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ABSTRACT

This report summarizes part of an investigation of audience response to theatrical settings; it proposes a direction for further research which would examine attitudinal relationships among theatre experts and laypersons, scenic designers, and directors; and it describes additional design-oriented quantitative studies. For the major investigation, two student groups--naive subjects (undergraduate, introductory theatre course students) and expert subjects (doctoral students in theatre)--viewed nine theatre productions and answered a five-part questionnaire. Results showed significant differences in the way in which the groups perceived the nine productions. In addition, the majority of the experts' responses were consistently less favorable than were responses of the naive group. Significant relationships between the semantic agreement of groups and the preferences for settings suggest that designers do communicate specifically, through settings, to the audience. Tables of findings illustrate the text. (JM)

SCENE DESIGN

AND

AUDIENCE ANALYSIS

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One of the major components of a theatrical production is often the mise en scene. Typically, considerable effort is given by a production organization to the development of the dramatic ambience for a play. Designers and directors frequently combine forces in an endeavor to elicit specific reactions, feelings and thoughts, from audiences through stage settings. Though varying degrees of influence seem to occur, few practitioners doubt the potential impact that a stage setting has on theatre audiences. Indeed, occasionally critics tell us of performances in which the audience leave the theatre "whistling the sets." But in most instances, designers strive to fulfill the primary function of a setting: to communicate to an audience the significant qualities of a play in a manner integral with other production elements. A variety of drama theorists and practitioners in the past have made numerous common assertions concerning the effects of stage settings; yet, there are no available methods by which to judge precisely the perception of visual stimuli in the theatre.

This report is intended to summarize a portion of an investigation of audience responses to theatrical settings, and to propose a direction for further research involving an examination of the attitudinal relationships among theatre experts and laypersons, scenic designers and directors and to describe additional design-oriented quantitative studies. The report will illustrate with slides various quantitative analyses of audience reactions to the visual components of theatrical production.

An Empirical Approach

As an initial empirical study of theatrical settings, the investigation

addressed itself at the outset to three basic questions. Are the differences in the responses of audience members to theatrical settings measurable? Do experts respond similarly or are their responses different from those of the average audience member? Do the audience responses change as the settings change?

Specifically, the study attempted:

1. To develop a precise and efficient instrument to measure quantitatively audience responses to theatrical settings.

2. To identify and compare responses toward various theatrical settings by naive and expert audience groups.

Tool.

To address the above concerns quantitatively, an appropriate dependent variable was developed to measure audience responses to visual stimuli in general. The Semantic Differential (S.D.) had been successfully used in other areas of empirical research in theatre[1] and in the field of experimental visual aesthetics.[2] Indeed, the application of S.D. scales to the assessment of stage settings was not far removed from the traditional use of adjectives by scene designers as an evaluative tool.[3] For example, the mood created by a setting has been described as "sparkling, warm, gloomy, violent, earthy and mystic."[4] For this investigation a list of forty S.D. scales was compiled (Appendix A).

In order to test and refine the dependent variable, to provide maximum efficiency during the major investigation, and to provide the experimenter with fundamental information about responses to visual stimuli, two preliminary experiments using line drawings and color slides of settings were conducted.

Investigation I: Line Drawings.

Considerable research in visual perception involved the study of responses to various geometric shapes and simple line drawings. As a preliminary step to the major investigation a set of seven line drawings was devised (Slide 1). Three of the drawings were designed as separate visual shapes intended to elicit varying responses. The three drawings consisted of curved lines, jagged lines and straight lines. Students from oral interpretation classes described each drawing using the sets of forty S.D. scales.

The responses were coded and factor analyzed (Varimax, orthogonal rotation). Criteria for the selection of scales was established as minimum loading of .70/ minimum purity of .40. The dimensions and scales qualified as follows: Dimension I bitter-sweet (.80/.66), violent-gentle (.75/.47), ferocious-peaceful (.75/.[illegible]), ugly-beautiful (.72/.42); Dimension II, unique-commonplace (.81/.65), unusual-usual (.73/.51); Dimension III, obvious-subtle (.75/.55), clear-hazy (.73/.49); Dimension IV, vibrant-still (.79/.58); and Dimension V, skinny-fat (.71/.51).

The responses to the three stimulus drawings (Curved, Jagged and Straight) were compared using univariate analysis of variance. The results, displayed in Table I, showed a significant difference in response to the drawings. Analysis of variance also indicated significant differences in the responses for each of the five dimensions.

Each concept was specifically characterized by the scores for each scale. The ratings outside the "meaningless" or "neutral" area of the seven-point range identified the degree of intensity of the responses. They were assessed by an examination of estimated means. The three visual concepts, viewed as significantly different, were characterized in the following manner:

TABLE I

ANALYSIS OF VARIANCE OF THE SEMANTIC DIFFERENTIAL FOR LINE DRAWINGS

Dimension I

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	979.71	489.86	33.69*
Within	135	1963.37	14.54	
Total	137	2943.08		

Dimension II

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	238.71	119.36	18.36*
Within	135	876.83	6.50	
Total	137	1115.54		

Dimension III

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	131.48	65.74	10.02*
Within	135	886.22	6.56	
Total	137	1017.70		

Dimension IV

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	164.48	82.24	33.43*
Within	135	332.13	2.46	
Total	137	496.61		

Dimension V

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	25.83	12.92	9.04*
Within	135	193.16	1.43	
Total	137	218.99		

*Significant F ratio at .05 level for 2 and 135 df - 3.92.

Curved lines (Slide 2): slightly gentle, slightly peaceful, slightly vibrant and slightly fat.

Jagged lines (Slide 3): slightly bitter, slightly violent, slightly ferocious, slightly ugly, slightly obvious, slightly clear and slightly vibrant.

Straight lines (Slide 4): quite commonplace, slightly usual, slightly obvious, quite clear and quite still.

Apparently, various design elements are capable of eliciting measurable responses from subjects. And, as the elements of visual designs are manipulated, corresponding changes in response occur. This tends to verify the contentions of scene designers, such as Adiz, Burris-Meyer, Parker and Smith.

Investigation II: Slides of Sets.

A second preliminary investigation was also run using color slide photographs of actual stage settings. Three color slides of theatrical settings were selected on the basis of the diversity of style. The settings were for productions of The Inspector General (stylized), The Glass Menagerie (realistic) and Biedermann and the Firebugs (abstract).

Students in a fundamental speech course responded with the S.D. to the slides of the settings, sequentially, as they were projected onto a screen.

The scores for the scales in the five dimensions determined in Investigation I were selected for analysis. Differences were calculated using analysis of variance. The results, found in Table II, indicated a significant difference in response to the three visual concepts, the slides of the settings, for each of the five dimensions.

TABLE II

ANALYSIS OF VARIANCE OF THE SEMANTIC DIFFERENTIAL FOR COLOR SLIDES OF SETTINGS

Dimension I

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	1404.79	702.40	39.09*
Within	129	2318.73	17.97	
Total	131	3723.52		

Dimension II

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	792.79	396.40	72.87*
Within	129	701.84	5.44	
Total	131	1494.63		

Dimension III

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	67.29	33.64	5.71*
Within	129	759.34	5.89	
Total	131	826.63		

Dimension IV

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	242.56	121.28	54.63*
Within	129	289.25	2.22	
Total	131	428.81		

Dimension V

Source	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between	2	11.77	5.89	3.35*
Within	129	227.14	1.76	
Total	131	238.91		

*Significant F-ratio at .05 level for 2 and 129 df = 3.07.

Each concept was specifically characterized by the scores for each scale. Using estimated means the three visual concepts, viewed as significantly different, were characterized in the following manner:

The Inspector General (Slide 5): slightly gentle, slightly unique, slightly unusual, slightly obvious and slightly clear.

The Glass Menagerie (Slide 6): slightly gentle, slightly peaceful, slightly commonplace, slightly usual and slightly clear.

Biedermann and the Firebugs (Slide 7) :slightly bitter, quite violent, quite ferocious, quite unique, quite unusual, slightly obvious, slightly clear and extremely vibrant.

Again, the S.D. scales and dimensions developed in the first investigation proved a capable measuring instrument. Results showed the S.D. sensitive to responses to visual stimuli more complex than line drawings. Analysis of the scales displayed measurable reactions by subject to color slides of stage settings and significant changes in reactions with the presentation of specific slides.

Results of both investigations showed that each visual stimulus produced significantly different responses among the subjects. But of greater importance, the preliminary investigations verified the set of S.D. scales as a robust, sensitive instrument for the measurement of theatre related visual concepts.

Investigation III: Stage Settings.

The major investigation was composed of a 2x9 factorial design. The levels consisted of two groups, naive and expert subjects, and nine settings from a season of theatrical productions at Bowling Green State University. Doctoral students in theatre served as the expert subjects, while undergraduate students in an introductory course in theatre served as naive subjects. The nine productions in order were:

1) Exit the King; 2) We Bombed in New Haven; 3) Two for the See Saw: 4) The Night Thoreau Spent in Jail; 5) A Flea in Her Ear; 6) Hamlet; 7) Rashomon; 8) Ride a Black Horse; and, 9) Autumn Garden.

The ten S.D. scales developed in the preliminary investigations were used as a dependent measure. In order to obtain information about subject preferences for the plays and settings, five Lickert-type summative questions were devised:

1) Did you like the play?

2) Did you like the setting?

3) Was the setting appropriate with the play?

4) Was the architecture of the setting meaningful?

5) Was the color and decor of the setting meaningful?

Differences

Following the administration of the questionnaire to the audiences, the data were coded and computed. In order to determine differences between the two groups of subjects and among the nine settings, the S.D. responses were tested with multivariate analysis of variance. The results are displayed in Table III. Significant differences were found between the perceptions of the two groups and the way in which both groups perceived the nine productions. Naive and expert audience groups differed distinctly in their reactions to each of the settings.

Analysis of variance was also applied to the data from the summative scales (preference questions). The results are displayed in Table IV. A significant difference in responses occurred between groups and among productions. For both the S.D. and the preference questions, distinct differences were found between the expert and the naive groups. Experience/training seemed to operate as variables that distinguished reactions among audience members. Additionally, differences in

TABLE III

2 X 9 MULTIVARIATE ANALYSIS OF VARIANCE OF THE SEMANTIC DIFFERENTIAL FOR SETTINGS

Entire System

Test of Roots	Λ	d.f. hyp.	d.f. error	p less than
A (expert/naive)	5.105	10.000	462.000	0.001*
B (productions)	9.310	80.000	4000.406	0.001*
AB (interaction)	0.931	80.000	4080.406	0.529

Dimension I (1, 3, 6, 9)

Test of Roots	Λ	d.f. hyp.	d.f. error	p less than
A (expert/naive)	4.582	4.000	648.000	0.001*
B (productions)	13.172	32.000	2391.301	0.001*
AB (interaction)	0.955	32.000	2391.301	0.540

Dimension II (5, 10)

Test of Roots	Λ	d.f. hyp.	d.f. error	p less than
A (expert/naive)	1.065	2.000	640.000	0.345
B (productions)	12.087	16.000	1300.000	0.001*
AB (interaction)	1.599	16.000	1300.000	0.062

Dimension III (2, 7)

Test of Roots	Λ	d.f. hyp.	d.f. error	p less than
A (expert/naive)	12.249	2.000	640.000	0.001*
B (productions)	11.459	16.000	1300.000	0.001*
AB (interaction)	0.790	16.000	1300.000	0.930

Dimension IV (8)

Source	Sum of Squares	d.f.	Mean Squares	F	p less than
A (expert/naive)	3.097	1	3.097	1.123	0.289
B (productions)	30.854	8	3.857	1.398	0.194
AB (interaction)	10.487	8	1.311	0.475	0.874

Dimension V (4)

Source	Sum of Squares	d.f.	Mean Squares	F	p less than
A (expert/naive)	11.480	1	11.480	8.694	0.003*
B (productions)	41.890	8	5.236	3.965	0.001*
AB (interaction)	15.503	8	1.938	1.468	0.166

* Significant at .05

Λ Wilks Lambda Criterion ∝ F

TABLE IV

2 X 9 ANALYSIS OF VARIANCE OF THE LICKERT-TYPE QUESTIONS FOR SETTINGS

Entire System

Test of Roots	^	d.f. hyp.	dif. error	p less than
A (expert/naive)	8.962	5.000	484.000	0.001*
B (productions)	5.812	40.000	2112.500	0.001*
AB (interaction)	0.980	40.000	2112.500	0.506

Question 1

Test of Roots	Sum of Squares	d.f.	Mean Squares	F	p less than
Within Cells	1113.776	488	2.282		
A (expert/naive)	4.048	1	4.048	1.773	0.183
B (productions)	197.454	8	24.682	10.814	0.001*
AB (interaction)	3.078	8	1.010	0.442	0.895

Question 2

Test of Roots	Sum of Squares	d.f.	Mean Squares	F	p less than
Within Cells	782.423	488	1.603		
A (expert/naive)	29.813	1	29.813	18.595	0.001*
B (productions)	106.712	8	13.339	8.320	0.001*
AB (interaction)	16.001	8	2.000	1.248	0.269

Question 3

Test of Roots	Sum of Squares	d.f.	Mean Squares	F	p less than
Within Cells	718.332	488	1.472		
A (expert/naive)	41.709	1	41.709	28.335	0.001*
B (productions)	59.789	8	7.474	5.077	0.001*
AB (interaction)	22.708	8	2.839	1.928	0.054

Question 4

Test of Roots	Sum of Squares	d.f.	Mean Squares	F	p less than
Within Cells	944.735	488	1.936		
A (expert/naive)	36.949	1	36.949	19.086	0.001*
B (productions)	50.414	8	6.302	3.255	0.001*
AB (interaction)	39.099	8	4.887	2.525	0.011*

Question 5

Test of Roots	Sum of Squares	d.f.	Mean Squares	F	p less than
Within Cells	840.226	488	1.722		
A (expert/naive)	63.382	1	63.382	36.812	0.001*
B (productions)	94.825	8	11.853	6.884	0.001*
AB (interaction)	27.642	8	3.455	2.007	0.044*

* Significant at .05

^ Wilks Lambda Ceiterion $\propto$ F

settings as visual stimuli tended to elicit different responses. The three basic questions posed at the beginning of the investigation had been answered, and the implications verified.

Accurate audience descriptions of the settings were attained from the S.D. data. The descriptions were assessed by an examination of the estimated means (Appendix B) and have been specifically characterized as follows:

Exit the King (Slide 8) was viewed as basically "bitter" and "unusual" by both subject groups.

We Bombed in New Haven (Slide 9) was perceived as "bitter," "ferocious," "violent" and "obvious" by the two groups. However, the experts also perceived the setting as "commonplace" and "usual," while the laypersons perceived it as "unique" and "unusual."

Two for the See Saw (Slide 10) was perceived as "clear" and "obvious" by the expert and naive groups.

The Night Thoreau Spent in Jail (Slide 11) was viewed as "unique," "unusual," and "clear" by the experts and laypersons. The experts perceived the setting as "obvious," and the naive subjects perceived it as "subtle."

A Flea in Her Ear (Slide 12) was judged by both groups as "beautiful," "sweet," "peaceful," "clear" and "obvious." Yet, the experts perceived setting as "violent" and "unusual," while the laypersons perceived it as "gentle" and "usual." The choice of these polar opposites suggests that perhaps the experts were aware of an underlying element that was missed by the naive subjects.

Hamlet (Slide 13) was perceived basically as "ugly" and "usual" by the experts and as "beautiful" and "unusual" by the laymen. This appears to have been an instance of a more rigid critical analysis by one group than another. The intensity of the responses of both groups was "slight."

Rashomon (Slide 14) was considered by the two groups as "sweet," "unique," and "unusual." However, the experts also perceived the setting as "hazy" and "obvious," and the naive group perceived the same setting as "clear" and "obvious." Similar to the responses to the setting for The Night Thoreau Spent in Jail, the experts seemed to have been making a negative criticism. The naive subjects either disagreed or were more tolerant and favorable in their responses.

Ride a Black Horse (Slide 15) was perceived as basically "bitter" and "violent" by both groups.

Autumn Garden (Slide 16) was perceived by the expert and naive groups as "beautiful," "sweet," "peaceful," "unique" and "clear." The setting for Autumn Garden received the most intense responses.

The scores of the summative questions also provided an estimation of audience preferences for the production, from the most to the least favorable. Ranks for the plays, Question 1, and the settings, Question 2, were determined from the estimated means and may be found in the table of Appendix C. For example, in Question 2, the experts responded to the setting for Production 9, Autumn Garden, the most favorably (1.00) and to the settings for Production 6, Hamlet, and Production 8, Ride a Black Horse, the least favorably (4.75). Also indicated by the means in Appendix C are the rank orders of group reactions to the settings for Questions 3, 4 and 5.

Differences and Similarities

Note in the list of group preferences for settings, Question 2, in Appendix C, the similarity between groups; yet, statistically the preferences of the two groups were calculated as significantly different. The initial thrust of the investigation had assumed that differences in responses between subject groups

would appear; however, further examination of the data revealed an unexpected trend. Although the analysis of variance tests indicated significant differences between groups and among productions, the rank order of audience responses implied a similarity in the reactions of both groups to some of the settings. The response patterns are best illustrated by the plotted means of group S.D. reactions to the individual settings. To examine the relationships, Spearman's rank correlation of coefficient tests were performed. Of the nine productions, four were significantly and positively correlated: Production 2, .76 (Slide 17); Production 3, .62 (Slide 18) Production 5, .68 (Slide 19) and, Production 9, .71 (Slide 20). Apparently, although differences did occur between expert and naive subjects, in several instances the overall patterns tended to bare a strong degree of similarity.

Even more obvious patterns of similarity emerged within the S.D. dimensions. Rank correlations were used to test between-group responses for each of the semantic dimensions. The significant results were .98 for Dimensions I (Slide 21) and .79 for Dimension III (Slide 22). Agreement semantically seemed to exist between expert and naive audience members.

The general variation of responses between the expert and naive subjects apparently was partially caused by the degree of intensity rather than polar direction of the responses, as suggested by the significant correlations and the significant differences between groups for the productions and within the S.D. dimensions. It should also be noted that, in a few instances, the experts tended to judge more negatively than did the naive group.

The same overall findings were apparent in the responses to the summative questions. Although significant differences occurred, rank correlations of

between-group scores showed a significant and positive relationship between the responses of the expert and naive groups for Question 1, .84 (Slide 23), Question 2, .86 (Slide 24), Question 4, .82 (Slide 25) and Question 5, .85 (Slide 26). Additionally, the majority of the responses of the experts were consistently less favorable than those of the laymen. The two groups agreed in their preferences, but the experts tended to be more "critical with their praise."

Semantic Agreement

Investigators in experimental aesthetics also using the S.D. have attempted to explain similar findings. In The Measurement of Meaning, Osgood concluded that training provides the framework for a system in which specific evaluations can be made.[5] In an earlier study of color in stage lighting using as the dependent measure a list of adjectives much like the S.D., Ross provided the following explanation for similar results:

> . . . the difference in the specificity of response on the adjective scales would imply that the trained group has learned to describe its reactions with greater precision than has the untrained group...the trained subjects are not experiencing different reactions but are more apt in describing their experience.

The notion implies that the naive subjects were semantically vague about their aesthetic responses; that may well be the case. Consistently among the S.D. scores of settings, the experts tended toward more extreme responses (away from neutrality) than the naive group while the reverse occurred with the preference questions. Perhaps, the theatre experts were more aware of the connotative applicability of the S.D. scales to the settings. Or, considered in a slightly different light, possibly the responses of the naive subjects were quite "correct" but not yet "refined." Regardless of the approach, the significant correlations between significantly different group scores clearly indicated audience members without training and experience in theatre shared the ability to evaluate stage settings and production.

in a pattern similar with those holding advanced degrees in the field.

Semantic agreement, then, may be identified by a significant difference between the S.D. responses of two groups and a significant correlation of similarity in the overall pattern of the responses of the two groups.

Semantic Agreement and Preference

Given the similarity in responses of expert and naive subjects, its relationship to preferences of settings was examined. To determine the association between the degree of semantic agreement and preferences for the settings, rank correlations were computed for both groups separately. The results indicated a significant correlation for the expert group, .81, and the naive group, .60. Apparently, the settings that elicited similar S.D. responses between groups were also preferred more by both groups. The positive direction of the correlations suggests that the greater the pattern of similarity, the more preferred the settings.

Potential Research

This last finding provides the foundation for further research. For the settings that received a high degree of audience preference, there also existed a high degree of semantic agreement. Conversely, the settings that produced little semantic agreement also tended to receive low preference ratings. This phenomenon may be related to the designer's ability to unify scenic elements into a communicative tool; i.e., if a setting is well defined as a "message," then it is in turn well appreciated. Such an association between semantic agreement and preference suggests that a theatrical setting is most successful when the designer communicates intentionally and accurately to the audience. Further exploration into the relationship between the level of semantic agreement by designer, audience and director and their preference for settings seems plausible.

Since the theatrical setting functions as the means by which the designer communicates, a viable relationship for investigation would appear to be that of designer and audience. The degree of semantic agreeement between the two subject categories may offer some indication of how effectively a designer communicates.

Another variable for consideration could be the relationship between designer and director. Frequently, the designer shares with the director the responsibility of communicating to the audience the setting. Indeed, during the past several years the process of scene design has been considered a collaborative effort between the two. The "success" of the collaboration between designer and director should be reflected in the degree of semantic agreement in their perception of the setting. Also, a positive relationship between the degree of semantic agreement and the degree of audience preference for the setting should emerge, if, as suggested, the success of the production depends upon the success of the collaboration. However, the association between the director's and the designer's perception of the setting has never been quantitatively examined.

The present study indicated that audience members with differing backgrounds in theatre reacted to stage settings in a similar manner but in varying degrees of intensity. The investigation showed that different settings also tended to produce measurably similar attitudes and preferences also in varying degrees of intensity among audiences.

Significant relationships appeared between the semantic agreement of groups and preference choices for settings, evidence which suggests that designers do communicate specifically through their settings to the audience. However, additional research is needed in order to analyze in greater detail the relationship between attitudes and

preferences toward settings among experts, nonexperts, designers and directors. Clarity of intention by the desinger may well be an important criterion for excellence. Certainly, if agreement among groups occurs, the setting fulfills its major function -- to communicate. Marcus Fuller pointed out, "To infer that a setting is beautiful, exciting, or creative is without foundation unless the setting can serve a sincere purpose and communicate a basic truth for the enlightenment of the audience.[7]

Chroma Key: Methodology for Scene Design Analysis

The scene designer often gives considerable attention to the use of the design elements (line, form, size and texture) for specific effects. Indeed, a long-accepted postulate has suggested that warm colors are most appropriate for tragedy. Some empirical evidence supports the notion;[8] however, study has been necessarily restricted to evaluations of color independent of settings, or color photographs of settings independent of dramatic production. The need to alter repeatedly the design elements in the same setting has so far made prohibitive the quantitative analysis of their effects on theatre audiences. One can easily imagine the difficulty apparent in painting a setting, let us say, six different times with a color for each experimental treatment. Or, with regard to other elements of design, the construction of four complete settings might be required merely in order to test the differences in reactions possibly elicited by four varying degrees of texture. In an attempt to solve such a problem, special attention should be turned to the methodology developed by Paul Swanstrom in a Master's thesis in progress, "The Effects of Line and Color in a Dramatic Context," at the University of Illinois, Chicago Circle.

Swanstrom wished to explore the effect of line and color on the audiences' aesthetic reaction to a dramatic scene in performance. Based on earlier research, both line and color were identified as the most influential of the design elements. Research further indicated that subjects displayed specific reactions to "curves" and "angles."[9] To obtain effective examples of the stimulus, Swanstrom asked subjects to select from three groups of line drawings the most jagged, the most curved, and, in addition, the straightest. Consistently, a large majority of subjects selected one drawing for each concept.

For the actual experiment, replicates of the selections were drafted onto large color poster cards. Since the extremes of warm and cool hues have been commonly considered red and blue, respectively, they were used as the background

colors. As a result six possible visual stimuli were available as experimental treatments: straight, curved or jagged lines with a red or blue wash.

Two types of plays were chosen as the dramatic variable: a serious scene, from O'Neill's Long Day's Journey Into Night, and a humorous scene, from Simon's The Star-Spangled Girl. Both scenes were contemporary, required two male actors, were similar in length and called for interior environments. The performances of the two scenes were videotaped before a neutral background (Slides 27 and 28).

Through the technique called Chroma Key, a method enabling one picture to be transposed into another, subsequent videotapes were made from the two master tapes, each containing an appropriate experimental background. The process provided Swanstrom with means to present to subject groups videotapes of identical performances with different interior settings. Using a Semantic Differential, subjects responded to each of the twelve scenes. Some of the treatments consisted of (Slide 29) Humorous-Straight-Red, (Slide 30) Humorous-Curved-Blue, (Slide 31) Serious-Straight-Blue, (Slide 32) Serious-Jagged-Blue and (Slide 33) Humorous-Jagged-Red.

Upon completion of the administrative aspect of the project, group data will be compared using analysis of variance. Although results of the project are not yet available, previous research gives some indication that the audience ratings of the scenes may differ predictably, according to the visual environment; i.e., that the line and color of a setting will determine to a degree the reactions of audiences toward a serious or humorous play.

Videotape and theatre are most certainly different media, not only with regard to actor performance but also dramatic scenery. However, Swanstrom gained significant advantages experimentally with the use of Chroma Key. He was able to maintain maximum control over the indpendent variable, thus checking possible changes in actor performance, including those which could be caused by changes in in the scenic environment. Also, videotape initially allowed for the selection of the performance of the highest quality. Chroma Key provided the opportunity to

isolate specific design elements, line and color, and to change entire scenic backgrounds with comparative ease and efficiency. As suggested earlier, application of similar treatments in the theatre would confront nearly insurmountable difficulties. The potential of videotape and Chroma Key also suggests further empirical studies in design: analysis of other elements of design and principles of composition; the inclusion of more complex visual stimuli than simple elements; examination of scenic style and appropriateness with a play; the determination of the degree of scenic detail necessary in order to elicit desired effects. Certainly, just the control and efficiency of Chroma Key offer the researcher in scene design ample chance for a wide variety of analytical experimentation.

An Investigation of Mode X Style

In an M.A. thesis in progress, University of Illinois, Chicago Circle, Thomas Bowman attempted to identify differences in audience reactions to three modes of performance (Live Theatre, Television Studio and Videotape Theatre) and two styles of production (Realistic and Abstract). Using Semantic Differential developed in a previous study by Tannenbaum,[10] subjects responded to performances of A Streetcar Named Desire by Tennessee Williams and El Hajj Malik by J. R. Davidson.

Bowman hypothesized that audiences would react differently to the three modes and the two styles. According to the results of multivariate analysis of variance, the audiences differed significantly (P less than .029) in their preferences, Evaluative Factor, toward the mode of production but did not differ significantly in their preferences of style. In terms of Activity, a second S.D. factor, the audiences perceived both mode and style as significantly different (P less than .001 and .016, respectively). In most instances, Bowman's hypotheses were verified.

The results also indicated some unexpected findings directly related to design. According to the previous literature, owing to the appropriate suitability of each style with each medium, one might expect the Realistic style, A Streetcar Named Desire, to be ranked most positively (lowest $\bar{X}$ score) in the Television mode, and the Abstract style, El Hajj Malik, to be ranked most positively in the Live Theatre mode. To extend the notion, it seems plausible that the Realistic/Television version would rank more positively than the Abstract/Theatre version. However, this was only partially the case.

The Abstract style did rank as most positive in the Theatre mode ($\bar{X}$=2.66; Slide 34). In fact, El Hajj Malik consistently received the most positive scores of the two styles in which significant differences occurred; the Abstract style was perceived as the most active in all three production modes ($\bar{X}$=2.54): (hold Slide 34) Theatre, (Slide 35) Videotape Theatre and (Slides 36, 37) Television. Further, the Live Theatre mode was both the most preferred ($\bar{X}$=2.5) and the most active ($\bar{X}$=2.55) of the three, while the Television Studio mode (Slides 38 and 39) was both the least preferred ($\bar{X}$-3.06) and the least active ($\bar{X}$-3.19). Even more surprising, the Realistic/Television (Slide 40) was the least preferred ($\bar{X}$=3.13) of all six treatments; and the Abstract/Theatre version (Slide 41) was the most preferred (X=2.39). Similarly, the Realistic/Television version ($\bar{X}$=3.45) was perceived as the least active, and the Abstract/Theatre version (X=2.12) was perceived as the most active.

Briefly, then, although Live Theatre was preferred more as a mode of production, neither style was preferred over the other. But both Live Theatre and and Abstract Style were considered the most active. Television Studio was least preferred. Realistic style and Television Studio were perceived as the least active. The Videotape Theatre was rated by the subjects between Theatre and Television in terms of preference and activity.

The implications of Bowman's findings reflect the dynamic quality of live performance and stylized presentation. The setting for El Hajj Malik (Slides 42 and 43) employed numerous ramps and platforms and incorporated the audience seating into the stage environment.. The production contained songs, dances and frequent interactions between the cast and the audience. The setting for Streetcar Named Desire (Slide 44), on the other hand, was performed on a stage with a single level, depicting an apartment bedroom and kitchen in a representational manner, while the production strived to maintain the illusory "fourth wall" between cast and audience. In this instance, statistical evidence gives rise to viable generalizations which may be applied to evaluations of the influence that design can have on audiences.

A Multi-Dimensional Comparison of Settings

The last investigation of design-oriented interest reported here involves a Master's thesis by Kim T. Sharp, "An Empirical Study of Audience Perception of the Stage Setting of The Hostage."[11] In order to examine audience responses to a setting that used a space-stage arrangement, Sharp developed a ninety-two item questionnaire consisting of summative questions on a seven-point interval scale (Appendix D). The questions were divided into two parts. Each question addressed some aspect of the theatrical setting; Part I provided an agree/disagree option, and Part II provided a bipolar adjective option.

Six factors in Part I and four factors in Part II resulted from factor analysis of the data. They were: Part I -- Factor I, Questions 7, 15, 17, 19, 25, and 29. Factor II, Questions 1 and 39; Factor III, Questions 33 and 41; Factor IV, Questions 13, 26, 32 and 44; Factor V, Questions 2 and 36; Factor VI, Questions 11, 21 and 40; and, Part II -- Factor I, Questions 61, 76, 81 and 83; Factor II, Questions 56, 57, 73 and 74; Factor III, Questions 63, 70 and 80; Factor IV, Questions 62 and 66.[12] According to the makeup of the factors, the

the audiences apparently made judgments of the setting on the basis of comprehension of set divisions, movement, satisfaction with seating, music, adaptability of the setting to other productions, lighting, acting levels, physical characteristics, quality, appropriateness with the play and atmosphere.[13]

Sharp also analyzed the reactions of different subject groups. (Slide 45) Since the design angled sections of audience seating into the setting, he divided them statistically into Main Audience and Side Audience. He also tested Actors and Participants (production staff) as separate groups. The data were computed with multivariate analysis of variance. No significant differences occurred among the subject groups for the entire system of dependent variables or for the ten factors. Audience groups, actors and production staff did not view the setting differently.

For the purpose of comparison, however, Sharp in addition performed a similar test using a setting for a production of The Man of Mode. Subject group divisions remained unchanged. Multivariate analysis of variance showed significant differences for the entire system of Part I (P less than .017) -- Factor I (.001) and Factor VI (.006).[14] Further analysis revealed that consistent ratings in the "neutral" range by the Participant group accounted for the differences. Interestingly, both Factor I and Factor VI measured responses about acting areas and levels of the settings. While The Hostage employed a number of isolated acting areas at varying heights, The Man of Mode (Slide 46) used a single acting area with an upstage platform for entrances. Possibly, the Participants (the only subject group with experience and training in design) recognized the inappropriateness of the particular questions, thus causing significant differences to emerge.

Of special concern to this report; statistical comparisons between productions were calculated using multivariate analysis of variance. In Part I significant differences occurred for the entire system (P less than .001) -- Factor I (.001),

Factor III (.001), Factor IV (.001), Factor V (.03), and Factor VI (.001). In Part II, significant differences also occurred between productions for the entire system (P less than .001) -- Factors I - IV (.001).[15] The subject groups perceived the setting for The Hostage differently than for The Man of Mode.

Further analysis of the data suggested that The Hostage received generally more intense responses than The Man of Mode. In comparison The Hostage setting was perceived as (Slide 47) more angular and divisional; it worked better with the play and facilitated to a greater degree the movement of the actors. The setting was further characterized by the subjects as old, rough, fast, disreputable, less stable but more meaningful and appropriate than the other setting. On the other hand, the setting for The Man of Mode was rated as (Slide 48) less angular and divisional. It did not work as well with the playnor aid in actor movement to the same degree as The Hostage. However, the subjects rated The Man of Mode as more complete, stable and ordered. They also characterized it as a colorful and reputable environment.

As indicated earlier the difference in reactions to the two settings was measurably significant. Sharp's study identified specifically the manner in which the differences occurred. Although both productions received ratings in the extreme and moderate areas of the positive range, The Hostage was viewed overall more favorably than The Man of Mode. It is of interest, however, to note that the production with a more dynamic spatial arrangement, The Hostage (reverse to Slide 47), also elicited stronger reactions on the dimensions of movement, acting areas and levels than did the production with a static stage arrangement (Slide 48), which was considered more complete, ordered and stable. Apparently, according to Sharp's findings, audiences, as well as theatre practitioners, were quite sensitive to the multi-dimensional effects of stage settings.

Conclusion

This report has described recent quantitative investigations of audience reactions to design stimuli from which some generalizations can be made, especially about the degree of sensitivity on the part of the audience toward stage settings. However, scene design and audience analysis is so far merely an area of potential research. The presentation of the slides has perhaps suggested that in many instances statistical results often verify that which we already sense to be true. Presently, a wealth of information can be borrowed from the findings of psychology and visual aesthetics, but considerable distance exists between the control of a laboratory and the complex environment of a theatrical playhouse.

> It will be many centuries, if ever, before aesthetic experience may be objectively described and predicted. But it has seemed of interest both as a problem of aesthetics and of psychology to discover how audiences react, . . . to attempt to discover the genesis of these reactions and their stability, and to arrive at some evaluation of the validity of the artistic intuitions which at present guide the scenic designer.[16]

Footnotes

[1] For a representation of research areas see Stirling Huntley, "Some Emotional Reactions of a Theatre Audience with Regard to Colored Light," Diss. Stanford 1956; David Lewis Thayer, "A Study of the Influence of Conventional Film Lighting on Audience Response," Diss. Univ. of Iowa, 1961; Percy H. Tannenbaum, "Music Background in the Judgment of Stage and Television Drama," Audio-Visual Communication Review, IV, No. 2 (Spring, 1956), 92-101; David W. Addington, "The Relationship of Certain Vocal Characteristics with Perceived Speaker Characteristics," Diss. Univ. of Iowa, 1963; R. Wayne Smith, "A Study of Actor-Character Relationships in Theatre Production," Diss. Bowling Green State Univ., 1970; and Brian K. Hansen, "The Semantic Differential as a Measure of Meaning in the Theatre," Diss. Univ. of Minnesota, 1966.

[2] Kenneth Beittel, "Factor Analysis of Three Dimension in the Art Judgment Complex: Criteria, Art Objects, and Judges," The Journal of Experimental Education, 32, No. 2 (Winter, 1963), 167-73; D. E. Berlyne and Sylvia Peckham, "The Semantic Differential and Other Measures of Reaction to Visual Complexity," Canadian Journal of Psychology, 20, No. 2 (June, 1966), 125-35; and Russell Eisenman and Joan Rappaport, "Complexity Preference and Semantic Differential Ratings of Complexity-Simplicity and Symmetry-Asymmetry," Psychonomic Science, 7, No. 4 (1967), 147-48.

[3] Examples include Vern Adix, Theatre Scenecraft (Anchorage, Kentucky: Children's Theatre Press, 1956); Hubert C. Hefner, Samuel Seldon and Hutton D. Sellman, Modern Theatre Practice (New York: Appleton-Century-Crofts, 1959); Harold Burris-Meyer, Scenery for the Theatre (Boston: Little, Brown and Co., 1936); and Oren W. Parker and Harvey K. Smith, Scene Design and Stage Lighting (New York: Holt, Rinehart and Winston, 1963).

[4] Parker and Smith, p. 20.

[5] Charles E. Osgood, George J. Succi and Percy H. Tannenbaum, The Measurement of Meaning (Urbana, Illinois: Univ. of Illinois Press, 1957).

[6] Robert T. Ross, "Studies in the Psychology of the Theatre: I. Preliminary Studies of Audience Reactions to Color," The Psychological Record, II, No. 5 (April, 1938), 185.

[7] Marcus Fuller, "What Part of Theatre Set Design Is Communicative?" Western Speech, 15, No. 2 (March, 1951) 42.

[8] Ross, 127-85.

[9] Helge Lundholm, "The Affective Tone of Lines: Experimental Researches," The Psychological Review, 28, No. 1 (January, 1921), 43-60.

Footnotes (continued)

[10] Percy H. Tannenbaum, "Music Background in the Judgment of Stage and Television Drama," Audio-Visual Communica-Review, IV, No. 2 (Spring, 1956), 94-95.

[11] Kim T. Sharp, "An Empirical Study of Audience Perception of the Stage Setting of The Hostage," Thesis, Univ. of Illinois, Chicago Circle 1975.

[12] Sharp, pp. 46-48.

[13] Sharp, p. 52.

[14] Sharp, p. 84.

[15] Sharp, pp. 96-97.

[16] Ross, 129-30.

SHARP'S QUESTIONNAIRE FOR THE HOSTAGE

1. Your seat at the performance seemed to be as good as any other seat in the theatre.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

2. The Hostage is the only play that could be performed on that particular set.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

3. By sitting where you did, you felt little sense of involvement with the play and its action.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

4. The stage level (the lowest acting level) seemed to be the main point of focus on the set.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

5. Your attention seemed to be immediately drawn to any actor or actress entering from a higher level.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

6. The set and its structure was quite ordinary or commonplace to you.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

7. You had difficulty understanding the divisions within the set.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

8. When the actors came directly toward you, the movement had a strong effect on you.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

9. The set provided a close relationship physically between the audience members and the performers.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

10. You felt better when the action of the play was further away from you rather than closer.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

11. The relationship among the different levels made logical sense to you.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

12. Movement patterns from one platform or area to another seemed to be performed by the actors with difficulty.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

13. A sense of excitement was created due to all the angles in the set.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

14. Your seat position seemed to be one of the worst in the theatre when trying to view the play.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

15. The actors could move quite easily through the set.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

16. The set did not help you understand anything about the play.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

17. Despite the varying angles of the set, the areas within the Brothel were understandable.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

18. The stage floor (lowest acting level) was a weak acting area.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

19. The performers made good use of all the different parts of the set.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

20. You were always aware of the rest of the theatre building throughout the play.

Agree :_____:_____:_____:_____:_____:_____:_____: Disagree

21. The more the set was used, the more it became a part of the play.
Agree :____:____:____:____:____:____:____: Disagree
22. You never believed the set was actually real.
Agree :____:____:____:____:____:____:____: Disagree
23. It was hard to distinguish which set elements gave the set its environment.
Agree :____:____:____:____:____:____:____: Disagree
24. The action of the 'raid' in Act III seemed to take place within the set.
Agree :____:____:____:____:____:____:____: Disagree
25. The set and the play worked well together.
Agree :____:____:____:____:____:____:____: Disagree
26. The set helped you to understand the play.
Agree :____:____:____:____:____:____:____: Disagree
27. The set provided a strong sense of atmosphere for the play.
Agree :____:____:____:____:____:____:____: Disagree
28. The set gave an environment in which the characters might indeed reside.
Agree :____:____:____:____:____:____:____: Disagree
29. If you sat in the side sections (2 or 3) you were constantly aware of those audience members sitting directly across from you.
Agree :____:____:____:____:____:____:____: Disagree
30. The set seemed to get in the actor's and actress' way extensively.
Agree :____:____:____:____:____:____:____: Disagree
31. Because you were on the same level as the stage, the actors constantly tended to block your view of the play's action.
Agree :____:____:____:____:____:____:____: Disagree
32. The set and the stage lights worked well together to give an atmosphere to the play.
Agree :____:____:____:____:____:____:____: Disagree
33. The music did much to indicate the tone of the play.
Agree :____:____:____:____:____:____:____: Disagree
34. The set had a non-American air about it.
Agree :____:____:____:____:____:____:____: Disagree
35. You had a sense of entering another environment as you went to your seat.
Agree :____:____:____:____:____:____:____: Disagree
36. Many other plays with interior settings could be performed on the set.
Agree :____:____:____:____:____:____:____: Disagree
37. The seating arrangement promoted a sense of intimacy with the action of the play.
Agree :____:____:____:____:____:____:____: Disagree
38. The songs helped to give the play a definite location.
Agree :____:____:____:____:____:____:____: Disagree
39. You wouldhave liked to have changed your seat to get a better view of the play.
Agree :____:____:____:____:____:____:____: Disagree
40. The lighting of the stage lessened the atmosphere of the set.
Agree :____:____:____:____:____:____:____: Disagree
41. Even though there was no actual wall behind the concrete bank of seats (section 1), you still got a sense that that area was also a part of the set.
Agree :____:____:____:____:____:____:____: Disagree

42. You felt that you were as much a part of the raid as the actors and actresses on stage.
Agree :____:____:____:____:____:____:____: Disagree
43. The two separate doorways (the double doors for the entrance and the cut away doorway to the kitechen area) strongly enclosed the central acting area.
Agree :____:____:____:____:____:____:____: Disagree
44. When the play ended, you had no idea why the set was like it was.
Agree :____:____:____:____:____:____:____: Disagree
45. The color of the set indicated that the play was a comedy.
Agree :____:____:____:____:____:____:____: Disagree
46. When the lighting localized on a particular area, you forgot about the rest of the set.
Agree :____:____:____:____:____:____:____: Disagree
47. You felt you had to move your head back and forth too much to follow the action of the play.
Agree :____:____:____:____:____:____:____: Disagree

48. The set gave a feeling of being
Heavy :____:____:____:____:____:____:____: Light
49. If the set was considered to have character, it would be described as
Tough :____:____:____:____:____:____:____: Fragile
50. Movement within the set was
Constrained :____:____:____:____:____:____:____: Free
51. The set seemed to make this play
Serious :____:____:____:____:____:____:____: Humorous
52. The set seemed to indicate an atmosphere that was
Energetic :____:____:____:____:____:____:____: Inert
53. The set would tend to indicate that the situation in the play was
Lasting :___:___:___:___:___:___:___: Transcient
54. The shapes in the set seemed
Angular :____:____:____:____:____:____:____: Rounded
55. The set tended to indicate that the play was
Unusual :____:____:____:____:____:____:____: Usual
56. When looking at the set, you had a feeling of
Refreshed :____:____:____:____:____:____:____: Weary
57. As you remember it, the set was
Colorful :___:___:___:___:___:___:___: Colorless
58. The outline of the set was
Interesting :___:___:___:___:___:___:___: Boring
59. The areas provided in the set seemed
Organized :___:___:___:___:___:___:___: Unorganized
60. The set gave a feeling of being
Open :____:____:____:____:____:____:____: Closed
61. The set and its elements indicated a feeling of
Completeness :___:___:___:___:___:___:___: Incompleteness
62. Towards the characters in the play, you felt
Superior :___:___:___:___:___:___:___: Inferior
63. In relation to the play, the set was
Meaningful :___:___:___:___:___:___:___: Meaningless
64. The main acting area of the set was
Concise :____:____:____:____:____:____:____: Diffuse

65. The line and form of the set was
Strong :____:____:____:____:____:____:____: Weak
66. The set gave an atmosphere of being
Reputable :____:____:____:____:____:____:____: Disreputable
67. The set had a sense of
Grace :____:____:____:____:____:___:____: Awkwardness
68. The set seemed
Alive :____:____:____:____:____:___:____: Dead
69. The atmosphere created by the set was
Exciting :____:____:____:____:____:____:____: Calm
70. The set helped the action of the play move
Fast :____:____:____:____:____:____:____: Slow
71. Knowing where to look on the set for the main action was
Difficult :____:____:____:____:____:____:____: Easy
72. Because the set was the residence of the characters, you felt they were
Careful :____:____:____:____:____:____:____: Careless
73. The appearance of the set was
New :____:____:____:____:____:____:____: Old
74. The texture of the set was
Rough :____:____:____:____:____:____:____: Smooth
75. The set seemed to be
Sensitive :___:___:___:___:___:___:___: Insensitive
76. The platforms and levels of the set were
Regular :___:___:___:___:___:___:___: Irregular
77. The different areas of the set were
Unrelated :___:___:___:___:___:___:___: Related
78. In general, the set was
Ordinary :___:___:___:___:___:___:___: Unordinary
79. The set was
Loud :____:____:____:____:____:____:____: Soft
80. In relationship to the production, the set was
Appropriate :__:__:__:__:__:__:__: Inappropriate
81. The set with all its levels and angles seemed
Ordered :____:____:____:____:____:____:____: Chaotic
82. The structure of the set was
Ornate :____:____:____:____:____:____:____: Plain
83. The set seemed
Stable :____:____:____:____:____:____:____: Unstable
84. The set was
Static :____:____:____:____:____:____:____: Dynamic
85. The set gave you a feeling of
Excitement :___:___:___:___:___:___:___: Calm
86. The set seemed to be aimed at representing someplace
Specific :____:____:____:____:____:____:____: General
87. The set appeared
Simple :____:____:____:____:____:____:____: Complex
88. As you sat in the audience, your feeling for the play's environment was
Imtimate :____:____:____:____:____:____:____: Remote
89. The nature of the set was
Masculine :___:___:___:___:___:___:___: Feminine
90. The setting was
Formal :____:____:____:____:____:____:____: Informal

91. The atmosphere of the set was
Full :_____:_____:_____:_____:_____:_____:_____: Empty
92. The set and the contributing elements seemed
Intentional :___:___:___:___:___:___:___: Unintentional