Perceptual perimeters and generalized drive

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Perceptual perimeters among high and low anxious groups were tested with varying time and stimuli. The results were that high anxious Ss exhibited a wider perceptual field than did low anxious Ss. Some theories suggest that under high drive, which may be defined in terms of emotional arousal, there is a narrowing of the perceptual field. This study found convincing contrary evidence. A distinction was made between cue utilization and cue perception.

Within recent years, psychologists have actively investigated the relationship between generalized drive and perception of cues. Easterbrook (1959) hypothesized that drive is inversely related to cue utilization with the primary mechanism being a focusing of attention or narrowing of Ss' perceptual fields. Results of empirical studies in this area are equivocal with regard to the theory.

Wachtel (1966) and Weltman (1966) have generally found that high drive Ss perceive restricted visual fields, thus supporting the Easterbrook position, while Schmidt (1964) reports that high drive Ss perceive wider visual fields. Zaffy & Bruning (1966) present some evidence to directly support the generalization that drive and cue utilization are inversely related. Frohlich (1965) found no difference in the visual fields of high and low drive groups. The disparity among these studies may be due, in part, to the threatening aspects of some studies (Wachtel, 1966; Weltman, 1966) and prolonged exposure time of cues (Schmidt, 1964; Weltman, 1966), which conceals the main effect of drive on perception.

Ambiguity of results may be due, in part, to a lack of precise definition of cue perception as contrasted with cue utilization. It may be argued that cue utilization is contingent on cue perception and that although high drive Ss may select and utilize few cues, they may perceive more cues than low drive Ss. Or, it may be that high and low drive groups perceive an equal number of cues from different parts of their perceptual field. Specifically, high drive Ss may more actively search a perceptual field for cues, which they may then select and utilize, while low drive Ss may focus their attention and not actively search a field. If this hypothesis is valid, then the absolute number of stimuli perceived over a brief time exposure may be identical for both groups but the location of the perceived item may differ. The present experiment tested this hypothesis.

METHOD

Experimental design. The overall design consisted of testing perception of high anxious (HA) and low anxious (LA) groups in a factorial arrangement which included differential exposure time of stimuli and centrality of stimuli perceived.

Subjects. The Taylor Manifest Anxiety scale (MAS) was administered to 214 student volunteers enrolled in a general psychology course. The scale was termed "Biographic Inventory" and contained 40 buffer items in addition to the 50 items of the MAS. The Ss were dichotomized into HA and LA groups, with the HA group being composed of the upper 30% and LA group composed of lower 30% of the MAS scores. The Ss were given nominal course credit for participating in the study. Sixty Ss (30 HA and 30 LA) were equally distributed throughout four cells of a factorial arrangement and were alternately assigned to an experimental condition upon their appearance in the laboratory.

Task and apparatus. Nine slides, each containing seven stimulus items were momentarily presented to each S. Three slides contained two-digit

numbers, three contained bigrams, and three contained trigram words. The stimuli were white figures on a dark gray background and were placed within three imaginary concentric circles. Within the first circle one stimulus was placed and served as a target stimulus, that is, Ss were asked to focus their attention on the screen area in which this stimulus would appear. Three items were placed in the second concentric circle and three were placed in the third concentric circle.

The bigrams were selected from norms collected by Underwood & Shulz (1960) and ranged between 421 and 840. The three letter words were all AA or A words as determined by Thorndike & Lorge (1953).

The Ss were seated at a distance of 82 in. from the screen, the center of which was placed at eye level for each S.

A projector (Carousel Model 900) was employed, equipped with tachistoscope. The projector to screen distance was 107 in. resulting in an overall visual field of 44 in., with stimulus items falling within concentric areas of approximately 14, 29, and 44 in. in diameter. The projected height of each stimulus item was 1½ in. on the screen.

Exposure time was either .50 or .75 sec depending upon the condition assigned to a given S.

Procedure. The Ss from the LA group were told that this was an experiment in perception, that they would be presented with nine slides containing various items, and that they should respond by writing the items perceived immediately after exposure. HA Ss were given the same instructions, but were also told that the test was reputed to be related to intelligence. All Ss were shown one blank slide at the designated speed prior to the experiment proper.

RESULTS

The data were treated with a 2 by 2 by 3 factorial analysis with the last factor representing repeated measurement. The first level factor corresponded to High and Low Anxious groups, the second factor was Time, .50 and .75 sec, and the third factor was represented by Correct Responses in the center of the screen, Correct Responses in the Second Circle and Correct Responses in the Third Circle. The means are presented in Table 1. Although the HA group reported more correct responses than the LA group, the main factor of Anxiety was statistically nonsignificant. The factor of Time was highly significant, $F(1,52) = 43.25, p < .001$.

The interaction between Anxiety and Time approached significance with $F(1,52) = 2.92, p < .10$. This finding is of importance even though the level of significance is low, because of the high similarity of correct responses between HA and LA groups in the first and second concentric circle. The specific source of significant A by B interaction took place in the third, peripheral, concentric circle.

The third level, Concentric Circles, also reached significance with $F(2,104) = 100.3, p < .001$. The A by C interaction (Anxiety by Concentric circle) also was close to significance with $F(2,104) = 2.43, p < .10$. These data are also of increased importance for the reasons mentioned above. The A by B by C interaction was significant with $F(2,104) = p < .05$.

An additional analysis of the modality of stimuli was also computed. The results indicated significant temporal effects ($p < .001$) but nonsignificant variance among the modalities although words tended to be given as a correct response more

Table 1
Mean Correct Responses in Each Cell

	Time (sec)	1st Circle	2nd Circle	3rd Circle
High	.50	5.78	7.64	2.07
Anxiety	.75	6.86	9.43	3.14
Low	.50	6.64	8.71	1.14
Anxiety	.75	6.29	10.00	1.43

Fig. 1. Mean correct responses for stimuli in the outer perimeter.

Fig. 2. Mean correct responses for total stimuli perceived.

frequently than bigrams. An analysis of the errors reported by Ss indicated a higher number of bigram errors and digit errors than word errors (Duncan's range test, $p < .05$). These results were anticipated and easily understandable.

The concept of perceptual perimeters and their relationship to anxiety was central to this paper. In the examination of the reported data only slight and nonsignificant variation within the first and second concentric circle are observed; however, if one examines the outer circle (cf. Fig. 1) profound differences exist between high and low anxious groups for the .5 sec exposure and these differences increased during .75 sec exposure. The mean correct responses for HA Ss with .5 and .75 sec exposure was 2.07 and 3.14, respectively, while for LA Ss with corresponding time dimension the mean correct responses were 1.14 and 1.42 (cf. Fig. 2), indicating very significant main effects of anxiety [$F(1,52) = 12.96$, $p < .001$] on perception of stimuli in the outer circle.

DISCUSSION

The results of this experiment suggest that HA and LA Ss perceived a stimulus field differently although the absolute amount of information perceived is similar. Specifically HA Ss exhibited a wider perceptual field than LA Ss. Theories of cue utilization and drive have suggested that under high drive, which may be defined as emotional arousal, there is a narrowing of the perceptual field. This study found quite the opposite. However, the theory of cue utilization and drive may remain essentially intact. It may be that high drive increases the scope of the perceptual field but that cue utilization, or the use of a specific cue within the range of available cues, is narrowed. The results are not interpreted as a refutation of the Easterbrook theory but that a finer discrimination must be made between the utilitarian function of a cue and the perception of cues among HA and LA groups.

A secondary, but theoretically significant, result was found in the

anxiety by time interaction. While LA Ss perceived only a slightly greater number of divergent cues (third concentric circle) as time increased, HA Ss' perception of divergent cues rose sharply. This characteristic was also manifested in the overall items perceived by HA and LA groups across the time dimension. The probable explanation for these results is that the mechanism of increased perceptual field as a function of generalized drive may be the result of manifest behavior, rather than the result of the sensory apparatus. It seems likely from the results obtained in this study that drive may be related to a variety of behavioral responses, such as widely diverging eye movement.

REFERENCES

- EASTERBROOK, J. A. The effect of emotion on cue utilization and the organization of behavior. *Psychological Review*, 1959, 66, 183-201.
- FROHLICH, W. D. (Psychological Institute Universität, Am Hof 1e, Bonn, Germany) Tribnveau (Manifeste Angst) und das Erkennen peripher eingeführter optischer Reize unter dem Einfluss eines bewegten Hintergrundes (Drive level (manifest anxiety) and the recognition of peripheral optical stimuli under the influence of a moving background) *Zeitschrift für experimentelle und angewandte Psychologie*, 1965, 12, 4, 570-584.
- SCHMIDT, HAROLD-EDWIN. Relation of the narrowing of the visual field with an increase in distance to manifest anxiety. *Journal of Experimental Psychology*, 1964, 68, 334-336.
- THORNDIKE, E. L., & LORGE, I. *The teacher's wordbook of 30,000 words*. New York: Cromwell, 1953.
- UNDERWOOD, B. J., & SCHULZ, R. W. *Meaningfulness and verbal learning*. Philadelphia: Lippincott, 1960.
- WATCHEL, P. L. Anxiety, cue utilization, and patterns of ego defense. Unpublished doctoral dissertation, Yale University, 1966.
- WELTMAN, G. Perceptual narrowing in novice divers. *Human factors*, 1966, 8, 499-506.
- WINER, B. J. *Statistical principles in experimental design*. New York: McGraw-Hill, 1962.
- ZAFFY, D. J., & BRUNNING, J. L. Drive and range of cue utilization. *Journal of Experimental Psychology*, 1966, 71, 382-384.