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DEVELOPMENT OF DISPARITY SENSITIVITY IN A CORRELATIONAL-BASED NETWORK MODEL OF THE VISUAL CORTEX REQUIRES TWO PHASES. GS Berns, P Dayan and TJ Sejnowski*, The Salk Institute, La Jolla, CA, 92037.

A correlational-based model of development of disparity sensitivity in the visual cortex was simulated. Two one-dimensional input layers, representing retinal and thalamic inputs from each eye, were fully connected to a single one-dimensional cortical layer with fixed intra-cortical connections. The weights were modified by a linear Hebb rule using correlations both within and between eyes and were subtractively normalized. Weights that reached zero were frozen. Three developmental paradigms were investigated: 1) retinal activity locally correlated within each eye but not between eyes, which might occur during prenatal development; 2) retinal activity locally correlated both within and between eyes, which might occur during postnatal development; and 3) two-phase development with the first phase corresponding to paradigm 1 and the second phase corresponding to paradigm 2, modelling both pre and postnatal development. The development of disparity and ocularity are intimately linked in our model. With no between-eye correlation, the cortex developed only monocular cells without any disparity sensitivity. Between-eye correlations throughout development led to a cortex of uniformly binocular cells with the receptive fields of both eyes aligned and thus tuned to zero disparity. The two-phase paradigm allowed the initial development of a monocular bias which was partially reversed by the addition of between-eye correlations. This resulted in a cortex populated by both monocular and binocular cells, the binocular cells tending to have zero disparity and the more monocular cells having nonzero disparity, thus matching the experimentally observed relationship of disparity and ocularity in the cat (LeVay & Voigt, *Vis. Neurosci.* 1988). (Supported by the Howard Hughes Medical Institute and SERC).