Measurements of Troxler's effect

DONALD B. POE, DUKE UNIVERSITY AND HERBERT F. CROVITZ, DURHAM VETERANS ADMINISTRATION HOSPITAL Durham, N. Caro. 27705

Two experiments involving Troxler's Effect measure the significance of the particular half of the visual field with which the stimulus is perceived, the significance of the amount of visual angle subtended by the stimulus, and the effects of prolonged viewing on the disappearance patterns. No effects are found due to temporal vs nasal viewing but the subtended arc is a major factor in disappearance time and frequency. Prolonged viewing creates a linear disappearance pattern over time.

Taylor (1966) has shown a variety of sensory phenomena which vary linearly as the square root of exposure time. Yet not all perceptual effects decay according to that rule. For instance, Cogan & Goldstein (1967) studied binocular rivalry with continuous viewing for 10 min and found that the number of changes from visibility for the left to the right eye was constant for successive minutes. However, they did not report data on any change in duration of suppressions which might vary with time, as it is known to vary with increased stimulus distance from fixation.

Law (1967) measured binocular suppression effects as well as monocular disappearances (Troxler's Effect) and found that disappearance increased as a function of the peripheral angle subtended on the retina by the stimulus. We now report measurements of both the frequency of disappearances and the duration of disappearance as a function of peripheral angle in two experiments; one with exposure duration of 30 sec, the other of 5 min of continuous monitoring of Troxler's Effect.

Method. Each white stimulus card had a center red fixation point (.04 in. in diameter) and a single pinhole (.02 in. in diameter). The pinholes were placed on the horizontal meridian so that, with a viewing distance of 0.5 m, the distance of separation between the pinhole and the fixation point represented 1, 2, 4, and 6 deg of visual angle.

In Experiment 1, each card was shown for a single 30 sec viewing period with inversion of cards so that with right eye monocular viewing, the four

Fig. 1. Mean seconds of disappearance as a function of peripheral angle for Experiment 1 and for the study of Law (1967).

Fig. 2. A cumulative record of the frequency of disappearances over 10 30-sec periods, averaged over two Ss in Experiment 2.

distances were viewed once in the nasal and once in the temporal visual field. The order of presentation of the eight conditions was separately randomized for each of the 18 Ss.

In Experiment 2, each of the four cards was shown once for nasal visual field viewing of the right eye for 5 min of viewing time to the two Ss.

Stimulus cards were front illuminated by a high intensity lamp (about 5 ft-c).

The Ss signalled the onset of each disappearance of the pinhole in both experiments by pressing a key and signalled its reappearance by releasing it. The key operated a Standard Electric Timer which added the seconds of disappearance within a given viewing period and also operated a counter which added the number of key depressions within the allotted viewing time.

Fig. 3. A cumulative record of the duration of disappearance over 10 30-sec periods, averaged over two Ss in Experiment 2.

Results and Discussion. Experiment 1 revealed that, as expected, there is indeed a significant increase in the total duration of disappearance of the stimulus point with increased separation between this point and fixation. This increase appears to be virtually linear (Fig. 1) as a function of the size of the subtended visual angle. Figure 1 also reveals that no significant difference exists between the nasal and temporal halves of the visual field in the perception of Troxler's Effect since essentially the same curves were obtained by plotting the data separately. The figure shows mean disappearance times (pooled for each half of retinal viewing) of 9.54, 6.58, 3.92, and 1.25 sec, respectively for the 6, 4, 2, and 1 deg of visual angle.

Experiment 1 shows that for the frequency of disappearances, there were significant differences ($p < .01$) for variation due to the treatments and due to the Ss. The mean number of disappearances of the stimulus for the 18 Ss tended to reach a limit of six for the 30 sec of allotted viewing time.

In Experiment 2, the cards were only presented to the nasal

visual field since the results of Experiment 1 indicated that the particular perceptual hemisphere in which the stimulus was received was of no significant consequence. In this situation, the number of responses failed to increase as a direct function of the peripheral angle, but both for summed frequency of disappearance (Fig. 2) and for the summation of stimulus suppression (Fig. 3), Troxler's Effect was linear as a direct function of time. This result would seem to substantiate the results obtained in the experiment by Cogan & Goldstein (1967).

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