6 Assessing Visual Preference and Familiarity for a Bog Environment

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Conceptual Approach

Perception of the visual environment necessarily depends on previous experiences and the memory of such encounters. Familiarity or past experiences with an environment or environments similar to it can greatly influence how it is perceived (Appleton, 1975; Arnheim, 1969; Kaplan, 1973). Therefore, visual preference for certain environments or aspects of environments depends largely on the visual resources perceived in that environment and the associated information processed with that encounter and past encounters.

The design of the present study and the interpretation of the results are based on a particular theoretical approach which assumes that people are information-processing organisms of their environment. Various environments or components of environments contain different information and are preferred on the basis of the information they offer. Simply stated, the theory proposes that humans, as evolutionarily successful organisms, are efficient at processing environmental information, and that humans are constantly building mental models of the environment they experience. Through environmental encounters, humans are exposed to considerable environmental information, which is processed and incorporated to varying degrees into mental representation of the external environment. The mental models that one develops from environmental encounters are, in turn, instrumental in how one interprets future environmental encounters. As stated by Kaplan and Kaplan (1978, p. 43),

> the cognitive map (or mental model) provides a link between the human thought process and the physical environment. The way an individual experiences and reacts to a given environment begins to be understandable in the context of an experience-based internal structure that corresponds, at least in certain respects, to the environment in question.

Also basic to the conceptual framework of this study is the belief that humans are primarily "visual" processors of environmental informa-

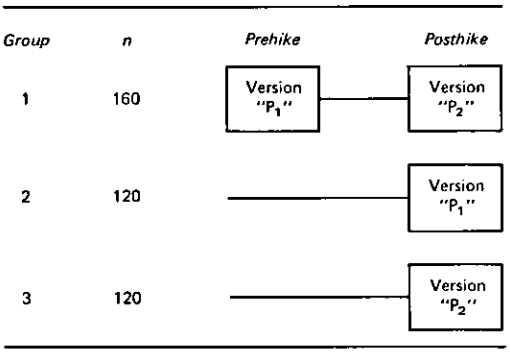


Figure 6.1. Research paradigm for sampling bog visitors.

tion. While the perception of natural environments is a complex process, involving all of our senses, our past experiences and their lasting traces in memory, it is vision that people depend on most for relating to the environment. Sight is of crucial importance and probably influences human response to environments more directly and with greater salience than do our other senses (Welsh, 1966). Even when the other senses are involved in processing information, they are usually associated with a visual image, either called up from memory or existing in the physical environment. When processing visual information, humans group into classes or categories (Bruner, 1957) or schemata (Attneave, 1957) those visual images that they encounter most frequently, find intriguing, and gravitate toward for various reasons.

Even though humans are primarily "visual" processing organisms—and much of this information is coded in memory—the visual information is not recorded as a "picture." Kaplan (1978, p. 56) points out that

> while the [cognitive model concept] may be equated in a very rough way with the idea that a person has a "picture of the environment" in his head, the information is far more schematic and incomplete than "picture" implies, to say nothing of the fact that this "picture" will in general never have been seen all at once.

The mental "picture" is an approximation of reality, an approximation that will vary according to individual experience level.

If, indeed, humans do formulate mental models of their environment, based primarily on visual encounters, then one could hypothesize that on-site experiences in natural environments could be important in cognitive model development of such environments. In addition, since much of the on-site information is processed visually, the use of photographs might be a logical approach for abstracting what visitors do perceive and record mentally during on-site encounters. Determination of those visual scenes most preferred and those that become most familiar could benefit resource planners and managers involved in providing visual resource experiences.

Study Description

Study Area

Visual preference and familiarity for photographs of a bog environment were investigated at the Cranberry Glades Botanical Area, Monongahela National Forest, West Virginia. Cranberry Glades contains four bogs, of which visitors have access to two by way of a loop-designed boardwalk trail. The boardwalk is 2,800 feet (853 meters) long and requires about a thirty-minute hike. Annual visitation (Memorial Day through Labor Day) totals approximately 26,000 visitors. The boardwalk was the actual location within the study area of the survey.

Respondents

The sample consisted of 400 on-site visitors. One individual per party was interviewed, with 20 visitors per day being surveyed over a twenty-day period during July and August 1977. Participants were at least eighteen years of age and were representative of the public visiting the boardwalk trail during the study period.

Stimuli

Two versions of a photo questionnaire (designated P_1 and P_2), each comprised of twenty-four black-and-white bog scenes, were used to obtain visitor response. Sixteen of the photographs were duplicated between the two questionnare versions for purposes of examining a particular aspect of familiarity. Photographs for the questionnaire included

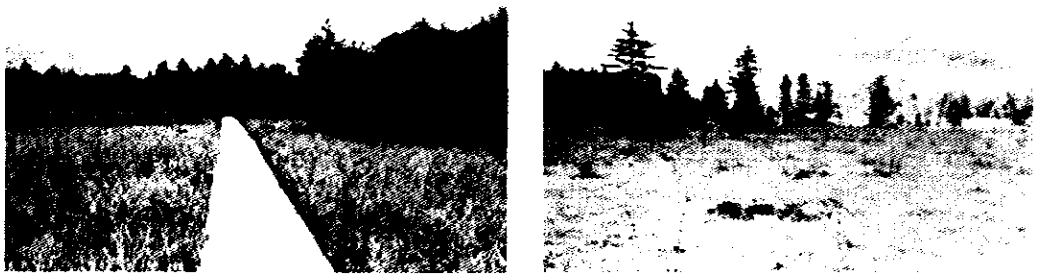


Figure 6.2. Examples from the photo questionnaire demonstrate the rating procedure for preference and familiarity.

some taken by visitors, some furnished by the interpretive staff of Cranberry Glades, and the remainder provided by the researcher. Visitor photographs were obtained by furnishing fifteen visitors to the bog with instamatic cameras prior to the actual survey and having them photograph bog scenes and features as they hiked along the boardwalk trail. From the three sources of photographs (visitor, interpreter, and researcher), a representative set was selected for inclusion in the questionnaire. Criteria used for selecting representative photographs were frequently photographed scenes in the case of visitor produced photos and scenes of distant, intermediate, and immediate aspects of the bog. Criteria used to eliminate photos were people included in photos and close-ups of individual flowers, plants, or objects. Six bog scenes from Michigan and a bog adjacent to the study area were also included for testing a portion of the familiarity component of the study.

In addition to the visual images, a brief portion of the photo questionnaire consisted of written items concerning reasons for visiting the bog and number of previous visits to the study area and other bog environments.

Procedure

Some visitors were asked to view and rate the bog photos just prior to hiking the bog boardwalk trail and then again after the hike (Figure 6.1, Group 1). Other visitors were shown the photo questionnaire only upon completing the hike (Groups 2 and 3). In both cases visitors were asked to indicate visual preference (on a 5-point Likert scale, ranging from 1 = preferred not at all to 5 = preferred very much) for each photographed scene. Preference was defined as "how much you like a scene for whatever reason." Respondents were instructed to preview quickly the bog photographs to get a general feeling for what the photos were about and then to indicate their preference for the twenty-four photos directly on the questionnaire by circling one of the five rating numbers below each photo.

Only at the end of the hike was information obtained about visitors' feeling of how familiar various photographs seemed (Groups 1 and 3). Familiarity was defined as the visitor's recall of having viewed a scene during the hiking experience. A three-choice option (yes = familiar, no = not familiar, ? = not sure) was provided for recording familiarity. As for the preference ratings, respondents were instructed to indicate familiarity for each photograph by simply circling one of the three choices located below each photo (see Figure 6.2). The written portion of the photo questionnaire was also completed only after the hike.

All respondents were sampled at the boardwalk trailhead, which served as both the beginning and ending point of the loop-designed trail. Thus all visitors were intercepted during the sample periods.

Bog Preference and Dimensions

Visual preference for the bog environment was analyzed from two approaches. First, to determine which individual scenes people preferred

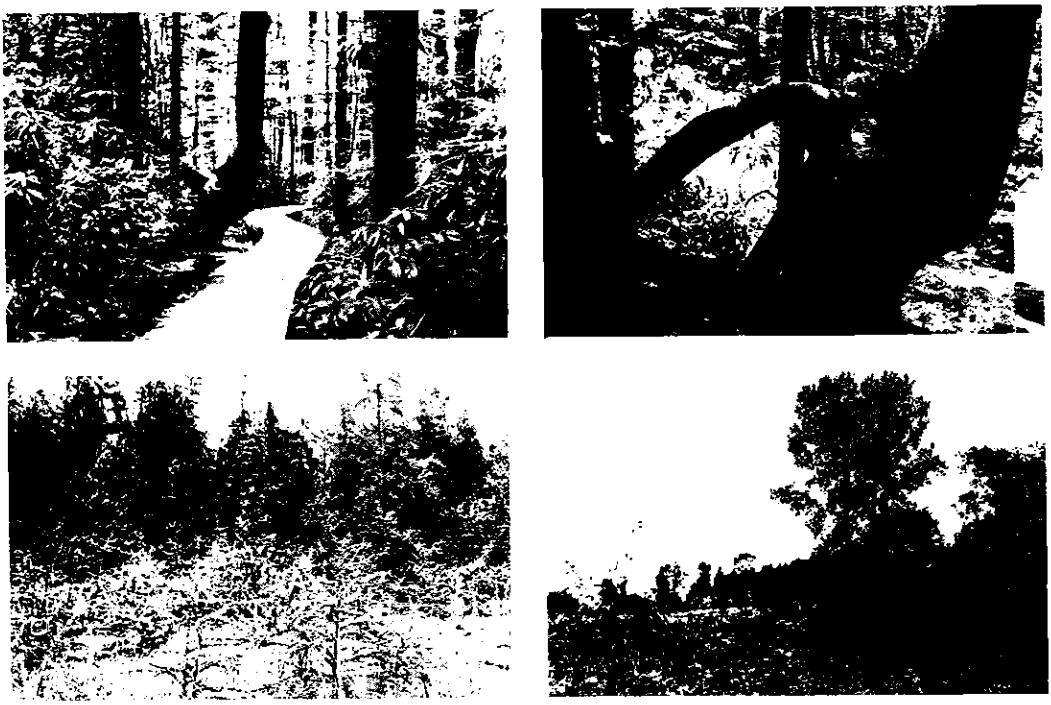


Figure 6.3. Results of preference ratings. *Top*: two most preferred bog scenes. *Bottom*: two least preferred bog scenes.

most to see, mean photograph ratings were examined. Then, using the preference rating data, the bog scenes were factor and cluster analyzed to determine the underlying patterns or commonalities among the scenes. The dimensions of bog scenes were then interpreted from both a descriptive and an information-processing viewpoint (Kaplan, 1975) to suggest environmental preference predictors operating in the various dimensions.

Preference for Bog Photographs

Mean preference ratings for the bog scenes ranged from a low of 3.33 to a high of 4.58. The overall mean for the twenty-four photographs was 3.90. Thus the scores were skewed toward the upper end of the scale, indicating a high preference for the bog. Results from other studies using similar methodologies indicate that the bog was rated considerably higher. Levin (1977) received on-site preference ratings (1–5 scale) for river landscapes in the range of 2.66 to 4.13. Gallagher (1977), in a study of a seminatural environment, obtained means in the range of 2.52 to 3.97.

A comparative examination of the most and least preferred photos revealed an obvious difference in habitat preference within the bog ecosystem (Figure 6.3). Scenes of the "bog forest" were most preferred, while scenes of the open "bog mat" were least preferred. Another pattern, related to the habitat zones, was the close, closed appearance of the preferred bog forest scenes as compared to the more distant, open character of the least preferred bog mat scenes. These results suggest that bog visitors should have the opportunity to experience many habitats of the bog ecosystem rather than only the ecologically interesting bog mat area. This has particular significance for the location of boardwalks by resource managers.

Identifying Dimensions

The use of ratings of individual scenes to predict preference has its limitations. First, it is impractical to interpret a very large data set. Second,

there is the question of just how valuable it is to the resource manager to know the preference for individual scenes. Only in limited situations can one design or manage an area to provide a particular scene. It is much more practical to search for underlying patterns among the scenes. Yet to rely on the mean preference rating as the basis for such grouping has its problems too. Groups of scenes based on high or low preference ratings can lead to a mixture of different patterns of scenes in each group that are sometimes difficult to explain.

Another approach to reducing the data set to meaningful and manageable groups is based on cluster-analytic procedures. These involve any of a number of mathematical techniques that group items (or scenes) in terms of patterns of relationships in the respondents' ratings. Using only the preference ratings, the resulting groups of items reveal similarities in the way the scenes were viewed by the respondents. R. Kaplan (1975) discusses criteria for selecting particular procedures and the role of the researcher in interpreting the results.

Because the bases for the groupings in dimensional procedures are necessarily related to the algorithms involved, two different techniques were used to add stability to the groupings generated. In both instances the preference ratings of the P_2 questionnaire respondents ($n = 274$) were used. The Guttman-Lingoes Smallest Space Analysis (SSA-III) (Lingoes, 1972), a nonmetric-factor analytic procedure, produced four dimensions of bog scenes. All twenty-four photographs had factor loadings greater than the determined minimum value of 0.40. Stability of the dimensions was reinforced by the findings of the second clustering techniques, ICLUST (Kulik, Revelle, and Kulik, 1970). ICLUST, a metric, hierarchical cluster procedure, also produced four dimensions. The two techniques produced essentially equivalent dimensions. Even though a few photos were placed in different dimensions by the two analyses, the central theme of each dimension did not change. The strength of associations and ordering of the scenes within the dimensions of both techniques were also quite similar, especially for the higher loading (SSA-III) or centrally arrayed (ICLUST). Since both techniques yielded similar dimensions of bog scenes, only the SSA-III results will be used for interpretation.

Bog Dimensions

The four dimensions of bog scenes and their factor loadings are summarized in Table 6.1. Each dimension was assigned a name, based on the general content theme that characterized it. The patterns of scenes characteristic of each dimension were consistent, and they make intuitive sense. Because it is impractical to include all the photos comprising each dimension, a brief description of the dimensions will be given, as well as one exemplary scene from each dimension. Although the dimensions to be described were based on the preference ratings of photographs, it should be reemphasized that while rating photos respondents were, in practicality, responding at the same time to the actual bog environment they had just hiked. Thus the visual preference dimensions indicate those

Table 6.1 Preference Dimensions, Based on Visitor Ratings of Bog Photographs

	Factor Loadings
Dimension 1:	.6630
"Bog Mat"	.6521
	.6459
$\bar{X} = 3.69$	.6453
	.5885
	.5062
Dimension 2:	.6737
"Boardwalk"	.6695
	.5580
$\bar{X} = 4.12$	.4707
Dimension 3:	.6328
"Feature"	.5381
	.5363
$\bar{X} = 3.99$	.4991
	.4555
	.4267
Dimension 4:	.6902
"Edge"	.6861
	.6407
$\bar{X} = 3.77$	.6189
	.5701
	.4650
	.4389

Figure 6.4. Example of one characteristic scene from each of the four dimensions of bog scenes, determined by factor analysis. Photo A, top left; Photo B, top right; Photo C, bottom left; Photo D, bottom right.

aspects of the bog that the visitors potentially experienced and preferred.

Bog Mat: This grouping of photographs included six-scenes characterized by the open, expansive view of the vegetative bog mat. The scenes appeared as having even, uniform, grasslike texture in the foreground that was surrounded by a distant fringe of trees or mountains. The scenes lacked any visual barriers to entry and had few distinct features or edges of immediate vegetation. Visitors rated this aspect of the bog the least preferred (Figure 6.4, Photo A).

Boardwalk: The most preferred dimension was dominated by scenes of the trail boardwalk. An additional component to these scenes was the type of habitat the boardwalk passed through. Boardwalk scenes in the forest were consistently preferred over those in the bog mat. The boardwalk seems to be an important component of the bog experience, especially if it affords entry into areas that appear otherwise difficult, yet desirable, to penetrate both in the physical and visual sense. Particularly preferred were those situations where the boardwalk made a bend in the trail within dense vegetation, thus producing a visual barrier as to what occurs farther ahead on the trail (Fig. 6.4, Photo B). Such scenes encourage the viewer to become visually involved, to walk around the corner to explore for the hidden view. An essential element of the hidden visual information component is the availability of dense vegetation, landform, or some example of visual barrier to block the viewer's vision of what lies around the corner. For example, in the open bog mat area bends in the trail failed to receive higher preference than straight segments of trail because of the lack of visual barriers present.

Feature: A third grouping of scenes involved distinct landscape features and minihabitats of the bog. An isolated clump of ferns (Fig. 6.4, Photo C), an odd-shaped tree, and a dense colony of rhododendron were typical examples. The unique features and the isolated minihabitats are different from frequent, repetitious elements along the trail, and they are noticed for their differentness. The features present an

element of novelty and identifiability to the visual experience. They are distinctive objects or places that are easily recognized, that represent "change," and serve as landmarks in the sequence of bog events perceived. The element of change, especially when it is distinctive, attracts attention. As the unknown becomes known, and as the stream of perceived environmental stimuli becomes repetitious, it is change that often attracts attention and offers new involvement. The desire to walk around all sides of an unusually shaped birch tree is underlaid with the promise of different and additional information upon further observation. Features within the bog landscape rate high in visual involvement, coherence, and legibility and were preferred second to the boardwalk dimension.

Edge: The final dimension was characterized by an abundance of jagged edge where two or more habitat types of vegetation met. All scenes contained an element of the bog forest, shrub, and mat habitats (Fig. 6.4, Photo D). Scenes in this dimension contained little unity and focus. Their legibility is weak in that it is difficult to identify a dominant pattern that makes the scenes easily readable. The great mixture of irregular textures where the vegetational units interface offers complexity but little coherence and predictability for the viewer. There are few coherent items or sharp boundaries to focus on. All this leads to a low "sense of place" and orientation. Preference for these scenes ranked third, only somewhat higher than for the bog mat dimension.

"Sense of place" may be an important cognitive issue when dealing with the repetitious but nonlegible jagged edge of bogs. Bogs are notorious environments for getting disoriented in and lost in. The problem seems to lie in not being able to recognize or relocate the point at which one entered the bog mat from the shrubby bog edge. The problem is easily solved by using a handkerchief as a landmark to indicate the entry point. Lack of focus is obviously at issue.

Because visitors rated all aspects of the bog environment fairly high, the dimension means do not vary by a great amount. Nevertheless, when compared, the means proved to be significantly different (Table 6.2). It might be argued that the statistical significance was simply a function of the large sample size. The dimensions, however, are meaningfully different thematically and help identify distinct aspects of the bog for visual-management purposes.

Familiarity as a Component of Visual Preference

Familiarity gained through prior information and past experiences can be vital to how humans will react to an environmental scene, and it often leads to increased preference. At the same time, it can also lead to decreased preference.

While familiarity can have varying effects on preference, it is also true that preference for an environmental scene has the potential to influence the degree of familiarity for that scene. One often tends to remember the most beautiful, the highly preferred, and in certain situations the ugly, the least preferred. In this section two aspects of familiarity are investigated: (1) the influence of various types of familiarity (i.e., the on-site experience, prior photographic information, and previous number of visits) on visual preference for the bog environment, and (2) the degree of familiarity resulting from the on-site recreational encounter.

Influence of Familiarity on Visual Preference

On-Site Experience: To determine the influence of the on-site experience, mean preference scores were compared between prehike (P_1) respondents and posthike (P_2)

Table 6.2 Comparison of Preference Means for the Four Photographic Dimensions

Dimension	Mean	*t*-value	Significance
Bog Mat	3.69		
		2.08	.05
Edge	3.77		
		5.38	.001
Feature	3.99		
		2.98	.005
Boardwalk	4.12		

Based on proximate pairs of dimensions. Nonadjacent pairs were all significant at $p \leq .001$.

Table 6.3 Mean Preference Ratings and Rank Position of Photographs Viewed Before or After Bog Hike

Means		Significance	Photographic Rank	
P_1	P_1			
Before	After		Before	After
4.65	4.80	.05	1	1
4.44	4.60		2	2
4.41	4.59		3	3
4.36	4.37		4	6
4.29	4.49		5	4
4.19	4.32		6	7
4.17	4.31		7	8
4.10	4.45	.01	8	5
3.95	4.08		9	10
3.79	4.06	.05	10	12
3.75	4.07	.01	11	11
3.71	3.95	.05	12	13
3.67	3.69		13	23
3.62	4.11	.001	14	9
3.55	3.91	.01	15	15
3.47	3.66		16	24
3.46	3.82	.01	17	20
3.44	3.85	.01	18	19
3.40	3.83	.001	19	18
3.38	3.84	.001	20	17
3.28	3.95	.001	21	14
3.24	3.88	.001	22	16
3.08	3.78	.001	23	22
2.98	3.75	.001	24	21
$\bar{X} = 3.95$	$\bar{X} = 4.28$			

Note: Paradigm of comparison: $\boxed{P_1} - P_2$; $- \boxed{P_1}$; $- P_2$

respondents (see Figure 6.1, Groups 1 and 2). The prehike group rated the photographs "before" the hike, the posthike group only "after" the hike. For the posthike group the photographs were viewed in terms of an experienced event.

The on-site experience was quite influential on visitors (Table 6.3). All twenty-four photos received a higher mean preference score after the hike. Fifteen of the scenes had statistically significant increases ($p < .05$). One might speculate that the lower ratings "before" the hike occurred because the photographs did not represent the actual on-site visual environment: that is, a picture cannot represent the real thing. There is support to suggest that this was not the situation. First, the "before" rating scores for photographs, even though lower than the "after" ratings, were still fairly high ($X = 3.95$). This would suggest that visitors could interpret the photos and had no problem in relating to the scenes. Second, when the mean scores for the "before" and "after" visitors were ranked from high to low (Table 6.3), there was little shift in position of preference between when the photos were viewed. The rank correlation value (rho) was .86, indicating a high degree of association. Thus variation in *pattern* of preference response for the bog scenes changed little. The same scenes were liked, but they were liked even more after the hike. This would again suggest that visitors had little difficulty in interpreting and responding to the photographs before the on-site hike. Third, evidence from other studies that have compared preference ratings of photographs with preference ratings of the actual on-site environment have shown high correlations (Daniel and Boster, 1976; Levin, 1977; Shafer and Richards, 1974). Thus the change in visitor response as a result of familiarity gained through the on-site experience appears to be the result of the information and rewards derived from the experience.

Prior Photographic Information: The influence of prior photographic information as a type of familiarity was determined by comparing preference scores of the sixteen duplicate photographs (between questionnaire versions) for visitors who saw the photos before the hike versus those who did not. In Figure 6.1 this involves comparing the posthike scores of Group 1 versus Groups 2 and 3. Data for Groups 2 and 3 were combined for the analysis since their means were similar.

The effect of having seen the photographs before the hike was opposite of what one might hypothesize. Instead of increasing visitor preference, the prior viewing appeared to have "preconditioned" the on-site experience, or ratings that followed, in a negative way (Table 6.4). The prior information group's ratings were lowest for all but one photo. The precondition-

ing effect might be explained in several ways. Seeing the photographs before the on-site hike may have led visitors to anticipate an experience less gratifying, or different, than that experienced by those visitors who had no prior information. A more probable explanation is that having given relatively low initial ratings before the bog hike the visitors may have been preconditioned as to how high their after ratings would range.

The extent of preconditioning was fairly substantial (ten of the sixteen duplicate photos had significant differences ($p \leq .10$). Yet there was little variation in the rank ordering of the preference ratings among the groups. Rank correlations between the various treatment groups for the sixteen duplicate photos showed the following rho values:

P_1 — P_2 (rho = .91)
— P_1
P_1 — P_2 (rho = .86)
— P_2

Thus the prior information (viewing and rating photographs) sensitized those visitors and decreased their magnitude of "after" preference, but it did not influence their order of preference among the bog scenes.

Previous Number of Visits: A third major area of familiarity considered was the previous number of times a visitor had been to the bog. Dimensions or clusters of photographs as determined by the nonmetric-factor analytic procedure were used for the comparison.

Number of previous visits was positively related to visual preference ratings (Figure 6.5). Preference increased at a steady rate for each of the four dimensions, with no sign of leveling off after three previous visits. The increment in preference with each level of prior visits was statistically significant at the .05 level or higher. The relationship of higher preference rating to number of visits is no doubt an interaction of an enhanced perception of environmental information by return visitors, as well as a greater appreciation of the setting by return visitors. The return visitor perceives different and additional information than the first time visitor because of past familiarity and cognitive structure for the bog area. These findings suggest the importance of on-site experiences in aiding visitors to develop cognitive structures for perceiving environmental information and in determining environmental preference during on-site engagements (Hammitt, 1981).

Influence of On-Site Experience on Familiarity

On-Site Experience: Visitors seemed to have little problem determining which scenes they had seen and which they had not. For some of the bog scenes as many as 90 percent of the participants indicated they were "familiar" with the scene. Thus visitors appeared to be quite cognizant of what they saw during the on-site bog experience. Far fewer participants used the "not

Table 6.4 Influence of Prior Photographic Information on Mean Preference Ratings

Group 1	Groups 2 and 3
3.61	3.91[a]
3.47	3.79[a]
3.85	4.06[a]
4.17	4.27
3.63	3.62
4.22	4.40[a]
3.82	4.00[a]
3.82	4.07[a]
3.45	3.54
4.54	4.51
3.83	4.00[a]
3.52	3.79[a]
3.76	3.93
3.46	3.70[a]
3.69	3.86[a]
4.52	4.62

[a]Significant difference ($p \leq .10$).

Note: Group one (P_2) of bog visitors had viewed the duplicate photographs before the hike; groups two (P_1) and three (P_2) had not.

Paradigm: $P_1 - P_2$
$- P_1$
$- P_2$

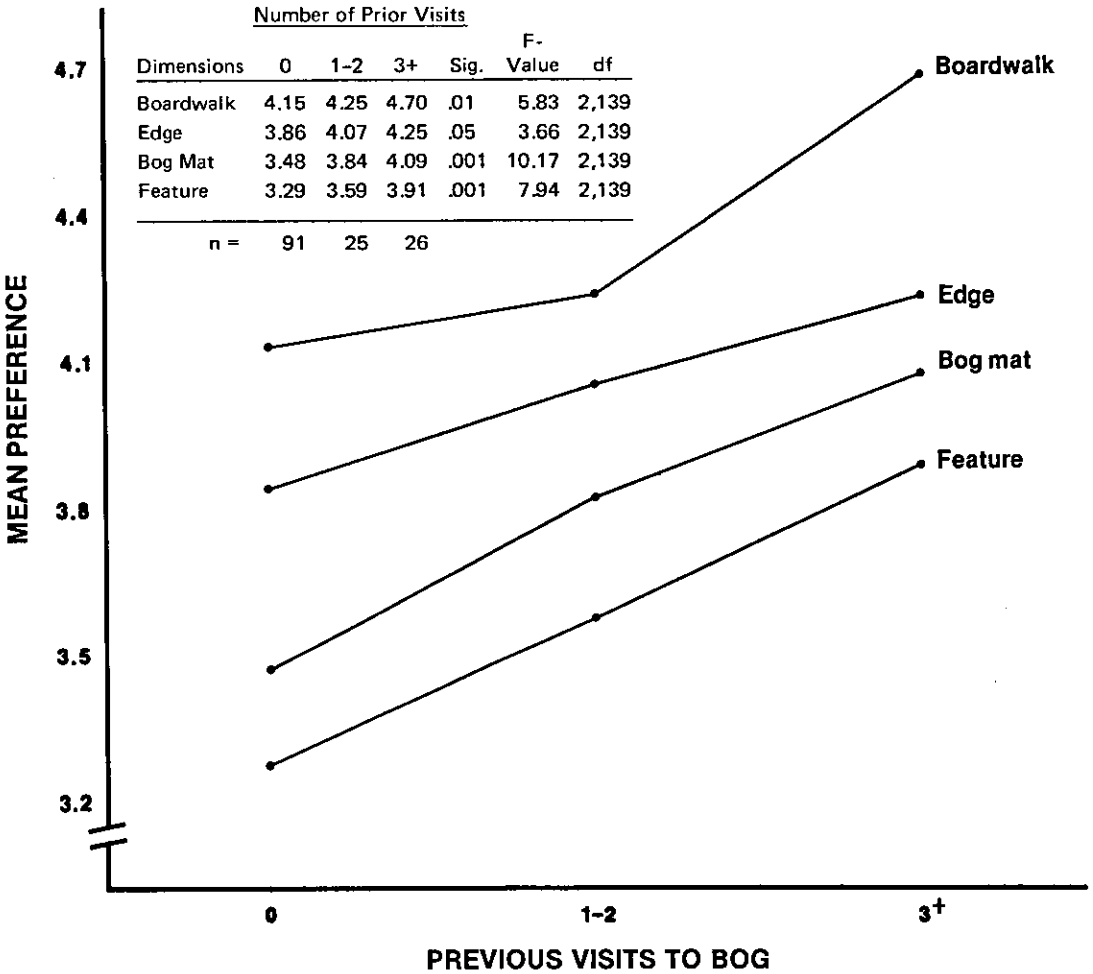


Figure 6.5. Influence of previous bog visits on mean preference ratings for dimensions of bog photographs.

sure" option than anticipated ($\bar{X}$ = 16 "pct"). The efficiency of participants' cognitive system for recognizing what they had seen was further demonstrated when visitors were able to recognize similar bog scenes from Michigan, or adjacent bogs near the study site, as having not been seen during the on-site hike.* Five of the six control or off-site photos were among the eight least familiar scenes.

Figure 6.6 shows most and least familiar scenes, based on the percentage of "familiar" scores. Some interesting patterns emerge when one examines the scenes for elements that aid and hinder familiarity. The most familiar or most remembered scenes are all characterized by two main bog components, boardwalk and distinct features. These scenes are distinctive and identifiable, and as a consequence, visitors

*Rating of the photos for preference and familiarity took place at the trailhead, in a forested area and out of sight of the photographed bog scenes. Participants were required to recall what they had seen; it was impossible for them to see the scenes during the interview process. Visitors rated the photos twenty minutes or more after the hike began.

Figure 6.6. Results of familiarity ratings. *Top*: two more familiar bog scenes, A and B. *Bottom*: two least familiar bog scenes, C and D.

were quite sure as to whether they had viewed the scenes. Photos A and B represent the dominance of the boardwalk as a visual component in the bog.

Familiarity for the features and the boardwalk correspond well with the findings of Lynch (1960), Devlin (1976), and R. Kaplan (1976). Lynch found that two of the major components in the "sketch maps" of city dwellers were landmarks (features) and paths (boardwalk). Both Lynch and Devlin found these two components to be among the initial elements that people incorporate into their cognitive models. Only with additional experiences over time were details added to one's model. In the study of wayfinding skills Kaplan states, "a critical component of these skills must be the capacity to identify distinctive aspects of the environment. Landmarks are vital to cognitive map development; their identification is enhanced when one is sufficiently well acquainted with the setting to know what is distinctive." Of course, the uniqueness, novelty, and even the function served by landmarks will have a bearing on how acquainted one must be with a setting to know what is distinctive. As will be discussed later, in the case of recognizing scenes that were seen during the bog hike, even a single experience seemed to be adequate.

The least familiar scenes tended to be those that lacked distinguishing features and/or were scenes that visitors in fact were unlikely to have seen during the hike. Photo C was of a bog environment in Michigan and thus fell into the latter category. Photo D was a distinct, novel, and memorable scene that the visitors did not see.

Influence of Prior Information and Visits: One might hypothesize that viewing photographic materials before an on-site experience, or having a familiarity with a setting through previous visits, would influence the ability to recall what had been seen during the on-site experience. The pre-post and control design of this study allows for investigating the first of these relation-

Table 6.5 Influence of Prior Photographic Information on Familiarity Scores for Bog Scenes

Frequency (percent) of "Familiar" Scores			
"Familiar" scores		Photographic rank	
Group		Group	
1	3	1	3
92.3	94.9	1	1
92.3	91.5	2	2
90.4	86.4	3	4
85.9	82.2	4	6
85.3	88.1	5	3
77.6	78.0	6	7
75.6	83.9	7	5
73.7	77.1	8	8
73.1	69.5	9	9
63.5	61.0	10	11
60.9	69.5	11	10
56.4	60.2	12	12
55.8	54.2	13	13
51.9	36.4	14	19
50.0	54.2	15	14
48.7	50.0	16	15
46.2	47.5	17	16
35.9	40.7	18	18
35.9	32.2	19	20
35.3	31.4	20	21
34.6	44.1	21	17
34.0	29.7	22	22
31.4	28.0	23	23
24.4	22.0	24	24

Note: Both groups scored photos for familiarity after the hike, but group 1 also viewed the photos before the hike.

Paradigm: $P_1 - \boxed{P_2}$

$- P_1$

$- \boxed{P_2}$

ships. Even though Group 1 viewed photographs (and rated them for preference) *before* the hike, they had no apparent advantage over Group 3 (which did not view photos before the hike) when both groups rated the photos for familiarity at the end of their hikes (rho = .97). The percentage scores were similar, and only two photos were somewhat discrepant in their ranked position (Table 6.5). The lack of influence of prior visual information suggests that the familiarity ratings were based on the on-site cognitive experience rather than on exposure to the prior photos.

The influence of prior visits on visual recall can be examined in terms of differences in familiarity scores for first-time visitors versus repeat visitors. Only one photograph showed any significant difference (chi-square test) in familiarity rating as the number of previous visits to the bog increased. Thus it appears that a single on-site experience was sufficient for developing a sense of familiarity.

It is important to keep in mind that in this study only visual recall of on-site scenes was measured as an indicator of familiarity. This does not mean that repeat visitors might not be more familiar with the environment if other indicators of familiarity were measured. Nevertheless, it is important to know the degree to which visual information enters memory as a result of on-site experiences, for this certainly can be important in the initial phases of cognitive model development.

It is also intriguing that visitors were so cognizant of the visual information they had processed while engaged in a recreational activity. The behavior of visitors while hiking the trail (or for that matter, participating in any other recreational activity) would lead one to believe that visitors "are just having a good time and the acquisition of information is the last thing taking place." Yet information-processing theory predicts that visitors necessarily have an efficient cognitive system for "knowing" the natural environment.

The Familiarity and Visual-Preference Relationship

When the preference and familiarity scores were ranked and compared, a positive relationship was revealed (rho = .53). However, as Figure 6.7 indicates, the majority of the scenes show a stronger relationship than indicated by the rho value. Two scenes that were highly preferred but low in familiarity are feature-oriented but were not available for visitor viewing during the on-site hike. Visitors liked the

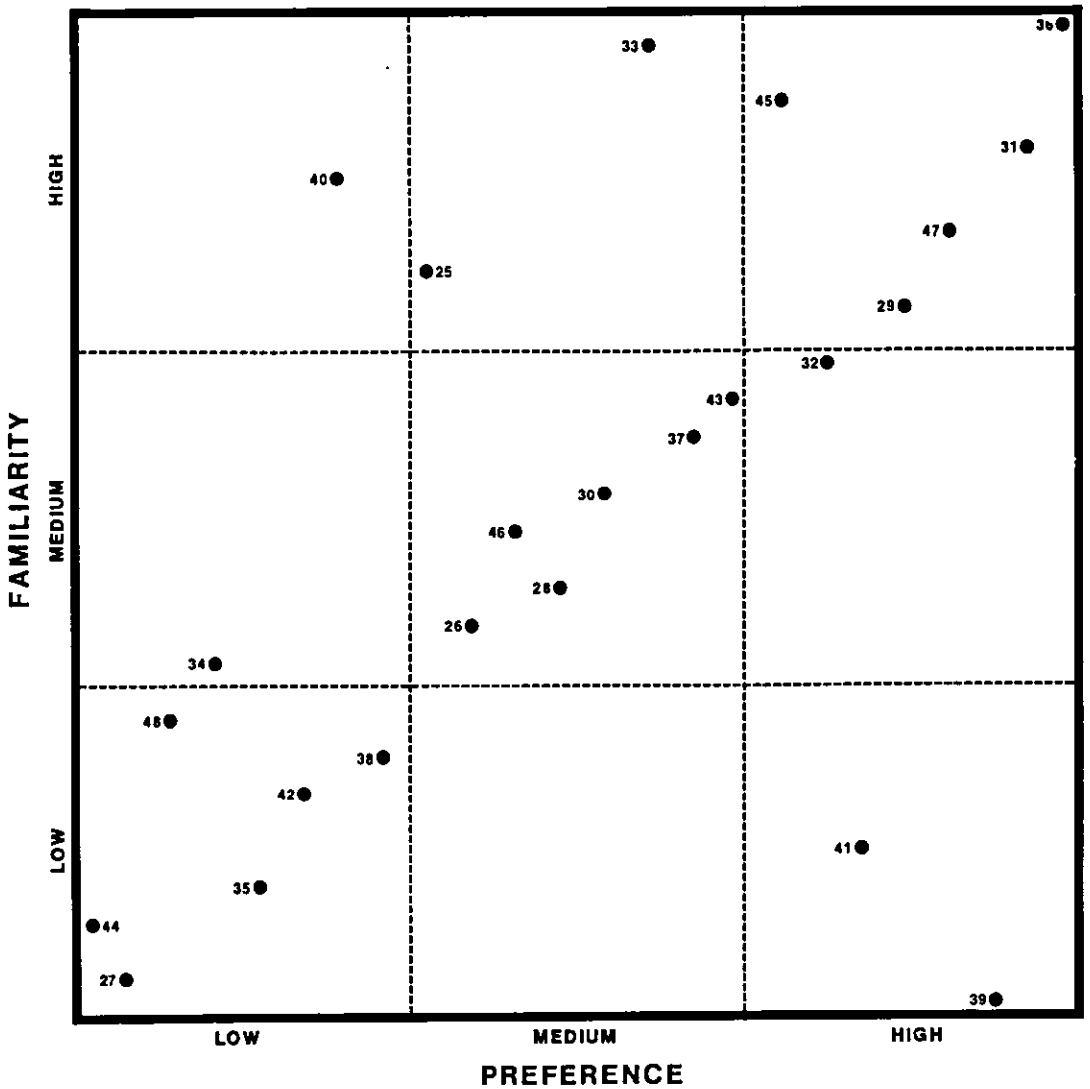


Figure 6.7. Relationship of preference to familiarity for photographs of a bog (n = 274, rho = .53).

scenes and, perhaps because they were distinctive, were quite sure they had not seen them on-site. Photo 40 (not reproduced here) represents the only instance of low preference but high familiarity. The scene was of an uprooted tree, a negative feature in the pattern of boardwalk events, which visitors did not appreciate but had no difficulty recalling.

How might the relationship between familiarity and preference be explained in terms of environmental cognition and the mental models that humans develop during on-site experiences? When an environmental setting is nondistinct, featureless, and offers little opportunity for individuals to become visually involved, they might be expected to pay less attention or to pass more rapidly through such areas. In preferred environmental settings they are likely to pay more attention and thus increase contact and familiarity. Also, operating along with

greater attention for preferred scenes is the fact that one prefers scenes that are more distinctive, that help in orientation, and distinctiveness is easier to remember. Thus an environmental scene high in the cognitive domains of "distinctiveness" and "involvement" is more likely to be attended, and such prolonged contact should enhance familiarity. It is further proposed that the enhanced familiarity is a component of cognitive model development during on-site engagements.

Although preference appears to lead to familiarity, a cautionary note is in order. While high preference for a scene tends to be associated with a high degree of familiarity, one is reminded that the opposite situation – of high familiarity being associated with low preference – can also occur. Familiarity can lead to increased preference, but familiarity per se is an insufficient basis for appreciation. One can be very familiar with nonpreferred aspects of an environment.

Summary and Implications

Preference ratings indicate that visitors rated most aspects of the bog environment fairly high, but that they also had definite preferences for certain aspects of the bog. The enclosed bog forest areas surrounding the open bog mat were given greater preference than the bog mat. These two types of habitats differ strikingly in terms of physical attributes as well as in the opportunity they afford for visual and cognitive involvement. The marked contrast in visitors' preference for the bog forest over the bog mat led to a cautionary note for resource managers: In one's eagerness to show the visitor the ecologically interesting bog mat habitat, do not ignore the visually interesting bog forest. Both aspects of the bog resource need to be considered.

Of particular interest to visitors were distinct, novel features and the inviting opportunity to explore for additional visual information within the environment. Bogscapes that contained an element of hidden but available information, which encouraged visitors to enter scenes to explore, were highly preferred. The bog forest rated high in this component, and the boardwalk trail offered easy access for its exploration. The open bog mat, on the other hand, offered far less visual information and opportunity for perceptual involvement.

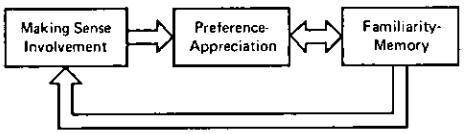
Familiarity ratings indicated that visitors were quite cognizant of what scenes they had or had not viewed during the on-site bog experience. The ratings further indicated that people process visual information in bog environments efficiently, with only one exposure seemingly enough for much of the information to be incorporated into memory. First-time visitors were as accurate at recalling visual scenes as were repeat visitors. First-time "experiences" or "environmental encounters" can be significant in the development of cognitive structures. The initial experience is often the most important in building a cognitive structure of any environment, and it probably greatly influences much other information to be incorporated into it during additional experiences. Devlin (1976) found the initial cognitive maps of new residents to a town to be sketchy frameworks of key locations with additional experiences serving to fill in the gaps with details. Such cognitive structures form rapidly and are facilitated by on-site experience. Thus the resource planner or designer must carefully plan settings to enhance the informational properties of initial experiences.

Familiarity, in terms of prior information and experiences, was shown to affect preference. The viewing of photographs before the bog hike tended to "dampen" the post-hike responses of visitors. Visitor's lack of previous experience and thus of a cognitive structure of bog scenes was suggested as one reason for the "dampening effect". Preference was, however, shown to increase directly with number of previous trips to the bog. Preference continued to increase even after three or more prior visits.

The role of photographic images in the area of environmental perception for bogs differed depending on whether the photographs were viewed before or after an on-site experience. The pre-trip viewing of isolated, unrelated, and non-familiar photographs was of little value to visitors, except for those repeat visitors who had a well-structured cognitive model to which the images could relate. Yet, after the on-site experience, the photographs were very effective at evoking memories and were no longer isolated, unrelated, or non-familiar images for the visitors. Visual stimuli are most efficiently perceived when experienced as related, mean-

ingful images in reference to past experiences and cognitive structure.

Preference and familiarity were shown to be closely related, provided visitors had the opportunity to view scenes during the on-site experience. A strong implication of this finding is the relationship among information processing, preference-appreciation, and familiarity-memory. A simplified sketch of this relationship might be as follows:



An environment whose informational components "make sense" and are legible to the viewer, and at the same time offer opportunity to become cognitively involved in terms of processing additional information, will be appreciated and preferred. The appreciated and preferred environment also appears to be more strongly coded into cognitive structure in terms of familiarity and memory. Yi-Fu Tuan (1977, pp. 4–5) refers to the memory-appreciation relationship: "Remembrance is an important component of appreciation. We tend to think of remembrance as warmed-over experience, forgetting that it can itself be an exquisite pleasure."

Knowing that humans are efficient at determining visual scenes they prefer, and at remembering what is viewed, leads to several implications for planning-designing the visual aspects of recreational opportunities. Trails can be designed to include preferred aspects of a bog environment or to expose visitors to those aspects of the visual resource that managers want visitors to become familiar with (Hammitt, 1980; Hammitt and Cherem, 1980). That preferred environmental scenes have been shown to aid familiarity also has implications in the area of environmental interpretation (Hammitt, 1978). More germane to the cognitive processes by which visitors acquire an appreciation for bog environments is the role that familiarity plays. It provides visitors with cognitive structures for incorporating future experiences. After all, it is the continuing sequence of experiences that eventually shape a person's thinking and behavior.

While the reviewed technique and approach for measuring visual preference and familiarity of bog environments has greatest application in planning and designing preferred environmental experiences, there are various other visual resource and land management situations to which it can be adapted. The fact that the methodology is economical, requires little statistical software, and is an approach that involves on-site public involvement in the management of visual resources should encourage its future use.

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PART III

Field Classification of Wetland Attributes