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Measuring Attention to Color Using an Equivalent Chromaticity Paradigm

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Purpose To measure the resolution of attention by means of a psychophysical procedure that quantifies attention in units of chromatic change. Expressing the size of such changes as a function of spatial frequency allows for the derivation of the effective spatial receptive field for attention to color. **Procedure** We used motion stimuli that were found by Lu and Sperling' to be ambiguous to first- and second-order motion systems. However, a third-order system, concerned only with the relative *salience* of features, yields motion. These third-order stimuli consisted of a sequence of five windowed vertical sine gratings. Each grating was exposed for 100 msec and displaced 90 deg consistently to the left or right relative to its predecessor. Isoluminant red/green gratings (bands of red and green) alternated with second-order gratings (bands of high and low contrast yellow-black texture)*. Normally, no motion is perceived in these stimuli. However, motion can be induced by adjusting the chromaticity of red or green away from background yellow or, equivalently, by instructing an observer to "attend to red" or "attend to green". Baseline psychometric functions were measured, prior to attention instructions, by collecting direction-of-motion judgments (consistent with red) vs. relative chromaticity for five spatial frequencies from 0.5 to 6 c/deg. This procedure was then repeated with attention instructions. The distance of the psychometric function with attention instructions from the baseline function was taken as a measure of the effect of attention, while the reduction in these distances with increasing spatial frequency indicated the spatial resolution of attention to color. **Results** At 0.5 c/deg, attending to a color is equivalent to a 30% increase in its chromaticity, while at 2.0 c/deg only a 12% increase. We found cutoff frequencies (50% sensitivity) of 1.6 c/deg and attention receptive field widths of -10 min. **Conclusion** Using the equivalent chromaticity paradigm, we measured attention in units of equivalent chromatic change, enabling a linear systems analysis of the spatial properties of selective attention to color.

1 . Z-L Lu & Sperling (1995). Nature, v377,237-239.

2. Blaser, Sperling, & Z-L Lu (1997) Investigative Ophthalmology & Visual Science 38.

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