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ABSTRACT

The purpose of this study was to determine if the reversal (i.e., mirror image) of a two-dimensional visual image would affect viewers' perceptions of selected aesthetic dimensions, using semantic differential scales as criterion measures of visual meaning. One hundred-twenty-five students who were enrolled in a basic introduction to mass communication class at the University of Utah were randomly assigned to two experimental treatments. While caution must be taken in generalizing the results of this preliminary study to other visuals and other populations, there appears to be little doubt as to the potential value of semantic differential scales for future visual communication research. This study suggests that a more ambiguous visual presentation may facilitate the measurement of responses to aesthetic elements. It may be necessary to eliminate color, at least initially, since there is little known about the possible interaction of various colors with other visual dimensions. (RB)

THE SYNTAX OF VISUAL MESSAGES: AN EMPIRICAL INVESTIGATION OF THE ASYMMETRY OF THE FRAME THEORY

by
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Aesthetic responses to visual stimuli are difficult phenomena to define and measure. Most of us look at a painting or a photograph and know whether we like it or not. Some of us are even able to identify specific elements of that visual field which contribute to our aesthetic appreciation. Successful painters, photographers, film-makers, and television directors use certain aesthetic principles to compose the visual images that serve to elicit an aesthetic response. The intuitive choices one makes in organizing and presenting a visual message, whether conscious or unconscious, affect the perceptual process by which an observer responds to the visual stimuli.

Several scholars have recognized the principle of asymmetry as an important factor in the composition of a visual message. Expanding this principle to an informal theory, Zettl (1973) makes a distinction between "asymmetry of the frame" and "asymmetry of the screen." The distinction is derived from the recognition of motion as an integral element of film and television. Hence, asymmetry of the <u>frame</u> generally refers to a static visual field, whereas asymmetry of the <u>screen</u> is generally used in reference to the dynamic and ever-changing images found in television and motion pictures. Zettl (1973, p. 129) offers the following definition of asymmetry:

> Asymmetry of the screen means that we do not divide our attention equally between the left and the right side of the screen area. We tend to focus more readily and carefully on objects on the right than on the left side of the screen.

This notion is supported by earlier works of Heinrich Wolfflin (1944) who claimed that the right side of a painting appears "heavier" than the left.

Arnheim (1974, p. 35) attributes differences in perception between the right and left sides of a visual field to a cultural bias of reading from left to right:

> Since a picture is "read" from left to right, pictorial movement toward the right is perceived as being easier, requiring less effort. If, on the contrary, we see a rider traverse the picture from right to left, he seems to be overcoming more resistance, to be investing more effort, and therefore to be going more slowly.

Arriving at a competing explanation, Dondis (1973) uses the argument that learning to read from left to right makes the eye favor the left side of a visual field. She contends that elements placed in the right side of a visual field are placed in areas of stress and take on more weight. She defines "weight" as the ability of an object placed within the frame to attract the eye of the observer. Suggesting an alternative hypothesis, Millerson (1966, p. 293) ascribes a preference for the right side of the screen to a right-handed bias:

> Our right-handed bias seems to influence too the ease with which one can concentrate attention within the frame. Broadly speaking, the eye tends to wander over to whatever is on the right of the picture. Even with a highly-dominant left-hand subject, this still seems liable to happen. But the situation is not reversible; for [if] subjects are placed on picture-right, anything left of them may go almost unregarded.

Obviously, there is no unanimity as to whether the left or right side of a visual field connotes greater importance or affects viewers' perceptions of elements placed within either field.

The most consistent body of knowledge within this general area can be derived from neurological research. It is here that one can find convincing evidence that the processing of visual and verbal information occurs in different hemispheres of the brain. Ornstein (1972, pp. 51-52) chronicles more than a century of neurological research to support the hypothesis:

> The left hemisphere (connected to the right side of the body) is predominantly involved with analytic, logical thinking, especially in verbal and mathematical functions....[whereas] the right

hemisphere (connected to the left side of the body) seems specialized for holistic mentation. Its language ability is quite limited. This [right] hemisphere is primarily responsible for our orientation in space, artistic endeavor, crafts, body image, recognition of faces.

Gazzaniga (1967) and Kimura (1973) have demonstrated that stimuli which are presented in the left visual field go to the right hemisphere and that presented in the right visual field go to the left hemisphere (see Figure 1). Since the two hemispheres of the brain are connected by nerve tissue (the corpus callosum), integration of the functions of the two cerebral hemispheres is possible. Thus, visual information which is sent to the left side of the brain is presumably transferred to the right hemisphere to be processed. Gazzaniga (1967) reports that patients who experienced surgical separation of the two cerebral hemispheres performed verbal and visual tasks using two independent spheres of consciousness:

> In one particularly interesting test the word "heart" was flashed across the center of the visual field, with the "he" portion to the left of the center and "art" to the right. Asked to tell what the word was, the patients would say they had seen "art" -- the portion projected to the left brain hemisphere (which is responsible for speech). Curiously when, after "heart" had been flashed in the same way, the patients were asked to point with the left hand to one of two cards -- "art" or "he" -- to identify the word they had seen, they invaribaly pointed to "he."

Using normal subjects, Kimura (1973) found that words and letters were reported more accurately from the right visual field than from the left, and that spatial tasks involving the location of visual elements on two or three dimensional planes were performed more accurately when presented in the left visual field.

In an empirical study of the asymmetry of the screen theory, Metallinos

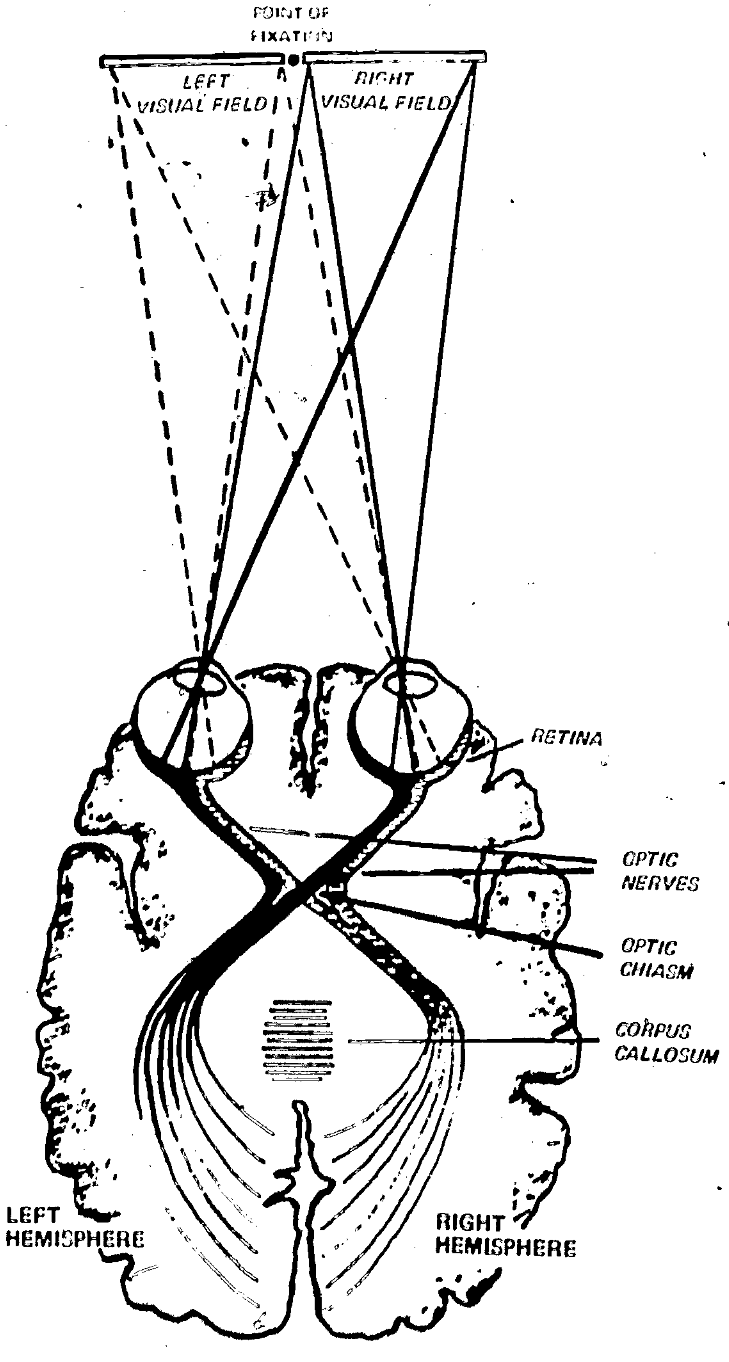

FIGURE 1

Processing of Visual Images in the Brain

About half of the fibers of the optic nerve from each eye cross to the opposite hemisphere of the brain. The uncrossed fibers from the outer part of the retina join with the contralateral, or crossed, fibers from the inner part of the retina of the opposite eye.

(1975) found that retention of visuals in a newscast was somewhat greater when placed on the left side of the television screen, a result which is consistent with the neurological studies reported by Ornstein (1972). However, using data obtained from Likert-type scales, Metallinos found no difference between effects of left and right placement on "perceived weight, importance, prominence, attractiveness and interest value" of the visuals.

Using college students in an informal classroom setting, it is not difficult to demonstrate that the principle of asymmetry is an operant factor in the perception of visual messages. By reversing the pictorial elements within a visual field, students claim repeatedly that they experience subtle differences in what the visual expresses. However, to identify the specific characteristics of this difference and to objectively measure the effect is an elusive task. Although we may respond covertly to visual stimuli, we are limited in our overt response to visual stimuli by a dependency on verbal language. Thus, the purpose of this study was to determine if the reversal (i.e. mirror image) of a two-dimensional visual image would affect viewers' perceptions of selected aesthetic dimensions, using semantic differential scales as criterion measures of visual meaning.

Procedure

A total of 125 students who were enrolled in a basic introduction to mass communication class at the University of Utah were randomly assigned to two experimental treatments. The subjects in Treatment Group A (N = 61) viewed the four projected visuals (35 mm slides) that are presented in the left column of Figure 2. Treatment Group B (N = 64) viewed the mirror image of the same

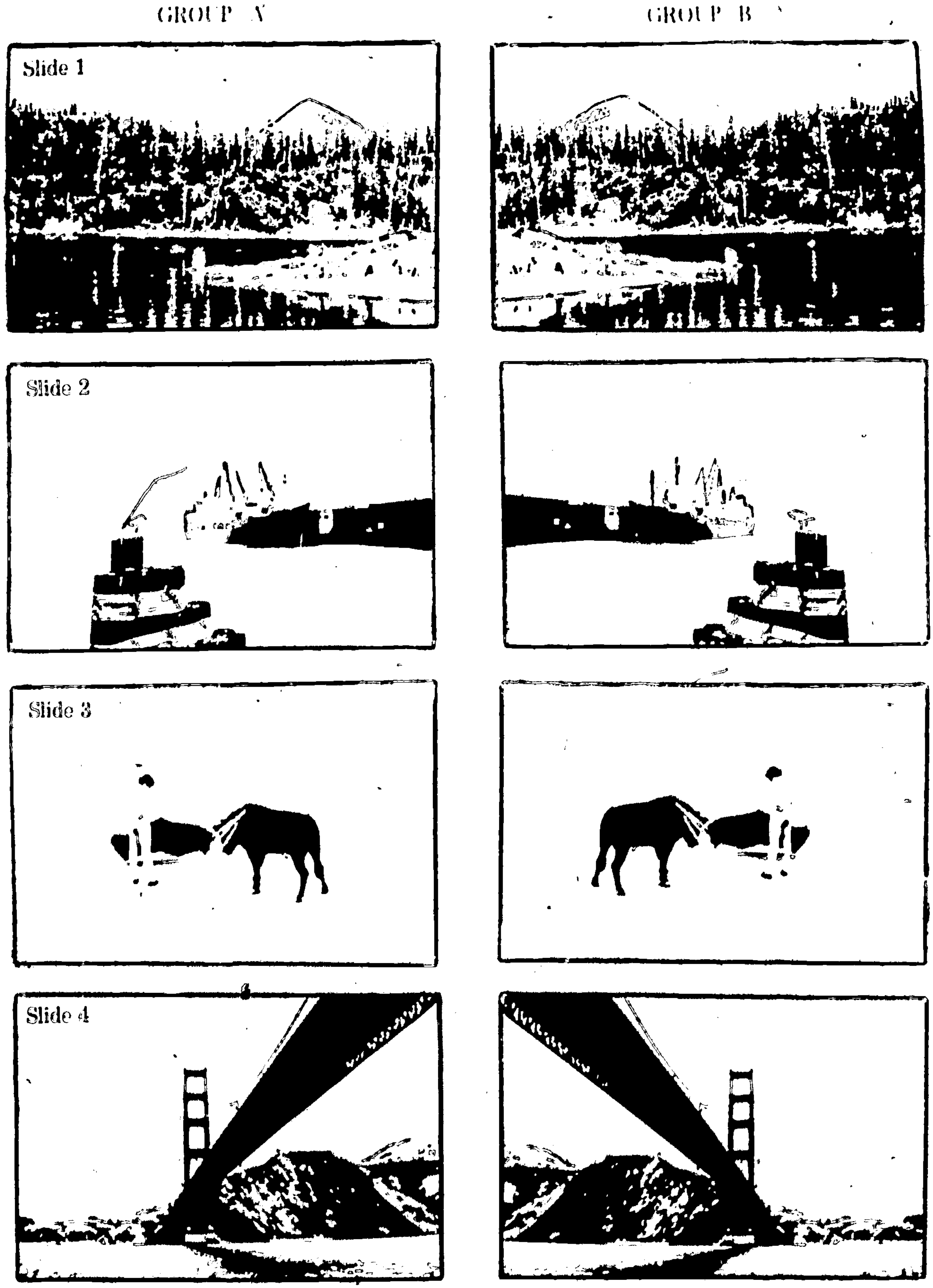

FIGURE 2
Visuals Used in Treatment Groups

visuals (right column of Figure 2).[1]

Using the theoretical considerations of Zettl (1973) as the basis for the design of this study, it was hoped that these visuals would provide for the analysis of several different aesthetic dimensions. Slide 1 represents a "neutral" pastoral scene without the presence of any dominant visual elements. A lake occupies much of the foreground and hills and a mountain the background, but without the presence of a prominent pictorial element. This slide was purposely selected as the first visual in the series as it was intended to serve as an appropriate "introduction" to the experimental setting. Slide 2 introduced an object (bird) in the foreground which was balanced by a larger object (ship) in the background. Dividing the visual field down the middle, the foreground object occupies the left half of the frame and the background object the right (Group A), or vice versa (Group B). Slide 3 introduces two dramatic objects (matador and bull) which occupy the center of the visual field. This visual afforded the opportunity to determine whether either version was more effective in communicating increased action or intensity, and whether the subjects perceived the action as occurring in one direction as opposed to another. Slide 4 provided one principal object (bridge) which dissects the visual field from upper right to lower left (Group A) or from upper left to lower right (Group B). The angularity of lines and apparent depth seemed to make this visual suitable for testing the asymmetry of the frame theory.

[1]It should be noted that the reproduced half-tones presented in Figure 2 provide only an approximation of the original visual. Color, detail, shading and associated pictorial elements are regretably absent.

Subjects viewed the projected visuals in an amphitheatre-type classroom with elevated seating. All subjects had an unobstructed view of the visuals, and no subject was positioned at an angle in excess of 20° from a line perpendicular to the center of the screen. Each visual was viewed for exactly 15 seconds, immediately after which the lights were brought up and the subjects were requested to complete a set of semantic differential scales. The 15-second time period was deemed appropriate since subjects were forced to recall the visual elements from memory as they completed the testing instrument. The seven-point, bi-polar semantic differential scales used in this study represented those drawn from a pool of items utilized in earlier visual communication research by Osgood (1969) and those developed specifically for this study. Given the theoretical orientation underlying this investigation and the specific stimulus materials prepared to test it, the following aesthetic dimensions and corresponding scales were selected: Temporal (beginning-end, first-last, start-finish, initial-final); Balance (balance-imbalance, light-heavy, stable-unstable, even-uneven); Closure (open-closed, free-restricted, complete-incomplete, part-whole); Activity (tense-relaxed, excited-calm, active-passive, dynamic-static); Spatial (near-far, close-distant, toward-away, front-rear, coming-going); Direction (horizontal-vertical, high-low, left-right, ascending-descending).

Analysis and Results

The preliminary data for each slide were submitted to principle components factor analysis with oblique rotation (SPSS, FACTOR). In order for a variable to be considered loaded on a factor, a loading of .50 or higher was required with a loading of no more than .40 on any other factor. For the acceptance of a factor, two or more scales had to meet the 50/40 criterion. An eigenvalue of 1.0 was established as the criterion for termination of factor extraction.[2]

Slide 1: Using these criteria, three factors emerged from the analysis of Slide 1 data and were labeled "Balance," "Temporal" and "Distance." These three factors accounted for 54.6% of the total variance. (Table I reports the scale loadings, accumulated variance and eigenvalues for each factor.) The "Balance" factor contained two scales (balance-imbalance, even-uneven) and accounted for 23.4% of the total variance. The "Temporal" factor consisted of four scales (beginning-end, initial-final, first-last, start-finish) and contributed 17.7% of the accumulated variance. Surprisingly, the two scales close-distant and near-far did not correlate highly with the other scales which had been selected a priori to constitute the spatial dimension (toward-away, front-rear, coming-going). Since these two scales appeared to represent a subset of the dimension as originally defined, the writers chose the label "Distance."

Slide 2: Factor analysis of the second slide resulted in a five-factor solution which accounted for 85.5% of the total variance (Table II). As in the case

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[2]The misuse of factor analytic techniques in communication research has received considerable attention in recent months. Whenever possible, decisions concerning the utilization of factor analysis in the present study were guided by the suggestions of James C. McCroskey and Thomas J. Young, "The Use and Abuse of Factor Analysis in Communication Research," paper presented at the International Communication Convention in Chicago, April, 1975.

of Slide 1, "Balance" was the initial factor emerging from the analysis, with the second factor, "Temporal," again loading on all four pre-selected scales, and "Distance" consisting of close-distant and near-far (Factor 4). Three new scales (excited-calm, active-passive, dynamic-static) loaded on Slide 2 to form an "Activity" factor. And two additional scales (light-heavy, free-restricted) comprised a fifth factor that was named "Weight." Similarly to the "Distance" factor, the *a priori* selection of scales had not provided for a separate "Weight" factor. The scales composing "Weight" were initially seen as representing the aesthetic dimensions of balance and closure.

Slide 3: Four factors emerged from the analysis of Slide 3 and were labeled "Temporal," "Activity," "Balance" and "Distance" (Table III). Whereas "Balance" had provided the largest single source of variance on Slides 1 and 2, the analysis of Slide 3 data indicated that the first factor was "Temporal" (beginning-end, initial-final, first-last, start-finish) and comprised 29.8% of the total variance (accumulated variance for all four factors equaled 78.1%). In fact, "Balance" was the third factor to result from this analysis (16.3%), following "Activity" which emerged as Factor 2 (20.2%). "Activity's" relaxed-tense scale appeared for first time, replacing the dynamic-static scale which had factored out on Slide 2. Also meeting the selection criteria for the first time were complete-incomplete and whole-part. Initially seen as constituting a closure dimension, these two scales loaded with balance-imbalance and even-uneven ("Balance").

Slide 4: The final factor analysis resulted in a five factor solution (Table IV). The same scales which comprised the four factors, "Temporal," "Balance," "Activity," and "Distance" for Slide 2, emerged from analysis of the Slide 4 data. The fifth factor produced three scales (toward-away, rear-front, coming-going) which were contained in the a priori list for "Spatial." Collectively, these five factors accounted for 79.0% of the total variance.

The results of the four factor analyses are summarized in Figure 3. The factors labeled "Balance," Temporal" and "Distance" were common to all four slides. "Activity" resulted from the analyses of Slides 2, 3 and 4. "Weight" emerged as a factor on Slide 2 only, and "Spatial," was unique to Slide 4. On Slides 1 and 2, "Balance" provided the largest single source of variance, and on Slides 3 and 4, "Temporal" was the initial factor.

Comparison of Group Means: Utilizing only the scales emerging from the factor analysis of data generated by each slide, independent t tests of sample means were performed (SPSS, T-TEST). Tables V, VI, VII and VIII summarize the findings of two-tailed t tests of group means for the factors derived from each slide. Only one of the seventeen t values was found to be significant at the .05 level. This single significant t value ($t = -2.76$) resulted from a comparison of group means for Factor I ("Balance") on Slide 1.

Discussion

The intent of this exploratory investigation was two-fold: 1) to assess the value of semantic differential scales as a means of identifying the aesthetic dimensions which affect viewers' perceptions of visual messages; and 2) to utilize these scales to test the asymmetry of the frame theory. While considerable caution must be taken in generalizing the results of this preliminary study to other visuals and other populations, there appears to be little doubt as to the

FACTOR NUMBERS

SLIDES	I.	II.	III.	IV.	V.
1.	Balance	Temporal	Distance		
2.	Balance	Temporal	Activity	Distance	Weight
3.	Temporal	Activity	Balance	Distance	
4.	Temporal	Balance	Activity	Distance	Spatial

Figure 3. A Summary of the Factors Resulting from Analysis of Data on the Four Slides.

potential value of semantic differential scales for future visual communication research. The extent to which the scales can elicit information concerning "non-content" dimensions remains largely unknown.

Although it is impossible to separate the content of a visual message from the manner in which the visual elements are displayed, i.e. in the right as opposed to the left side of the frame, a less realistic set of visuals than those employed in the present study might serve to reveal the subtle differences which continue to elude the researcher. The overall failure of this investigation to demonstrate differences between viewers perceptions of the two sets of slides is not so much an indictment of the asymmetry of the frame theory as it is a potential limitation of the stimulus materials selected. A cursory examination of the results from the four factor analyses suggest that some factors might be a product of the slide's content rather than the less obvious aesthetic elements. Both the length of viewing (15 seconds) and the degree of realism depicted in the slides may have minimized the aesthetic impact of subtle differences resulting from either left or right placement. The realism and relatively long viewing period may have prompted a personal association with the visuals that permitted subjects to create a "storyline."

This study suggests, therefore, that a more ambiguous visual presentation may facilitate the measurement of responses to aesthetic elements. It may also be necessary to eliminate color, at least initially, since there is little known about the possible interaction of various colors with other visual dimensions.

Of interest is the fact that the only significant t Value produced by the independent comparison of group means resulted from the "Balance" factor on Slide 1. While the most obvious explanation is to attribute this significant observation to chance, one is tempted to speculate as to plausible hypotheses which are based upon the theoretical orientation of this study. Analysis of the sample means reveals that subjects in Group B rated the slide as having better balance. This finding would tend to support Dondis' hypothesis that the right side of the frame naturally has more weight and to create balance within the frame, heavier objects (such as the mountain and the land mass in the foreground) should appear on the left. However, the writers emphasize that since this statistically significant result is the only one (of seventeen t-tests) it is likely to be due to chance.

Because of the exploratory nature of this study, no attempt was made to group subjects on the basis of visual or verbal aptitudes. Yet, a growing body of instruction l media research is drawing increased attention to differences in viewer predispositions, specific intellectual abilities, personality traits and individual preferences as variables which interact with viewers' perceptions of visual stimuli. Snow and Salomon (1968), Salomon (1970) and Di Vesta (1975) are among the corps of researchers who have demonstrated that without accounting for the intereaction of these subtle variables, comparisons between treatment means may fail to reveal meaningful differences.

As in the case of most exploratory investigations, this study served to raise questions rather than provide concrete answers. Selection of new semantic differential scales, the variation of stimulus materials, and the use of larger samples providing a greater cross-section of the population, will obviously contribute to our understanding of the impact of various aesthetic dimensions.

When we arrive at the refinements that this kind of effort will provide, production elements in all forms of visual communication will receive the research attention that is long overdue.

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TABLE I
SCALES FOR THE MEASUREMENT OF AESTHETIC DIMENSIONS FOR SLIDE 1

Variable	I Balance	II Temporal	III Distance	Communality
Balance-Imbalance	.89	-.09	-.10	.78
Even-Uneven	.69	-.09	.13	.59
Beginning-End	.13	.69	-.10	.74
Initial-Final	-.12	.64	-.12	.52
First-Last	-.11	.71	.08	.64
Start-Finish	.06	.63	.11	.47
Close-Distant	.02	-.04	.92	.82
Near-Far	.03	.00	.79	.64
Accumulated Variance(%)	23.4	41.0	54.6	
Eigenvalues	2.88	2.17	1.68	

TABLE II
SCALES FOR THE MEASUREMENT OF AESTHETIC
DIMENSIONS FOR SLIDE 2

Variable	I Balance	II Temporal	III Activity	IV Distance	V Weight	Communality
Balance-Imbalance	-.67	-.01	-.00	-.00	-.04	.55
Even-Uneven	-.90	.03	-.01	.02	.06	.81
Beginning-End	.05	.69	.01	-.07	-.03	.54
Initial-Final	-.03	.79	.02	.07	-.08	.62
First-Last	.04	.86	.03	-.01	-.02	.75
Start-Finish	-.16	.63	.07	.08	.11	.64
Excited-Calm	.21	.05	-.66	-.09	-.12	.59
Active-Passive	.11	.01	-.62	-.05	-.15	.57
Dynamic-Static	-.24	-.04	.56	-.07	.10	.38
Close-Distant	.03	-.07	-.00	-.81	-.04	.65
Near-Far	-.03	-.01	.03	-.94	.07	.89
Light-Heavy	.02	.12	-.08	-.08	-.74	.60
Free-Restricted	.20	.19	-.02	.01	-.58	.65
Accumulated Variance(%)	33.4	50.9	64.9	77.1	85.5	
Eigenvalues	4.33	2.25	1.81	1.58	1.08	

TABLE III
SCALES FOR THE MEASUREMENT OF AESTHETIC DIMENSIONS FOR SLIDE 3

Variable	I Temporal	II Activity	III Balance	IV Distance	Communality
Beginning-End	.82	.03	-.07	.04	.73
Initial-Final	.89	-.15	.06	-.10	.83
First-Last	.76	.06	.00	-.07	.71
Start-Finish	.85	.03	-.02	-.07	.75
Relaxed-Tense	.07	.84	-.05	-.01	.69
Excited-Calm	-.02	.77	-.02	.09	.59
Active-Passive	-.01	.65	.08	.04	.54
Balance-Imbalance	-.23	.01	.61	-.15	.60
Even-Uneven	-.18	.01	.75	-.04	.70
Complete-Incomplete	.16	-.02	.66	.01	.44
Whole-Part	.00	.08	.57	.11	.40
Close-Distant	.05	.08	.03	.85	.70
Near-Far	-.04	.07	.02	.85	.71
Accumulated Variance (%)	29.8	50.0	66.2	78.1	
Eigenvalues	3.94	2.67	2.15	1.57	

TABLE IV
SCALES FOR THE MEASUREMENT OF AESTHETIC
DIMENSIONS FOR SLIDE 4

Variable	I Temporal	II Balance	III Activity	IV Distance	V Spatial	Communality
Beginning-End	.71	-.06	-.03	.14	-.07	.57
Initial-Final	.66	.08	.11	-.02	-.08	.54
First-Last	.66	.01	-.09	-.07	.05	.50
Start-Finish	.82	-.09	-.03	.01	.13	.71
Balance-Imbalance	.06	-.70	.06	-.02	.02	.53
Even-Uneven	.01	-.80	.02	.05	.04	.67
Excited-Calm	-.01	.01	.65	-.11	-.10	.55
Active-Passive	-.03	-.09	.65	-.06	.00	.51
Dynamic-Static	.11	-.05	.71	.11	.01	.70
Close-Distant	.03	.05	-.05	.99	-.07	.99
Near-Far	.00	-.03	-.01	.62	.23	.55
Toward-Away	-.00	.11	-.07	.02	.80	.69
Rear-Front	.17	.04	-.08	.07	.50	.38
Coming-Going	-.03	-.16	.05	.06	.58	.37
Accumulated Variance (%)	26.8	45.1	58.8	70.2	79.0	
Eigenvalues	3.46	2.35	1.76	1.47	1.12	

TABLE V
t TESTS OF GROUP MEANS
FOR THE THREE FACTORS ON SLIDE 1

Factor	Mean	Standard Deviation	t Value	p
I. Balance				
Group A	9.67	3.35	2.76	.01
Group B	11.16	2.63		
II. Temporal				
Group A	15.02	3.82	1.54	.13
Group B	13.84	4.6		
III. Distance				
Group A	7.67	3.28	.18	.86
Group B	7.56	3.56		

Degrees of Freedom = 123
Critical t Value ($p < .05$) = 1.98

TABLE VI
t TESTS OF GROUP MEANS
FOR FIVE FACTORS ON SLIDE 2

Factor	Mean	Standard Deviation	t Value	p
I. Balance				
Group A	8.28	3.24	-.46	.65
Group B	8.55	3.28		
II. Temporal				
Group A	15.75	4.60	-.37	.71
Group B	16.06	4.62		
III. Activity				
Group A	6.10	2.77	1.30	.19
Group B	5.47	2.63		
IV. Distance				
Group A	8.59	3.29	-.48	.63
Group B	8.87	3.31		
V. Weight				
Group A	6.38	3.32	-.86	.39
Group B	6.89	3.32		

Degrees of Freedom = 123
Critical t Value (p. .05) = 1.98

TABLE VII
t TESTS OF GROUP MEANS
FOR FOUR FACTORS ON SLIDE 3

Factor	Mean	Standard Deviation	t Value	p
I. Temporal				
Group A	22.28	5.18	.37	.71
Group B	21.95	4.73		
II. Activity				
Group A	18.07	2.62	−.63	.53
Group B	18.41	3.40		
III. Balance				
Group A	15.36	5.52	.48	.63
Group B	14.92	4.77		
IV. Distance				
Group A	7.05	3.48	.68	.50
Group B	6.63	3.48		

Degrees of Freedom = 123
Critical t Value ($p < .05$) = 1.98

TABLE VIII
t TESTS FOR GROUP MEANS
FOR FIVE FACTORS ON SLIDE 4

Factor	Mean	Standard Deviation	t Value	p
I. Temporal				
Group A	14.41	4.72	-.87	.38
Group B	15.14	4.63		
II. Balance				
Group A	8.85	3.12	-.68	.50
Group B	9.21	2.91		
III. Activity				
Group A	11.92	4.24	.01	1.00
Group B	11.92	4.01		
IV. Distance				
Group A	8.62	3.55	1.40	.16
Group B	7.70	3.77		
V. Spatial				
Group A	12.65	4.79	.47	.64
Group B	12.28	4.11		

Degrees of Freedom = 123
Critical t Value ($p < .05$) = 1.98