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Patching, Geoffrey

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Geoffrey R. Patching
Department of Psychology
Lund University
Sweden

Email: Geoffrey.Patching@psy.lu.se

Systematic asymmetries are known to arise in comparison and discrimination of paired visual magnitudes. Yet, all too often, asymmetries in discrimination of visual magnitudes are dismissed as methodological artifact or assumed to arise merely as the result of bias. Here, the focus is on paired comparisons of the brightness and size of visual stimuli. Situations will be considered where people are required to compare the brightness and size of visual stimuli by making timed binary choices. An aim is to examine changes in the magnitude and direction of asymmetries with changes in the physical magnitude of the stimuli, overall levels of performance, and with changes in load processing capacity as defined in terms of our relative ability to discriminate one as compared to two visual dimensions. Increments and decrements in performance are gauged by means of the steepness of psychometric and chronometric functions. Load processing capacity is assessed by examination of changes in response time as a function of the number of dimensions, either luminance or size, or both luminance and size, over which the paired visual stimuli are physically varied. The magnitude of asymmetries in visual discrimination of brightness and size are found to increase with increased visual magnitude, regardless of whether paired stimuli are presented successively and separated by a time interval, or presented simultaneously and separated spatially. Moreover, for temporally presented stimuli, response times are faster when choice responses are based on the perceived magnitude of the first presented stimulus of each stimulus pair. In sum, the data indicate that systematic asymmetries in visual discrimination of the brightness and size of paired stimuli are perceptual and reflected in the weighted accumulation of noisy information about the difference between stimulus values over time. In addition, the data show that interindividual differences in weightings asymmetries are related to the relative processing capacity of participants. On these grounds, process of adaptive perception and discrimination optimization, as posited by Hellström (1986, Patching, Englund, & Hellström, 2012), find support from theoretically driven analyses of both response probabilities and response times in comparison and discrimination of the brightness and size of paired visual stimuli.

References

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