they perceive landscapes that are useful to humans as relatively atypical examples of nature.

Environmental Beliefs

Environmental beliefs can be defined as ethical-normative cognitions concerning the relationship between humans and nature. Analogous to nature images, environmental beliefs are often classified according to their position on a dimension ranging from anthropocentric to ecocentric (e.g., Catton & Dunlap, 1980). Individuals holding anthropocentric environmental beliefs view nature as subordinate to humans, who are seen as rulers or managers of the natural world. Individuals holding ecocentric environmental beliefs regard nature as the most important reality, and view humans as only part of that reality.

In order to assess individual differences in environmental beliefs, Dunlap & Van Liere (1978) have developed the New Environmental Paradigm (NEP) scale. The NEP scale was intended as a unidimensional measure of environmental beliefs, with low scores indicating anthropocentrism, and high scores indicating ecocentrism. The scale consists of twelve items that cover three broad themes, i.e., humanity's ability to upset the balance of nature, the existence of limits to growth for human societies and the appropriate role of

humans relative to the rest of nature. Studies employing the NEP scale have revealed relationships between ecocentric environmental beliefs and a wide range of sociodemographic variables, including knowledge of the environment (Arcury, 1990) and urban versus rural place of residence (Arcury & Christianson, 1990). Although the dimensionality of the NEP scale has been contested in recent years, the NEP scale continues to enjoy considerable popularity as a unidimensional measure of individual differences in environmental beliefs (for a review, see Buttel, 1987).

The Present Research and Hypotheses

Thus far, the links among nature images, environmental beliefs and individual differences in landscape preferences have received little empirical attention. The present research aimed to fill this void. Participants from three different educational disciplines, i.e., agriculture, psychology, and biology, evaluated natural landscapes with varying degrees of human influence on several dimensions, including scenic beauty and degree of human influence. The landscapes were presented without any reference to their relevance to nature development strategies, so that contextual influences were minimized.

Nature images were assessed using a well-know category formation methodology developed by Rosch and her co-workers (Rosch & Mervis, 1975). Unlike previous research (Purcell, 1986, 1987, 1992), in which prototypicality ratings were obtained from landscape photographs, the present study obtained prototypicality ratings from verbal descriptions of nature instances (e.g., 'a meadow with cattle' or 'a forest in autumn colors'). Verbal descriptions were used, because verbal information is less vivid, and requires more cognitive processing than visual information. Thus, employing verbal descriptions instead of photographic stimuli was expected to minimize the impact of affective influences on prototypicality judgments. Environmental beliefs were assessed using the 12-item version of the NEP scale (Dunlap & Van Liere, 1978).

On the basis of previous research, it was expected that students from different educational disciplines would differ in their landscape preferences as well as in their nature images and environmental beliefs. Students of agriculture, because of their upbringing in farming families and rural place of residence, were expected to favor natural landscapes with a high degree of human influence, and to have relatively anthropocentric nature images and

environmental beliefs (Arcury & Christianson, 1990; Daniel & Boster, 1976; González Bernaldez & Parra, 1979; Vogel, 1996; Yu, 1995, see also Chapter 2). Biology students, because of their interest in and expert knowledge about nature, were expected to favor natural landscapes with a low degree of human influence, and to have relatively ecocentric nature images and environmental beliefs (e.g., Arcury, 1990; Dearden, 1984; Kaplan & Herbert, 1987; Zube, 1974). Psychology students were primarily included in the study as a control group, with few distinctive characteristics as regards their landscape preferences and cognitions about nature. Nevertheless, because of their high level of education and their urban residence, psychology students were expected to be more similar to biology students than to students of agriculture with respect to their landscape preferences, nature images, and environmental beliefs.

In a more exploratory vein, the present research sought to examine the possible mediational role of nature images and environmental beliefs in group differences in preferences for natural landscapes. Thus, it was investigated whether group differences in the preferred balance between spontaneous and human-influenced processes in natural landscapes could be explained by corresponding group differences in nature images and environmental beliefs.

These predictions imply interactions between perceiver characteristics, i.e., educational discipline, nature images, and environmental beliefs, on the one hand, and landscape characteristics, i.e., degree of human influence, on the other hand, with respect to landscape preferences. Standard statistical techniques for analyzing landscape preferences, such as ordinary (OLS) regression analysis, do not allow for the estimation of such 'cross-level' interactions (cf. Hull & Stuart, 1992). Recently, however, a new statistical technique, called 'multilevel analysis', was developed that permits the reliable estimation of influences of both perceiver characteristics and landscape characteristics on landscape preferences (Bryk & Raudenbusch, 1992). Generally, multilevel analysis provides better estimates in answer to simple questions for which ordinary regression analysis is commonly used and in addition allows more complex questions to be addressed (see Chapter 2 for a detailed description of the application of multilevel analysis to the study of landscape evaluation).

Method

Participants

Participants were students from three different educational disciplines:

20 students of a school for secondary vocational agricultural training (16 males and 4 females; mean age 20 years), 20 psychology students (14 males and 6 females; mean age 20 years) and 20 biology students (13 males and 7 females; mean age 20 years). Both psychology and biology students were undergraduates at the University of Groningen. Participants received Dfl. 15 (approximately $US8) for taking part in the study.

Stimuli

The stimulus set consisted of 36 color slides drawn from an initial collection of 42 slides. A first prerequisite for the initial selection of slides was that these should represent the different groups of natural landscapes as described in the handbook of target nature types in The Netherlands (Bal et al., 1995; see also Ministry of Agriculture, Nature Management & Fisheries, 1996). In this ecological handbook, natural landscapes are classified into four broad groups (the so-called 'target nature types') according to the intensity of nature management activities that are required to maintain these landscapes: (a) 'approximately natural units', (b) 'guided natural units', (c) 'semi-natural units', and (d) 'multifunctional units'. A second prerequisite was that the slides should cover the largest physical-geographical regions of The Netherlands, including sand grounds, clay areas, river areas and peat areas. A third prerequisite was that all slides should be at eye-level; thus, slides depicting details of nature development landscapes or bird's eye views were not included. As a last prerequisite, none of the slides should depict intrusive signs of human influence, such as buildings or farming machinery.

Each scene was classified by three ecologists (all experts on nature development) into one of the four target nature types. These classifications were used to select a final set of 36 slides, consisting of 18 managed natural landscapes that were developed through active nature management strategies, such as fertilizing, grazing and ploughing (i.e., scenes classified as 'semi-natural' or 'multifunctional' by at least two experts) and 18 unmanaged natural landscapes that developed spontaneously without active human intervention (i.e., scenes classified as 'approximately natural' or 'guided natural' by at least two experts). Agreement between the experts was adequate, with Cramer's V coefficients ranging from .62 to .84.

Slide Ratings

All participants rated each of the 36 slides for beauty and a number of

other characteristics, including degree of human influence. Perceived degree of human influence was assessed by asking respondents to indicate how 'well-cared-for' the landscapes were. All ratings were given on nine-points scales ranging from 1 = 'not at all' to 9 = 'a great deal'. Each scene was presented as a 'landscape' plus index number. No reference was made to the fact that the scenes were representative for nature development landscapes.

Nature Images and Environmental Beliefs

After rating the slides, participants filled out several questionnaires, among which were measures of nature images and environmental beliefs. Nature images were assessed using a methodology based on the work of Rosch and her colleagues on cognitive schemata (Rosch & Mervis, 1975; see also Purcell, 1987). Participants judged 33 descriptions of instances of nature according to their typicality for the category of 'nature'. The nature instances represented eleven 'nature images' listed by the Dutch Nature Conservation Council (Natuurbeschermingsraad, 1993) on theoretical and experiential grounds. Instructions were similar to the instructions used by Rosch & Mervis (1975, p. 588) and Purcell (1987, p. 73). Participants were asked to rate the extent to which an instance represented their idea or image of the meaning of nature on scales ranging from 1 to 10. Scale extremes were labeled 1 for 'worst example' and 10 for 'best possible example'. Table 1 below lists the final selection of 25 of the 33 instances used.

Environmental beliefs were assessed using a Dutch translation of the original 12-item New Environmental Paradigm (NEP) scale by Dunlap and Van Liere (1978). Participants were asked to indicate their agreement with each item on 5-point scales. The items were coded so that high scores corresponded to high ecocentrism (M = 3.80, SD = .56; Cronbach's Alpha = .78).

Procedure

All instructions and questions were presented on Apple MacIntosh computers. Each session included three to six participants, who were each seated behind a computer. Slides were projected on a screen in random order that remained the same across all sessions. Two scenes classified as diffuse were used as filler slides at the beginning and the end of each session to avoid start and end effects. The average time for completing the study was approximately one hour.

Figure 1

Example of natural landscape with a high degree of human influence

Figure 2

Example of natural landscape with a low degree of human influence

Table 1

Results of Factor Analysis of Prototypicality Ratings of 25 Instances of Nature (N=59)

	Nature-Image Factors		
	Useful	Healthy	Spontaneous
a field with grain and vegetables	.84		
wind and water for the sailor	.80		
a meadow with cattle	.78		
a dog or cat as a pet	.74		
the waterside with a fisherman's spot	.69		
a mountain wall for a mountaineer	.65		
plants on the windowsill	.55		
a tree farm with pines and poplars	.55		
a genetically modified organism	.42		
natural decomposition of materials		.84	
the biological growth of plants and flowers		.78	
natural purification of the air		.77	
a bird's nest		.65	
mist above a field		.60	
the healthy smell of woods		.60	
the natural cycle of nature		.54	
a medicinal herb		.53	
flats and/or a sand bar			85
a dark, impenetrable forest			.74
a forest in autumn colors			.69
a primal forest			.62
a river that overflows its banks			.57
a swirling sea			.52
coming face to face with wild animals			.45
a rare meadow bird			.42
Explained Variance	22.9	16.9	9.0

Note. The results shown are the results of a rotated factor solution, using Varimax rotations. The number of factors was constrained to three. All factor loadings greater than .40 are included.

Results

One participant, a student of agriculture, was excluded from the analyses below because of missing values.

Nature Images

Prototypicality judgments for 33 instances of nature were submitted to principle components factor analysis with varimax rotation. A three-factor solution yielded readily interpretable results. Factorial composition was determined by including all items with a factor loading greater than .40 on a given factor. Table 1 provides an overview of the final three factors that resulted from the factor analysis.

The first factor was named Useful Nature. It included nine items describing instances of nature with a practical value to humans. Three of these items described instances of agrarian nature, another three items described nature as an environment for undertaking recreational activities, i.e., fishing, climbing, sailing, two items described instances of domestic nature, and one item described a genetically modified organism. This factor appeared to reflect and anthropocentric nature image.

The second factor was named Healthy Nature. It included eight items that described instances of nature's (re)generative power and healing properties. This factor appeared to reflect a mixture of anthropocentric and ecocentric images. On the one hand, it included instances of nature with practical values to humans, i.e., 'a medicinal herb', on the other hand, it included instances of nature with more intrinsic values, i.e., 'natural decomposition of materials'.

The third factor was named Spontaneous Nature. It consisted of eight items describing instances of spontaneous nature. One half of these instances represented rather 'innocent' forms of spontaneous nature, i.e., the wadden, a forest in autumn colors, a primal forest and a meadow bird, while the other half represented forms of spontaneous nature that are potentially harmful to humans, i.e., a dark, impenetrable forest, a river that overflows its banks, a swirling sea and coming face to face with wild animals. This factor appeared to reflect an ecocentric nature image.

Scores on the Useful Nature factor were significantly negatively correlated with NEP scores, $r = -.58$ $p < .001$, while scores on the Spontaneous Nature factor were significantly positively correlated with NEP scores, $r = .30$, $p < .05$. Scores on the Healthy Nature factor were not correlated with NEP scores,

r = -.06, p > .65. As the NEP scale is assumed to measure environmental beliefs on a dimension ranging from anthropocentric to ecocentric, these findings support the interpretation of Useful Nature and Spontaneous Nature as, respectively, an anthropocentric and an ecocentric nature-image factor. In addition, the finding that scores on nature-image factors were only moderately correlated with NEP scores suggests that nature images and environmental beliefs are related, but distinct concepts.

Table 2

Perceived Degree of Human Influence (Scale Range 1 - 9) as a Function of Landscape Type and Educational Discipline, Standard Deviations in Parentheses

	Educational Discipline		
Type of Landscape	Agriculture	Psychology	Biology
Managed	5.99[a] (.62)	6.11[a] (.67)	6.28[a] (.62)
Unmanaged	3.95[b] (1.30)	3.83[b] (1.39)	3.69[b] (1.05)

Note. Means with unequal superscripts differ per column at p < .01.

Preliminary Analyses of Landscape Ratings

As can be seen in Table 2, the subset of managed natural landscapes was rated more human-influenced than the subset of unmanaged natural landscapes, F (1, 56) = 183.71, p < .001. To examine the influence of educational discipline on ratings of human influence, mean ratings of human influence were computed for each participant, and the resulting values were subjected to a 2 (Landscape Type: Managed versus Unmanaged) x 3 (Educational Discipline: Agriculture, Psychology, Biology) mixed MANOVA with repeated measures on the first factor. This analysis revealed that educational discipline did not affect ratings directly, nor in interaction with Landscape Type, p > .99 and p > .43, respectively. In sum, the foregoing analyses revealed that ratings of human influence were sensitive to expert-rated differences in nature management strategies among the landscapes, and displayed high levels of interrater agreement.

Group Differences Landscape Preferences

Table 3 provides an overview of the mean beauty ratings for the two subsets of managed and unmanaged natural landscapes as a function of educational discipline. Inspection of Table 3 shows that students of agriculture

rated managed and unmanaged natural landscapes about equally beautiful, while psychology and biology rated unmanaged natural landscapes significantly more beautiful than managed natural landscapes. These results provide some preliminary support for the hypothesis that students from different educational disciplines would differ in their preferred degree of spontaneous to human-influenced processes in natural landscapes.

Table 3

Perceived Beauty (Scale Range 1 - 9) as a Function of Landscape Type and Educational Discipline, Standard Deviations in Parentheses

	Educational Discipline		
Type of Landscape	Agriculture	Psychology	Biology
Managed	6.17 (1.27)	6.68[a] (.67)	7.02[a] (.76)
Unmanaged	6.39 (.73)	5.69[b] (1.23)	5.91[b] (1.02)

Note. Means with unequal superscripts differ per column at $p < .01$.

To obtain a more precise estimate of the preferred degree of spontaneous to human-influenced processes in natural landscapes among respondents from the three educational disciplines, individual beauty ratings were regressed on the mean ratings of degree of human influence for each landscape. This approach is more appropriate than comparing the mean preferences for the two subsets of managed and unmanaged natural landscapes, because it uses the complete range of variation in perceptions of degree of human influence to predict individual beauty ratings. To control for dependencies in the data due to the fact that beauty ratings were nested within individuals, regression analyses were performed with the multilevel program MLn (Woodhouse, 1995). In Mln, a basic two-level regression model was specified with the individual beauty ratings as the dependent variable. Starting from this basic model, respondents' mean ratings of degree of human influence for each landscape, and interactions between this variable and education level, nature images, and environmental beliefs, were added and tested.

On average, perceived degree of human influence was found to be negatively related to perceived landscape beauty, $ß = -.16$, $c^2(1) = 6.20$, $p < .05$. However, inspection of the random part of the model revealed that there was a substantial amount of between-individual variation in this relationship, $\sigma^2 = .18$, $c^2(2) = 138.36$, $p < .001$. To investigate the role of educational discipline in this variation, dummy variables representing the effects of educational

discipline, and product terms representing the interaction between these variables and perceived degree of human influence were added to the model. Results of this analysis revealed a significant interaction effect between educational discipline and perceived degree of human influence on perceived landscape beauty, $c^2(2) = 21.07$, $p < .001$. To aid in the interpretation of this interaction effect, predicted beauty ratings were generated for participants from each educational discipline using values of 2 standard deviations above and below the mean to represent high and low degrees of perceived human influence. Inspection of these predicted beauty ratings in Figure 3 shows that, as expected, perceived degree of human influence was positively related to beauty ratings of students of agriculture, while it was negatively related to beauty ratings of psychology and biology students.

Univariately, students of agriculture differed significantly from both psychology and biology students in the relationship between perceived degree of human influence and perceived landscape beauty, $c^2(1) = 10$, $p < .001$, and $c^2(1) = 20.6$, $p < .001$, respectively. The difference between psychology and biology students in the relationship between perceived degree of human influence and perceived landscape beauty was only marginally significant, $c^2(1) = 2.73$, $p < .10$.

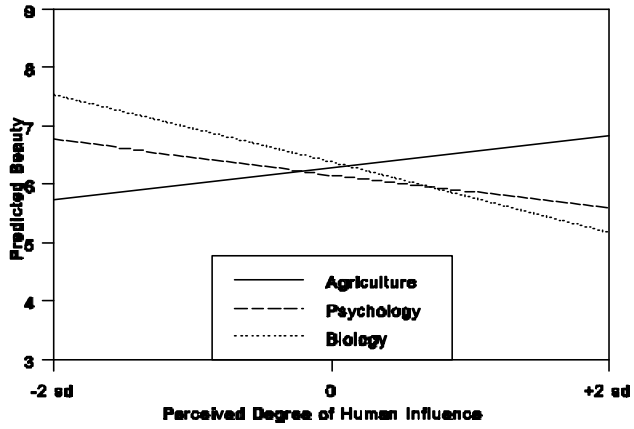

Figure 3

Predicted landscape beauty as a function of educational discipline and degree of human influence

Group Differences in Nature Images and Environmental Beliefs

To test for group differences in nature images and environmental

beliefs, individuals' mean prototypicality scores for the three nature-image factors and their mean NEP scores were computed and summarized to group level. As can be seen in Table 4, participants from all three educational disciplines instances of Spontaneous and Healthy Nature as more typical than instances of Useful Nature. This indicates that nature images were generally ecocentric rather than anthropocentric. As expected, students of agriculture gave reliably higher prototypicality ratings to instances of Useful Nature than did participants from nonagricultural disciplines. Biology students, as compared to psychology students and students of agriculture, gave reliably lower prototypicality ratings to instances of Useful Nature. No differences were found for the other two nature-image factors, i.e. Healthy Nature and Spontaneous Nature, except for the finding that students of agriculture gave higher prototypicality ratings to instances of Healthy Nature than did biology students. Thus, the predictions concerning group differences in nature images received some support.

Table 4

Mean Prototypicality Scores (Range 1 - 10) for Nature-Image Factors and Mean NEP Scores (Range 1 - 5) as a Function of Educational Discipline, Standard Deviations in Parentheses.

	Nature-Image Factors			NEP score
Education	Useful	Healthy	Spontaneous	
Agriculture	5.3[a]	8.3[a]	8.3	3.49[a]
(N = 19)	(1.7)	(1.0)	(1.5)	(.58)
Psychology	4.3[b]	7.7[ab]	8.3	3.87[b]
(N = 20)	(1.2)	(0.9)	(0.7)	(.55)
Biology	3.3[c]	7.0[b]	8.3	4.02[b]
(N = 20)	(1.2)	(1.7)	(1.1)	(.43)

Note. Means with unequal superscripts differ per column at $p < .10$.

Mean NEP scores were above the scale midpoint, indicating that, on average, participants from each group tended to have ecocentric environmental beliefs. Mean NEP scores were reliably lower for students of agriculture than for psychology and biology students. Although mean NEP scores seemed to be higher for biology students than for psychology students, this difference did not reach significance (p = .33). Thus, the predictions concerning group differences in environmental beliefs were only partially supported.

Mediational Analyses

A final series of analyses investigated nature images and environmental beliefs as potential mediators of the finding that the relationship between perceived degree of human influence and perceived landscape beauty differed across students from different educational disciplines. For nature images or environmental beliefs to operate as mediators, four conditions must be met (Baron & Kenny, 1986; Kenny, Kashy & Bolger, 1998). First, educational discipline must affect the relationship between perceived degree of human influence and perceived landscape beauty. Second, educational discipline must affect nature images and environmental beliefs. Third, there should be significant effects of nature images and environmental beliefs on the relationship between perceived degree of human influence and perceived landscape beauty when these effects are estimated simultaneously with the effects of educational discipline. Finally, if the first three conditions are met, then the effect of educational discipline on the relationship between perceived degree of human influence and perceived landscape beauty should be diminished when it is determined while controlling for the mediating effects of nature images and environmental beliefs.

Thus far, the results provide support for the first condition, while the second condition is partially supported for two of the nature-image factors, i.e. Useful Nature and Healthy Nature, and NEP scores. Thus, only Useful Nature, Healthy Nature, and NEP scores qualify as potential mediators of the group differences the relationship between perceived degree of human influence and perceived landscape beauty. To test for the third and fourth condition, participants' scores on the Useful and Healthy nature-image factors and the NEP scale, as well as product terms representing the interactions between these variables and degree of human influence, were added to the multilevel model. Results of this analysis showed that prototypicality ratings for instances of Useful and Healthy Nature and NEP scores did not significantly influence the relationship between perceived degree of human influence and perceived landscape beauty, all *p*s > .48. At the same time, the interaction effect between educational discipline and perceived degree of human influence on perceived landscape beauty remained highly significant when it was estimated while controlling for the influences of the nature images and environmental beliefs, $c^2(2) = 12.97$, $p < .01$. Taken together, these results suggest that despite the fact that participants from different educational disciplines differed in their

preferred balance between spontaneous and human-influenced processes in natural landscapes, as well as in their nature images and environmental beliefs, nature images and environmental beliefs did not mediate group differences in the preferred balance between spontaneous and human-influenced processes in natural landscapes

Discussion

The present study explored systematic differences in landscape preferences, nature images and environmental beliefs among students from different educational disciplines. As expected, students of agriculture favored natural landscapes with a high degree of human influence, while psychology and biology favored natural landscapes with a low degree of human influence. Unlike the study reported in Chapter 2, the present study was conducted outside a planned-change context. Thus, present findings provide stronger evidence for the existence of chronic individual differences in the preferred balance between spontaneous and human-influenced processes in natural landscapes. Importantly, however, group differences in landscape preferences found in the present study were restricted to variations in positive evaluations, as beauty ratings were generally in the upper half of the scale. This is consistent with findings that natural landscapes are generally evaluated in a positive manner (see reviews by Hartig, 1993; Kaplan & Kaplan, 1989; Ulrich, 1986, 1993).

An important aim of the present research was to investigate group differences in nature images. In order to achieve this, prototypicality ratings for the category of nature were obtained from verbal descriptions of nature instances. Subsequent factor analyses on these prototypicality ratings uncovered three nature-image factors. One factor, labeled Useful Nature, corresponded to an anthropocentric nature image, another factor, labeled Spontaneous Nature, to an ecocentric nature image, and a third factor, labeled Healthy Nature, corresponded to a mixed anthropocentric-ecocentric nature image. Thus, two out of three factors could be used to examine group differences in anthropocentric and ecocentric nature images.

Participants from all three educational disciplines rated instances of Spontaneous Nature and Healthy Nature as more typical examples of nature than instances of Useful Nature. This suggests that participants' nature images were generally more ecocentric than anthropocentric. As expected, there were differences in nature images among participants from different educational

disciplines. Group differences in nature images were mainly restricted, however, to perceived typicality of Useful Nature. More specifically, students of agriculture rated instances of Useful Nature as relatively typical examples of nature, while students of psychology and biology rated instances of Useful Nature as relatively atypical examples of nature. This finding suggests that nature images of students of agriculture were more comprehensive and less ecocentric than nature images of students from nonagricultural disciplines.

A further aim of the present research was to investigate group differences in environmental beliefs. Environmental beliefs were measured by means of the NEP scale (Dunlap & Van Liere, 1978). Like nature images, participants' environmental beliefs were generally more ecocentric than anthropocentric. This finding is consistent with sociological analyses which have argued that the New Environmental Paradigm has become the dominant belief system in Western societies (Catton & Dunlap, 1980). As expected, students of agriculture had less ecocentric environmental beliefs than psychology and biology students.

Nature images and environmental beliefs did not affect preferred degrees of spontaneous to human-influenced processes in natural landscapes. This finding may be due to several causes. First, it should be noted that there was little interindividual variation in ecocentrism in the present research, as indicated by a high overall level of ecocentrism. Because the present research took special care to include participants who could be expected to vary in ecocentrism, it seems likely that the lack of variance in ecocentric images and beliefs was not due to sample homogeneity. As several authors have pointed out, acceptance of ecocentric ideas may have become so widespread that new measures are needed to capture more subtle differences in people's cognitions regarding the relationship between humans and nature (e.g., Gooch, 1995; Scott & Willits, 1994). Alternatively, nature images and environmental beliefs on the one hand, and landscape preferences on the other hand, may have diverged too much in their level of specificity. In other words, abstract nature images and environmental beliefs may correspond to different psychological processes than concrete preferences for particular types of natural landscapes (cf. Fishbein & Ajzen, 1975). Taken together, these findings show that cognitions need not necessarily mediate landscape preferences, even when it can be demonstrated that groups with different landscape preferences display corresponding differences in cognitions.

Besides systematic differences between students of agriculture and

students from the two nonagricultural disciplines, the present study found several suggestive differences between psychology students and biology students. Biology students evaluated human influences in natural landscapes more negatively than did psychology students. However, this difference was only marginally significant. Furthermore, biology students gave reliably lower prototypicality ratings to instances of Useful Nature than did psychology students. These results are consistent with findings of previous studies, in which environmental experts have generally been found to be a distinct group with high preferences for wilderness landscapes and highly ecocentric environmental beliefs (e.g., Arcury 1990; Dearden, 1980; Zube, 1974). Future work is needed to address the precise influence of environmental knowledge on nature images, environmental beliefs, and landscapes.

Results of the present study extend the results of the field study reported in Chapter 2. Because of differences in participants and procedures, results are difficult to compare across studies. Nevertheless, one interesting discrepancy deserves mention. Farmers included in the field study displayed much stronger preferences for human-influenced natural landscapes than the students of agriculture in the present study. This difference may be due to differences in sociodemographic characteristics of these two groups, such as the fact that students of agriculture were younger, and had less experience with rural landscapes than the farmers in the field study. Alternatively, farmers' judgments in the field study may have been influenced by the planned-change context in which the study was conducted. Consistent with this interpretation, results of the study presented in Chapter 2 indicate that effects of planned-change context on landscape preferences may be moderated by pre-existing group differences. Future research might profitably explore the interaction between group differences and contextual influences on landscape evaluation.

The present findings have several practical implications. First, the results indicate that group differences in the preferred balance between spontaneous and human-influenced processes in natural landscapes may occur even under neutral circumstances. Thus, these differences can never be completely attributed to contextual factors. Furthermore, the finding that group differences in landscape preferences were not mediated by cognitive images and beliefs suggests that persuasion attempts aimed at changing people's images and belief systems will not increase people's preferences for wilderness landscapes. Finally, the finding that students of agriculture tended to include instances of Useful Nature in their cognitive image of the category nature,

while students from nonagricultural disciplines tended to exclude instances of Useful Nature from their nature image may have important implications with regard to policy strategies for increasing the natural values of agricultural areas by means of nature development (cf. Ministry of Agriculture, Nature Management and Fisheries of The Netherlands, 1996). Especially farmers may question the usefulness of such strategies, because, in their conceptions, the existing agrarian landscape already is a natural landscape. Thus, in addition to their aesthetic preferences, farmers' nature images may constitute an important source of diverging responses to nature development plans.