

BASIS FUNCTIONS AND HEMINEGLECT A. Pouget^{*1} and Sejnowski, T.J.². ¹Brain Research Institute, UCLA and ²Salk Institute, San Diego.

Cortical lesions in the parietal lobe of human produce a neurological syndrome called hemineglect, in which patients tend to ignore sensory stimuli in the hemispace contralateral to the lesion. Several studies attempted to determine the spatial frame of reference affected in visual neglect and found that it can be retinotopic, head-centered, body-centered, environment-centered, and in some cases, object-centered, all in the same patient.

We recently developed a theory of spatial representations in the parietal cortex based on the responses of single parietal neurons and the computational nature of sensorimotor transformations. The model assumes that parietal neurons encode their sensory inputs with basis functions (BF), a type of receptive fields that can be used to generate nonlinear motor commands. *One of the important property of BF map is that the position of an object can be represented in several frames of reference simultaneously.* We simulated a lesions of BF maps and found that, as observed in hemineglect, the resulting deficits affect multiple frames of reference, including object-centered. This model can also account for recovery from neglect that occurs over weeks and transiently after caloric vestibular stimulation. The model demonstrates that neglect can be explained without assuming the existence of explicit representations of cartesian space or object-centered representations. It relies instead on basis function maps biased for the contralateral side of space. This is, to our knowledge, the first account of hemineglect at the single cell level.