

**PREDICTORS OF ENVIRONMENTAL PREFERENCE:
DESIGNERS AND "CLIENTS"**

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Abstract

It has previously been suggested that preference for slides of the outdoor environment is only partially accounted for on the basis of complexity ratings. The present study explored two other variables, coherence and mystery. Further, the prediction of preference was studied for people who differed in prior training in design-related professions.

Highly significant differences were obtained in the preference patterns of the three samples: students in Architecture, Landscape Architecture, and the College. Coherence and mystery were found to be relatively independent of each other; each was strongly effective as a predictor of environmental preference.

Of the various factors that help in the understanding of environmental preference, complexity has received the most attention. Craik (1970) discusses several studies dealing with the simplicity-complexity dimension, Rapoport (1971) has extended his previous statements on the preference for an optimal level of complexity, and Wohlwill (1970) asserts that he has demonstrated such an inverted-U relationship between complexity and preference of physical environments. However, in a study reported at EDRA last year and more fully detailed elsewhere (Kaplan, Kaplan & Wendt, 1972), it was shown that Wohlwill's assertion is perhaps overstated and that complexity was found to have limited utility in explaining preference for environmental displays. While complexity and preference were indeed linearly related within a nature and within an urban domain, the overwhelming preference for nature material could not be explained in terms of complexity.

In his EDRA paper, S. Kaplan (1972) proposed a "tentative model" which dealt with complexity as one of four informational factors pertinent to the prediction of preference. The purpose of this paper is to present results of a study that investigated two of these, "coherence" and "mystery." Furthermore, the prediction of preference was studied for people who differed in prior training in design-related professions.

The tentative model. Briefly, the part of the model pertinent to the present study consists of two independent "sources of information," each further divided according to the "degree of inference required." The two sources of information differ in how readily accessible the information is. When the transmission of information is rapid and present in the setting, one can more easily figure out what

is going on. This dimension is quite similar to Lynch's (1960) "legibility" concept. Kaplan divides this category into two further components, coherence and identifiability. The latter deals with "making sense out of what is depicted," with recognizing it for the object or setting that is intended. "Coherence," which requires relatively less inference, depends on redundancy of the elements and textures that help make the display "hang together."

The second major category, "predicted information," consists of those situations where the information acquired would be increased by studying the scene either for a longer time because of the "complexity" of the material or from a different vantage point in the case of "mystery." A scene high in mystery would promise more information if one could step into the picture to "see around the corner" or behind the foliage.

Kaplan contends that "both legibility and predicted information are important in landscape preference. Further, the landscape represents sufficiently diverse patterns of information that both can be and often are present in the same setting." People desire settings where they can make immediate sense out of the general context but there is also attraction to needing more information to fully comprehend and appreciate the setting.

The study reported here is based on subject ratings of preference, mystery, and coherence. A series of 60 slides of the outdoor environment was used. These covered a wide range of contents and different organizational properties.

Method

Subjects. A total of 107 subjects participated in the study. They consisted of three sub-samples: the advanced Architecture students (n=38) were enrolled in a required course in landscape architecture; the Landscape Architecture students (n=30) were in the second year of a three-year graduate program; the College students (n=39) were enrolled in an upperclass psychology course. The last of these, lacking any specific training in design, might be considered to represent the public or the client.

Slides. The 60 slides were all monochromatic, with half consisting of graphic renditions and the other half photographic. Since graphics often depend more heavily on contour than do photographs, an effort was made to select graphics that had a stronger sense of texture as well as some sketchier line drawings.

Four major content areas were sampled: those with predominant paths or highways, those with a predominance of natural areas, those depicting a grouping of related buildings, and those where the focus was on a part of a building. That is not to say that there was no overlap in these categories. In particular, the "part building" scenes included a certain amount of landscaped natural area. This category could also be subdivided in terms of the kind of buildings depicted: a private residential dwelling or a public (including apartment unit) building. An effort was made to take photographs of content areas for which graphic material could be found, although it was not possible to match these on a one-to-one basis. This proved

particularly difficult in the case of nature areas where few graphic renditions were available and for oblique views of building complexes where the artist is at an advantage.

The slides, or "environmental displays" using Craik's (1970) terminology, can also be categorized in terms of organizational qualities. They were approximately evenly divided in terms of a deep/shallow designation. A display can be considered "deep" if one can see far into the picture, while it is "shallow" if it is mainly foreground or if the foreground object or mass prevents one from "entering" the scene. They were also approximately evenly divided in terms of an open/enclosed designation. Here the difference is the openness of the depicted space. The feeling of being enclosed can be created by the trees and foliage, or in some instances by the juxtaposition of buildings or parts of buildings. In a few instances a "shallow" display could not be categorized in terms of "open" or "enclosed," but generally speaking all combinations of these organizational dimensions were represented, with between nine and sixteen instances of each.

A panel of judges served to make the content and organizational judgments and the final 60 slides were selected to reflect a balance of these criteria. For purposes of presentation, the slides were in random order and were presented in a different order each time.

Response format. For all three ratings -- mystery, coherence, and preference -- a five-point scale was used ranging from "not at all" to "a great deal." The instructions indicated that the rating of mystery meant "to what degree do you think you would learn more if you could walk deeper into the scene." Coherence was defined as "to what degree does it hang together." And for preference, the subjects were asked to indicate "how pleasing you find the scene; how much do you like it."

The response sheet consisted of both sides of a single page with identical instructions on both sides. Each side had 35 numbered lines and three banks of numbers from 1-5 so that the subject circled the appropriate number in each of the three labeled columns. (The pages had extra lines to prevent the subject from knowing when the last slide was shown.)

Procedure. The slides were presented in a classroom setting. After general discussion of the meaning of the three ratings, three practice slides were shown and rated, and further discussion was permitted. The 60 slides were then shown for 20 seconds each, with a brief rest after the first 30.

Results: Preference Domains

Following the procedure outlined by R. Kaplan (1972), dimensional analyses were performed using the preference ratings of all 107 subjects. Both the Guttman-Lingoes Smallest Space Analysis III (SSA-III), a non-metric factor analysis, and the hierarchical cluster analysis program ICLUST were used to determine the main preference domains. Lingoes (1966, 1967) explains that the SSA-III entails a rank-ordering of the original correlation matrix thus making the procedure non-metric, while the sub-

sequent procedures using this transposed matrix are basically factor-analytic. This procedure has been found to yield highly stable results even when the variables are somewhat altered or when different samples are studied. The ICLUS procedure, developed by Kulik, Revelle, and Kulik (1970), is fast and efficient and complements the results obtained from the SSA-III.

Based on these analyses, three non-overlapping domains were identified and these form the basis for subsequent analyses of the data and comparisons of the three subject groups. The same analyses made it possible to identify some inadequacies in the environmental display sampling process which necessitated the elimination of a large number of the slides from further analyses. Both the nature of the three domains of preference that were found and the nature of the displays that did not load on these dimensions will be discussed briefly.

The nature domain. This consisted of seven slides which have in common that they represent natural settings with few indications of man-influence. Where parts of houses or paved paths are visible they in no way detract from the basically "woody" feeling. In all cases, the displays give an enclosed (as opposed to open) feeling and with one exception, they were characterized as "deep" (as opposed to "shallow").

Only two other slides in the total set fit these descriptions of being strong on nature, deep and enclosed. One of these shows a private residence with a side yard that is densely wooded, but the nature does not obscure the building, and the other is a graphic rendition which seems to have communicated a too romanticized impression to appear on the same dimension with the photographs. Other nature scenes which did not load on this dimension were either basically open in their organization or basically shallow, or both.

Part-buildings with nature. This domain consisted of seven slides which have in common that they depict parts of public (including apartment) buildings in a distinctly natural setting; they are all "open" in organization, but both shallow and deep displays are included among them. The landscaped area, being open in character, does not obscure the built component but provides a setting.

The examples of part-buildings which did not load on this dimension can be characterized by being clearly residential, lacking a clear setting, lacking the feeling of openness, or combinations of these. In addition, several of the part-building displays were in a context of a group of buildings and these too did not join this domain. It is particularly striking that the various scenes depicting parts of residential dwellings in an enclosed natural setting did not form a dimension of their own. As with the Kaplan et al. (1972) study, it would seem that subjects make rather fine discriminations when it comes to residential scenes.

Building complexes. Seven displays in this domain depict architecturally striking groupings of related buildings that are graphic renditions. The eighth display is a photograph of an architecturally striking masonry canopy extending from the side of an obviously major building. Half of the displays include definite landscaping features; the other half lack these. They can all be characterized as relatively "shallow" in organization. The scale of these graphic displays would be

very difficult to accomplish photographically since the appropriate "view from a hill" is rarely available. The artist or modeler is not restricted by such difficulties.

Three displays of building complexes did not load on this dimension. All three differed in being "deep" in organization, in suggesting a stronger feeling of topography, and in two cases, in being more difficult to decipher.

The displays that were predominantly of paths or highways did not form any coherent domain probably because they represented a great variety of contents, strong differences in scale, and no uniformity of organization.

Graphics vs. photographs. Few of the graphics are included in the three preference domains and in general the graphics and photographs did not mix in the dimensional results. While the explanation for this is necessarily after the fact, it can nonetheless be helpful in guiding future attempts with such material. Many of the graphic displays that showed no clear results were difficult to understand -- they were low in identifiability. They were too sketchy or too crowded with detail that could not be understood in the 20 seconds of presentation. The same problem of identifiability plagued some of the photographs. Four in particular were of extremely stylized, stark, and unfamiliar settings.

The display sampling problem is a difficult one. One has to have criteria for selection and while a panel of judges can reliably rate the slides in terms of content and organization, the subjects are basing their judgments in terms of many other attributes as well. Thus "part building," with or without a major path, with or without a landscaped setting, and with or without the feeling of openness, still ignores that the "part-building" itself can be of a great variety of structures and that this too makes a difference.

Results: Group differences

Before comparing the three subject samples in terms of their patterns of preference, it is interesting to note the relationship between the ratings of graphic and photographic material as a whole, and between the 22 slides which comprise the three preference domains and the remaining 38 slides that did not load on these dimensions. Based on the entire sample, the mean preference, mean coherence, and mean mystery ratings for the 30 graphic displays as opposed to the 30 photographic displays were virtually identical (3.06 vs. 2.98; 3.29 vs. 3.26; 2.92 vs. 2.90, respectively)! Even within each sub-sample there were no significant differences between graphic and photographic ratings. Comparably, the differences between ratings of the slides used for the subsequent analyses and those eliminated by the dimensional analyses were also nonsignificant.

Two basic modes of analysis were used to examine the differences in the subsamples with respect to their preference patterns. Comparisons were made based on the separate ratings (preference, mystery, and coherence) with respect to each preference domain (nature, part-building, and building complex). In addition, correlational

analyses were used to determine the role of mystery and coherence in the prediction of preference.

Preference. With respect to each of the three preference domains the ratings of the groups were significantly different. The difference among the groups was smallest for the nature domain ($F=3.56$, $df=2$, 104 , $p<.05$) where the Architects had the lowest mean rating and the other two groups were much higher and at roughly the same level. The groups differed most strongly in their preference of the building-complex domain ($F=8.31$, $df=2$, 104 , $p<.001$) where the Architects were at the high end, the College students at the low end, and the Landscape Architecture students a close second. For the landscaped part-building domain, ($F=6.81$, $df=2$, 104 , $p<.005$) the Landscape Architecture students had the greatest appreciation, the College students had the lowest mean rating, and the Architecture students fell right inbetween.

For all three groups, the part-building domain was the least preferred. For the Architects the building complexes were by far the most preferred while for the College students the nature domain took a strong lead. The Landscape Architecture students liked the building complex dimension nearly as much as did the Architects and the Nature domain nearly as much as did the College students.

Mystery. The three groups showed no difference in their ratings of the mystery component of the nature domain or the building complexes. For the part-building domain ($F=3.24$, $df=2$, 104 , $p<.05$) the College students felt less mystery was evident than did the other two groups. All three groups rated the nature domain as by far highest in mystery, the part-buildings as lowest, and the building complexes right inbetween.

Coherence. The Architects found significantly less coherence in the nature domain than did the other two groups ($F=3.43$, $df=2$, 104 , $p<.05$), while the groups did not differ significantly in their coherence judgments with respect to the other two domains. Part-buildings were considered lowest of the three domains with respect to coherence by each of the three groups, but not to a striking degree. While the nature domain was the most coherent for the College students, it was the building complexes for the Architects. These two domains were tied for the Landscape Architecture students.

The pattern that emerges from these results is one of strong differences in preference as a function of area of professional interest with an understandable preference for buildings on the part of Architects, a divided preference of buildings and landscaped settings for the Landscape Architecture students, and a strong preference for unadulterated, enclosed nature settings for the College students. At the same time, the ratings of coherence and mystery show considerable agreement despite differences in training.

The prediction of preference. To determine the relative importance of mystery and of coherence in the rating of preference, a series of partial correlations was performed using the 22 slides that define the three domains. Since it has already been shown how the subject groups differed in their ratings of these domains, and how the domains differed in their relative position, it seemed pertinent to examine

the interrelations among the different ratings for these items.

The prediction of preference based on coherence when the effect of mystery is partialled out (r_{DC}^m) and the prediction of preference based on mystery when coherence is partialled out (r_{DM}^c) are both very strong (.67 and .86 for the entire sample, respectively). For the Architects, the coherence rating is without a doubt the more important determinant (partial r's of .89 vs. .66), while for the College students the opposite is the case (partial correlations of .72 vs. .93) where mystery, independent of coherence, is the stronger predictor. For the Landscape Architecture students both coherence and mystery are almost equally effective (partial r's of .72 and .80, respectively) in predicting preference.

There is an interesting further question that needs to be answered, especially given such highly significant correlations. And that is the issue of the independence of the two predictor variables, coherence and mystery. It could be argued that since the same subjects produced all three ratings a "halo effect" was operative, or a response set, or some other biasing influence. In other words, a subject who liked a particular slide may have rated it high in mystery and coherence as well, since he considered these to be "good" or favorable qualities. However, when relating the ratings of these two variables, independently of (partialling out) the preference rating, the resulting correlation is in all cases negative (-.32 for the Landscape Architect sample, -.42 for the Architecture sample, -.58 for the College sample, and -.40 for the sample taken as a whole). Only the College sample's partial r is significant at $p < .05$. Clearly the subjects did not simply rate slides as consistently high or low on all ratings, but made discriminating judgments with respect to each of the ratings. Furthermore, the coherence and mystery ratings, showing partial correlations that account for only between one-tenth and one-third of the common variance, can be considered relatively independent of each other.

It would seem then that coherence and mystery are both strikingly important factors in understanding preference of a variety of physical environments. For Architects, coherence makes more difference, while for the untrained eye of the College student, mystery plays a more important role in determining preference. Further, within the ranges represented by the environmental displays used in this study, the relationships are clearly linear. And finally, coherence and mystery can both be present or absent, relatively speaking, within the same display.

Discussion

The picture that emerges here with respect to the two factors that bear on environmental preference is highly promising. The results are perhaps even stronger and more intriguing than those reported for complexity. Coherence, as one component of Kaplan's "legibility" dimension, is clearly an important factor in predicting preference. (The other legibility component, "identifiability," while not tested in this study, seemed to have some bearing on the ratings. Many of the slides that did not load on the domains analyzed here were rated as lower on identifiability by several of the people making the judgments that affected which slides were selected for the study.)

The "predicted information" dimension Kaplan proposed included both complexity and mystery. The mystery ratings were powerful in predicting preference for all three groups, but particularly for the College sample.

"Mystery" has not received as much mention in the literature as have complexity and legibility.² Cullen's (1961) "here and there" concept, especially in his instances "with a known here and an unknown there," is a closely related idea. There is a promise of more information if only one could get to that better vantage point, but the picture must communicate a feeling that there is a better vantage point to be had.

This is important. A picture that has great depth (as in the "deep" judgments discussed in terms of the organizational qualities of our slides) is not necessarily high in mystery. One can see far into the scene without feeling that a different vantage point would provide further information. A "shallow" picture, by contrast, is not necessarily lacking in mystery. The very object that blocks one from seeing beyond the foreground defines the vantage point that would change one's view. Comparably, both open and enclosed displays can provide the sense of mystery.

"Mystery" is perhaps not the best term for this notion. Our subjects however had no difficulty making the ratings and understood what was meant by this concept given the explanation on the instruction sheet. Cullen's use of "anticipation" as one case in his larger category, comes very close to the meaning intended here. He writes, "We now turn to those aspects of here and there in which the here is known but the beyond is unknown, is infinite, mysterious, or is hidden inside a black maw. First among these cases is anticipation. These two pictures clearly arouse one's curiosity as to what scene will meet our eyes upon reaching the end of the street" (p.49).

The importance of coherence and mystery in preference have direct implications for design. Both are important and both need to be present for optimal effects. Thus while a playground should look like a playground, it should also not reveal itself completely right from the start. Surprises are welcome and desired, especially when the necessities of having one's bearing and feeling comfortable in the setting have been taken care of. Frequently these two factors are operative at different distances. This is particularly true when the immediate stretch is clear and coherent. In such instances the next stretch is more inviting if we don't know completely what awaits us. This is much like the familiar urge to continue a walk to the next bend in the path.

The strong differences among the subject samples also have direct implications for designers. While this study was intended to ascertain the degree to which people in design professions show certain preferences, it was not designed to determine whether any differences found were because of training or because of prior dispositions. There is no doubt that both factors are pertinent and one would expect that designers trained at different schools would show somewhat different patterns of preference. But the preferences of those who have not self-selected themselves to be designers and have not been trained in these skills, is clearly different. The en-

closed woodsy feeling of a natural setting was strongly preferred for this group, and even though the part-building displays were all in a landscaped setting, that "kind of nature" did not receive the same response. Understandably, it is the Landscape Architecture students who have the greatest appreciation for the juxtaposition of buildings and their settings, as well as appreciating both architectural renditions of building complexes and unspoiled natural settings.

These discrepancies are interesting and they are understandable. But when the time comes that the professional deals with the client or the public, they have further implications. While the designer is accustomed to being a "taste-setter" and can impose his preferences on the public, this does not necessarily lead to the happiest consequences. If designers and the public are to work together to some degree in design decisions, a mutual recognition of these differences is essential.

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