Visual Landscapes and Psychological Well-Being

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Introduction

The notion that exposure to nature is psychologically healthful is very old, and has appeared in many cultures. A more specific form of this hypothesis, advanced by numerous writers through history, is the idea that contact with plants, water, and other nature elements can calm anxiety and help people cope with life's stresses. As an example, the renowned American landscape architect Frederick Law Olmsted strongly believed that urban dwellers find nature relaxing, and wrote that nature reproduced in urban settings brings 'tranquility and rest to the mind' (1870, p. 23). Today this idea is frequently heard in subjective arguments favouring, for example, city parks and the provision of urban fringe wilderness areas. Given the persistence and importance of the 'nature tranquility hypothesis', it is surprising that this notion has remained virtually untested by researchers.

The research described here is intended as a step towards the evaluation of this hypothesis for the specific case of visual contact with outdoor environments. Two principal questions are addressed: 1) what effects, if any, does visual perception of nature have on feelings of anxiety; and 2) how do these effects compare with those produced by views of urban environments lacking nature elements? Environmental perception is of course multi-sensory, and is not restricted to vision. If some types (as opposed to levels) of environmental content or stimuli do effect anxiety it is possible that senses such as hearing or smell are also of importance. Nonetheless it is not artificial to focus on visual aspects of landscapes. Vision is by far our most important sense in terms of yielding information about outdoor environments. Moreover, features of life in modern societies – such as heavy reliance on the automobile – have further heightened the importance of vision relative to other senses. The individual, for example, who sits in an air-conditioned or heated room and gazes outdoors through a double-paned window, experiences the outside world almost entirely in visual terms. In this example, it would be of interest to planners as well as behavioral scientists to know whether the type of landscape visible through the window influences the individual's psychological well-being.

Methods

The basic design of the experiment involved showing coloured slides of outdoor environments to two groups of mildly stressed subjects. One group was shown 50 slides of unspectacular nature scenes dominated by green vegetation. The other group viewed 50 urban scenes lacking nature elements. The 'affect states' or feelings of the subjects, defined primarily in terms of anxiety emotions, were measured both immediately before and after the slide exposures. Comparisons of the results for the two different times make possible inferences concerning the anxiety reducing effects of the nature and urban scenes. The principal hypothesis prior to the data collection was that the anxiety levels of both groups would decline during the slide viewings, but that the group shown nature scenes would report significantly lower post-slide levels than the group exposed to urban views. More detailed discussions follow concerning the procedures for selecting the slides, and the methods of the experiment.

Selection of Slides

Given the major role of slides in the experiment, it should be pointed out that more than a score of studies have supported the use of slides and photographs as surrogates for 'real' environmental views (e.g. Shafer and Richards, 1974; Zube, Pitt, and Anderson, 1974; Sorte, 1975; Clamp, 1976.) Also, theories of psycho-physiological arousal assign major importance to visual properties of environments as factors affecting psychological activation (e.g. Berlyne, 1971; Kuller, in press). The notion that visual properties such as stimulus complexity and colour affect a person's level of activation or arousal is generally accepted. It is a reasonable assumption that such properties are accurately simulated by colour slides. Most importantly, the fact that responses and feelings related to visual properties of environments are of salient concern supports the validity of using slides as a simulation technique.

The collections of nature and urban scenes were selected from a larger group of more than 300 slides taken in Delaware, Pennsylvania, and Maryland. The slides were taken in September, which meant that green vegetation was the dominant content in the nature views. Insofar as possible, the slides were taken under similar lighting and sun-angle conditions. All slides were taken from the ground; an attempt was made to avoid composing the views. No people or animals were visible in either the nature or urban collections. The absence of people probably increased the pleasantness levels of the urban as well as nature scenes (McClelland and Auslander, 1976; Carls, 1974; Sorte, 1978).

Although the nature sample excluded built features, many of the views in this collection were obviously man-influenced. For example, several scenes in the final sample of 50 slides showed parts of cultivated fields. The urban scenes primarily depicted commercial landscapes, and to a lesser extent industrial areas. The urban slides excluded residential areas, churches, funeral agencies, police stations, fire stations, and hospitals, because of the possibility that emotional associations would bias the results. The urban collection also excluded scenes containing litter, graffiti, and other blight.

The final samples of 50 nature and 50 urban views were selected to represent diversity in terms of elements such as vegetation and building types. Also, each sample presented a range of values for depth and complexity (Ulrich, 1974, 1977). Complexity was an important consideration in selecting the samples because the complexity level of a visual display is known to affect the perceiver's state of psycho-physiological arousal or activation (Berlyne and McDonnell, 1965; Baker and Franken, 1967). If slide samples had been chosen that varied markedly in terms of complexity, this difference alone could have produced significant variation in the anxiety levels of the groups of subjects – thereby obscuring findings concerning the influences of the nature and urban content. With this point in mind, a panel of judges procedure (Craik, 1970; Kaplan, 1972) was utilized to obtain complexity ratings for each slide.[1] On the basis of the judges' scores, the final samples were chosen so that the overall complexity levels of the nature and urban collections were similar (Table 1). In practice, the balancing of the samples was achieved by selecting urban slides with complexity values in the lower ranges, and choosing nature scenes having scores in the higher ranges.

These selection procedures meant that the sample of nature slides – compared to most nature landscapes in the northeastern United States – was unrepresentatively high in complexity. The high complexity of the slides was in many instances produced by rough textures and coarse vegetation, and consequently many of the nature scenes appeared 'scruffy' and comparatively unaesthetic. (Figure 1). By contrast the urban sample – compared to most American urban landscapes – was unrepresentatively low in complexity, and included a disproportionate number of 'clean', neat urban views. Indeed, a conscious attempt was made to include a large number of attractive scenes in the urban sample. (Figure 2). These characteristics of the samples meant that the experiment was a conservative test of the psychological effects of nature versus urban scenes.

Table 1: Complexity Levels of Urban and Nature Scenes

General Complexity Level	Nature Scenes (n = 50)	Urban Scenes (n = 50)
Low	22 %	26 %
Mid-Range	44 %	46 %
High	34 %	28 %

Figure 1: Examples of Landscape Scenes—Nature Dominated by Vegetation

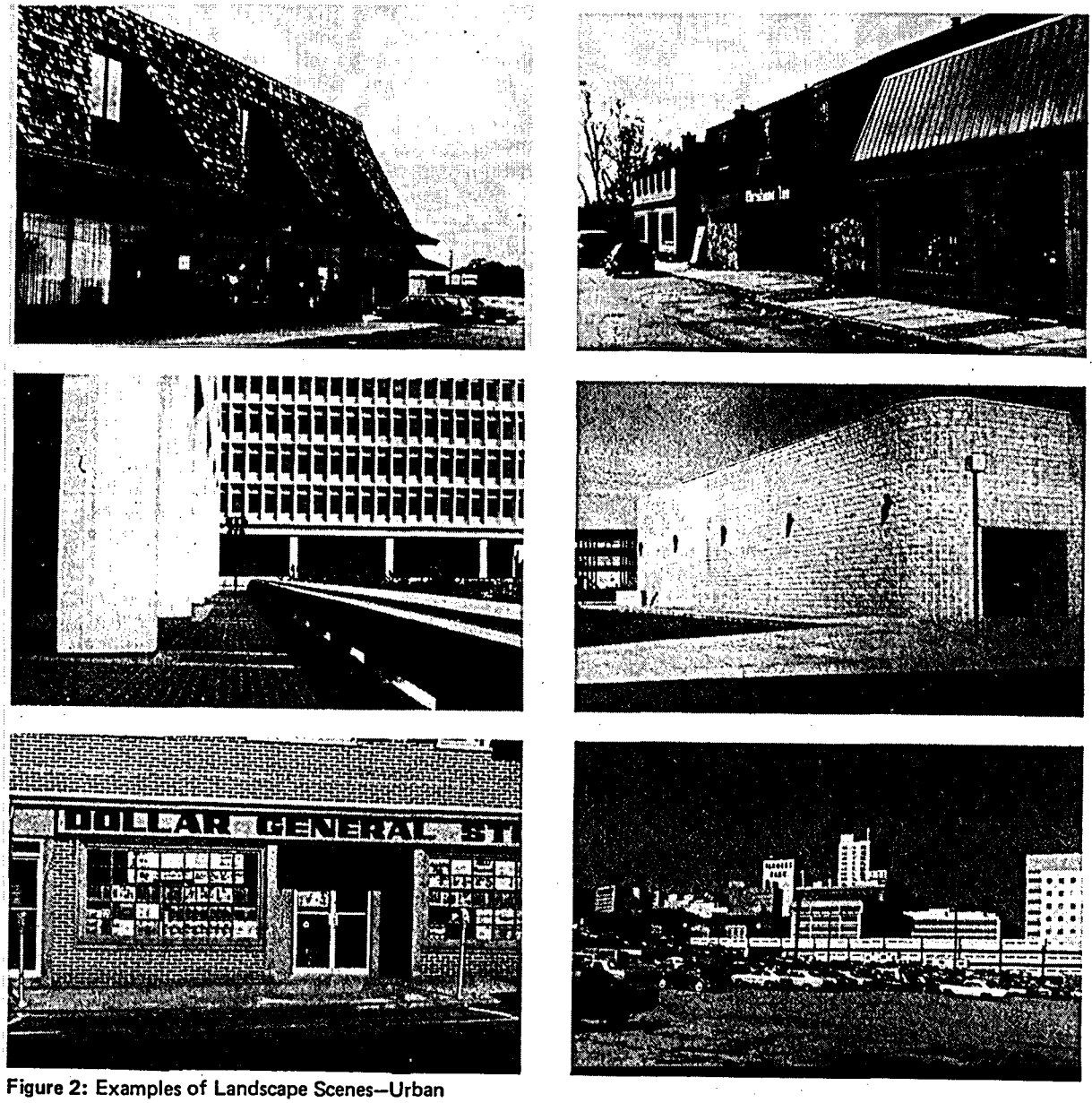

Figure 2: Examples of Landscape Scenes—Urban

Methods of Experiment

The subjects were 46 students in an introductory geography course at the University of Delaware. The students' fields of concentration were diverse, ranging from the humanities to natural sciences. The subjects had taken a one-hour course examination prior to the experiment, and were therefore experiencing some anxiety and elevation of arousal. Immediately upon completing the exam the subjects were divided into two groups and seated in identical windowless rooms.

As the first step in the data collection, both groups were asked to answer 12 questions of the Zuckerman Inventory of Personal Reactions (ZIPERS) Zuckerman, 1977). The ZIPERS is a broad affect test that measures an individual's emotions and anxiety state at the particular time the test is taken. The ZIPERS assesses feelings on five factors: fear arousal, positive affect, anger/aggression, attentiveness-coping, and sadness. The respondent indicates on a 5-point scale the degree to which each item describes the way he feels 'now'. Examples of the items are: ' I feel sad', and 'I feel affectionate or warmhearted'.

Following the ZIPERS test, both groups witnessed slide presentations that were procedurally identical. The subjects were instructed to 'pay attention to the slides', and were requested to rate the scenes relative to one another on a 5-point aesthetic preference scale. The purpose of obtaining preference ratings was simply to assure that the subjects paid attention to the slides.[2] Before commencing the ratings, the subjects were briefly shown the first 20 slides from the collection in order to reveal the range of content in the sample, and thereby assist the individuals in making relative preference judgements. Each group was then shown its sample of 50 nature or urban slides at intervals of 18 seconds. (An 18-second exposure time was chosen after trial runs of the experiment. This interval proved of sufficient length to permit unhurried perception of a scene, but at the same time was not excessively long so as to allow the subject's attention to wander). The entire slide procedure took approximately 18 minutes. Upon completion of the slide presentation, the groups answered the ZIPERS items for a second time. Lastly, the subjects were asked to provide background information that included sex and the general type of environment lived in before coming to the University (rural area, small town, suburb, or city).

The data collections for both groups were synchronised time-wise as they proceeded through the various stages of the experiment. Thus, the single difference in the groups' experiences stemmed from the variation in content between the two collections of slides. This meant that if the groups' anxiety levels changed in different ways during the slide viewings, the variation could be attributed to the nature versus urban content difference of the slides.

Results

Pre-Slide Affect Scores
A series of nonparametric Mann-Whitney U tests identified no statistically significant differences between the groups' scores for the ZIPERS items prior to the slides. These results indicate that affect levels, or feelings and moods, were similar across groups prior to the slide presentations. The mean values for the pre-slide ZIPERS scores (Table 2) suggest that anxiety levels had indeed been somewhat elevated by the examination prior to the experiment. Compared to ZIPERS ratings obtained during normal class sessions,the subjects' scores at the beginning of the experiment indicated higher levels of Fear Arousal and Anger/Agression, and lower levels of Positive Affect. Levels of Sadness and Attentiveness were similar to scores on normal class days.

Results: Effects of Urban Versus Nature Scenes
As the first step in analysing the effects of the slide exposures, each group's post-slide ZIPERS scores were compared with its scores at the beginning of the experiment. A nonparametric test, Wilcoxon signed ranks analysis (Siegel, 1956), was used in these within-group comparisons to identify significant differences. Unexpectedly, the results suggest that the group shown urban scenes felt somewhat worse after the slide viewing (Table 2). Although the urban group's post-slide scores indicate some improvement (not significant) on the Fear Arousal factor, the results reveal a pattern for the subjects' emotional states to deteriorate in terms of the other dimensions. While most of the differences between the pre and post-slide scores are not significant, there is a clear trend in the changes towards lower levels of psychological well-being.

Of particular note is the significant increase in Sadness ($p<.025$). Thus, exposure to the urban views appears to have more aggravated than mitigated the subjects' psychological states. The sharp decline in Attentiveness ($p<.01$) can be interpreted as an indication that the urban views were not effective in maintaining the subjects' attention and interest.

In sharp contrast are the results for the nature scenes (Table 2). The post-slide scores reflect a consistent pattern of improvement in well-being, and the changes for two factors are statistically significant. All four individual items in the Positive Affect dimension show marked increases, and the change in terms of the factor as a whole is highly significant ($p<.005$), indicating that the subjects had higher levels of positive feelings after viewing the nature scenes. Likewise, the change in the Fear Arousal factor is highly significant ($p<.005$), with the declines in item scores indicating lower levels of fearfulness and arousal or activation. In contrast to the results for the urban group, the post-slide decline in Attentiveness is not significant. Whereas the changes in the Sadness and Anger/Agression factors are not significant, it should be noted that the direction of change for every item is toward improvement of well-being. Overall the results strongly suggest that exposure to the nature scenes had mitigating influences on the subjects' anxiety states.

A direct comparison of the effects of the nature and urban scenes is made in Table 3. The table lists the magnitude and direction of change between pre and post-slide ZIPERS scores for both groups of subjects. The 'change' figure for each item was calculated by subtracting the mean pre-slide score from the post-slide value. The 'difference between groups' for each item was computed by subtracting the change of one group from the change of the other. The 'difference between groups' figure therefore represents the total change in a given ZIPERS item directly attributable to the effects of the nature and urban scenes. A series of Mann-Whitney U tests were performed to determine if the differences were statistically significant.

The results in **Table 3** clearly support the conclusion that the nature and urban slides had different effects on the subjects' emotional states. The most salient difference is in terms of the Positive Affect factor; a Mann-Whitney test of the variation attributable to slide content was highly significant ($p=.002$), indicating that the effects of the nature and urban scenes on levels of positive feelings were very different. Inspection of the

Table 2: Affect Scores Before and After Slide Presentations

		Urban Group		Nature Group	
Affect Factor	ZIPERS Items	Before Slides	After Slides	Before Slides	After Slides
Fear Arousal	Feel fearful	1.83	1.52	1.57	1.30 ($p<.005$
	Heart is beating faster	2.09	1.74	1.98	1.22 for factor)
	Breathing faster	1.83	1.57	1.45	1.17
Anger and Aggression	Feel angry or defiant	1.48	1.61	1.83	1.65
	Feel like getting out of this situation or avoiding it	1.70	1.96	1.87	1.82
	Feel like hurting or 'telling off' someone	1.26	1.35	1.39	1.13
Sadness	Feel sad	1.83	2.30 ($p<.025$)	1.52	1.39
Positive Affect	Feel carefree or playful	1.78	1.65	1.87	2.35 ($p<.005$
	Feel affectionate or warmhearted	1.96	2.00	1.94	2.65 for factor)
	Feel elated or pleased	2.09	1.87	1.87	2.44
	Feel like acting friendly or affectionately	2.43	2.17	2.35	2.91
Attentiveness	Feel attentive or concentrating	2.61	2.00 ($p<.01$)	2.43	2.09

Table 3: Comparison of Effects of Nature and Urban Slides on Affect States

Affect Factor	ZIPERS Items	Change in Urban Group (from pre to post-slide states)	Change in Nature Group (From pre to post-slide states)	Difference Between Groups
Fear Arousal	Feel fearful	−.31	−.27	.04
	Heart is beating faster	−.35	−.76	.41
	Breathing faster	−.26	−.28	.02
Anger and Aggression	Feel angry or defiant	+.13	−.18	.31 (p=.11 for factor)
	Feel like getting out of this situation or avoiding it	+.26	−.05	.31
	Feel like hurting or 'telling off' someone	+.09	−.26	.35
Sadness	Feel sad	+.47	−.13	.60 (p=.01)
Positive Affect	Feel carefree or playful	−.13	+.48	.61
	Feel affectionate or warmhearted	+.04	+.71	.67
	Feel elated or pleased	−.22	+.57	.79 (p=.002 for factor)
	Feel like acting friendly or affectionately	−.26	+.56	.82
Attentiveness	Feel attentive or concentrating	−.61	−.34	.27

data in **Table 3** reveals that the variation in Positive Affect arose primarily because exposure to the nature scenes produced higher levels of positive feelings such as friendliness and playfulness. A smaller component of the variation was the tendency of the urban scenes to reduce such feelings.

There was also a significant difference between the urban and nature scenes in terms of effects on Sadness (p=.01). This variation arose primarily from the increase in feelings of sadness produced by the urban scenes, and not from the weak therapeutic influence of the nature scenes. The results for the Anger/Aggression factor suggest mild improvement in well-being associated with the nature exposures, and a tendency for the urban scenes to aggravate feelings on this dimension. The variation in terms of Anger/Aggression is most marked for the single item: 'I feel like hurting or telling off someone' (p=.04). However, when the groups were scaled on the basis of their changes for the entire factor, the difference reached only p=.11. The results therefore do not permit firm conclusions regarding differential effects of the nature and urban scenes on feelings of anger and aggression.

The variations between groups for the Fear Arousal and Attentiveness factors are not significant. However, it will be recalled that the within group decline in Fear Arousal was significant for the individuals shown nature scenes, but not for the group shown urban scenes. Also, there was a significant decline in Attentiveness associated with the urban slides, but not with the nature slides. This implies that the nature scenes were somewhat more effective than the urban scenes both in maintaining attention and reducing fear arousal.

Background Variables and Affect Scores

The final phase of the analysis tested whether the subjects' affect states and affect changes differed as a function of 1) sex or 2) the type of environment in which they had grown up. The group shown nature scenes included 10 males and 13 females; the group shown urban scenes was comprised of 11 males and 12 females. A series of Mann-Whitney U tests revealed no significant sex differences. These results are consistent with a study by Zuckerman (1977), who found little variation between sexes in state anxiety for a wide range of stress situations.

The subjects were also stratified on the bases of whether they had grown up in a rural area (n=8), small town (n=8), suburb (n=26), or city (n=4). Tests revealed no significant differences in affect states or affect changes as a function of these background environments. Similar results were obtained when the subjects were stratified into two larger groups (rural area and small town versus suburb and city). Thus, the earlier findings concerning differential effects of the nature and urban scenes apply to both sexes in the study, and to subjects who had grown up in different environments.

Summary and Discussion

The findings suggest that stressed individuals feel significantly better after exposure to nature scenes rather than to American urban scenes lacking nature elements. Compared to the influences of the urban scenes, the salient effect of the nature exposures was to increase Positive Affect – including feelings of affection friendliness, playfulness, and elation. The increase in positive affect produced by the nature scenes is consistent with the finding that the nature exposures also significantly reduced Fear Arousal. According to psychological theories, a reduction in arousal or activation produces pleasurable feelings if an individual is experiencing stress or excessive arousal (Berlyne, 1971, pp. 81-82). In contrast to the nature scenes, the urban views tended to work against emotional well-being. The major effect of the urban scenes was to significantly increase Sadness. There was also a consistent but non-significant tendency for the urban scenes to aggravate feelings of Anger/Aggression, and for the nature scenes to reduce such feelings. The urban exposures also held the attention of subjects somewhat less effectively than the nature exposures. These findings were stable across sexes, and applied to subjects who had grown up in either rural or urban environments.

The urban and nature scenes produced different changes in psychological states despite the fact that the complexity levels of the slide samples were similar. Largely on the basis of laboratory studies by psychologists using 'non-landscape' stimuli, complexity has received considerable emphasis as a variable

influencing emotional activation. The findings here suggest the possibility that other visual properties — related to nature versus man-made differences — are also of importance. It should also be pointed out that the sample of urban scenes, compared to most American urban landscapes, contained a disproportionately large number of nonblighted, relatively aesthetic views. For example, the urban collection included only one slide of a roadside strip development; 'strips' are one of the most common, as well as visually blighted, features in American urban areas. The nature sample, on the other hand, contained an unrepresentatively large number of high complexity scenes that were 'scruffy' and relatively unaesthetic in appearance. This meant that the experiment was a conservative test of the effects of nature versus urban scenes. If the slide collections had been selected using a geographical sampling technique rather than a procedure that favoured the urban scenes, it is likely that the differences among the effects of the nature and urban scenes would have been even more extreme.

The findings have a number of implications for environmental planning and design. At the most general level, the results suggest that outdoor visual environments can influence individuals' psychological well-being, and therefore should be given explicit attention in planning and design decisions. Most planners have some sensitivity for aesthetic aspects of environments, and in fact there exists some direct empirical evidence showing that aesthetic benefits can be of considerable importance (e.g. Ulrich, 1974; Shafer and Mietz, 1969). The findings here imply that the importance of visual landscapes is by no means limited to aesthetics, but also includes a range of influences on emotional states. More specifically, an individual's experiences in terms of his degree of visual contact with nature or urban scenes may influence his feelings, and in some instances have distinctly positive or negative effects on his well-being. Although the findings clearly favour nature scenes vis-a-vis American urban views, the results should not be construed as an indictment on psychological grounds of urban landscapes in general. It is likely that the differences between the effects of the two landscape categories would have been less if the urban scenes had contained large amounts of nature elements, and perhaps if the forms and materials of the built structures were different. For planners, the results support the notion that the benefits of providing landscaping or nature-like views in urban areas extend beyond aesthetics to include such psychological 'payoffs' as higher levels of positive affect. A related implication is that location and design decisions for some activities and institutions — such as high stress workplaces and hospitals — should assign considerable importance to providing 'through the window' contact with nature. Does a pre-operative hospital patient experience less anxiety if his window overlooks a park rather than, say, a motorway or vegetationless parking lot? Do school children feel more anxious in windowless classrooms than in classrooms having window views of nature? Does an individual recuperate more quickly at home after a stressful workday if, for example, his apartment complex has been planned to allow visual contact with a forest or lake? The potential of visual landscapes to reduce or heighten anxiety, and to influence other aspects of emotional states, should be considered in attempts to achieve more holistic evaluations of planning effects. In this regard there will likely emerge a demand for landscape researchers to develop procedures for assessing the psychological, as well as aesthetic, 'resources' of visual landscapes.

This study has been intended as an exploratory first step, and many research questions remain. To what extent do the results apply to people of different ages, levels of education, culture, etc? Do the differences which characterise psychological response to nature and urban views vary seasonally? How do people respond to scenes containing water? Are nature views more therapeutic than urban scenes for individuals experiencing boredom and understimulation rather than anxiety and high arousal? Is a scene's aesthetic value related to its influence on emotional well-being? What man-made forms, textures, and materials evoke responses similar to those to nature elements? These and other unresolved questions underline the fact that the general issue of differential human response to nature and built elements is of central importance to landscape research and planning.

Notes

1 The panel of judges consisted of two geographers, a psychologist, a landscape architect, and a layman. The judges worked independently, and rated each nature and urban scene on a five-point complexity scale. Complexity was judged in a phenomenal, subjective sense; this criterion insured that the measure had psychological relevance.

2 The fact that the subjects rated the slides for preference relative to one another, rather than on an absolute scale, reduced the possibility that the rating procedure might influence the groups' emotional states in different ways. The mean rating on the 5-point scale for the nature scenes was 2.96, and for the urban scenes, 2.72. The difference between the means is not significant. This suggests that if the rating procedures per se had any effects on the subjects' feelings, the influences on the two groups were similar.

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1 Part of this research was presented as a paper at the annual meeting of the Environmental Design Research Association. Tucson, Arizona, April 1978.