Notes and Comment

Visual persistence without the rods

EDWARD H. ADELSON
*University of Michigan
Ann Arbor, Michigan 48109*

Sakitt (1975, 1976) has proposed that rods serve as the main source of visual persistence in a variety of tasks, including the partial report technique of Sperling (1960). But Adelson (1978) and Banks and Barber (1977) found that partial report advantage remained even in the absence of a rod contribution. These experimenters, working independently, presented letters of one color against a field of a different color, the letters being so chosen that the rods could not discriminate the letters from the field. Although only cones could discriminate the letters, partial report remained intact.

Sakitt and Long (1979) have raised the possibility that both sets of results are spurious; specifically, they propose that both Adelson and Banks and Barber made sufficiently large calibration errors that the scotopic matches were significantly off, and that these mismatches produced a rod image strong enough to give the observed partial report advantage. They propose a control experiment which they say must be done to settle the issue: If one chooses a set of tightly spaced scotopic contrasts surrounding the nominal match point, one can be confident that the true match point will be found. If partial report advantage is, indeed, dependent on the rods, performance will plunge at this point.

I have performed the experiment suggested by Sakitt and Long. It supports the earlier findings of Adelson and of Banks and Barber.

METHOD

Subjects

The subject was one of the original subjects used in the experiments of Adelson (1978); she was a female graduate student, experienced in tachistoscopic experiments.

Apparatus

The Maxwellian view system of Adelson (1978) was used. Red (650 nm) letters appeared on a green (550 nm) field; the wavelengths were produced with narrow band interference filters. The letters were 1° high, in a 3 by 4 array.

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The scotopic match was determined radiometrically, using a PIN-10 photodiode and the quantized CIE scotopic luminosity function, as well as psychophysically, using the method of Flamant and Stiles (1948). These techniques agreed within .05 log unit. The retinal illuminance of the field was 1.7 log scotopic trolands. No adapting field was used.

Procedure

The letter arrays were presented for 50 msec; an auditory tone cued the high, middle, or low row for readout. SOA for the cue was always 200 msec.

Partial report at 200 msec was measured for five different scotopic contrasts near the match point, in accord with the procedure outlined by Sakitt and Long. The contrasts were .2, .1, 0, -.1, and -.2 log units. Each contrast was run in eight blocks of eight trials each (for a total of 64 trials per condition), in a random sequence.

RESULTS AND DISCUSSION

The results are plotted in Figure 1. Contrary to the suggestions of Sakitt and Long, the partial report

Figure 1. Partial report at 200-msec SOA, for a set of scotopic contrasts neighboring the match point. Error bars are ± 1 standard error of the mean.

advantage shows no sign of vanishing anywhere in the region of the match; the five data points are not significantly different from one another, and are far above the level of whole report shown by the dashed line.

One may contrast these results with those of Sakitt and Long, who used a very different measure of visual persistence. In their task, the subjects had to judge precisely whether temporally separate stimuli lined up perfectly on the retina. In that case, the subjects apparently *were* compelled to use rod afterimages, for in the absence of these afterimages performance dropped. When Sakitt and Long's scotopic contrast was within $\pm .2$ log unit of a match, performance fell by half; and at the match point itself, performance fell completely to chance.

This points to different sources for different kinds of visual persistence. The persistence underlying Sakitt and Long's task is highly dependent on rods; but the same manipulations which destroy that persistence leave partial report advantage intact, as shown here.

To my knowledge, there is to date not a single experiment showing that partial report advantage

vanishes in the absence of rods, and there are several experiments showing that it does not. More important, there is no evidence that the rods are important in producing the partial report advantage observed in the light-adapted conditions typical of daily life.

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