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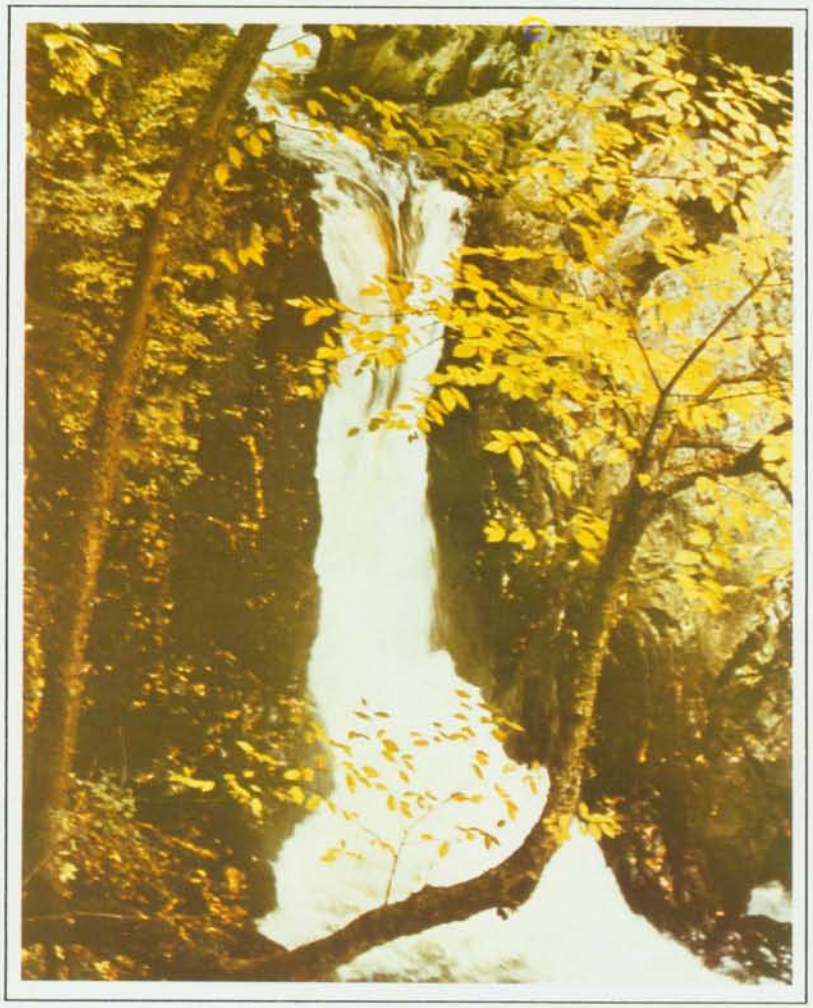
A Comparison of VIEWER REACTIONS to Outdoor Scenes and Photographs of Those Scenes



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A Comparison of VIEWER REACTIONS to Outdoor Scenes and Photographs of Those Scenes

ABSTRACT

A color-slide projection or photograph can be used to determine reactions to an actual scene if the presentation adequately includes most of the elements in the scene. Eight kinds of scenes were subjected to three different types of presentation: (A) viewing the actual scenes, (B) viewing color slides of the scenes, and (C) viewing color photographs of the scenes. For each scene, responses to each of the three treatments were compared statistically and graphically. On-site reactions to scenes provided quantitative measures of the positive effects that some forest environments have over some man-made environments.

PHOTOGRAPHS of outdoor environments play an important role in the competitive advertising and educational strategies designed to maintain, enhance, or change those environments. Photographs are used to measure, document, inform, and—frequently—change public attitudes and policies about important natural-resource issues.

Pictures of outdoor environments are used in a wide variety of commercial advertisements ranging from the background scenes in cigarette adds to promotion of outdoor recreation equipment. Consequently, resource planners and managers, landscape architects, information-education specialists, photo-journalists, advertising executives, and private citizen groups are interested in knowing how effectively a photograph duplicates or changes public opinion or feeling about an actual scene.

A review of literature failed to uncover any scientific studies that answer the question of possible difference between reactions to photographs and reactions to actual scenes. Nonetheless, a certain segment of the scientific research community argues that the connotative aspects of the meaning of a scene must be obtained from respondents at the time they view the actual scene. Other researchers suggest that there may be a strong positive correlation between connotative reactions to a scene and a comprehensive photograph of that same scene.

Overall results of our experiment, by the USDA Forest Service and the Newhouse Communications Center at Syracuse University, indicate that if a photograph of an outdoor scene adequately depicts most of the variety in a scene, respondents have similar reactions —in terms of the adjectives they use—to describe both the photograph and the scene. On the other hand, a photograph that shows only a part of a scene's total variation usually accounts for only a portion of the variation in verbal reactions to the entire scene. Therefore, a photograph that shows only part of a scene can change, not only one's word description of the scene, but may also change one's reaction to resource or landscape-management procedures involving the total environment where the photograph was taken.

THE STUDY

Eight different scenes were used in this study. One group of respondents viewed the actual scenes; a second group viewed 5⅜ x 8 color slide projections of the scenes; and a third group viewed 8 x 10-inch color photos of the scenes. We called these three types of viewing experiences *presentations A*, *B*, and *C* respectively.

Respondents

Three different groups of photography students took part in the study—one group per presentation, selected at random from the undergraduate student body at Syracuse University. Photography students are trained to recognize variations in photographic composition and quality, and we wanted to maximize this possibility in our experiment. We assumed that if a photograph of a scene was not of high professional quality, but respondent reaction was the same for an actual scene and a photograph of that scene, then probably other types of respondents in similar experiments would not be significantly influenced by imperfections in the photographic quality of a scene.

The Measurement Device

In all three presentations, each respondent was asked to look toward the center of a given scene and record his feeling about the scene on each of 27 bi-polar, seven-step adjective scales (figs. 1 to 8).

Social-psychologists refer to these adjective scales as semantic differentials. The 27 adjective scales were selected from previous experiments that used semantic measurements of paintings (*Tucker 1955*), urban environments (*Sanoff 1969*), and unrelated concepts (*Osgood et al 1957*). On the interview forms for the three treatments, the 27 adjective pairs were arranged in a different sequence for each of the 8 scenes. However, the same sequence of adjective pairs was used for the same scene in all three presentations.

The instructions for evaluating each scene in this study followed the procedures outlined by Osgood et al (*1957*). If a respondent felt that a scene was *very closely related* to one end of an adjective scale, he placed a check-mark as follows:

BEAUTIFUL X : _ : _ : _ : _ : _ : _ : UGLY

or

BEAUTIFUL _ : _ : _ : _ : _ : _ : X : UGLY

If he felt that a scene was *closely related* to one or the other end of the scale (but not extremely), he placed a check-mark as follows:

FRUSTRATING _ : X : _ : _ : _ : _ : _ : SATISFYING

or

FRUSTRATING _ : _ : _ : _ : _ : X : _ : SATISFYING

If the scene seemed *only slightly related* to one side as opposed to the other side (but not really neutral), the respondent checked as follows:

UNEMOTIONAL _ : _ : X : _ : _ : _ : _ : EMOTIONAL

or

UNEMOTIONAL _ : _ : _ : _ : X : _ : _ : EMOTIONAL

If a respondent felt that both sides of the scale were *equally associated* with the scene, or that the scale was unrelated to the scene, he placed a check-mark in the middle space:

EXHILARATING _ : _ : _ : X : _ : _ : _ : DEPRESSING

Respondents were requested to make a check-mark for each of the 27 adjective pairs as a separate and independent judgment.

Interviews

On-the-scene interviews were conducted at the peak of fall foliage coloration in central New York. Twenty-nine students visited each of the eight sites and were allowed, as a group, to view each scene for about 5 minutes. The total field trip took 3 hours. Forty-four students were used in presentation B, and 30 students in presentation C.

During the on-the-scene interviews, a professional photographer took color slides and color photographs of each scene.

The slides and photographs were used in laboratory presentations B and C, where the viewing time was 1 to 2 minutes for each picture. Each respondent, while viewing each scene, filled out a questionnaire containing the 27 adjective pairs. After all questionnaires were completed, the next scene was presented.

The time lapse between viewing scenes in presentation A was about 15 to 20 minutes. For presentations B and C the time lapse was only a few seconds.

Here is the order in which the eight scenes were viewed:

Scene	*Predominate feature*
1	Syracuse University field house.
2	Part of a car junkyard.
3	A stone-crushing plant.
4	A lake, with the stone-crushing plant in the background.
5	A scenic vista along a rural highway.
6	Railroad tracks and a train station in a rural community.
7	A forest environment: lake with mountains in the background.
8	Waterfall in a forest setting.

Mathematical Analysis

Analyses of the data followed those procedures described by Osgood et al (*1957, pp. 85-90, 99-100*). For the benefit of our readers, we present here the highlights of the analytical procedures we followed.

Each respondent provided a complete set of 27 adjective-pair judgments for each of the 8 scenes. These judgments were converted to a score ranging from 1 to 7, depending on where a respondent placed a check-mark along the 7-point scale of any adjective pair.

Subsequently, the presentation A (or field interview) scores for each scene were factor-analyzed *(Harman 1966)*. Factor-analysis results provided a description of the dimensions of connotative reaction to a given scene—somewhat as independent dimensions of length, width, and height describe the shape of the space within a box.

Osgood et al (*1957*) pointed out that the dimensions, or factors, resulting from factor analysis of semantic differential data define the "semantic space" of the scene; and furthermore, that the distribution of respondents' scores for all adjective-pairs with high factor loadings within a factor represents an independent "cloud of points," or distribution, along that factor.

The objective of the experiment was to determine whether, in terms of semantic differential response patterns, reactions to colored slides and colored pictures of a scene differed significantly from on-site reactions. Therefore, factor analysis of presentation-A data determined which adjective pairs constituted a meaningful cloud of points along each of n independent dimensions, or factors, of semantic space for an actual scene.

Only those factors that accounted for 10 percent or more of the total variation in all adjective-pair scores were considered to be important in defining the semantic space of a given scene. To say it another way, some dimensions of semantic space are more important than others in terms of how well they help to explain the variability of that space. In this case, we were interested only in those dimensions that included 10 percent or more of the total variability in the factor-analysis re-

Table 1.—Number of factors that describe the reaction to presentation A, and the percentage of total variation explained by the factors for each scene

Scene	Number of factors	Percent of total variations explained by all factors
1	8	100
2	4	62
3	6	93
4	5	100
5	4	68
6	4	60
7	4	68
8	3	50
Average	5	75

Table 2.—An example of how data were summarized and compared for each scene

[This analysis is for scene 2, which required 4 independent factors to describe adjective-pair data for that scene. Only those factors that accounted for 10 percent or more of the total variation were considered.]

Presentation	Factors	Number of adjective pairs in the Factor	Percent of total variation described by the factor	Number of respondents by adjective-pair score categories							Presentation comparisons[1]	X^2 value for comparison between presentations
				1.0—1.5	1.6—2.5	2.6—3.5	3.6—4.5	4.6—5.5	5.6—6.5	6.6—7.0		
A	I	7	23	—	1	8	7	11	2	—	A vs. B	32.9 *
B				1	14	15	10	2	2	—	A vs. C	18.45*
C				—	3	16	8	2	1	—		
A	II	6	19	1	—	3	1	7	13	4	A vs. B	28.14*
B				—	2	4	14	12	8	4	A vs. C	14.88*
C				—	1	5	5	11	8	—		
A	III	3	10	3	9	10	6	—	—	1	A vs. B	12.22*
B				11	14	14	5	—	—	—	A vs. C	4.65
C				6	9	12	3	—	—	—		
A	IV	2	10	—	—	–7	19	3	—	—	A vs. B	3.60
B				2	4	10	24	3	1	—	A vs. C	8.57*
C				3	4	7	13	3	—	—		
Total	—	13[2]	62	—	—	—	—	—	—	—	—	—

*Indicates presentations differed significantly at 95 percent probability level.
[1]Whenever necessary, contingency-table values were combined in the chi-square analysis so that all cells had expected values of 2 or greater.
[2]Note that the total number of adjectives is less than 27. This is because certain factors that accounted for less than 10 percent of the variation contained the missing adjective-pairs.

sults. Therefore, the variation considered important in the on-site interview data was often less than 100 percent (table 1).

On the average, five independent factors (or dimensions) were required to explain the semantic space of a scene. These five factors accounted for an average 75 percent of the total variation in the semantic-differential response to the scene (table 1). Mathematically, it is possible to define the semantic space of a scene in terms of more than three dimensions (such as an *average* of five independent dimensions in this case), but it is impossible to graphically portray this same space beyond a three-dimensional diagram.

For each scene, chi square (*Walker and Lev 1954*) was used to determine if the distribution of adjective-pair scores along each factor (or cloud of points) in presentation A had the same distribution of scores as the corresponding adjective-pair in presentations B and C (table 2).

Graphic Analysis

Average adjective-pair scores per scene were graphed so that, generally (but not always), a low score represented some degree of dislike, whereas a high score reflected a certain degree of elated feeling about an environment. Graphic results are discussed on a non-statistical basis (figs. 1 to 8).

Table 3.—Percent of presentation A variation that was explained by presentations B and C

Scene	Treatment B (Color slides)	Treatment C (Color pictures)
1	76	53
2	16[1]	16
3	32	11
4	64	12
5	48	33
6	41	100
7	100	54
8	28	28
Average	51	38

[1]For example, presentation B explained 16 percent of the variation that occurred in the on-site interviews at scene 2. This percentage value was obtained by first summing values of column 4 in table 2 whenever presentation-A and presentation-B data were not significantly different. In this case, they were similar only in factor 4; so the sum value was 10 percent. Next, this sum divided by the proportion of total variation described by all factors equals 16 percent: $10/62 = 16\%$.

Why did we conduct both a mathematical and a graphic analysis of the data? Social-psychologists have not yet defined what constitutes a *meaningful* statistical difference between sets of semantic differential data. So, what may be statistically significant in this study may not necessarily be managerially significant to the practitioner who wants to use the study results. Graphic presentations of results, therefore, permit the reader to decide for himself whether presentations B and C differ from presentation A for his particular situation or objective in the use of photographs.

RESULTS

Reaction patterns of color slides and pictures accounted for 11 to 100 percent of the on-site presentation variation (table 3). On the average, a color-slide presentation of a scene described 51 percent of the on-site response variation, and a color picture described 38 percent. These average percentages, however, do not reflect the range in results.

In five of the eight scenes (1, 3, 5, and 7), color-slide projections described more presentation-A response variation than color pictures did. In two of the scenes (2 and 8), color-slide and photo results were about the same. Only for scene 6 did the photo measure more presentation-A variation than the slide (table 3).

When looking at the results of the statistical and graphic analyses, one cannot assume that plotted mean values are not equal simply because they do not seem to belong to the same distribution and vice versa. For example, the color picture for scene 6 accounts for 100 percent of the variation in the on-the-scene response to presentation A (table 3), but the graphic means for response data do not overlap exactly for presentations A and C (fig. 6).

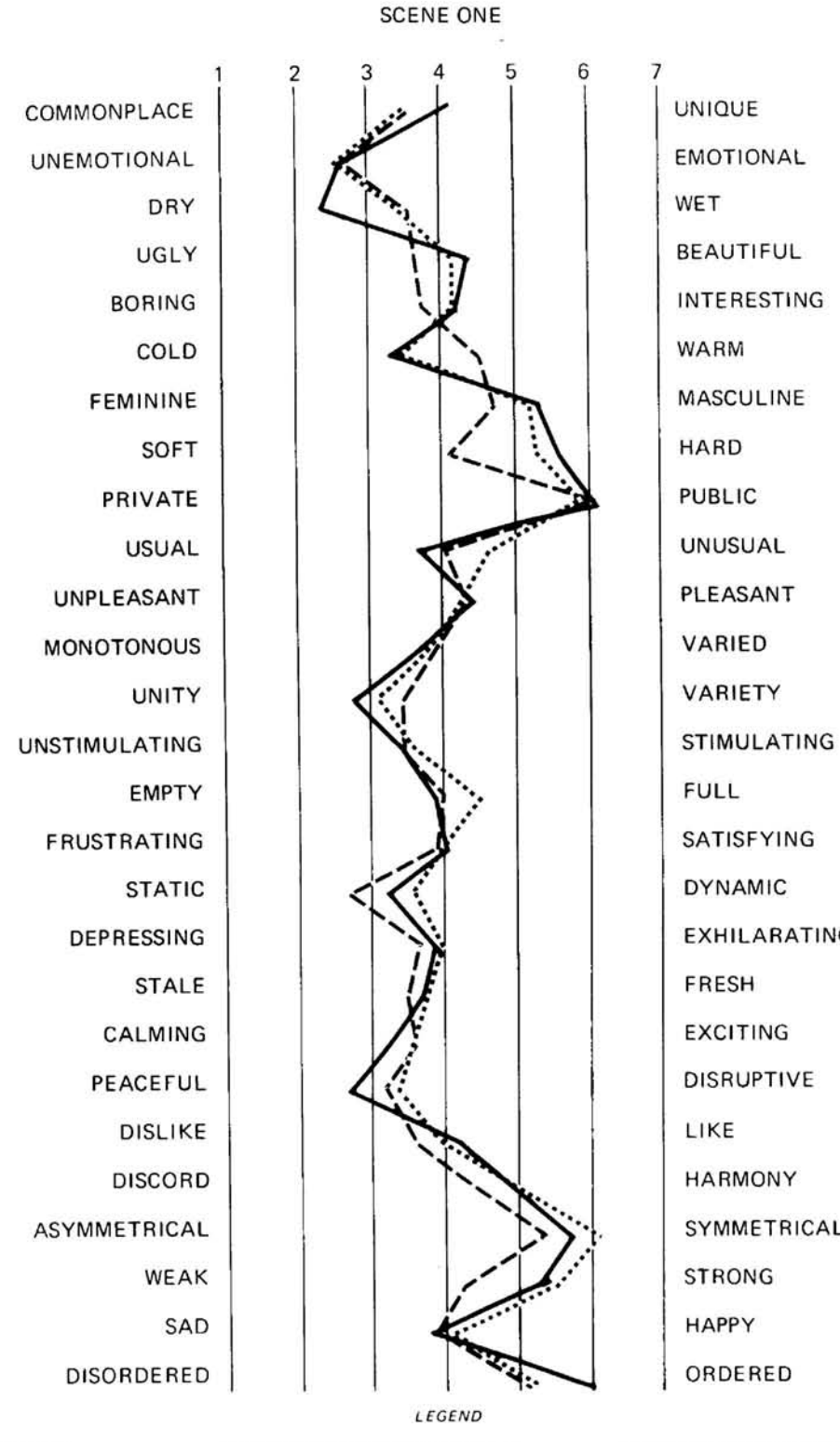
The results of this study are limited to a specific population, time period, and set of environments. The experiment was conducted under controlled conditions that may not exist when people view scenes.

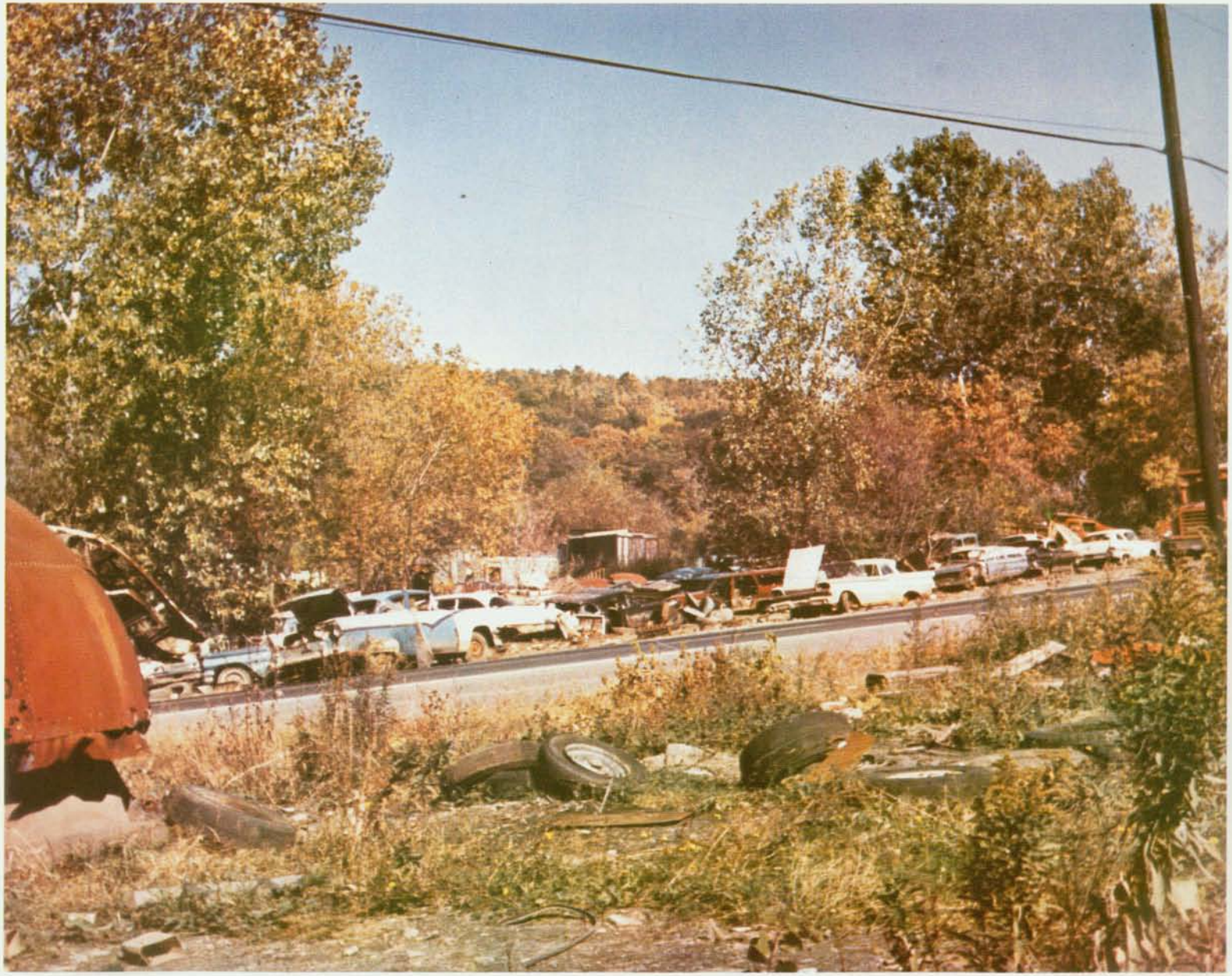
The average person probably will want to spend more time in an environment he enjoys (the waterfall in scene 8, for instance) than in one he dislikes (such as the junkyard in scene

TEXT CONTINUES ON PAGE 23.

Scene 1.—A circular-shaped college field house.

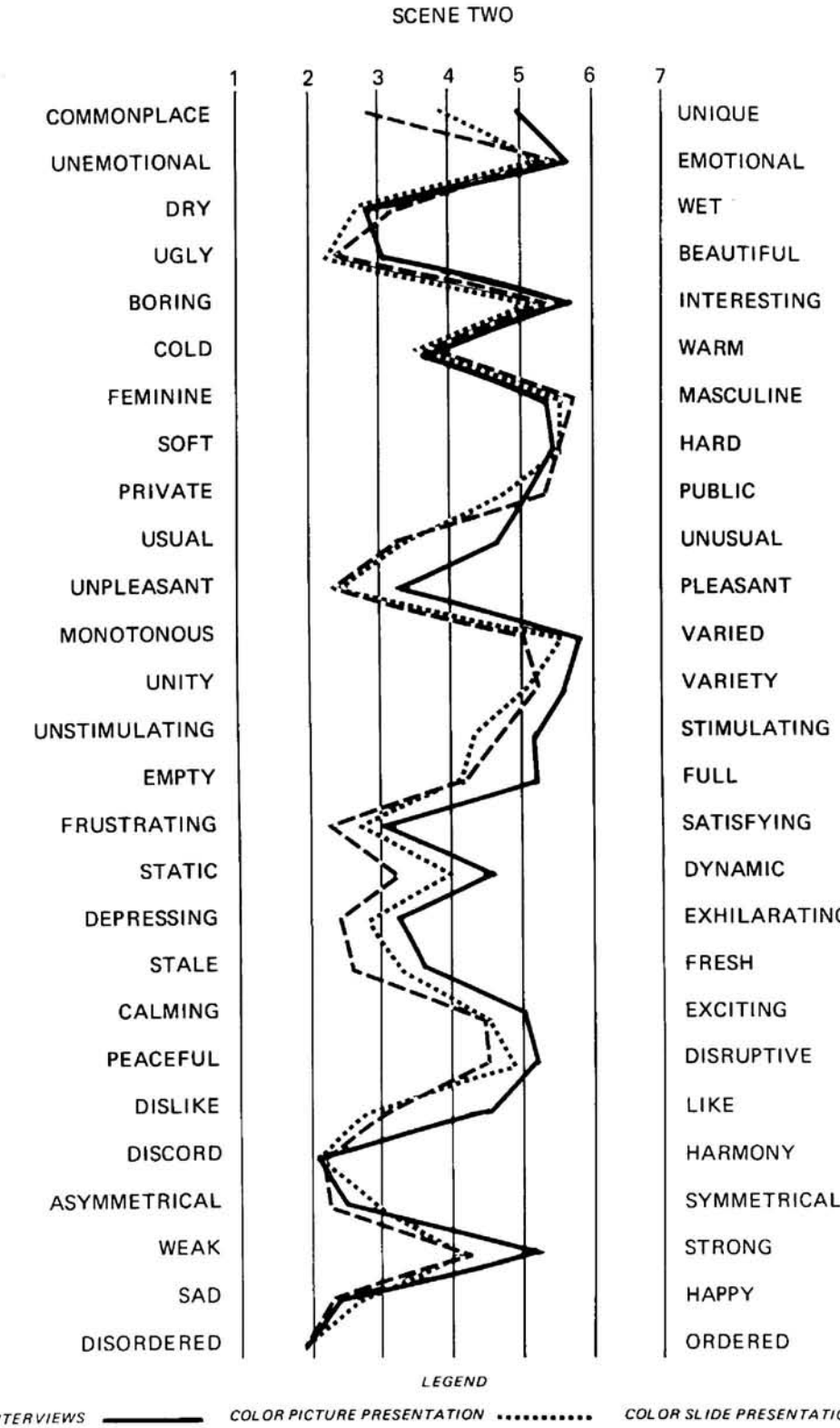
Figure 1.—Statistical mean distribution of semantic differential scores for the three presentations of scene 1.





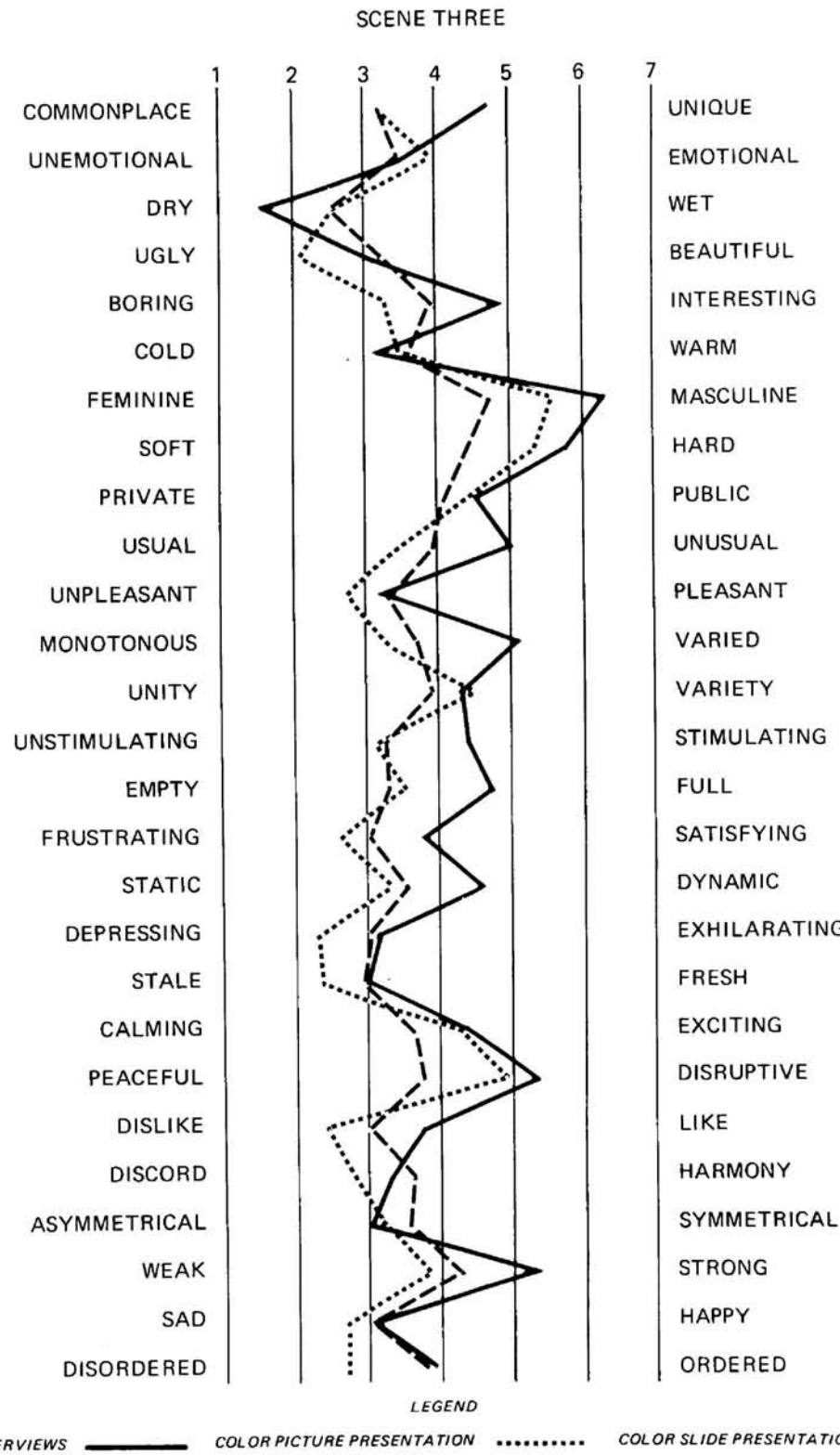
Scene 2.—Part of a car junkyard.

Figure 2.—Statistical mean distribution of semantic differential scores for the three presentations of scene 2.



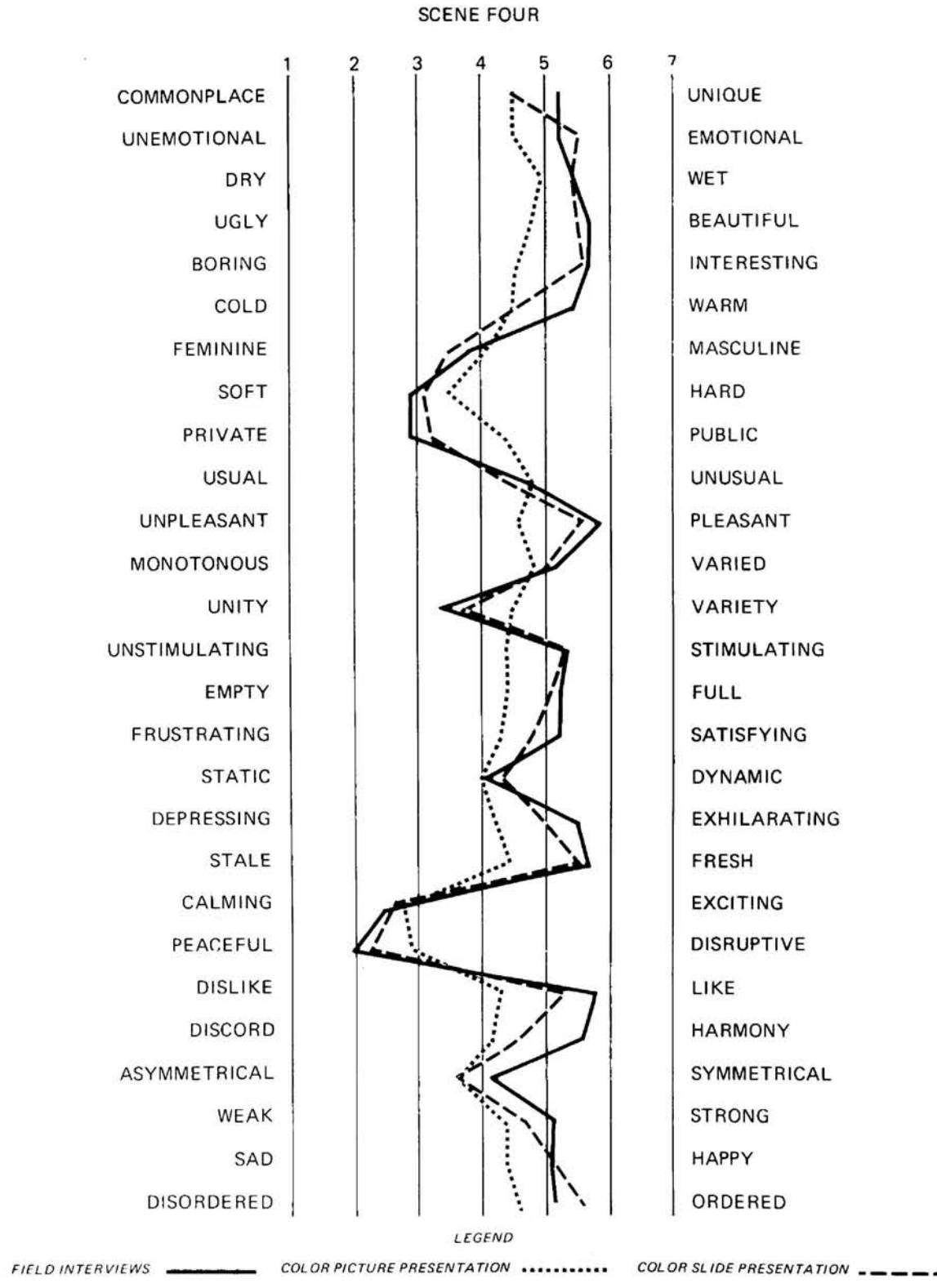
Scene 3.—A stone-crushing plant.

Figure 3.—Statistical mean distribution of semantic differential scores for the three presentations of scene 3.



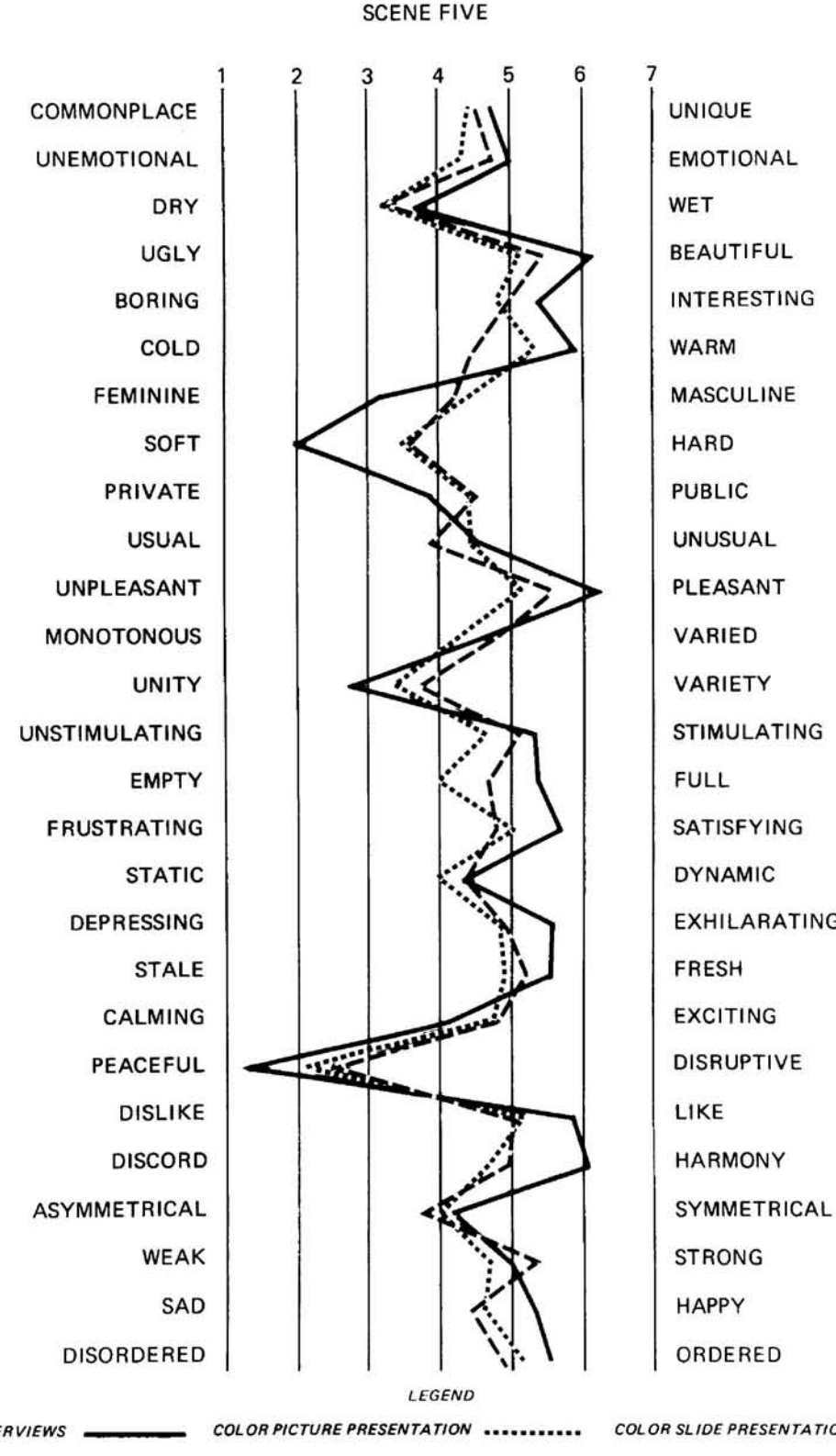
Scene 4.—A lake with stone-crushing plant from scene 3 appearing in the background.

Figure 4.—Statistical mean distribution of semantic differential scores for the three presentations of scene 4.



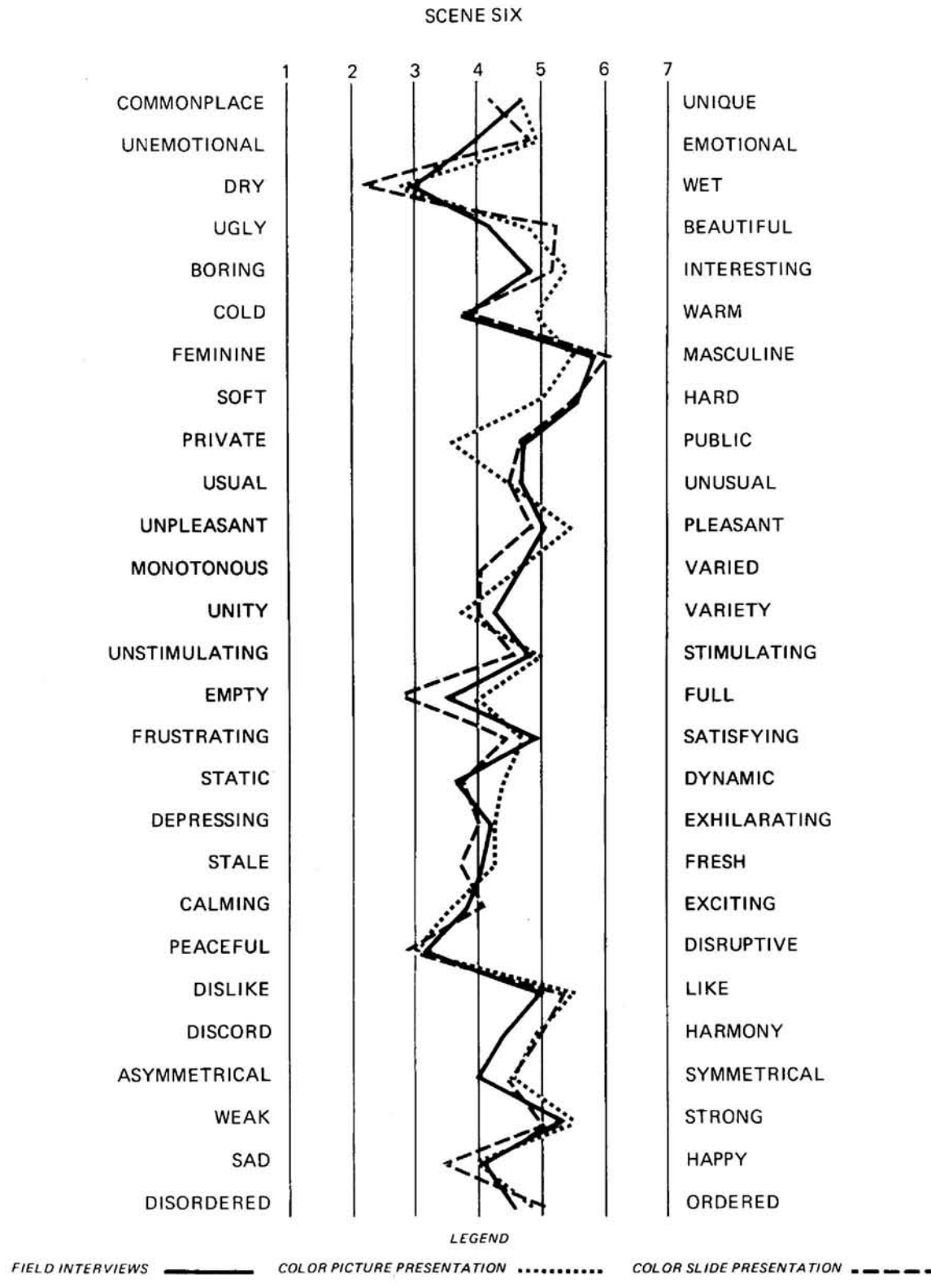
Scene 5.—A vista along a rural highway.

Figure 5.—Statistical mean distribution of semantic differential scores for the three presentations of scene 5.



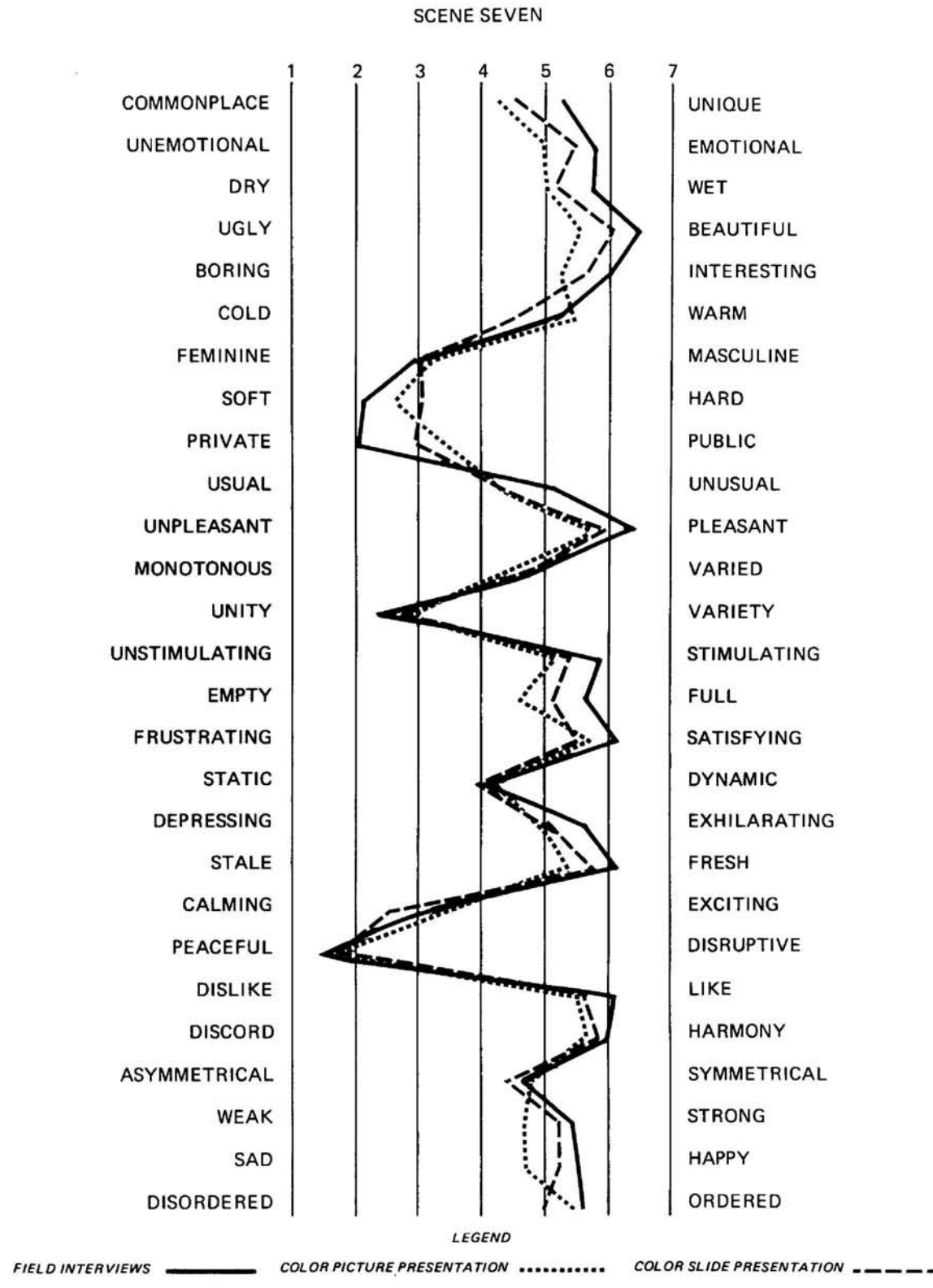
Scene 6.—Railroad tracks and train station in rural community.

Figure 6.—Statistical mean distribution of semantic differential scores for the three presentations of scene 6.



Scene 7.—A forest environment and lake, with mountain in background.

Figure 7.—Statistical mean distribution of semantic differential scores for the three presentations of scene 7.



Scene 8.—A waterfall in a forest setting. A, the full scene viewed in presentation A; the area marked off at upper left was used in presentations B and C. B, the photo used in presentations B and C.

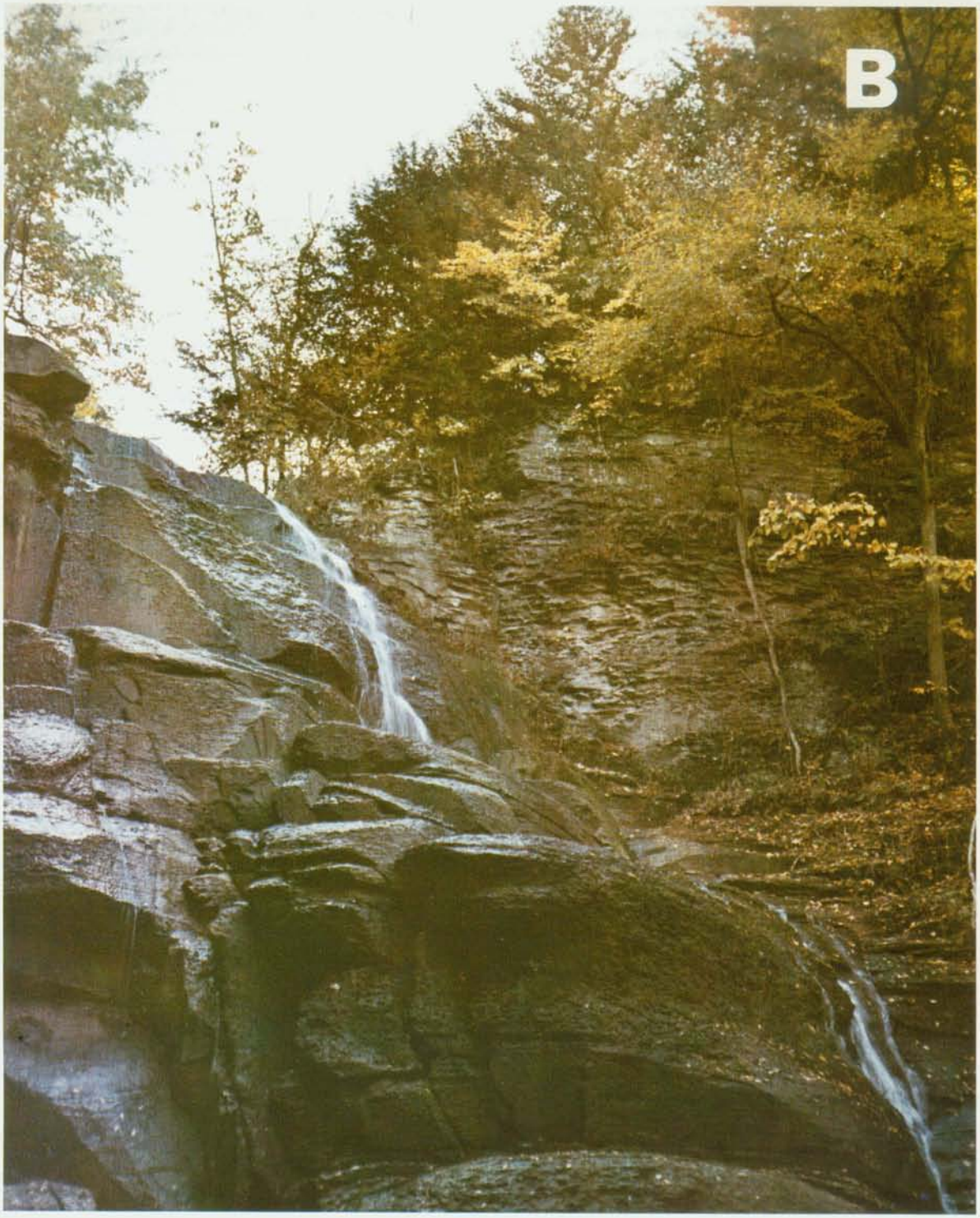
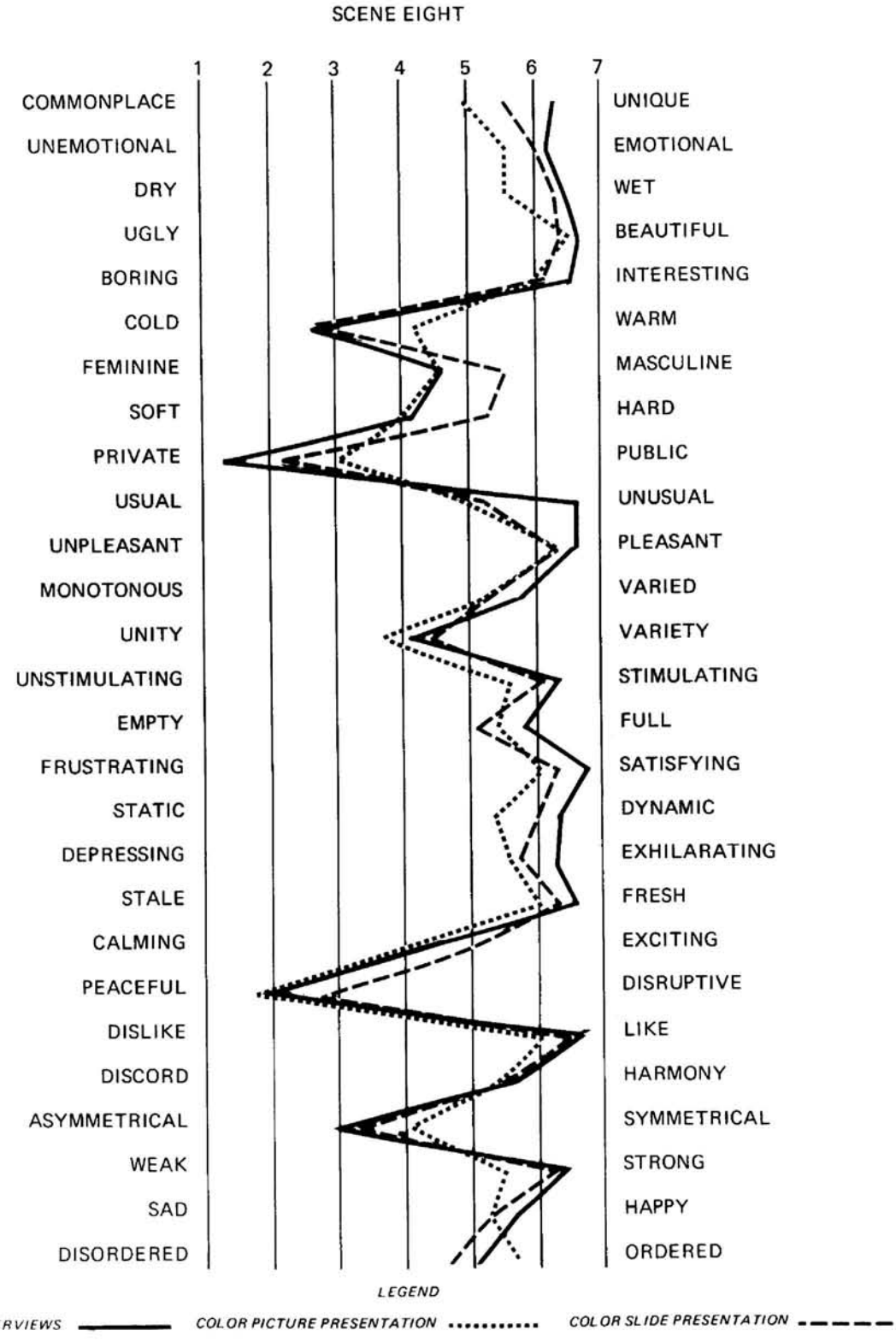

B

Figure 8.—Statistical mean distribution of semantic differential scores for the three presentations of scene 8.



2). This type of behavior pattern was very evident in the field interviews. Consequently, the reasons why one views a given scene and the length of time he spends in that environment probably condition his reaction to the scene. In this experiment we did not try to account for this possibility.

Most of the students had seen many of the scenes several times before. Therefore the adjective-description patterns for each of the more familiar scenes may typify the reaction that could be expected across a range of similar environments.

Essentially, each scene constitutes a separate experiment involving respondent reaction to that scene. On the other hand, hypotheses suggested by interview results from one scene occasionally were reinforced by interview results from a later scene. We did not attempt to relate viewer reactions among scenes, although the order of presentation may have affected viewer reactions to succeeding scenes.

Scene 1 (Field house)

In the field interviews, respondents stood in a tree-shaded location and looked out into a bright sunny scene. This situation was similar to the laboratory environment for the color-slide presentation and therefore may help account for the 76 percent of field-interview response explained by the color-slide projection. In comparison, response patterns to the color-picture presentation explained 53 percent of presentation-A variation.

In the graphic analysis of the data for this scene, the average value for most adjective-pairs did not vary by more than one scale point between presentation A and the other two presentations (fig. 1). Therefore, on a non-statistical basis, the average responses to all three presentations were fairly similar.

As might be expected, the meaning of this scene was closely related to the adjectives *public*, *symmetrical*, and *ordered*; and only slightly related to the adjective *dry*. Otherwise, average scores for all other adjective pairs ranged between scores 3 and 5—that is, one of the two adjectives in a pair was only slightly related, was not associated, or was only slightly unrelated to the meaning of the scene.

On the basis of these results, we suggest the following hypothesis for further testing:

> Color slides and possibly color pictures that adequately show a single architectural structure and one center of interest in an uncluttered environment may induce word responses that are similar to on-site viewing reactions.

In a sense, landscape architects assume that at least part of this hypothesis is operating whenever they present a model or a drawing of a proposed project to a client.

Scene 2 (Junkyard)

Treatments B and C accounted for only 16 and 17 percent, respectively, of on-site verbal-response variation.

During the field interviews, the students stood on gray-colored gravel within this disorganized environment as car traffic moved along a road in the center of the scene.

Graphically, the adjective-air scores for presentations B and C were parallel, but were usually 1 to 1.5 points lower than presentation-A data about two-thirds of the time. For example, in terms of the adjective-pairs that were used, the picture and color-slide scores were not as *stimulating*, *exciting*, or *strong* as the on-site feeling about this environment. On the other hand, respondents felt that presentations B and C were more *unpleasant*, *frustrating*, and *depressing* than the actual scene.

The similarity in average response patterns among the three presentations for scene 2 suggests that slides and photographs could come reasonably close (on a nonstatistical basis) to duplicating on-site feeling for this kind of scene (fig. 2).

Analytical results and comments by respondents in all three presentations for this scene suggested that:

> Photographic presentations of polluted or unpleasant natural environments elicit a greater degree of unfavorable reactions than those reactions obtained at the actual site, unless the photo presents most of the environment's variation and is supplemented by sensory stimuli of sound and smell. However, there may be a high positive correlation between reaction to photographic presentations and on-site reaction to this type of scene.

Scene 3
(Stone-Crushing Plant)

The color slide presentation explained 32 percent of presentation-A verbal-pattern responses, and color photos explained 11 percent.

In the field tests, human activity and structures on both sides and behind the test area seemed to distract respondents.

Overall results tended to support our previous hypothesis for scene 2 about the need for total photo coverage of visually polluted environments before one can duplicate on-site reaction or feeling for that environment. Average semantic differential scores usually ranged within one plus or minus point of the neutral zone, with only a few exceptions for on-site reactions such as the adjectives *dry* and *masculine*.

Scene 4
(Lake and Stone-Crushing Plant)

Presentation-A respondents viewed this scene from within the cool shadowed protection of a rustic open-air shelter in a picnic area. This viewing situation was somewhat similar to the slide presentation in the laboratory for this scene, which may account partially for the better performance of the slide (64 percent) over the photo (12 percent) in duplicating the on-site response variation in presentation A.

In the graphic analysis, response patterns for presentations A and B were similar, but those for A and C were quite different (fig. 4).

There was a dramatic shift in favorable reaction toward the total environment when the pollution that was shown in scene 3 was followed by the mountains and water in scene 4. For example, adjective scores for *beautiful*, *interesting*, *pleasant*, and *peaceful* were either neutral or negative for scene 3, but quite positive for scene 4. These results suggest that:

> In terms of viewer response, natural environments can be used effectively to subordinate the negative effects of nearby, familiar, visual, and biological pollution.

An additional hypothesis suggested by semantic differential results from scene 4 corresponds to the hypothesis suggested for scene 1:

> Color slides that adequately portray most of the variation of an outdoor environment may be adequate for measuring response to the actual scene. This may be true even when a small degree of visual pollution exists in the scene.

Scene 5
(Roadside Scenic Vista)

The slide and photo were restricted to about 50 percent of the total variation in the scene. Furthermore, the two-dimensional aspect of presentations B and C accentuated a highway guard rail that was subordinate in the actual scene.

Respondents stood in the open along a highway overlooking this scene during the on-site evaluations. The 48 and 33 percent of on-site variation described respectively by the slides and photo enforced the need to have complete photo coverage of a natural scene when measuring reaction to the scene. The graphed viewer-response of all three treatments tended to highlight the reaction differences between presentation A and the other two. Results of average on-site reactions indicated that the actual scene was especially more *beautiful*, *warm*, *soft*, *pleasant*, *peaceful*, and *harmonious* than colored pictures or slides of the scene (fig. 5).

Scene 6
(Railroad Tracks and Station)

The color photo explained 100 percent of on-site reaction. The color-slide treatment was less than half as effective, accounting for only 41 percent.

The color print had a slightly lower camera angle than the slide. Perhaps the difference in results between the photo and the slide presentation was caused by a difference in camera angle; but this aspect of the problem needs additional research.

Graphic presentation of average user response to all three treatments showed how presentation A and C data tended to follow the same pattern (fig. 6), thus reinforcing the statistical analysis results.

The railroad—a theme that pervaded and glorified the technological revolution in this country—was accentuated by including an abandoned but well-preserved railroad station. In its heyday, this environment was domi-

nated by noise and smoke similar to that dominating scene 3. Why, then, didn't scene 6 (fig. 6) and scene 3 (fig. 3) have similar semantic differential response patterns? Even more intriguing is the question, Why didn't respondents appreciate scene 6 more than scene 1, which was a modern non-polluting structure? In answer to these questions we suggest that:

> In many respects, on-site and photographic presentations of scenes of historical technological achievements may elicit more overall interest and appreciation than modern non-polluting man-made structures.

Such hypotheses lead credence to the need for preserving (on-site and in photographs) past historical developments. Such developments may be regarded by today's observers as particularly *masculine*, *beautiful*, *peaceful*, *likeable*, and *strong* (fig. 6).

Scene 7 (Lake and Mountain)

The foreground objects appeared taller than they really were because of a low camera angle in the photo. Although the representation of the environment does not include the entire scene, the variability in the remainder of the scene did not differ much from that shown in the picture. The students stood in an isolated area along a grass-covered shore of the lake as they recorded how they felt about this scene.

Survey results from this scene supported the hypothesis generated by results from scene 4, suggesting that photo presentations of natural environments, adequately portraying most of the variation in a natural environment, can be used to measure feeling about that environment. The color slide for scene 7 accounted for 100 percent of presentation-A variation; the photo print explained 54 percent. Part of the difference between slide and print results may be due to the total in-depth focus of the slide.

Graphic analysis of the data reinforced the similarities between results of presentations A and B (fig. 7.) Most of the time, presentation-C results also closely paralleled the on-site results.

Note that as we shifted from environments containing man-made structures—buildings junkyards, factories, and roads (scenes 1 to 6)—to natural environments—vegetation, mountains, and lakes (scene 7)—the *meaning* of the environment to the observer became more accentuated.

For example, scene 7 elicited a much more *beautiful*, *fresh*, *unifying*, *pleasant*, *peaceful*, *likeable*, and *harmonious* feeling than most of the other scenes. Therefore our experimental results supported the accepted fact that:

> Generally, natural environments are more pleasing to man than environments containing man-made structures and developments.

Scene 8 (Waterfall)

Content of the slide and print was the same, but purposely included only about 30 percent of the total variation of the actual waterfall; about 60 percent of the waterfall was not shown on the slide or the color print.

The slide and the photo each accounted for 28 percent of presentation-A response variation. Because of the close agreement between the portion of total waterfall variation included in presentations B and C, and the amount of variation in on-site feeling explained by these presentations, we propose one final hypothesis for further testing:

> A viewer's response to an actual scene probably is governed by his feeling toward the total variation in patterns and colors in that scene. Therefore the amount of on-site variation in the response patterns that can be duplicated by a photographic presentation of a scene probably is conditioned by the amount of actual total environmental variation represented in the colored photo or slide.

However, graphic analysis of the data suggested that the photographic presentations did a better job of duplicating on-site reaction than the statistical analysis seemed to indicate.

Only rarely did the average values for the two photo presentations vary by more than $\pm$ 1 from average values from the actual situation. Here again, a graphic analysis of the data indicated that all three presentations had similar responses (fig. 8).

Graphic results for this scene substantiate, even further, the conclusions suggested from

results of scene 7: that the more intriguing a natural environment is, the more positive the response—in terms of observer reaction—to that environment.

CONCLUSIONS

Overall, our research results suggested that, when color-slide or picture presentations adequately depict most of the variation of natural and man-made environments, the adjective-pair measurement of response to the picture presentations agrees favorably with similarly measured on-site responses to the same scenes.

At the same time, experimental results also suggest that if pictorial presentations include only a portion of the total variation in natural environments, man-made structures, or polluted scenes, responses to such presentations are significantly different from on-site response patterns to the same conditions.

Study results also have particular relevance to previous research in which photographs were used to measure people's reactions to their environment and to relate that reaction in mathematical terms to various elements in those same environments *(Shafer et al 1969)*.

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A color-slide projection or photograph can be used to determine reactions to an actual scene if the presentation adequately includes most of the elements in the scene. Eight kinds of scenes were subjected to three different types of presentation: (A) viewing the actual scenes, (B) viewing color slides of the scenes, and (C) viewing color photographs of the scenes. For each scene, responses to each of the three treatments were compared statistically and graphically.

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