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LINE ELEMENT MODEL OF DISPARITY DISCRIMINATION

Sidney R. Lehky, Jennifer M. Jester *, and Terrence J. Sejnowski
*Department of Biophysics and * Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD 21218.*

A set of disparity-tuned mechanisms were used to generate disparity discrimination curves, as measured by Badcock and Schor (1985) and others. Shapes of tuning curves for the mechanisms were similar to those measured physiologically by Poggio (1984), and were divided into three classes, "near", "far", and "tuned" (to near zero disparity). Seventeen disparity mechanisms were used to model the data, six "near", six "far", and five "tuned", distinguished from each other by their peak locations and their bandwidths in the disparity domain. Tuning curve bandwidths increased as a function of peak disparity, and there was a high degree of overlap among the curves. "Near" and "far" mechanisms were major determinants of stereoacuity at the horopter. Data collected away from fixation were modeled by increasing the bandwidths, and increasing the spacing between tuning curve peaks in the disparity domain. Attempts to model disparity discrimination data using narrowly-tuned disparity mechanisms which did not substantially overlap, as postulated by some computational models of stereopsis, were unsuccessful. The modeling of the data suggests that disparity is coded in a distributed fashion, as a set of activities within a population of broadly-overlapping disparity-tuned mechanisms. (The precise numbers of disparity mechanisms stated above are probably not significant.) However, such distributed coding is contrary to the representational scheme generally used in computational models of stereopsis. *Supported by the Sloan Foundation, and NIH grant GM07057.*

Badcock, D. and Schor, C., (1985) *JOSA A2*, 1211; Poggio, G. (1984) in: *Dynamic Aspects of Neocortical Function*, G. Edelman, E. Gall, M. Cowan, eds. New York: Wiley