

Poster Session: Achromatic increments and decrements are different: the relationship between scaling and discrimination

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Abstract

A basic problem in psychophysics is to relate the internal representation of a stimulus to its physical intensity. In this study, we measured perceptual scales for achromatic contrast with Maximum Likelihood Difference Scaling (MLDS), using squares against a mid-grey background. Observers compared two stimulus pairs and chose the more different pair. All four squares were either achromatic increments (A+), or achromatic decrements (A-). The MLDS result was then compared with 2AFC achromatic pedestal discrimination, with pedestals and tests that were all combinations of A+ and A-. The main result is not novel: A+ and A- obey different rules. A Naka-Rushton saturating function describes the A+ MLDS result well, and the derivative of that function is proportional to the A+ pedestal discrimination for some (but not all) observers. A- MLDS and discrimination results are more complicated and are reminiscent of the classic findings of Whittle (1986, 1992). The sensitivity of A- is a cubic polynomial function of pedestal contrast.

These findings will be compared with a similar study of S-cone contrast (reported

at VSS 2022), which found a different type of asymmetry between S+ and S-.

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Presumably, these increment/decrement asymmetries are due to underlying

differences between ON and OFF neural pathways. One implication is that using stimuli that include both contrast signs, such as gratings and flicker, may obscure important asymmetries in the processing of contrast.

Footnotes

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