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ASYMMETRY OF LINE LENGTH JUDGEMENTS FOR NASAL AND TEMPORAL HEMIRETINAE. Shiro Otake and Carol M. Cicerone.
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There is a well-known asymmetry in the density of cones in nasal and temporal hemiretinae of the human eye (Østerberg, 1935; Curcio, 1990). In the anatomical data this asymmetry favors the temporal retina for areas near the fovea centralis, up to approximately 3 deg eccentricity; thereafter, the density of cones in the nasal hemiretina exceeds that in the temporal hemiretina. We predicted that this asymmetry could be assessed psychophysically using the judged length of lines presented to nasal hemiretina as compared to temporal hemiretina. Our observers made judgements of line length for stimuli of 2, 5, and 10 deg lengths presented to the left or right eyes. A variable length was compared to a constant stimulus, presented randomly to the left or right of fixation. The observer's task was to judge whether the line to the left or the right of fixation was longer. Measurements were made with stimuli centered at the fovea, as well as with a 5 deg inferior offset. Our measurements, normalized for bias using binocular measurements, show a significant difference in the judged length of lines presented to the nasal retina as compared to the temporal retina. For example, the length of a 10 deg line presented to the temporal hemiretina is matched by a line of length 9.37 ± 0.08 (SEM) deg presented to the nasal hemiretina for one observer; for another observer, the match is obtained with a line of length of 9.45 ± 0.12 (SEM) deg in the nasal hemiretina. Our results are well-fit by a simple model in which judged line length depends on the cumulative number of cones underlying the line stimulus. If such a model is correct, then this implies that there may be subtle naso-temporal asymmetries in the representation of the visual field at higher centers. Supported by BNS:8819874 and NIH EY08200 to CMC.