Rated preference and complexity for natural and urban visual material*

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In order (1) to study the relationship between complexity and preference for slides of the physical environment and (2) to test the hypothesis that the content of slides (in particular, whether nature or urban) will influence preference, independent of the rated complexity, 88 Ss were asked to rate 56 slides, both for preference and for complexity. Based on dimensional analyses, a nature and an urban dimension were identified. Three major results were obtained: (1) Nature scenes were greatly preferred to urban scenes ($p < .001$). (2) Complexity predicted preference within the nature domain ($r = .69$) and within the urban domain ($r = .78$). (3) Complexity did *not* account for the preference for nature over urban slides; the greatly preferred nature slides were, in fact, judged on the average less complex than the urban slides. The possibility is raised that the domain-specific character of the preference/complexity relationship found in this study may be general; that is, it may not be a special property of environmentally generated arrays.

The emerging discipline of environmental psychology has raised theoretical and empirical issues of considerable interest to students of perception and information processing (cf. S. Kaplan, 1972a). The stimulus arrays characteristically generated by the physical environment represent a fascinating challenge to principles developed largely through use of alphanumeric arrays and nonsense material. Certainly there are suggestions in the literature that the handling of the complex, uncertain environment is based on different or at least additional principles of processing (Brunswik, 1952; Bruner, 1957; Ittelson, 1962; S. Kaplan, 1970, 1972b). An important first step in dealing with multidimensional arrays of this kind is to determine to what extent previously developed generalizations are applicable. Wohlwill (1968) has broken ground in this area with his study of complexity as a determinant of preference for various examples of the physical environment.

Wohlwill (1970) refers to his earlier study and concludes that it "has demonstrated that responses to photographic slides of the physical environment vary as a function of the judged complexity of these scenes in much the same fashion as do responses to artificially constructed stimuli varying in complexity." More specifically, he indicates that the function "representing affective or evaluative responses (reaches) an optimal value at a low or intermediate level of complexity [p. 305]," a finding in agreement with previous studies by Berlyne (1963) and Vitz (1966) based on more traditional stimulus material.

There are, however, several factors that preclude an uncritical acceptance of this conclusion. First, Wohlwill's (1968) results with respect to the preference ratings did not achieve statistical significance. While the highest mean preference rating was given to a slide of intermediate complexity ("Lake scene with partial view of shore"), a slide at the adjacent complexity level received by far the lowest mean rating of any of the stimuli in the study. This slide is described as depicting "Factory and downtown area of small city." This leads to a second factor: on intuitive grounds, it is surprising to find that complexity predicts preference for the physical environment, regardless of the content. It would seem reasonable to expect that whether a slide depicted nature or the built environment would influence preference rating. Unfortunately, Wohlwill's sampling of physical environments, based on only 14 slides, is too limited to permit an evaluation of this possibility.

The present study is based on a substantially larger sample of slides to accomplish two objectives: (1) to permit a more precise determination of the function relating complexity and preference, and (2) to test the hypothesis that nature and the built environment, representing different domains, will lead to differences in preferences not attributable to rated complexity.

METHOD

Subjects

Eighty-eight female college freshmen (all between 17 and 19 years of age), enrolled in one of the introductory psychology courses, served as Ss. Participation in the study partially fulfilled a course requirement. Twenty-five to 30 Ss participated in each scheduled session.

Slides

The slides were selected to depict nonspectacular, relatively local places. Close-up scenes of animals or objects were avoided, as were especially unattractive scenes (such as junkyards or city slums). Consistency of color, brightness, and picture clarity were also selection criteria.

The urban scenes were taken in Detroit and Ypsilanti. They consisted of various scenes depicting traffic situations, street intersections, tall buildings in downtown side streets, medium-sized factory buildings, and stores.

The nature scenes were taken in different parts of the University's arboretum. They consisted of open grassy stretches, meadow scenes, dense foliage, and stretches with more or less woodland. In addition, some other pictures taken in the arboretum consisted of some evidence of human influence—unpaved roads, unpaved parking lot, an occasional car or group of people—along with definite indications of the natural setting.

The remaining slides consisted of a variety of settings that were neither solely natural nor man-made. These included residential scenes, housing developments, apartment complexes, commercial buildings, all with varying degrees of grass and trees. Some showed no buildings but only the street intersections of obviously residential areas.

These different contents can be viewed as constituting a continuum ranging from nature, to a predominance of nature, to a predominance of man-made aspects, to the urban scene. The slides were selected to sample about equally from these four categories. They were divided into thirds, each consisting of approximately equal numbers of the different settings, in random orders. Different S samples were shown a different third of the slides, first, second, or third, respectively, to minimize confounding of ratings with order of presentation.

Response Forms

The Ss were asked to indicate "how intricate or complex you find the slide" and "how pleasing you find the slide" or "how much you like it," using a 5-point rating scale ranging from "not at all" to "a great deal." In addition, two other ratings were obtained: "how exciting, fascinating, and/or intriguing you find the slide" on a 5-point scale, and whether S

*This study is based on an honors thesis by J.S.W. The research was supported in part by the Forest Service, U.S. Department of Agriculture. We are grateful to Father Joseph Voor and Roger Peters for taking the photographs used in this study. Requests for reprints should be addressed to S. Kaplan, Psychological Laboratories, Mason Hall, University of Michigan, Ann Arbor, Michigan 48104.

would like to look at the slide for a longer period of time, indicated by a check mark. Both of these ratings were highly correlated with preference and are not included in the analyses here.

Procedure

After reading the slide evaluation instructions, E showed the three practice slides and the Ss recorded their ratings for each. The first two slides were on the screen for as long as the Ss wished, and questions were answered as they arose. The third practice slide, as well as the 56 remaining slides, were shown for 20 sec each. Following each third of the stimulus set, the Ss completed paper-and-pencil perceptual-cognitive tasks for about 5 min to separate the three slide-rating sessions. (The response forms were set up for 25 slides, and the Ss could, therefore, not anticipate which slide would be the last one in each set.)

RESULTS

Classification of Slides

The slides had been selected to fall into four categories, ranging from entirely nature scenes to predominance of nature, to predominance of man-made aspects, to those with virtually no natural features. The grouping of the slides for purposes of analysis, however, was based not on these a priori judgments but rather on the results of a nonmetric factor analysis (Guttman-Lingoes Smallest Space Analysis III), carried out separately for the complexity and preference ratings. The mathematical features of this form of dimensional analysis and its relation to linear factor analysis are discussed by Lingoes (1966, 1967). Its designation as nonmetric is due to the fact that the correlations are transposed to a rank-order matrix; the designation of factor analysis is due to the fact that the subsequent algorithms are those of factor analytic procedures. (See R. Kaplan, 1972, for a discussion of the advantages of this form of analysis.) A criterion of factor loadings greater than .40 was used to determine the dimensions.

Results of the SSA-III analyses were somewhat different from the four a priori categories. For both the preference ratings and the complexity ratings, there were two dimensions that comprised virtually the same stimulus scenes. One of these, the urban dimension, consisted of the slides categorized as urban scenes, with two minor exceptions: one urban slide, depicting an almost empty street of a large city, did not load on this dimension, and one slide, previously categorized as "predominantly man-made," did load on this dimension. The latter showed a downtown plaza viewed across a wide street, with modern buildings in the background. It had not been grouped in the urban set because some small trees in planters are part of the plaza.

The nature dimension, by contrast, consisted of slides categorized as falling into two adjacent categories, those of entirely nature scenes and some of those where some human-influenced features could be seen in a natural setting. In fact, this set consisted of all of the pictures taken in the arboretum (including the ones showing unpaved roads and unpaved parking lot), with the addition of two other slides in the "predominantly nature" category that were not taken in that setting (a large cornfield with fence in the foreground and trees across the distant horizon, and an open grassy hill with a row of telephone poles).

The remaining slides—consisting of a variety of residential scenes and building complexes with varying degrees of natural and man-made components—did not show a uniform dimensional pattern for both complexity or preference ratings.

Based on these results, the nature slide set was defined as those items that loaded on the nature dimension, for both complexity and preference ratings. A total of 23 slides was included. The 13 urban slides likewise had to meet the criterion of loading on that dimension, for both ratings. Further analyses of the data utilize this dimensional definition as the basis for distinguishing meaningful content characteristics among the slides.

Comparison of Ratings

Having identified nature and urban dimensions, one can proceed to determine their relative preference and complexity ratings. The results leave no doubt about the preference for nature content. Nature material was so vastly preferred over the urban slides ($t = 8.45$, $df = 34$, $p < .001$) that the distributions barely overlap. In other words, with a single exception, the least preferred nature slide was favored over the most preferred urban slide. And the urban scene with by far the highest preference rating was the one with the plaza containing a few small trees! The urban scenes, by contrast, were rated as significantly more complex than the nature scenes ($t = 3.38$, $df = 34$, $p < .01$).

Figure 1 clearly shows that complexity ratings cannot account for preference across the various scenes. The correlation between rated preference and rated complexity for all 56 slides was .37. However, within the nature set and within the urban set, complexity and preference are significantly correlated ($r = .69$ and $r = .78$, respectively). Regression lines have been drawn for both these sets to show these high positive relationships within each of the two sets.

The results indicate, first, that nature scenes are generally preferred over urban scenes, and, second, that complexity cannot account for the difference in preference values between nature scenes and urban scenes, even though higher complexity values are related to higher preference values within each group.

The question can be raised whether background factors characteristic of this particular sample might have a direct bearing on the pattern of results. Almost half the sample in this study can be characterized as coming from a suburban background, 28% indicated an urban background, 11% indicated both urban and suburban, and the remaining 13% can be categorized as coming from rural or small town areas. The background variable, however, failed to account for the obtained results. The differences among the groups were in all cases very small, none of them approaching statistical significance. For each of the four groups, the nature items were vastly preferred; the actual ratings of complexity and preference showed little variation from group to group.

DISCUSSION

The primary goal of this study was to clarify the role of content in the relationship of preference and complexity. The results support the utility of separating the natural and the built environment in analyzing this relationship. The linear relationship between preference and complexity within both domains would obviously have been obscured had this separation not been made. The results also suggest that the preference difference *between* the domains is not a function of complexity differences. Since the nature material sampled in this study tended toward intermediate complexity values and high preference relative to the other material, the total collection of data points does suggest an inverted-U relationship. It must be noted, however, that such a relationship is completely confounded with content.

Alternatively, there is the possibility that an inverted-U relationship might be obtained if the complexity dimension were extended to include the extremes. Wohlwill's procedure was designed to obtain instances at each point along a 7-point complexity scale. The material used in the present study, however, was intended to reflect everyday, unspectacular environments and, thus, undoubtedly

lacks instances of complexity values at either extreme. Since the major portion of the function through the middle range appears to be roughly linear and positive, any decline at the high end of the scale might be expected to be rather precipitous, yielding a highly skewed function. While such speculation is clearly beyond the findings of the present study, the possibility remains that a nonmonotone, though not necessarily interted-U-shaped function, might be obtained if a large sample of slides covering the full complexity range were used.

A further intricacy concerns the possible differences in the complexity range characteristic of the content domains. In the present study, the nature material was found to have a lower mean complexity. This is reasonable on intuitive grounds, since natural processes have an inherent redundancy that places an upper bound on possible complexity. This supposition is supported by the material in the Wohlwill study. While that material was selected on the basis of complexity, irrespective of content, if a rough categorization is made (using the verbal descriptions in the published report), it is clear that the nature material is substantially less complex than the urban material. There are no urban slides at the three lowest complexity levels and no rural slides at the two highest levels. This failure to obtain very high complexity nature material, if confirmed, may limit any nonmonotone function to environments transformed by the hand of man.

The usefulness of domain separation in analyzing the complexity/preference relationship is not necessarily limited to the nature/urban distinction. Not only are there likely to be other identifiable domains in the physical environment; there is also the possibility that this concept may be applied to the content of more traditional laboratory experiments. By including a greater variety of stimulus material within the same experiment, the generality of the domain separation effect can be explored.

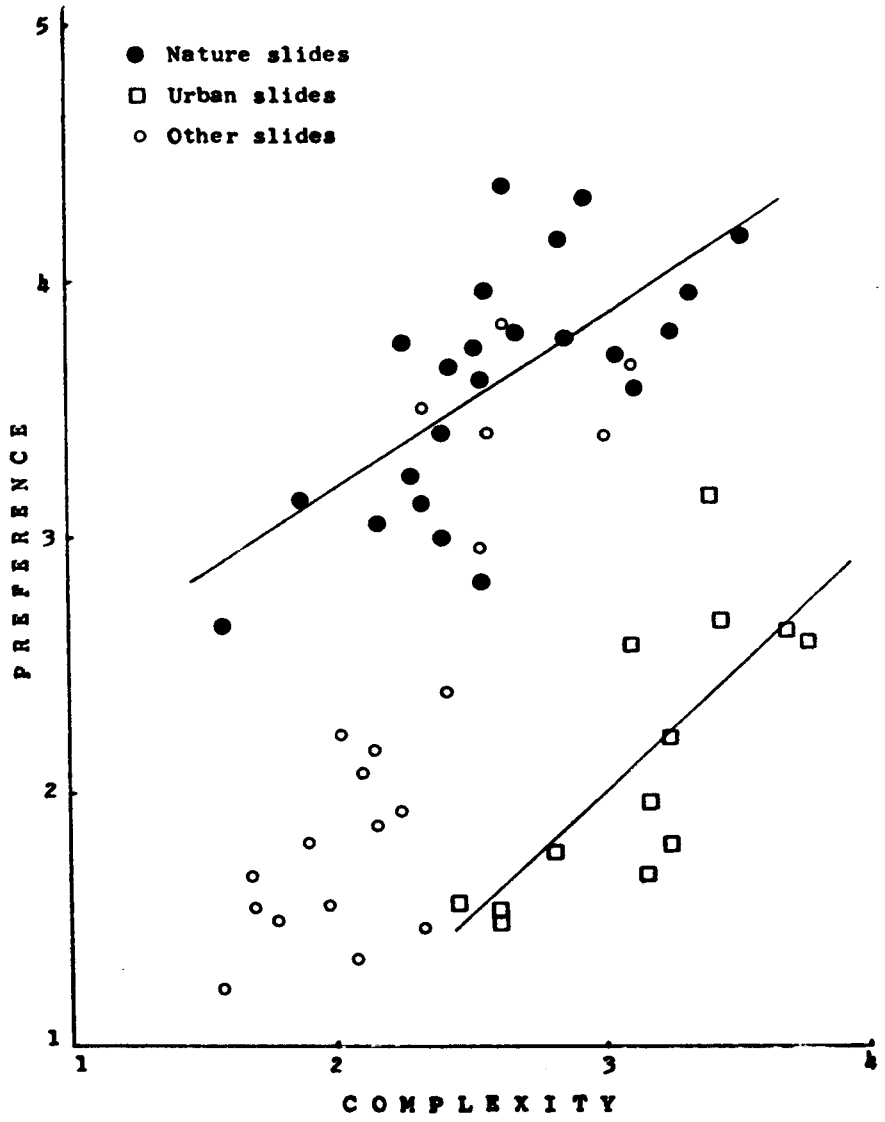

Fig. 1. The relationship between mean preference and mean complexity ratings for nature, urban, and other slides.

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(Accepted for publication June 6, 1972.)