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ABSTRACT

This study examined the effects and interaction of multiple and linear visual presentation modes and cognitive style on performance in a visual location task. Subjects were 132 undergraduate college students (40 males, 92 females) in professional education courses. The Group Embedded Figures Test (GEFT, Wilkin et al., 1971) was used to identify students as field dependents, field independents, or neutral. The visual location task tested the subjects' ability to select a criterion picture from a group of three similar pictures after viewing three quadrants of the criterion picture in random order. In the linear treatment each quadrant of the criterion picture was presented separately for 2 seconds, one after another, followed by presentation of the criterion picture with the two similar pictures for a total of 6 seconds. In the multiple treatment, each quadrant was presented simultaneously on the screen for 6 seconds. Field independents and neutrals both scored significantly higher on the visual location task than field dependents. Presentation mode did not affect performance, and there was no significant interaction between presentation mode and cognitive style. Six references are listed. (LMM)

Field Independence-Dependence, Multiple and Linear Imagery in a Visual Location Task

by

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The purpose of the study was to determine the effects of multiple and linear visual presentation and cognitive style on performance in a visual location task. The study also considered whether the scores in a visual location task were affected by the interaction of presentation mode (multiple and linear image presentation) and of cognitive style (Field Dependent and Field Independent).

Most of the research on field-dependence-independence has been conducted by Witkin and his associates and is summarized in a 1977 issue of the Review of Educational Research (Witkin, et al., 1977). Field independents (FI) can give structure to unstructured material and can separate an item from its overall context. Field dependents (FD) on the other hand tend to respond holistically to stimuli. Compared to FI's, FD's have a greater need for and are more dependent on external sources of structure and organization.

When recalling information, the thought strategies of FD's and FI's vary greatly. Field dependents are not likely to depart from the dominant arrangement of the total visual as given, and tend to remember the most noticeable cues, whether or not they are relevant. Information recall in FD's is facilitated if major visual cues are made relevant and is hindered if important cues are irrelevant or if relevant visual cues are not salient. Field Independents

tend to be able to identify the most important visual cues whether or not they are the most important (Wilkin, et al., 1977).

In recent years the field of instructional media has begun to develop an empirical base which combines certain unique medium (visual)characteristics and psychological requirements of specific learning tasks (Allen 1974). The existing empirical base is lacking with respect to multiple presentations, perceptual types, i.e., cognitive style, and visual location tasks.

The typical format of visual image presentations has consistently been linear. Since it appears Field Dependent individuals may have difficulty in mental retention of a visual from image to image, the linear format of visual presentations may be inappropriate. Hence, it may be that the format of large amounts of the existing visual material would not be effective for FD individuals. If the use of multiple image presentation enhances the ability for the FD individual to learn visual tasks, then the design of instructional media may be made beneficial for FD's. Since the FI individual seem to have the ability to retain visual images mentally, multiple image presentation may not result in significantly different performance than linear imagery in a visual location task. However, it would seem

reasonable to expect that multiple image presentation would reduce the visual task factor, for FI's as well as for FD's. If data can be produced which supports the idea that for certain learning tasks and certain cognitive types, a specific format is effective, then instructional developers would be able to utilize the results in alternate media design (Whitley and Moore, 1979).

Method

Subjects

The subjects of this study were 150 undergraduate college students enrolled in professional education courses. One hundred thirty two (132) students (40 male, 92 female) completed accurately all phases of the experiment. These subjects were identified as field dependents, field independents and neutral by means of the Group Embedded Figures Test (GEFT), (Wilkin et al, 1971). Since the test manual set no guidelines for grouping, subjects were grouped into the above categories in approximate thirds according to their scores, i.e., scores of 15 and above were classified as FI (N=47), 11 to 14 as neutral (N=45) and those with scores of 10 and below as field dependents (N=40). The GEFT has a range of scores from 0-18. A median split was rejected because of the closeness of low FI and high FD scores.

Materials

The experiment used a visual location task and was designed to test the subjects ability to select a criterion picture from a group of three similar pictures after viewing three quadrants (in random order) of the criterion picture. These pictures (15) represented a variety of pictorial styles and were selected from instrument designed by Whitley (1978). Two treatments were developed. All pictures and quadrants were made into Black and White 2 X 2 slides, to eliminate the additional factor of color. They were then videotaped via a film chain in a television studio. Treatment one (linear) presented each quadrant of the criterion picture separately for two (2) seconds, one after another. The criterion picture was then presented with the two similar pictures for a total of six (6) seconds. In treatment two (multiple) each of the quadrants were presented simultaneously on the screen for a period of six (6) seconds. As in the first treatment, the criterion pictures were then presented with the other two similar similar pictures for six (6) seconds, The criterion score was the total number of correct choices (0-15). The pictures used, chosen by a panel, the criteria of similar content, detail and format. Both treatment groups saw the exact same stimuli materials.

Procedure

The experiment was conducted in two phases. In phase one, the subjects were given the Group Embedded Figures Test. This is a timed test and takes approximately 20 minutes to conduct. The reliability of this test is .82 (Witkin, et al., 1971). Phase two took place on a separate day and subjects were randomly placed into the linear or multiple treatments groups. Subjects viewed the assigned treatment in groups of eight or less and viewed the same television screen (25") from approximately the same distance and under similar conditions. Because both treatments were videotaped, timing, and lighting etc. was held constant. The subjects indicated on the answer sheet (optical scan) if the criterion picture was the first, second or third picture. The total correct answers were the dependent variable and the subjects had scores ranging from 0-15. A 3x2 analysis of variance was used to test the following hypotheses: there is no (1) significant difference between the criterion scores of FI's, neutrals, FD's, (2) significant difference between the mean scores of the subjects viewing the multiple and linear presentations, (3) significant interaction of student mean scores between cognitive style and presentation mode in a visual location

task. The independent variables were presentation mode and cognitive style.

Results

A summary table of the factorial analysis of variance based upon the table of means (see Table 1) is presented in Table 2. As can be seen, the college students depending upon their classification as FI, neutral or FD performed significantly different $F(2,131)=7.91$, $p=.0006$ on the visual location task. A secondary analysis using the Duncan's Multiple Range Test indicated that FI's ($\bar{X}=10.553$) and Neutrals ($\bar{X}=9.533$) both scored significantly higher than FD's ($\bar{X}=8.200$). Table 2 also indicates that presentation mode (linear vs. multiple presentation) was not significantly different $F(1,131)=0.79$, $p=0.3747$ in this study. In addition, there was no significant interaction between presentation mode and cognitive style $F(2,131)=.91$, $p=0.4033$. The fact that FI's mean scores was significantly higher than FD's was predicted. However, the results which indicated there were no significant difference in treatment groups was surprising. Added to this fact that FD's actually had higher mean scores on the linear presentation ($\bar{X}=8.333$) than on the multiple presentation ($\bar{X}=8.053$) was unexpected. Both FI's and neutrals had higher mean scores on the multiple treatment than on the linear presentation.

INSERT TABLE 1 and TABLE 2 ABOUT HERE.

Discussion

Because of the characteristics of FI and FD subjects described earlier by Witkin, it was expected that FI's would score significantly higher than FD's on a visual location task. The results of this study confirmed this. This fact should strengthen the premise that there are people who have the characteristics of FD and FI as described by Wilkin and that the GEFT does indeed identify these individuals with those characteristics. As noted earlier, it was hypothesized that a multiple presentation of three quadrants would be beneficial to FD types in selecting the criterion picture, because all visual information would be on the screen at one time and not separated. Howell (1972) in an comparison of Lowenfeld's Haptic-Visual theory and Witkin's Field Dependent-Independent theory, suggested that Visual types and Haptic types (from Lowenfeld) tend to match respectively Field Independent and Field Dependent types (from Witkin). Whitley and Moore (1979) reported that the Haptics scored significantly higher with a multiple presentation of a visual location task than with a linear

presentation. However, these findings were totally reversed and in this present study and the mean scores of FD individuals were actually higher for the linear presentation than the multiple presentation. Whitley and Moore (1979) inferred that multiple image presentation might tend to facilitate the retention and comprehension of visual cues for Haptic individuals, thus the inferred FD types. The results of the present study may bring into question the close relationship between Haptics and Field Dependents as suggested by Howell (1972) and thus questions Whitley and Moore's inferences as presented earlier in this paper.

Previous research comparing multiple and linear presentations have also tended to produce conflicting results (Whitley and Moore 1979) as does this study. It appears that there may be other factors which may be interacting with presentation mode and cognitive style which might account for the unexpected results. These factors might include intelligence, sex or experience in viewing visuals as well as others. These factors should be studied in the future. Until further results are presented media developers cannot be sure that multiple visual presentations will be of assistance to field dependent individuals as suggested earler in this paper.

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Table 1

Correct answer Means by Cognitive Style and Treatment

	N	Mean	Overall Dependency
Field Independent	47		10.553
Linear	19	9.789	
Multiple	28	11.071	
Neutral	45		9.533
Linear	23	9.435	
Multiple	22	9.636	
Field Dependent	40		8.200
Linear	21	8.333	
Multiple	19	8.053	
Overall Treatment			
Linear	63	9.175	
Multiple	69	9.783	

Table 2

3 x 2 Factorial Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F value
Model	5	139.62026	27.92405	3.69
Dependency	2	119.77540		7.91*
Treatment	1	6.00410		0.79
Dependency X Treatment	2	13.84076		0.91
Error	126	953.37215		
Corrected Total	131	1092.99242		

* p > .001

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