

## THE ANALYSIS OF PERCEPTION VIA PREFERENCE: A STRATEGY FOR STUDYING HOW THE ENVIRONMENT IS EXPERIENCED

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### ABSTRACT

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Systematic approaches to the management of the visual resource tend to be based on categorizations, and on assumptions of what is valued or preferred. Underlying these distinctions is an implicit view of the perception of the environment. The expert's perceptions, however, may be quite different from the perceptions of those who lack specialized training. While direct questioning regarding environmental perception is unlikely to be fruitful, it has been shown that the use of preference reactions to photographic material is a highly effective procedure for deriving salient perceptual categories. A series of studies focusing on diverse land uses and land covers has generated considerable insight into the way the environment is experienced by the general public. It is safe to say that these empirical results neither match the categories that are the provinces of professional groups assigned with the management of the visual resource, nor do they correspond directly to the attributes assumed to be important in preference. Rather, environmental perception is finely tuned in certain kinds of environments and much less differentiated in others. Equally preferred scenes may fit distinctly different categories. The neglect of the public's categorizations and valuation may lead to approaches that are apparently rational and systematic, but inconsistent with such prevailing perceptions.

### INTRODUCTION

The landscape is an illusive phenomenon. It has been difficult to define and even more difficult to assess. At the same time, it is readily taken for granted and all too readily destroyed. Great strides have been made in the past decade, however, in acknowledging the landscape as a visual resource. By this accomplishment, the landscape has been recognized as far more than an enumeration of its pieces; of the numbers and types of flora, of the soil types, the uses, and so on. To say that the landscape is a visual resource is to admit to the integral tie between the physical aspects of the land and the human experience of it.

As soon as we permit the realm of human experience to be part of the landscape concept, we are courting complexities. Given this broadened

scope, even long inventories of what is on the land cannot adequately describe why it is valued. Humans, after all, respond not only to the "things", but also to their arrangement, and not merely to the arrangement, but also to the inference of what such arrangement makes possible. However, even that is not complex enough. Humans respond differently to these aspects depending on their prior experience and on their current situation.

Given such complexities, a systematic approach to the management of the visual resource could hardly be a simple matter. It must be sensitive to a host of considerations and yet be workable and affordable. It must not only take the existing landscape into account, but anticipate the consequences of changes and, somehow, the visual experience of all the real and potential views must be synthesized into a coherent whole. It is, thus, hardly surprising that landscape management systems are imperfect.

While perfection may be an unreasonable criterion, it is important to recognize that such systems are based on implicit assumptions. One of the purposes of this paper is to examine some of these assumptions and to question their appropriateness. This assessment will be based on a comparative analysis of results obtained from numerous studies which all involve ratings of environmental preference. Through the analysis of environmental preference, however, has come a greater understanding of what is salient in the human view of the landscape. Thus, a major objective of this paper is to show how preference measurement can serve as a vehicle for the exploration of landscape perception. Across a wide range of environmental types, these analyses reveal some strong communalities and these, in turn, are not consistent with the implicit assumptions underlying current landscape management systems.

#### ASSUMPTIONS OF WHAT IS IMPORTANT IN THE LANDSCAPE

Underlying any systematic approach to the management of the visual resource are assumptions about the important components of the landscape. Stated in another way, such systems are based on implicit notions of the categories of environmental perceptions and of attributes that are preferred. By way of illustration, the systems adopted by the U.S. Forest Service (1974) and the U.S. Bureau of Land Management (1980) are enlightening. Key aspects of these systems will be highlighted in this section and compared to some empirical findings in the next section.

Both systems are built upon the concept of landscape elements: "An observer sees the landscape in terms of form, line, color and texture" (U.S.F.S., 1974, p. 8); "landscape character is primarily determined by the four basic visual elements". Furthermore, "the stronger the influence exerted by these elements the more interesting the landscape" (U.S. B.L.M., 1980, p. 13). It is also assumed that the relative impact of these basic elements is greatest for form and least for texture.

The aesthetic pleasure derived from the landscape is assumed to be most

strongly influenced by variety or diversity. This concept, defined by the U.S. Forest Service as “an intermixture or succession of different things, forms or qualities” (U.S.F.S., 1974, p. 6) is the basis for designating Variety Classes which are a major component in this management tool. In the B.L.M. process, the application of the diversity criterion is explicit in the scoring scheme for Scenic Quality. Highest scores are given to the land-form, vegetation and color patterns that have the greatest variety. At the same time, however, the permitted modifications to the landscape are guided by a concern to keep contrast to a minimum. Thus, although variety is a stated asset, the principle is not applied to changes.

Both systems also ascribe scenic quality in terms of other criteria than variety. In particular, scarcity or uniqueness is highly valued. The unusual landscape is considered most distinctive and the typical landscape fares less well. Furthermore, cultural modifications are viewed as generally intrusive. While the B.L.M. system grants the possibility of a positive effect, such man-made changes can never receive a score greater than “2”. By contrast, for five of the other six components of the Scenic Quality evaluation, the top weighting is “5”; for scarcity, it is “6”. For each of these six factors (land-form, vegetation, water, color, adjacent scenery and scarcity), little or no variation is scored “0” or “1”. Cultural modification, however, is the only component that can receive a negative score — a potential weighting of “-4”.

Thus, the major themes underlying these two visual resource management systems include a high valuation of the natural, with variety a major criterion. The variety, however, is considered in the light of unity or harmony with the whole, and as such, cultural modifications are considered likely to have negative effects. Furthermore, vividness and distinctiveness are highly regarded, as is the scarce and unusual. *Changes*, however, are to be made so as to keep variety and vividness to a minimum. The landscape features are valued in terms of the basic elements of form, line, color and texture.

### *Bases of categorization*

A further assumption about environmental perception is reflected in the choices of categorizations underlying various professional systems. In the Forest Service system, for example, the notion of Character Type identifies the basic classifications. This typology is based on a combination of land-form, vegetation cover, water bodies and man-made structures. As Calder (1981) points out, comparisons of visual quality are made within a character type, as there is no rational basis for comparison between types. The broad character types are further divided into sub-types, and based on these the landscape is classified into units already described as “variety classes”. In other words, the variety classes constitute sub-units which are visually homogeneous with respect to the distinctiveness and diversity of the basic

components of the character types. The character types in this system entail large regions determined by major biophysical characteristics. Thus, the sub-types within a single character type might include gorge lands, steep mountain lands, foothills and rolling plateaus (U.S.F.S., 1974, p. 6), and within each of these, in turn, the variety classes would designate different degrees of distinctiveness or smaller regions.

Other professional groups have based their categorizations on somewhat different considerations. Thus, land use is a well-known system for identifying types of environments. Commercial, residential, institutional and recreational land uses are among categories often considered to be salient. Realtors might further divide these land-use categories to reflect size and amenity value. In certain situations, the combination of land use and land cover is considered more important than either alone. Foresters might categorize areas in their jurisdiction either in terms of dominant species (e.g. red pine plantation) or in terms of dominant practice (e.g. naturally regenerated).

For each area of expertise, such categorizations take on an air of reality; for the group sharing the code they appear to be reasonable, widely-accepted bases for describing the respective environment. It is in the nature of expertise that one not only perceives the world through these categories, but that one no longer remembers that it was ever otherwise (Kaplan and Kaplan, 1982, Chaps. 7 and 10). However, the basis for environmental categorization for the person on the street, as it were, may not match the land use, land cover, forest practice or biophysical distinctions. Environmental perception is more likely, one would think, to be along the lines of actions and decisions that are required on a moment-to-moment basis. Appleton's (1975) theory, for example, would suggest that prospect and refuge are the key elements of perception. Our own previous work suggests that the *organization of the space* is vital to the way it is perceived (Kaplan and Kaplan, 1982). Rather than digress to explore these theoretical positions, however, I would like to proceed to discuss the empirical work that examines both the issue of categorization and the prediction of environmental preference.

#### EMPIRICAL APPROACHES TO ENVIRONMENTAL PERCEPTION

While we all perceive our surroundings all the time, it would not be easy to answer a request such as "Tell me about the Australian landscape", even if one were well acquainted with it. Neither is it easy to describe the salient categories of experience of the environment; nor are we adroit at describing why we prefer certain views. There are some commonly used adjectives for such purposes — green, lush, open, sparkling — but these fail to adequately describe many preferred landscapes and do not adequately differentiate the preferred from the less preferred.

One approach to landscape assessment (based on the semantic differential procedure) that has been used extensively begins with such adjectives and asks for ratings of a given scene in terms of each of these words. Thus, one

can determine whether particular settings are considered exciting, strong, likable, sad, thick, active, ugly, and so forth, for a good long list of words. Of course, it is an imposition to repeat this arduous task with too many scenes; characteristically such research includes only a few instances. While such an approach may seem appropriate as a way to determine perception and preference, the results are rather unenlightening. They serve better as confirmation of the thesaurus than for providing insight into the patterns discussed here. In study after study, this procedure reveals that certain adjectives are likely to be grouped together. Invariably, one such grouping consists of evaluative terms (e.g. good, beautiful, valuable, pleasant, nice), but this tells one little about environmental perception.

### *Preference rating approach*

The approach described here is, in certain respects, disarmingly simple and forthright. From the participant's standpoint, it consists of viewing pictures and indicating for each one how much it is liked or preferred, using a 5-point rating scale. The pictures are presented as slides or photographs; in many studies the photographs are printed with eight small scenes on a single page. For large samples, this approach is both inexpensive and easy to administer; it permits people to work at their own pace and at a convenient time and place. Even though the inexpensive printing methods lead to less than outstanding photographic quality (and the scenes are not in color), the procedure has been used without difficulty in many projects.

While the participant's task is straightforward and even pleasurable, the approach is not quite as simple as it appears at first glance. Much of the strength of this method derives from careful attention to the selection of the pictures to be rated. While the semantic differential procedure, as we have seen, compromises on the number of scenes in favor of rating many adjectives, this approach requests a single rating (preference) for each of many scenes.

It is through conscientious sampling of environments that one can begin to discern the categorizations underlying the perceptual process. With only one or two instances representing a particular kind of landscape, it would be impossible to test any hypotheses about typologies or even about preferred attributes. It is quite striking that the wariness that would greet attempts to generalize from a sample of only two individuals to the population at large does not seem to be aroused when generalizing from a single scene to an entire landscape, and yet environmental sampling is no less important than the sampling of individuals if one is to understand environmental perception.

When one has asked a relatively large number of individuals to rate each of several (say, somewhere between 24 and 60) scenes in terms of their preferences, one is very quickly entrusted with a vast amount of data. Perhaps the most straightforward way to examine this treasure is to compute the average value for the preference of each scene. In this way, one can

quickly determine which scenes tended to be particularly well liked and which ones were found to be less preferred. This is instructive; it makes possible a quick check as to whether such attributes as variety and uniqueness are, in fact, the most important features of prized scenery.

The wealth of data also lends itself to other forms of analyses. In particular, one can examine the relationships among the ratings rather than concentrate on their magnitude. Is there a pattern of preference such that individuals who favor a particular landscape also like another of the scenes? Such analyses are based on correlations and on subsequent steps that attempt to extract clusters of items that are grouped together in terms of the pattern of ratings. The best-known name for such an approach is factor analysis. In fact, specialists in such procedures have developed numerous versions and this, too, has become a high-technology field. For our purposes, it is sufficient to think of these approaches as extracting groupings or categories that are based on common patterns in the preference ratings.

The methodology described does not depend on any particular theoretical orientation or, for that matter, on any theory at all. Our own initial work in this area was discovery-oriented rather than theory-driven. Admittedly, an atheoretical approach has certain disadvantages; at the same time it does permit meaningful categories of predictors to emerge, unfettered by prior theorizing. Although it had not been the specific intention, by proceeding in this fashion, it was possible to test a central tenet of the U.S. Forest Service approach to landscape assessment: if form, line, color and texture are, in fact, the pivotal factors underlying scenic quality, one would certainly expect to find them reflected in the results.

#### EMPIRICAL EVIDENCE

To provide even a brief description of the studies that collectively lead to the insights discussed here would take far too much space. It is possible, however, to characterize them in terms of a number of common methodological properties. These 15 studies have in common that they include visual representations (slides or photographs) that were carefully selected to give broad samples of the respective environments, that they used a single 5-point rating scale for preference, and that they included participants without any particular environmental expertise. The studies differ in many respects, but perhaps the most important difference is in the kinds of environments being studied. These range from relatively urban areas to wildlands; from "pretty" waterscapes to wet areas that are not considered particularly aesthetic; from studies drawing on a particular location to others which include visual material representing highly diverse places. Some of the studies also included various professional groups, some included measurements of familiarity with the particular environments, and some included extensive verbal items to supplement the picture ratings.

### *Categorizations*

All but one of the studies include analysis using clustering or factoring procedures<sup>1</sup>. The single exception (Ellsworth, 1982) may provide a good starting point for this discussion. This study constitutes a rather direct comparison of the principles underlying the U.S. Forest Service approach to visual analysis and the kinds of predictor variables that have been presented as being theoretically important (cf. Kaplan and Kaplan, 1982, Chap. 4). Five distinct waterscape units were selected, with 10 slides representing each: a central marsh and two regions along each of two rivers (all in a single character type in the state of Utah). The results strongly demonstrate that this basis for categorization bears relatively little relation either to preference for the scenes or to categorization based on the empirical input. While the marsh scenes were quite homogeneous visually, the river setting units were not. Furthermore, variety was found to be enhanced by the presence of human use (e.g. trash), which did not contribute positively to preference! In other words, content plays an important and complex role. While the setting unit concept is closely related to a content designation (e.g. river), it does not define a perceptually salient and visually homogeneous category. Trash, on the other hand, is a content domain that demonstrates that all variety is hardly equivalent.

At the same time, two of the predictor variables included in the Ellsworth study were effective in accounting for preference: mystery (the sense that more information would be available if one could move further into the scene) and coherence (the degree of visual organization in the scene). It is important to recognize that the landscape management systems do not take these qualities into account.

Another relatively direct comparison of categorization schemes is provided by a study which attempted to locate corridors that would be designated as scenic routes (Kaplan, 1977). Here photographs were taken to sample land-cover and land-use combinations that had been hypothesized to be of varying scenic value (Polakowski, 1975). The results using these categories were not meaningful, however, because visual variability within any particular land form, land use, or combination of these can be quite large. Instead, valued scenery was found to be more closely related to issues such as the perceived penetrability of the setting and the sense of spaciousness. Once again, variety was not a particularly effective predictor of preference, and the scenes receiving the highest preferences were neither scarce nor distinc-

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<sup>1</sup>Not all factor analytic procedures are alike. Two procedures have been found particularly useful and have generally been used jointly in these studies, as the combination provides further insight into the results. See Kaplan (1975) for a discussion of the rationale for the use of both the ICLUST clustering program and the Gutmann—Lingoes non-metric factor analysis. Kaplan (1983) comments on the use of factor analytic procedures in this context.

tive in form, line or texture. Rather, these scenes depicted trees that permitted the light to filter in, creating transparency through the foliage.

Anderson's (1978) study provides yet another challenge to categorizations established by professional groups. In this case, six foresters were asked to designate the appropriate grouping of a series of scenes in terms of land use or silvicultural practice. There was marked discrepancy, even within this panel of experts, in sorting the photographs. Further, the vast majority of the resultant groupings were unlike the categories based on the preference ratings of 300 local residents. Similarly, when Hudspeth (1982, using scenes of urban waterfront areas) and Miller (1984a, using coastal landscapes) asked various planners to anticipate the way citizens would categorize the respective sets of photographs, there was relatively little agreement — both among the professionals and between their judgments and those based on the empirical results.

In fact, the outcomes of the empirically-based categorization procedures are intricate and at the same time stimulating. In none of the studies are the resulting groupings a simple reflection of any professionally-based system. Nor are they in any sense haphazard. Rather, these categories show that perception entails a combination of criteria. The emergence of a category is an indication of a thematic unit, of a pattern that is perceived as separate from other clusters. Thus, two groupings that emerge in a particular study may reflect a comparable range of preference ratings, but their appearance as separate clusters is an important indication of perceptual distinctions. Similarly, a given land use may or may not be perceived as a single pattern. The point is not that land use is irrelevant to the way people experience the environment; in some cases subtle distinctions within a land use lead to separate categories, while in other instances classically diverse land uses might be grouped together. I will try to illustrate some of these points.

### *Human influence*

Analyses of the results of the 15 studies reviewed here show that the relationship between the built and the "natural" consistently emerges as a salient perceptual attribute. When the majority of scenes are of the built environment (e.g. Herzog et al., 1982), the ones that are dominated by natural elements tend to form a separate group. In studies including scenes consisting of both built and natural aspects, the resulting groupings seem to reflect the balance between these forces. Thus, in a study by Gallagher (1977) which included a modern commercial building where the participants were employed, one grouping consisted of scenes in which the building itself is a dominant aspect of the scene. In a recent study I conducted of multiple-family neighborhoods (Kaplan, 1983), categories can be distinguished in terms of the dominance of the buildings with respect to the surrounding land. In the groupings where the buildings dominated, preference was relatively low; groupings with only natural elements showed much



higher preferences. Two other clusters were similar in the range of preference ratings and in the balance between the natural and built in the residential context, but differed in terms of the role the plant material was playing.

Miller's (1984a) study shows surprisingly parallel results in a totally different setting. In his examination of the perception of British Columbia shorelines, he found five of the seven groupings reflected different kinds of juxtapositions between the natural and the human influence. These ranged from what Miller calls "man-dominated-nature" (scenes of intensive development) to "man in harmony with nature" (scenes where small structures are set in the natural setting). (The preference differences between these two were sizable, as one would expect).

Where most of the scenes in a study do not include obvious examples of human interference, the scenes that depict human habitation are the key element in forming a cluster. Herbert's (1981) study of a largely rural portion of an urbanizing county in Michigan is particularly interesting in this regard. One of the four groupings, "Residential", includes virtually all the scenes that show any housing at all. These were by far the least preferred. Highest preference, however, went to the "manicured landscapes"; scenes which while not obvious with respect to human influence achieved their orderliness and smooth textures by intentional change, or what must be considered "cultural modifications".

In Ellsworth's (1982) study of rivers and marshes, one of the five clusters consisted of scenes which had in common the presence of human influence, including a bridge, houses, dumped vehicles and trash. While these scenes received relatively low preference ratings, it was not the distaste for the intervention that was the basis for the grouping. The marsh scenes were no better liked, but were clearly a distinct theme. In other words, the clustering is based on a similarity in reaction to a group of scenes, not on whether they are liked or disliked. Signs of blatant human influence in an otherwise natural setting are perceived as a distinct category.

It would seem then that one of the basic perceptual differentiations reflects a "built" as opposed to "nature" categorization when the sampled scenes include both. These categories may then be refined further, depending on a number of factors. One of these involves the frame of reference provided by the particular set of pictures to be judged. Another factor seems to reflect perceived importance. Roads, for example, even if they clearly cut through an otherwise forested setting, do not necessarily make such settings distinct from similar scenes without such obvious intervention. In the Kaplan et al. (1972) study, the "nature" scenes included settings with unpaved roads and even with a parked car; in Anderson's (1978) study, scenes with roads appeared in several groupings, suggesting that roads were not perceived as the distinguishing characteristic. Similarly, parked cars appeared in a number of clusters in the multiple-family neighborhood study.

On the other hand, in the Kaplan et al. (1972) study, the various scenes showing residential areas did not form any coherent clusters. Participants

were clearly not identifying these scenes simply as “residential”, although they responded to the urban and the nature scenes in a broad categorical sense. This suggests that with respect to residential settings, finer discriminations are salient. Working-class single-family homes do not “belong” in the same category as architecturally-distinctive single-family homes, and apartments distinguish yet another cluster. (In fact, subsequent studies of residential settings, e.g. Frey (1981) and Widmar (1983), corroborate this tendency toward much finer discriminations in this context.)

To summarize, the balance between the built and the natural is a consistently dominant theme in the experience of the environment. Based on empirically-derived groupings, human influence emerges as a salient attribute. At the same time, however, results of these studies suggest that human intervention is not a unitary concept. In some instances, a mixture of human influences is perceived as essentially similar, while in other cases — mostly in the context of residential land-use — human intervention is further distinguished into several distinct categories.

The salience of this balance between human and natural aspects of the landscape is not appropriately captured by the landscape management systems discussed in the previous section. The pattern of results summarized here suggests that the B.L.M.’s “cultural modification” distinction cannot meaningfully be separated from other aspects of the setting; nor can it be considered a unitary quality.

#### *Access and way-finding*

In virtually all the studies that provide the data base for the analysis presented here *several* distinct categories emerged which can be described as consisting of “nature” scenes. In other words, the existence of separate groupings suggests that the presence of vegetation was not the only distinguishing characteristic; some other properties of the scenes must have been salient. Two themes seem to be particularly prominent in distinguishing among these separate “nature” clusters. One entails the degree of openness, and the other involves spatial definition — factors which provide information about the three-dimensional organization of the scene.

In quite a number of studies, groupings emerged that consist of scenes that are wide open; they generally lack any particular differentiating characteristics and the sky occupies a considerable portion of the scene. Such landscapes might be of farmland (top row Fig. 1) or unused roadside land (Ulrich, 1974), or even of the bog mat (Hammit, 1978), marshes (Ellsworth, 1982) or “low flat shorelines” (Miller, 1984a). In Anderson’s (1978) study, two separate clusters fall under this heading. The “heavily manipulated landscapes” included recent clear-cuts, cut-over stands, clean-up after harvest, and poorly stocked areas. The “open, unused land” cluster “may be considered as wildlife openings, old uncultivated fields, or meadows”. As might be expected, the preferences for these two groupings were significantly different (2.2 and 3.2 on a 5-point scale).

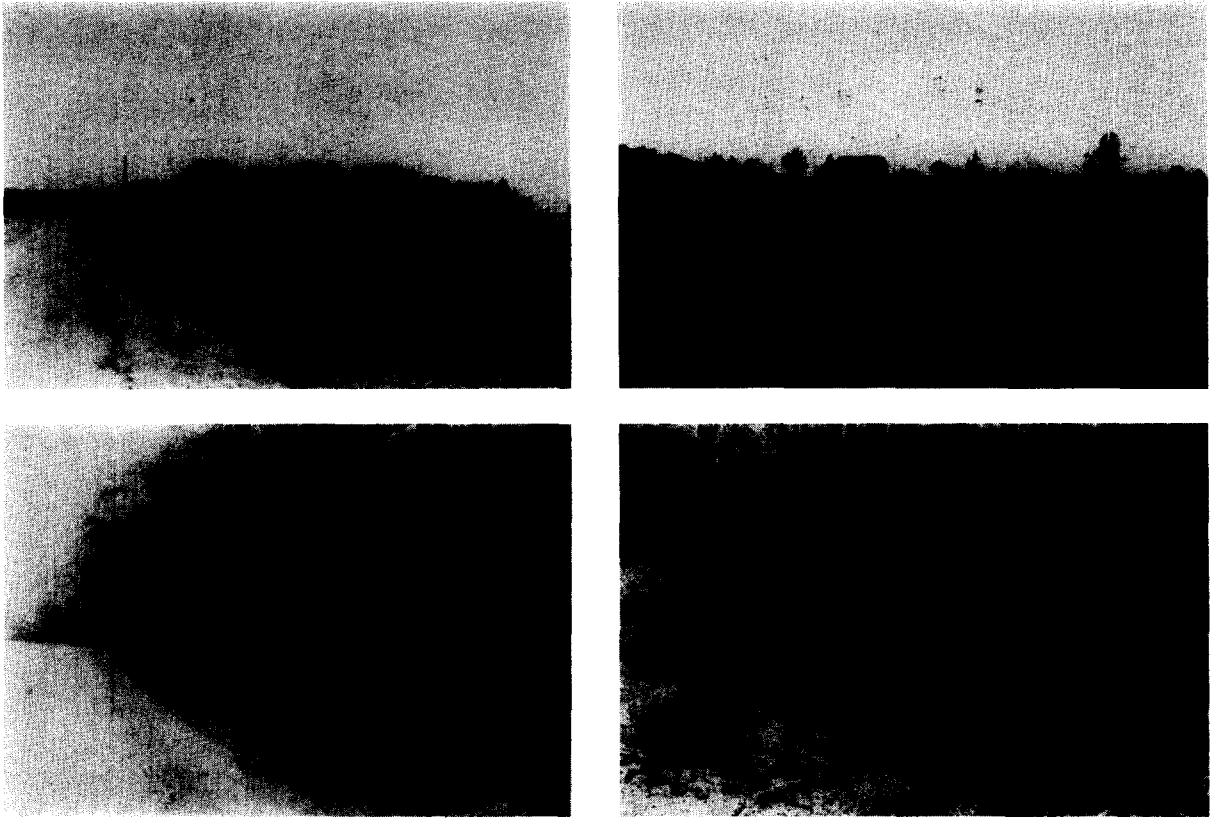


Fig. 1. These scenes reflect a lack of spatial definition although they differ markedly in their degree of openness. In both instances — the wide-open scenes in the top row and the blocked scenes in the bottom row — way-finding is impaired.

While these clusters provide a sense of great openness, the lack of spatial definition generally detracts from preference. Consistently, across many studies, scenes that are relatively open but have some distinct trees form a separate grouping, and are among the most preferred. It is difficult to judge the depth of an undifferentiated surface. Even a relatively small number of trees, however, contributes markedly to the spatial definition of a scene (see top row Fig. 2). In most studies, the best name for this spatially-defined, open cluster is “parklike” (e.g. Kaplan (1977), study of storm drain; Kaplan (1983), study of multiple-family neighborhoods; Ulrich (1974), study of roadside scenes; Hudspeth (1982), study of waterfront revitalization). Herbert’s (1981) cluster of “manicured landscapes” provides yet another example of such highly favored scenes. Woodcock’s (1982) savanna scenes illustrate this phenomenon in landscapes that are unmanaged.

Both types of groupings just mentioned tend to be of relatively open areas. The same distinctions, however, seem to be salient within a forested

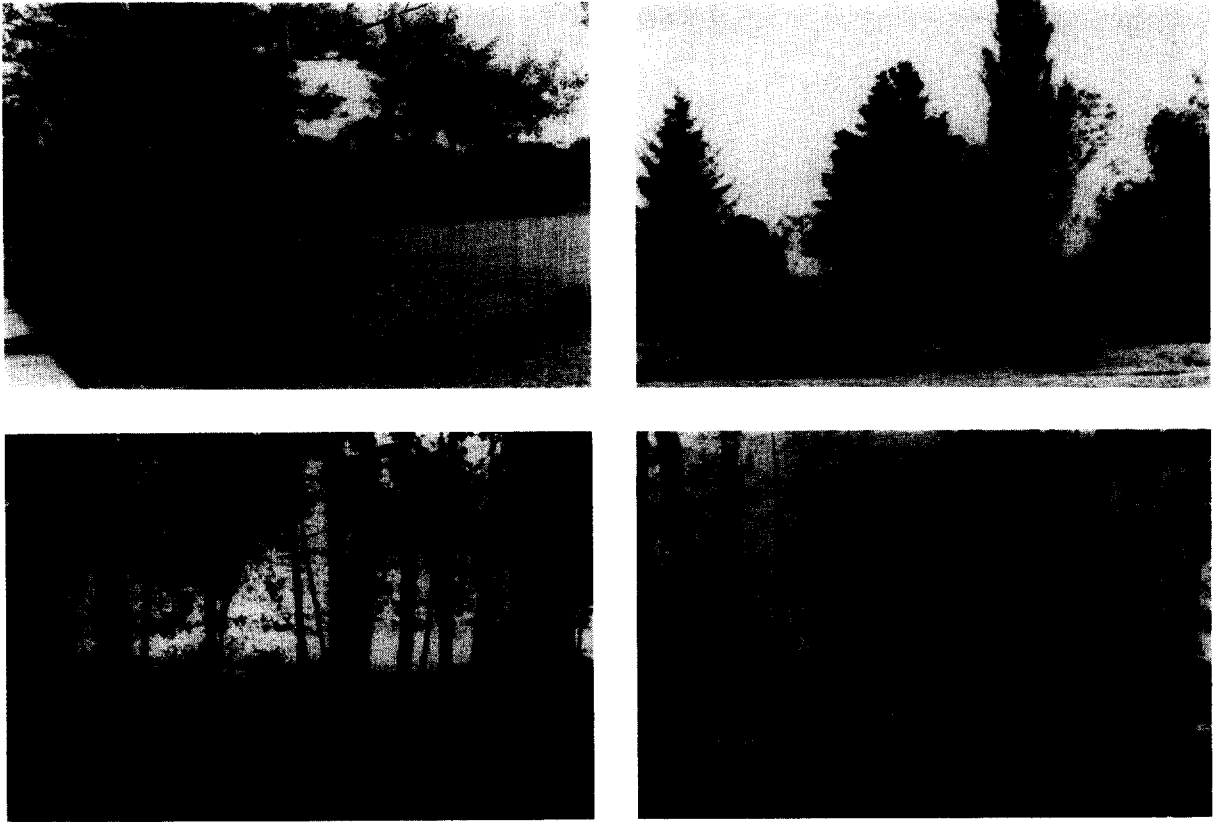


Fig. 2. Both top and bottom rows here reflect high spatial definition. The top two scenes are from relatively open landscapes, while the bottom two are in a forested context.

environment. In other words, where the scenes in a particular study are of forested areas, separate groupings emerge for relatively open forests and for forests that are relatively dense or seemingly impenetrable. In Woodcock's (1982) study, the rain forests tended to be grouped together and constituted the more "blocked" landscapes, while the mixed hardwood forests were generally more open. In both the scenic route study (Kaplan, 1977) and a study of wilderness areas in Michigan's Upper Peninsula (Kaplan, 1984), the degree of openness of the forest was a key basis for categorization. The scenes in the bottom rows of Figs. 1 and 2 provide examples of the dense and more open forests, respectively.

While these groupings can be distinguished on the basis of openness, there is indication that spatial definition also applies to the forested landscape. Anderson (1978), for example, discusses a "Planned spacious openings and scenic roads" grouping which involves scenes in forested settings. Here spatial definition is enhanced by the openings in the forest and, in some instances, by paths or roads. The scenes in this grouping received a

mean rating of 3.8; considerably higher than even the more preferred of the open clusters.

Consistently, the more open forests and the ones with greater spatial definition receive higher preference ratings. In these more favored landscapes, there is a sense that one could function more effectively, either because the transparency among the trees permits increased visual access, or because the smoother ground texture suggests that locomotion could be accomplished relatively easily. In the dense or blocked forested views, by contrast, where there is considerable understory or a mass of foliage, neither visual nor locomotor accessibility is apparent. The opportunities for acquiring knowledge are seriously impaired.

Thus both openness and spatial definition constitute salient perceptual categories that emerge from the empirical results of preference judgments. They suggest that perception entails a very rapid (albeit unconscious) assessment of what it is possible to do in the setting. Information that facilitates comprehension about what might be going on is valued; thus smoother textures, suggestions of paths, and sufficient openness to permit at least a sense of visual access are appreciated. The presence of landmarks, of features that contribute spatial distinctiveness such as a few trees in an otherwise relatively open setting, provide spatial definition and suggest that way-finding will be possible. On the other hand, as the scenes in Fig. 1 show, apparent sameness — either in a wide-open area lacking structure or in a dense wood — and the suggestion that traversing the scene will be difficult make it all the more likely that one might get lost.

#### SUMMARY AND IMPLICATIONS

While this description can hardly do justice to the richness of a great diversity of studies, it provides some insights into the way people respond to the environment. The use of the land itself is part of the implicit categorization underlying environmental perception. Thus, certain kinds of uses tend to emerge as distinct clusters. Industrial land uses serve as a good example (e.g. Herzog et al., 1982; Hudspeth, 1982), but land use is also too broad a category in many cases, as can be seen from the empirically-derived groupings. Thus, neither residential land uses nor natural areas emerge as unique clusters. Rather, these are disaggregated into separate groupings reflecting subtler differentiations. Furthermore, the balance between the built and the natural is an important basis for differentiation.

Far more important than land use as a basis for perceptual categories are the spatial properties of the environment. It is apparent that in the rapid and largely unconscious decision regarding preference, there is an assessment of the glimpsed space and its qualities. This rapid assessment appears to be heavily influenced by the potential for functioning in the setting. Thus, indications of the possibility of entering the setting, of acquiring information, and of maintaining one's orientation emerge as consistently vital

attributes. Wide open, undifferentiated vistas and dense, impenetrable forests both fail to provide information about one's whereabouts, and both consistently appear as perceptual categories. By contrast, scenes that convey a sense of orderliness (such as the parklike and manicured areas shown in Fig. 2) tend to group together. In such settings, the smooth ground texture affords prediction about how one could function in the setting. Similarly, forests that are more transparent, with light filtered through the trees (Fig. 2) and with suggestions of paths, provide information about accessibility and direction. Thus, a major underlying basis for the categories that have emerged in these studies is a spatial and a functional one: an assessment of one's possibility of functioning in the setting.

The task of visual assessment and visual resource management, then, must focus on the organization and pattern of spaces and on the interpretations of these spatial characteristics in terms of human functioning. From such a functional perspective, variety and uniqueness are less likely to be salient than the likelihood of way-finding and the ease with which one can understand the setting. The existence of vegetation, modification and color may not be as useful as the ease of locomotion and the ability to acquire information. While people are quick to make evaluative judgments, these are a reflection of much more than the pleasurable and pleasing. The environment is a major source of information. Embedded in the preference reactions are assessments of the compatibility of the environment with one's anticipated needs and goals.

One would certainly hope that out of a body of research of this size and relevance that there would be some practical benefits, some implications for the practice of landscape architecture. There are, in fact, three implications that bear at least a brief mention.

The first of these is as much an affirmation as it is a mandate. The arrangement of elements in space is a central factor in human environmental preference. This has long been a primary concern of landscape architects, and as such this generalization should come as welcome and deserved support for a traditional area of strength and interest. At the same time, it may be that this perspective could bear even greater emphasis in both landscape assessment and design.

A second, and related, implication concerns the informational properties of the landscape. Variety, in and of itself, is unlikely to be valued; an unrelated confusion of elements is unlikely to enhance comprehension or to lend interest. Uniqueness, similarly, is hardly a guaranteed "good". The only strip mine in the county may be seen by some as one too many. While it is understandable that the landscape management systems have selected certain characteristics as particularly important, their decisions must nonetheless be questioned on both theoretical and empirical grounds. Miller (1984b) has demonstrated that these systems fail to provide appropriate theoretical tools to aid the landscape architect in making sensitive and appropriate decisions. The empirical evidence also points to the limitations of these systems.

Research results suggest that the landscape is preferred when way-finding is more likely, when there are elements that invite one to go deeper into the scene, and when the landscape is legible. Perhaps these factors require more than a simple score-sheet with arbitrary weightings, but the substitution of characteristics that are inappropriate, though readily assessed, may be a futile exercise.

A third implication is perhaps less obvious but no less significant. While the studies reviewed here are quite obviously instances of research, many are at the same time examples of public participation. The existence of a growing body of knowledge concerning environmental preference does not constitute an adequate substitute for input from the individuals impacted by a particular decision or project. This body of knowledge certainly establishes the broad outlines of what people are likely to prefer. As such, it can allow the participation process to be more focused and predictive. Participation permits the influence of regional, cultural and other more local factors to modulate these broad outlines and to contribute a welcome distinctiveness.

Despite its theoretical advantages, however, it must be acknowledged that public participation, in reality, is often an unsatisfactory experience for all concerned. In this respect the approach described here is modestly revolutionary. It does not call for shouting matches, nor is it at the mercy of the vocal few. It draws on the strengths of the public and the designer alike. People assess environmental scenes with facility and interest. The designer's skill is challenged both in the presentation of alternatives and in the integration of the resultant findings. As a further bonus, it should be noted that participation carried out in this way is also research, thus blurring some unnecessary boundaries as it contributes to a growing understanding of that fascinating relationship that people have with the landscape.

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