

New wilderness in the Netherlands: An investigation of visual preferences for nature development landscapes

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Abstract

The present research investigated visual preferences for nature development landscapes among 500 residents from six plan areas in The Netherlands. Significant differences in relative preferences for wild versus managed scenes were found between landscape types and respondent groups. Development of wild nature was evaluated less positively in a forested area than in more open, rural areas. Among the background variables included in the study, place of residence, age, socio-economic status, farming background, preference for green political parties, and recreational motives were found to be systematically related to relative preferences for wild versus managed nature scenes, accounting for 16% of the variance in preference ratings. These findings are discussed within an applied decision making context in The Netherlands.

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1. Introduction

“The wildness pleases. We seem to live alone with Nature. We view her in her inmost recesses, and contemplate her with more delight in these original wilds than in the artificial labyrinths and feigned wildernesses of the palace” (A.A. Cooper, third Earl of Shaftesbury, *The Moralists*, 1709/1999)

Anthony Ashley Cooper, third Earl of Shaftesbury (1671–1713), was one of the first modern thinkers who advocated the virtues of wild nature. In the three centuries that have passed since his pioneering work, the traditional notion of wilderness as an ugly and evil place has become slowly replaced by a new vision of wilderness as a unique and valuable type of environment (Nash, 1967; Thacker, 1983). In the United States, this new vision of wilderness has ultimately resulted in the legal protection of wilderness areas by the Wilderness Act of 1964 and the creation of a National Wilderness Preservation System (NWPS). Likewise, other countries around the world have estab-

lished laws and strategies to protect the values of wilderness (cf. Jongman et al., 2004).

In recent years, some countries have adopted more pro-active strategies to safeguard the values of wilderness (SER, 2002). In The Netherlands, for instance, the Dutch authorities have decided to establish a National Ecological Network that involves the transformation of more than 50,000 ha of farmland into new natural areas (Ministry of Agriculture, Nature Management, and Fisheries, 1996). Some of these former farmlands will be actively managed by regulative activities such as mowing and clear-cutting. Other former farmlands will be more passively managed and left undisturbed to evolve into “new wilderness”. Enhancing the scenic quality of the landscape is one of the major aims of this Dutch nature development policy. However, because nature development practices are based on ecological principles rather than on lay people’s aesthetic preferences, it remains to be seen how far the newly developed natural areas will be appreciated by the general public (Gobster, 1999; Parsons and Daniel, 2002).

The central aim of the present research was to gain more insight into people’s visual preferences for nature development landscapes. In the following paragraphs, we first discuss different strategies for nature development and their relation to the concept of wilderness. We then review prior research on indi-

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vidual differences in visual preferences for wild versus managed natural landscapes along with the potential relevance of place of residence, socio-economic variables, and recreational motives to explain these differences. Finally, we present the results of a survey among 500 residents from six nature development areas in The Netherlands.

1.1. *Nature development and the concept of wilderness*

The Dutch nature development policy can be understood as part of an international movement that has set forth ecological restoration as the new standard in nature management practice (Hobbs and Norton, 1996; Davis and Slobodkin, 2004). In general, ecological restoration may be defined as human intervention intended to recover nature's integrity which is considered to be threatened or even absent because of human activities such as agriculture, industry, mining, and recreation (Swart et al., 2001). A distinctive characteristic of the Dutch plans for ecological restoration is that the interventions will be carried out mainly in agricultural production areas, which will be transformed into completely new natural areas. To achieve this, several kinds of nature management strategies may be applied, ranging from active strategies that guide natural processes by means of regulative activities, to more passive strategies that encourage the development of spontaneous natural processes by minimizing human activities in an area (cf. Hobbs and Harris, 2001). Application of active nature management strategies promotes the development of orderly, managed natural landscapes, while application of more passive strategies promotes the development of wild, unmanaged natural landscapes. In The Netherlands, these latter landscapes are commonly referred to as "new wilderness areas".

The term "new wilderness" for humanly redeveloped landscapes may sound like a contradiction. However, this contradiction only arises when one defines wilderness as pristine areas which are completely untouched by humans. The latter definition is often used in legal documents (cf. the American Wilderness Act, 1964). However, it is also possible to define wilderness from a more subjective, psychological perspective. Results of landscape perception studies indicate that lay people use the term wilderness to describe any natural area without *discriminable* human influences (Wohlwill, 1983; Kaplan and Kaplan, 1989). Thus, the appearance of an environment, rather than the actual amount of human interference, determines whether an individual perceives it as wilderness or not. On the basis of this psychological definition of wilderness it is possible to refer to humanly redeveloped landscapes as wilderness landscapes.

The planned nature development will drastically change the appearance of the Dutch countryside. Consequently, the scenic consequences of nature development plans as they are experienced by those who live, work, and recreate in the designated areas constitute an important element in land management decisions. In recognition of this notion, Dutch nature development policy has included enhancement of the landscape's scenic quality as a criterion for environmental planning and management next to ecological criteria such as increase of biodiversity and

naturalness. By doing so, the Dutch government has shown an awareness that public or scenic aesthetics should be distinguished from ecological values (cf. Gobster, 1999; Parsons and Daniel, 2002). However, details on how the scenic quality criterion relates to the various restoration options have not been specified. It would therefore be useful to gain more insight into how local people evaluate the scenic quality of different types of nature development landscapes, in particular wild versus more managed landscapes.

1.2. *Visual preferences*

When people are asked to categorize natural scenes, they typically put wild, disorderly scenes together in one pile, whereas they put more managed and structured scenes together in another pile (cf. Hartig and Evans, 1993). Degree of human influence thus represents a key dimension underlying people's landscape perceptions. The evaluation of this dimension varies considerably between individuals. Indeed, settings reflecting either low or high degrees of human influence tend to elicit the most individual variation in environmental preferences (Dearden, 1984; Gallagher, 1977; Orland, 1988; Strumse, 1996). Accordingly, there exist important individual differences in visual preferences for wild versus more managed natural settings.

Kaplan and Kaplan (1989) have reviewed the available evidence on individual differences in landscape preferences. Their analysis suggests that differences between members of various subcultures and ethnic groups can nearly always be interpreted in terms of the preferred balance between natural and human influences. Some individuals tend to display a preference for wild natural landscapes, whereas others tend to display a preference for more managed nature. Unfortunately, the studies reviewed by Kaplan and Kaplan (1989) do not allow any firm conclusions concerning the cultural or ethnic variables that underlie these differences, because the subcultures and groups that were studied differed on more than one dimension (e.g., urbanity, familiarity, age, race, income). In the following paragraphs, we consider the empirical evidence for three types of variables that are often mentioned as possible correlates of individual differences in preferences for wild versus managed natural landscapes: place of residence, socio-economic characteristics, and recreational motives.

1.3. *Place of residence*

A first potential source of individual differences in preference for wild versus managed nature is place of residence. Studies among rural residents have sometimes reported negative evaluations of plans to protect or develop nearby wilderness areas (e.g., Fiallo and Jacobsen, 1995; Durrant and Shumway, 2004). For example, results of a recent survey indicated that residents of six south-eastern Utah counties displayed negative attitudes toward the designation of wilderness study areas in their county (Durrant and Shumway, 2004). Such negative attitudes have been attributed to perceived impacts on livelihoods or disagreement with local planning procedures, which may give rise to a 'resistance to change'.

The relevance of ‘resistance to change’ to visual preferences is supported by an experimental study by Van den Berg and Vlek (1998). In this study, five landscape photographs, depicting one agricultural landscape and four natural scenes with varying degrees of human influence, were either presented as ‘five existing Dutch landscapes’, or as ‘one existing landscape and four plans for nature development from this landscape’. Respondents were asked to evaluate the landscapes from the perspective of a rural resident, a cyclist, or from a neutral perspective. Results showed that the four natural landscapes were rated less beautiful if the landscapes were presented as planned changes, in particular if a landscape was judged from the perspective of a local resident, and if it was perceived as wilderness. These findings suggest that low preferences for wilderness landscapes by rural residents may partly reflect the influence of the planned-change context.

Rural residents have also been found to display lower preferences for wilderness landscapes than urbanites when these landscapes did not represent planned changes in their area (cf. Strumse, 1996). This phenomenon is commonly interpreted in terms of rural residents’ greater direct experience with the managed, local landscape, which may foster a generic preference for this type of landscapes (e.g., Lyons, 1983; Wellman and Buyhoff, 1980). Notably, the socio-economic composition of rural communities tends to differ from the composition of urban communities. As such, differences in landscape preferences between rural and urban residents could also reflect influences of socio-economic variables such as age and socio-economic status.

1.4. *Socio-economic characteristics*

A second potential source of individual differences in preference for wild versus managed nature consists of socio-economic characteristics. Prior research on relations between socio-economic characteristics and landscape preferences has uncovered several relevant variables. First, preference for natural landscapes has been found to vary with age (Balling and Falk, 1982; Lyons, 1983; Strumse, 1996; Van den Berg et al., 1998). In particular, elderly people have been found to display relatively low preferences for wild natural landscapes, and relatively high preferences for managed natural settings. Elderly people’s greater preference for managed nature may be explained by their greater physical and psychological vulnerability, which may make them more susceptible to the dangers of wilderness areas. Alternatively, increasing preferences for managed nature with age may also reflect generational differences in culture and upbringing.

Socio-economic status, measured by level of income and education, is another variable that has been related to preferences for wild versus managed natural landscapes. The finding that people with high incomes and education levels are typically overrepresented among wilderness users provides some indirect support for the relevance of this variable (Roggenbuck and Lucas, 1987; Hendee et al., 1990; Virden, 1990). Results of visual preference studies provide more direct support for a relation between socio-economic status and preference for wilderness (Lyons, 1983;

Van den Berg et al., 1998). For example, Van den Berg et al. (1998) reported that highly educated people displayed a greater preference for computer-simulated wilderness landscapes.

Finally, a number of studies have focused on specific societal groups that might differ in their landscape preferences (Brush et al., 2000; Dearden, 1984; González Bernaldez and Parra, 1979; Kaplan and Herbert, 1987; Van den Berg et al., 1998, in press). By and large, these studies have revealed two subpopulations with relatively extreme landscape preferences: environmentalists and farmers. Environmentalists, such as members of nature protection groups, have been found to display relatively strong preferences for wilderness settings as compared to more managed natural settings. This strong preference for wilderness among environmentalists has been related to their ecocentric environmental beliefs, according to which nature is considered intrinsically valuable (Van den Berg et al., in press). By contrast, farmers have been found to display relatively strong aesthetic preferences for managed settings. This finding has been related to farmers’ direct dependence on the cultivation of nature for their subsistence, in combination with their long experience with agricultural landscapes (Van den Berg et al., 1998).

1.5. *Recreational motives*

A third potential source of individual differences in preference for wild versus managed nature consists of recreational motives. Wilderness researchers have traditionally focused on recreational motives to distinguish between users and non-users of wilderness areas (e.g., Knopf, 1983; Knopf et al., 1983; Ribe, 1994; Stankey and Schreyer, 1987). In particular, researchers have suggested that more intrinsic motives, such as studying nature, restoration from stress, escape from civilization, and reflection on important life issues, are relatively important to wilderness users as compared to users of other natural settings (e.g., Johnson, 2002). In line with these notions, a study by Knopf et al. (1983) found that users of wild and undisturbed rivers were more strongly motivated by a desire to escape civilization than users of more developed and crowded rivers. It should be noted, however, that recreational motives have not yet been linked to differences in visual preferences for wild versus managed scenes. As such, it remains to be established whether recreational motives are indeed relevant to this domain.

1.6. *The present research and hypotheses*

Our goal in the present research was to learn more about visual preferences for wild versus managed nature development landscapes in The Netherlands. On the basis of the previous discussion, we expected that these preferences would be systematically related to three sets of variables: place of residence, socio-economic characteristics, and recreational motives.

First, we predicted that local residents, as compared to non-residents, would display lower preferences for plans to develop wild nature in their area, and higher preferences for plans to develop managed nature in their area. These lower preferences for wild natural landscapes by local residents may reflect a ‘resistance to change’ (Van den Berg and Vlek, 1998), or they may be

indicative of a more generic influence of residents' familiarity with the local, managed landscape (Kaplan and Kaplan, 1989).

Second, with respect to socio-economic characteristics, we predicted that farmers, because of their extended experience with agricultural, managed landscapes and their dependence on nature for their income, would display relatively low preferences for wild nature development landscapes, and relatively high preferences for managed nature development landscapes. In a similar vein, we expected that elderly respondents and respondents with a low socio-economic status, because of their weaker position in life and greater vulnerability to the dangerous aspects of wild nature, would display relatively low preferences for wild as compared to managed nature development landscapes. Furthermore, we expected that environmentalists, because of their more eco-centric environmental beliefs (cf. Van den Berg et al., *in press*), would display relatively high preferences for wild as compared to managed nature development landscapes.

Third and last, we predicted that preferences for wild versus managed nature development landscapes would be related to respondents' recreational motives. Based on the notion that certain, more intrinsic, motives are relatively important to wilderness users as compared to users of other natural settings (Knopf et al., 1983; Johnson, 2002), we expected that respondents who visited nature for reflection, recovery from stress, and nature study would display higher preferences for wild natural landscapes as compared to managed nature development landscapes.

2. Method

2.1. Data collection and respondents

Data were obtained via a mail survey among residents from six different areas in The Netherlands. A total of 1340 questionnaires with full-color photographs (225 per area) were distributed with a cover letter indicating that only persons of 16 years and older were to answer the questionnaire. In each area, addresses were selected using a random-selection procedure based on postal codes. A total of 515 questionnaires were returned, yielding a response rate of 38%. This somewhat low response rate was probably due to the length of the questionnaire (27 pages). Fifteen questionnaires were discarded because they contained missing data on more than two variables, leaving 500 respondents (360 males, 140 females) for the analysis. The mean age of the respondents was 49 years, and varied between 16 and 84 years.

Because the present research was not aimed at making generalized statements about proportions of the Dutch population that prefer wild or managed nature development, we considered the somewhat low response rate acceptable. The primary focus of the present research was on gaining insight into the relations between individual characteristics and landscape preferences. The most important requirement for studying such relations is that the sample shows enough variation on these individual characteristics, i.e., place of residence, socio-economic characteristics, and recreational motives. Preliminary analyses indicated that respondents were approximately evenly distributed across the six selected areas, $80 \leq n_s \leq 89$. Moreover, our sam-

ple included respondents from a wide range of socio-economic backgrounds and with various recreational motives. Thus, there was sufficient variation in the present sample to conduct our analyses.

2.2. Plan areas

At the time of the survey, all six plan areas had been designated by the Dutch Government as nature development areas (cf. Ministry of Agriculture, Nature Management and Fisheries, 1996). However, the areas differed with regard to physical geographic circumstances, land use, surface area of planned nature development, and phase of the planning procedure. In the following, a brief description of the main characteristics of each area at the time of survey will be provided.

Area 1 ('Ulvenhout-Galder') was a sandy, agricultural area situated in the province of North Brabant. The plans for nature development in the area focused on several brook valleys with a total surface area of about 800 ha. At the time of survey, several plan alternatives had been formulated and made public. A preferred alternative had not yet been selected.

Area 2 ('De Burd') was a highly managed clay area in the province of Friesland, surrounded by canals and lakes. The plans for nature development in the area focused on grassland in the Northern part of the area, which had a total surface area of about 250 ha. At the time of survey, a preferred plan to develop a clay marsh had been selected and made public. Local reactions to this plan had been predominantly negative.

Area 3 ('Grensmaas') was part of the valley of the river Maas in the province of Limburg. The nature development plans for the specific area included in the survey covered about 250 ha. At the time of survey, a plan to develop riparian woodlands, floodplains, and marshes had been selected and made public. A specific feature of the plan was that it would be financed by profits from gravel mining. Local reactions to this plan had been primarily positive.

Area 4 ('Compagnonsbossen') was a wooded area of about 225 ha situated in the province of Friesland. The woods, which had originally been planted for forestry purposes, were on one side adjacent to a protected peat area. On the other sides, they were surrounded by fields. The aim of the nature development in this area was to increase the water level in the woods to help prevent dehydration of the adjacent peat area. Although several plan alternatives had been formulated at the time of survey, these had not yet been made public.

Area 5 ('Branden') was a highly managed sandy area situated in the province of Drenthe. The plans for nature development in the area focused on a brook valley with a total surface area of about 350 ha. The planning procedure in the area had not yet started at the time of survey. However, a possible land-use plan for this area had been developed. This plan involved the development of marshes and the restoration of the original winding of the brook.

Area 6 ('Bergen-Egmond-Schoorl') was a coastal area with bulb fields and grassland situated in the province of North Holland. The plans for nature development in the area focused on several polders with a total surface area of about 920 ha. At the

time of survey, several plan alternatives had been formulated and made public. A preferred alternative had not yet been selected.

2.3. Stimuli

The stimulus set consisted of six pairs of full-color photographs (10 cm × 15 cm) of natural landscapes. The photographs were selected in consultation with local authorities (Fig. 1). One photograph of each pair depicted the landscape in the area as it would look like after the realization of active nature management strategies (i.e., landscapes classified as ‘semi-natural’ or ‘multifunctional’ in the Dutch handbook of target nature types; Bal et al., 1996). The other photograph of each pair depicted the landscape in the area as it would look like when it would be left to evolve spontaneously, without active human intervention (i.e., landscapes classified as ‘approximately natural’ or ‘guided natural’ in the handbook of target nature types). Because examples of the latter type of landscape were not available in The Netherlands at the time of study, our contact persons in the areas selected referent images from other countries, such as Poland and Russia, to portray this type of landscape.

In the questionnaire, the two types of nature development landscapes were referred to as landscapes A and B. In the introduction, it was explained that the landscapes indicated with an A represented ‘actively’ managed settings, while landscapes indicated with a B represented ‘passively’ managed settings. The concepts of active and passive management were explained in a neutral manner, without emphasizing the desirability of a particular strategy (see Appendix A).

2.4. Measures and questionnaire

The questionnaire began with a general introduction, in which respondents were given a map depicting the locations of the six plan areas and some basic information on nature development and nature management strategies (see Appendix A). The remainder of the questionnaire was divided into three parts. The first part started with questions about the 12 photographs of natural settings. Pairs of photographs of actively and passively managed landscapes were shown in the upper halves of adjacent pages, with actively managed landscape on the left page, and the passively managed landscape on the right page. Rating scales were printed directly underneath each photograph. Respondents were asked to rate each landscape on several characteristics, including beauty and perceived wilderness.

Perceived beauty was measured on a positively skewed, 6-point Likert scale with separate verbal labels for each scale point (1 = ‘not at all beautiful’; 2 = ‘not beautiful’; 3 = ‘somewhat beautiful’; 4 = ‘beautiful’; 5 = ‘very beautiful’; 6 = ‘extremely beautiful’). We decided to use a positively skewed scale, because previous research has shown that natural landscapes generally elicit positive reactions and are rarely rated as ugly (cf. Ulrich, 1993). Perceived wilderness was measured by asking the respondents to rate, on a 5-point Likert scale, the applicability of the description: ‘a wild landscape where nature can take its own course’. To avoid response bias, the question about perceived wilderness was embedded in a list of eight questions, seven of

which are irrelevant to the focus of the present investigation and will not be further discussed.

The second part of the questionnaire consisted of general questions about nature and landscape, including questions about recreational motives. These motives were assessed by asking the respondents to rate the applicability of reasons for visiting natural areas on a 5-point scale. The first recreational motive, recovery from stress, was measured by the statement: “I visit nature to escape the stress of daily life and to put my worries aside”. The second motive, reflection, was measured by the statement “I visit nature to think in peace about the things that bother me”. The third motive, studying nature, was measured by the statement “I visit nature to study special animals and plants”. These three statements about recreational motives were embedded among three other statements which are irrelevant to the focus of the present investigation and will not be further discussed.

The final part of the questionnaire assessed various background characteristics, including age, income, education level, farming background, and environmentalism. Respondents who indicated that they, or their partner, worked, or had worked, on cattle and/or arable farms were classified as farmers. A measure of environmentalism was derived from respondents’ political preference. Respondent who indicated that they voted for a ‘green’ political party (i.e., “Groen Links”) during the last elections were classified as environmentalists.

2.5. Data analysis

The questionnaires of 40 respondents contained one or two missing values on relevant variables. Because the questionnaire was quite extensive, we suspected that these missing data reflected random omissions rather than systematic response patterns. Therefore, to avoid the omission of valid data, we decided to impute the missing data for these respondents instead of deleting their data altogether. We replaced the missing values by the average values of the other respondents. The same pattern of results was obtained when cases with missing data were deleted from the dataset (Van den Berg, 1999).

We analyzed the data using analysis of variance (ANOVA) and regression analysis. These statistical techniques assume interval data, while the main dependent variable, perceived beauty, was measured on an ordinal Likert scale. However, according to prevailing notions, Likert scales can be used with interval procedures, provided the scale items have at least five and preferably seven categories. Perceived beauty had six categories, and thus fulfilled this requirement. Jaccard and Wan (1996) state that for many statistical tests, even rather severe departures from intervalness do not seem to affect Type I and Type II errors dramatically. This is supported by other literature (Binder, 1984; Nunnally, 1978; Zumbo and Zimmerman, 1993).

To prepare the data for regression analysis, we first computed difference scores between beauty ratings for wild and managed landscapes, in such a way that higher scores represented higher relative preferences for wild nature. Notably, the use of this single preference index potentially results in a loss of information because it neglects continuous varia-



Fig. 1. Pairs of managed (left) and wild (right) natural settings presented as nature development plans in six areas.

Table 1

Mean ratings of wilderness (scale range 1–5) and beauty (scale range 1–6) for managed and wild nature development landscapes in six areas ($N = 500$, standard deviations in parentheses)

Area	Perceived wilderness (1–5)		Perceived beauty (1–6)	
	Managed	Wild	Managed	Wild
1	2.05 (.83)	4.14 (.78)	3.87 (.76)	4.69 (.88)
2	2.37 (.98)	3.75 (.94)	3.49 (1.01)	4.14 (1.00)
3	2.63 (.88)	3.84 (.92)	3.88 (.79)	4.25 (1.09)
4	2.73 (.95)	4.18 (.85)	4.25 (.89)	3.73 (1.15)
5	3.00 (.91)	4.16 (.79)	4.32 (.84)	4.75 (.86)
6	2.05 (.81)	4.01 (.85)	3.71 (.91)	4.29 (1.08)
Total	2.48 (.56)	4.01 (.58)	3.92 (.55)	4.31 (.69)

Note. See Fig. 1 for depictions of the landscapes; perceived wilderness was measured by asking respondents to rate the applicability of the description: 'a wild landscape where nature can take its own course'. All means differ significantly between wild and cultivated landscapes at $p < .001$.

tions in perceived wilderness of the landscapes. To examine the influence of continuous variations in perceived wilderness on landscape preferences, we re-analyzed the data using multi-level analysis (Bryk and Raudenbush, 1992; see Van den Berg et al., 1998, for an application in the domain of nature evaluation). We formulated a basic two-level model, with individual beauty ratings of the twelve landscapes as lower level observations nested within persons. Effects of perceived wilderness on beauty ratings, and socio-economic differences in relations between wilderness and beauty, were estimated by adding ratings of perceived wilderness, socio-economic variables, recreational motives, and their interaction terms to this model. The results of the multilevel analysis were highly similar to those produced by the linear regression analysis with the preference index as a single dependent variable (see Van den Berg (1999, Chapter 5) for a more detailed description of the outcomes of the multilevel analysis). Because the regression approach is more conventional and easier to interpret for most readers than multilevel analysis, we remained with this approach in this article.

3. Results

3.1. Perceived wilderness

To check whether our classification of the landscapes as 'wild' versus 'managed' corresponded to respondents' perceptions, we compared respondents' average wilderness ratings of wild landscapes to their average wilderness ratings of managed landscapes. Relevant means are displayed in the left half of Table 1. Wild landscapes were generally perceived as wilder and more spontaneous in character than their managed counterparts, $M = 4.01$ versus $M = 2.47$, $t(499) = 47.20$, $p < .001$. This difference in perceived wilderness was found for each pair of landscapes, all p 's $< .001$. Thus, respondents' perceptions of the landscapes as wild or managed corresponded with variations in nature management strategies between the landscapes.

Table 2

Mean beauty ratings (scale range 1–6) for managed and wild nature development landscapes in six areas rated by residents and nonresidents (standard deviations in parentheses)

Area	Residents		Nonresidents	
	Managed	Wild	Managed	Wild
1	4.00 a (.85)	4.84 b (.77)	3.85 a (.75)	4.66 b (.91)
2	4.13 a (1.07)	4.11 a (1.26)	3.36 b (.95)	4.15 a (.95)
3	3.80 a (.85)	4.28 b (1.17)	3.89 a (.78)	4.25 b (1.08)
4	4.29 a (1.06)	3.73 b (1.23)	4.24 a (.86)	3.72 b (1.13)
5	4.56 a (.83)	4.81 b (1.00)	4.29 c (.84)	4.75 a,b (.83)
6	4.00 a (.95)	4.55 b (1.06)	3.65 c (.89)	4.23 d (1.08)

Note. Means with unequal letters differ per row at $p < .05$.

3.2. Perceived beauty

Respondents generally perceived both the wild and managed landscapes as beautiful. As can be seen in the right half of Table 1, mean beauty ratings of both types of landscapes were well above the conceptual midpoint of the scale, which was already positively skewed. The ANOVA also revealed a significant effect of landscape type, which indicated that wild landscapes were generally perceived as more beautiful than managed landscapes, $M = 3.92$ versus $M = 4.31$, $t(499) = 9.92$, $p < .001$. Higher beauty ratings for wild landscapes were found for five out of the six landscape pairs, all p 's $< .001$. The only exception to this pattern was obtained for the pair of landscapes from Area 4 (a forested area). In Area 4, the wild landscape was rated significantly *less* beautiful than the managed landscape, $M = 3.73$ versus $M = 4.25$, $t(499) = 7.88$, $p < .001$.

3.3. Residents versus nonresidents

Table 2 provides an overview of mean beauty ratings by residents and nonresidents. In Areas 2, 5 and 6, residents rated the managed plan for their own area as significantly more beautiful than nonresidents, all p 's $< .01$. In addition, residents of Area 6 also rated the wild landscape in their own area significantly more beautiful than nonresidents, $p < .05$.

The strongest differences in landscape preferences between residents and nonresidents were found in Area 2. As can be seen in Table 1, nonresidents rated the managed landscape in Area 2 as significantly less beautiful than the wild landscape, $M = 3.36$ versus $M = 4.15$, while residents of Area 2 rated the managed landscape in their area as slightly more beautiful than the wild landscape, $M = 4.13$ versus $M = 4.11$. This interaction-effect was highly significant, $F(1,499) = 29.03$, $p < .001$.

We analyzed beauty ratings of residents of Area 2 in more detail to find out whether their higher preference for managed nature applied only to their own area, or whether it also applied to landscapes from the other five areas. Results of this analysis showed that residents from Area 2 also rated the managed landscape in three other areas significantly more beautiful than other nonresidents of these areas, all p 's $< .05$. This finding suggests that the higher preference for managed nature by residents of Area 2 reflects a general preference for managed landscapes,

Table 3

Mean beauty ratings (scale range 1–6) for managed and wild landscapes as a function of socio-economic variables (standard deviations in parentheses)

Socio-economic variables	Landscape type		b – a	F-value
	Managed (a)	Wild (b)		
Place of residence				
Area 2 (N=82)	4.07 (.50)	4.11 (.73)	.04	15.53***
Other areas (N=418)	3.98 (.55)	4.34 (.68)	.46	
Farming background				
Farmers (N=91)	4.12 (.54)	4.04 (.77)	–.08	33.11***
Nonfarmers (N=409)	3.88 (.54)	4.37 (.66)	.49	
Age				
<50 years (N=252)	3.87 (.52)	4.37 (.56)	.50	8.5**
≥50 years (N=248)	3.97 (.56)	4.25 (.71)	.28	
Education level				
Low (N=114)	4.02 (.56)	4.21 (.72)	.21	7.3**
Medium (N=197)	3.96 (.52)	4.29 (.72)	.33	
High (N=189)	3.82 (.55)	4.39 (.61)	.57	
Income				
Low (N=92)	4.05 (.52)	4.03 (.72)	–.02	13.70***
Medium (N=171)	3.92 (.53)	4.33 (.66)	.42	
High (N=237)	3.87 (.56)	4.40 (.68)	.53	
Political preference				
Green party (N=50)	3.79 (.62)	4.64 (.58)	.85	15.46***
Other parties (N=450)	3.93 (.54)	4.27 (.69)	.34	

** $p < .01$.

*** $p < .001$.

rather than a specific preference for managed nature in their own region (see Table 3 for relevant means).

3.4. Socio-economic characteristics

To estimate relations between socio-economic characteristics and generic preferences for wild versus managed nature, we first computed difference scores between beauty ratings for wild and managed landscapes. Positive scores on this preference index indicate that the six wild landscapes were rated as more beautiful than the six managed landscapes. A series of one-way ANOVAs revealed significant effects of place of residence, farming background, age, income, education, and preference for green political parties on this index. Relevant means for each variable are displayed in Table 3. Residents of the second area, farmers, older respondents, and respondents with low levels of income and education displayed relatively low preferences for wild nature, while younger respondents, respondents with high levels of income and education, and respondents with a preference for green political parties displayed relatively high preferences for wild nature. No significant effects were found for other socio-economic characteristics, including gender, religion, other occupations than being a farmer, place of residence in other areas than Area 2, and other political preferences than a preference for green political parties.

To estimate the relative contributions of the socio-economic variables, we entered these variables as predictors in a regression analysis with the preference index as a dependent variable. The outcomes of this analysis are provided in the left half of

Table 4

Results from regression analyses (β) using socio-economic variables and recreational motives to predict relative preferences for wild vs. managed landscapes

	Step 1: socio-economic variables	Step 2: +recreational motives
Living in Area 2	–.13**	–.11**
Farming background	–.19***	–.20***
Age	–.09*	–.10*
Income (1 = low, 6 = high)	.12*	.11*
“Green” political preference	.13**	.12**
Study nature		.12**
Reflection		.12*
Recovery		.02
R ²	.13	.16
F change	14.20***	6.33***

Note. Relative preferences for wild vs. managed landscapes were measured by subtracting respondents’ mean beauty scores for the six managed landscapes from their mean beauty scores for the six wild landscapes.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4. Five socio-economic variables were significantly related to relative preferences for wild landscapes, revealing a multiple correlation of .35 and accounting for 13% of explained variance. Education level did not have a significant effect on relative preferences for wild landscapes over and above the other socio-economic variables, due to the high correlation with income, $r = .49$, $p < .001$.

3.5. Recreational motives

To estimate the influence of recreational motives on relative preferences for wild landscapes, we first estimated simple bivariate correlations between each recreational motive and the preference index. Recovery ($r = .09$, $p < .05$), reflection ($r = .16$, $p < .001$) and studying nature ($r = .14$, $p < .01$) were each significantly positively related to relative preferences for wild landscapes. Next, we added the three recreational motives to our regression model. The outcomes of this analysis are displayed in the right half of Table 4. Two of the three recreational motives, reflection and studying nature, were significant predictors of relative preferences for wild landscapes, adding 3% of explained variance. Due to its high correlation with reflection, $r = .48$, $p < .001$, recovery did not have a significant effect on relative preferences for wild landscape over and above the socio-economic variables and the other two recreational motives.

4. Discussion

In the present research, we investigated visual preferences for pairs of photographs depicting realistic plans for the development of wild versus more managed natural landscapes in six rural areas in The Netherlands. As predicted, we found systematic differences in preferences for wild versus managed nature development landscapes between groups from different socio-economic backgrounds and with different recreational motives. These findings confirm and extend previous research on visual

preferences for nature development landscapes (Van den Berg, 2003; Van den Berg and Vlek, 1998; Van den Berg et al., 1998, *in press*).

Averaged across the six areas, plans to develop wild natural settings were rated as more beautiful than plans to develop managed settings. This finding fits well with findings of studies in other countries, which have also found a general “taste for wilderness” (e.g., Arriaza et al., 2004). However, it is important to note that the present research did not employ representative samples of respondents and landscapes. The present finding that wilderness landscapes were generally preferred over managed natural landscapes should therefore be interpreted with caution.

Although wild nature development landscapes were generally preferred over managed landscapes, wilderness was not appreciated in all areas. In the fourth area, a plan to develop a wild forest was evaluated less beautiful than a plan to develop a more managed forest. Both residents and nonresidents displayed a preference for the managed forest, which suggests that this finding cannot be attributed to contextual influences, such as a resistance to change by local residents. Conceivably, the wild natural landscape in the fourth area may have received low preference ratings because of the dense foreground and mid-ground underbrush, characteristics which have been found to influence visual preferences for forests in a negative way, irrespective of the degree of wilderness (Schroeder and Daniel, 1981; Brown and Daniel, 1986). Alternatively, it is also possible that wilderness is less appreciated in forests than in other types of natural landscapes because structure and order are more important in these highly dense and complex environments.

Consistent with our expectations, local residents displayed higher preferences for the development of managed nature in their area than nonresidents. Residents did not, however, display lower preferences for the development of wild nature in their area than nonresidents. The higher preference for managed nature was strongest among residents of the second plan area (Area “De Burd” in Friesland). Because there had been some local resistance to nature development in this area, higher preferences for managed nature by residents of this area may have reflected a momentary influence of the planned-change context (cf. Van den Berg and Vlek, 1998). However, residents of the second area also displayed higher preferences for managed nature in other regions, which points to a more generic effect of familiarity or experience with rural landscapes. Still, because geographical region of residence was confounded with characteristics of local planning procedures, interpretations of differences between residents and nonresidents must remain tentative.

Among the other socio-economic variables included in the study, age, socio-economic status, farming background, and environmentalism were all found to be significantly related to individual differences in preferences for wilderness. As expected, farmers, older respondents, and respondents with low levels of income and education displayed relatively low preferences for wild natural landscapes, while respondents with a preference for green political parties, younger respondents, and respondents with high levels of income and education, displayed relatively high preferences for wild nature. As in previous

research (e.g. Van den Berg et al., *in press*) even groups with the lowest preferences for wilderness, such as farmers, did not rate managed nature as significantly more beautiful than wild nature. Rather, respondents from these groups rated managed and wild nature as equally beautiful.

In line with our predictions, respondents who indicated that they visited nature for restoration, reflection, and to study plants and animals, displayed higher preferences for wild natural landscapes than respondents for whom these motives were less important. These findings speak to the adaptive role of visual preferences in guiding and directing perceivers to landscapes that promise to fulfill their needs (Staats et al., 2003; Koole and Van den Berg, 2004, 2005; Van den Berg et al., 2003). Still, recreational motives explained only 3% of the variance. Consequently, individual differences in the appreciation of wilderness could not be exhaustively explained in terms of differences in recreational motives.

4.1. *Limitations and practical implications*

The present research is subject to several limitations. First, we examined people’s evaluations of photographs rather than actual natural settings. Fortunately, various studies have reported high levels of consistency between visual preferences based on photographs and parallel responses based on direct experience of the represented landscapes (Daniel, 1990; Kellomaki and Savolainen, 1984; Stamps, 1990). Moreover, the preference for wild nature that was obtained in the present research was corroborated in recent Dutch survey among local respondents who had had direct experience with nature development landscapes (Buijs et al., 2004). Based on these results, it seems likely that the current results will generalize to evaluations of actual natural settings.

A further limitation is that the present research used only Dutch respondents. There is reason to believe, however, that our findings are relevant to other cultures as well. Studies in other countries, including nonwestern nations such as Nepal, have yielded similar differences in preferences for wilderness among groups from different socio-economic backgrounds (see Durrant and Shumway (2004), for an overview). Nevertheless, it would be informative to extend the current analysis to other countries, in particular countries where wilderness is less scarce than in The Netherlands.

Finally, recreational motives were each assessed by only one item in the present research. This relatively crude measurement may have suppressed the predictive power of recreational motives. Future work should be directed toward constructing a larger pool of items that covers the entire range of recreational motives in order to obtain a better test of the relevance of motivational accounts for understanding individual differences in the appreciation of wilderness.

Despite the aforementioned limitations, the present research may have some important practical implications for land agencies. The finding that the majority of respondents evaluated plans for nature development in their area as beautiful provides a rationale for the continuation and implementation of nature development strategies. However, as already noted, this finding should

be interpreted with caution because the study did not employ representative samples of responses. Furthermore, local authorities may use the information on individual differences in preferences for wild versus managed nature to make informed decisions on the application of active versus passive management strategies. A final finding with practical value for land agencies is that evaluations of local residents were not strongly influenced by their place of residence, even though they were confronted with realistic alternatives for each of the six areas. Based on this result, residents' evaluations of nature development plans should not be dismissed too easily as being induced by the local change context. Rather, the input of residents deserves to be taken seriously as a useful source of information regarding the visual quality of nature development plans.

Appendix A. Background information on nature development (translated from Dutch)

A.1. Nature management: What does it mean?

The concept of 'nature management' refers to all measures that are aimed at strengthening nature values. The circumstances in an area are adjusted in such a manner that more plants and animals can live there. In this questionnaire, we will make a distinction between two types of nature management: *active* nature management, and *passive* nature management. Actively managed landscapes will be indicated with the letter A, passively managed landscapes will be indicated with the letter B.

A.2. Active nature management

Active nature management implies that nature is continuously guided and strengthened by measures such as grazing, adjusting the water level, mowing, cutting, and dredging. In most cases, active nature management is applied to combine nature values with other values, like agriculture, recreation or the cultural history of an area. Active nature management can be carried out by farmers, or by national nature management organizations.

A.3. Passive nature management

Passive nature management implies that nature in an area is left to reign freely as much as possible. To start this process, human interventions such as cleaning the soil or restoring the original water level are often required. These interventions are carried out by nature management organizations. After these interventions species of plants and animals are left to evolve on their own. The only management that takes place is grazing, for example by wild horses or cows.

References

- Arriaza, M., Cañas-Ortega, J.F., Cañas-Madueño, J.A., Ruiz-Aviles, P., 2004. Assessing the visual quality of rural landscapes. *Landscape Urban Plann.* 69, 115–125.
- Bal, D., Beije, H.M., Hoogeveen, Y.R., Jansen, S.R.J., Van der Reest, P.J., 1996. *Handboek natuurdoeltypen in Nederland [The Handbook of Target Nature Types in The Netherlands]*. National Reference Centre for Nature Management, Wageningen (with English summary).
- Balling, J.D., Falk, J.H., 1982. Development of visual preference for natural environments. *Environ. Behav.* 14, 5–28.
- Binder, A., 1984. Restrictions on statistics imposed by method of measurement: some reality, some myth. *J. Criminal Justice* 12, 467–481.
- Brown, T.C., Daniel, T.C., 1986. Predicting scenic beauty of timber stands. *For. Sci.* 32, 417–487.
- Brush, R., Chenoweth, R.E., Barman, T., 2000. Group differences in the enjoyability of driving through rural landscapes. *Landscape Urban Plann.* 47, 39–45.
- Bryk, A.S., Raudenbush, S.W., 1992. *Hierarchical Linear Models: Applications and Data Analysis*. Sage Publications, London.
- Buijs, A.E., De Boer, T.A., Gerritsen, A.L., Langers, F., De Vries, S., Van Winsum-Westra, M., 2004. Gevoelsrendement van natuurontwikkeling langs de rivieren [Affective value of nature development along rivers]. Report 868. Alterra, Wageningen.
- Cooper, A.A., Third Earl of Shaftesbury (1709), 1999. *The Moralists: A Philosophical Rhapsody, Characteristics of Men, Manners, Opinions*. Times, Clarendon, Oxford.
- Daniel, T.C., 1990. Measuring the quality of the natural environment: A psychophysical approach. *Am. Psychol.* 45, 633–637.
- Davis, M.A., Slobodkin, L.B., 2004. The science and values of restoration ecology. *Restor. Ecol.* 12, 1–3.
- Dearden, P., 1984. Factors influencing landscape preferences: an empirical investigation. *Landscape Plann.* 11, 293–306.
- Durrant, J.O., Shumway, J.M., 2004. Attitudes toward wilderness study areas: a survey of six Southeastern Utah counties. *Environ. Manage.* 33, 271–283.
- Fiallo, E., Jacobsen, S., 1995. Local communities and protected areas: attitudes of rural residents towards conservation and Machalilla National Park, Ecuador. *Environ. Conserv.* 22, 241–249.
- Gallagher, T.J., 1977. *Visual preference for alternative natural landscapes*. Unpublished Doctoral Dissertation. University of Michigan, Ann Arbor.
- Gobster, P.H., 1999. An ecological aesthetic for forest landscape management. *Landscape J.* 18 (1), 54–64.
- González Bernaldez, F., Parra, F., 1979. Dimensions of landscape preferences from pairwise comparisons. In: Elsner, G.H., Smardon, R.D. (Eds.), *Proceedings of Our National Landscape. A Conference on Applied Techniques for Analysis and Management of the Visual Resource*. General Technical Report PSW-35. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, CA, pp. 256–262.
- Hartig, T., Evans, G.W., 1993. Psychological foundations of nature experience. In: Gärling, T., Golledge, R.G. (Eds.), *Behavior and Environment: Psychological and Geographical Approaches*. Elsevier Science Publishers, Amsterdam, pp. 427–457.
- Hendee, J.C., Stankey, G.H., Lucas, R.C., 1990. *Wilderness Management*, 2nd ed. North American Press, Golden, CO.
- Hobbs, R.J., Harris, J.A., 2001. Restoration ecology: repairing the earth's ecosystems in the new millennium. *Restor. Ecol.* 9, 239–246.
- Hobbs, R.J., Norton, D.A., 1996. Towards a conceptual framework for restoration ecology. *Restor. Ecol.* 4, 93–110.
- Jaccard, J., Wan, C.K., 1996. *LISREL Approaches to Interaction Effects in Multiple Regression*. Sage Publications, Thousand Oaks, CA.
- Johnson, B., 2002. On the spiritual benefits of wilderness. *Int. J. Wilderness* 8, 28–32.
- Jongman, R.H.G., Külvik, M., Kristiansen, I., 2004. European ecological networks and greenways. *Landscape Urban Plann.* 68, 305–319.
- Kaplan, R., Herbert, E.J., 1987. Cultural and subcultural comparisons in preference for natural settings. *Landscape Urban Plann.* 14, 281–293.
- Kaplan, R., Kaplan, S., 1989. *The Experience of Nature: A Psychological Perspective*. Cambridge University Press, Cambridge.
- Kellomaki, S., Savolainen, R., 1984. The scenic value of the forest landscape as assessed in the field and the laboratory. *Landscape Plann.* 11, 97–107.
- Knopf, R.C., 1983. Recreational needs and behavior in natural settings. In: Altman, I., Wohlwill, J.F. (Eds.), *Human Behavior and Environment: Advances in Theory and Research*, vol. 6. Plenum Press, New York, pp. 205–240.

- Knopf, R.C., Peterson, G.L., Leatherberry, E.C., 1983. Motives for recreational river floating: relative consistency across settings. *Leisure Sci.* 5, 231–255.
- Koole, S.L., Van den Berg, A.E., 2004. Paradise lost and reclaimed: a motivational analysis of human–nature relations. In: Greenberg, J., Koole, S.L., Pyszczynski, T. (Eds.), *Handbook of Experimental Existential Psychology*. Guildford, New York.
- Koole, S.L., Van den Berg, A.E., 2005. Lost in the wilderness: terror management, action control, and evaluations of nature. *J. Personal. Social Psychol.*
- Lyons, E., 1983. Socio-economic correlates of landscape preference. *Environ. Behav.* 15, 487–511.
- Ministry of Agriculture, Nature management, and Fisheries of The Netherlands, 1996. Nature conservation policy in The Netherlands: objectives, methods and results. Report nr. B-16. National Reference Centre for Nature Management, Wageningen.
- Nash, R., 1967. *Wilderness and the American Mind*. Yale University Press, New Haven, CT.
- Nunnally, J., 1978. *Psychometric Theory*. McGraw-Hill, New York.
- Orland, B., 1988. Aesthetic preference for rural landscapes: some resident and visitor differences. In: Nasar, J. (Ed.), *Environmental Aesthetics: Theory, Research, and Applications*. Cambridge University Press, New York, pp. 364–378.
- Parsons, R., Daniel, T.C., 2002. Good looking: in defense of scenic landscape aesthetics. *Landscape Urban Plann.* 60, 43–56.
- Ribe, R.G., 1994. Scenic beauty perceptions along the ROS. *J. Environ. Manage.* 42, 199–221.
- Roggenbuck, J.W., Lucas, R.C., 1987. Wilderness use and user characteristics: a state-of-knowledge review. In: Lucas, R.C. (Ed.), *Proceedings of the National Wilderness Research Conference: Issues, State-of-knowledge, Future Directions*. General Technical Report INT-220. United States Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT, pp. 204–345.
- Schroeder, H.S., Daniel, T.C., 1981. Progress in predicting the scenic beauty of forest landscapes. *For. Sci.* 27, 71–80.
- SER, Society for Ecological Restoration Science & Policy Working Group, 2002. *The SER Primer on Ecological Restoration*. www.ser.org/.
- Staats, H., Kieviet, A., Hartig, T., 2003. Where to recover from attentional fatigue: an expectancy-value analysis of environmental preference. *J. Environ. Psychol.* 23, 147–157.
- Stamps, A.E., 1990. Use of photographs to simulate environments. A meta-analysis. *Percept. Motor Skills* 71, 907–913.
- Stankey, G.H., Schreyer, R., 1987. Attitudes toward wilderness and factors affecting visitor behavior: a state-of-knowledge review. In: Lucas, R.C. (Ed.), *Proceedings of the National Wilderness Research Conference: Issues, State-of-knowledge, Future directions*. General Technical Report INT-220. United States Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT, pp. 246–293.
- Strumse, E., 1996. Socio-economic differences in the visual preferences for agrarian landscapes in western Norway. *J. Environ. Psychol.* 16, 1–15.
- Swart, J.A.A., Van der Windt, H.J., Keulartz, J., 2001. Valuation of nature in conservation and restoration. *Restor. Ecol.* 9, 230–238.
- Thacker, C., 1983. *The Wildness Pleases: The Origins of Romanticism*. Croom Helm, London.
- Ulrich, S.R., 1993. Biophilia, biophobia and natural landscapes. In: Kellert, S.R., Wilson, E.O. (Eds.), *The Biophilia Hypothesis*. Island Press, Washington, DC.
- Van den Berg, A.E., 1999. Individual differences in the aesthetic evaluation of natural landscapes. Unpublished Doctoral Dissertation. University of Groningen, Groningen. Retrieved January 22, 2006, from <http://dissertations.ub.rug.nl/faculties/p/sw/1999/a.e.van.der.berg/>.
- Van den Berg, A.E., 2003. Personal need for structure and environmental preference. In: Hendrickx, L., Jager, W., Steg, L. (Eds.), *Human Decision Making and Environmental Perception: Understanding and Assisting Human Decision Making in Real-life Settings*. Rijksuniversiteit Groningen, Groningen, pp. 129–148. Retrieved January 22, 2006, from <http://www.agnesvandenbergnl/nfs.pdf>.
- Van den Berg, A.E., De Vries, D., Vlek, C.A.J., in press. Images of nature, environmental values, and landscape preference: Exploring their relationships. In: Van den Born, R.J.G., De Groot, W.T., Lenders, R.H.J. (Eds.), *A Scientific Exploration of People's Implicit Philosophies regarding nature in Germany, The Netherlands and the United Kingdom*. LIT-Verlag, Münster. Retrieved January 22, 2006, from <http://www.agnesvandenbergnl/images.pdf>.
- Van den Berg, A.E., Koole, S.L., Van der Wulp, N.Y., 2003. Environmental preference and restoration: (How) are they related? *J. Environ. Psychol.* 23, 135–146.
- Van den Berg, A.E., Vlek, C.A.J., 1998. The influence of planned-change context on the evaluation of natural landscapes. *Landscape Urban Plann.* 43, 1–10.
- Van den Berg, A.E., Vlek, C.A.J., Coetier, J.F., 1998. Group differences in the aesthetic evaluation of nature development plans: a multilevel approach. *J. Environ. Psychol.* 18, 141–157.
- Viriden, R.J., 1990. A comparison study of wilderness users and non-users: implications for managers and policymakers. *J. Park Recreation Admin.* 8, 13–24.
- Wellman, J.D., Buyhoff, G.J., 1980. Effects of regional familiarity on landscape preferences. *J. Environ. Manage.* 11, 105–110.
- Wohlwill, J.F., 1983. The concept of nature: a psychologist's view. In: Altman, I., Wohlwill, J.F. (Eds.), *Human Behavior and Environment: Advances in Theory and Research*, vol. 6. Plenum Press, New York, pp. 5–37.
- Zumbo, B.D., Zimmerman, D.W., 1993. Is the selection of statistical methods governed by level of measurement? *Can. Psychol.* 35, 390–399.

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