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Discrimination of Depth and Criterion-Setting

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Do cognitive factors affect the judgment of apparent depth in standard psychophysical discrimination tasks? To examine contextual effects on discrimination performance, we conducted two experiments. In each the MSS was used and contextual effects were produced by varying the location of the range of test stimuli. Ocular vergence served as the only depth cue in the first and horizontal disparity in the second experiment. In each trial of the first experiment a fixation cross flanked by nonius lines was presented in a Wheatstone configuration for 1.4 sec before it disappeared. After a short interval, a vertical bar was presented in an extended dark field and the subject verged on the stimulus. The bar remained present until the subject had responded. Each subject judged if the bar appeared to be in front of or behind the previously seen fixation cross. In three sessions the midpoint of the test stimuli was centered on -2 , 0 , or $+2$ arcmin from the fixation cross. The second experiment was conducted in a dimly lit room where the monitor face provided a fusion lock. On each trial the fixation cross remained visible throughout so that the subjects could base their judgments on the horizontal disparity of the bar. In three sessions the midpoint of the test stimuli was centered on -2 , 0 , or $+2$ arbitrary units (AU) from the fixation cross. (A single AU was half the individual discrimination threshold as determined by an adaptive staircase procedure before the first test block. The results show that ocular vergence is an unreliable depth cue that generates uncertainty and promotes contextual effects. On average the discrimination thresholds were twelve times higher than for horizontal disparity judgments. Nevertheless, the latter were also susceptible to contextual effects. The contextual effects for depth discrimination are similar to those that have previously been shown for spatial frequency and orientation discrimination, and can be explained by criterion-setting theory (Lages and Treisman, 1998). This supports the generality of criterion-setting effects in visual discrimination.

Lages, M. & Treisman, M. (1998). Spatial frequency discrimination: Visual long-term memory or criterion setting. *Vision Research*, *38*, 557–572.

Treisman, M. & Williams, T.C. (1984). A theory of criterion setting with an application to sequential dependencies. *Psychological Review*, *91*, 68–111.