Abstract

*Tolerance to Image Transformations During Object Recognition: Computational Models and Neurophysiology*

We can visually recognize large numbers of objects in a small fraction of a second. Visual object identification and categorization rely on combining selectivity and tolerance to image transformations. Selectivity refers to discriminating an object from other similar objects and tolerance refers to the possibility of mapping the infinite number of projections that objects can cast on the retina onto the same object label. I will describe our attempts to quantitatively characterize the physiological responses in human temporal cortex during object recognition and how these responses are modified by image transformations including scaling, rotation, clutter and occlusion. The physiological recordings come from patients with intractable epilepsy who are implanted with electrodes to localize the seizure focus for potential resection. I will argue that the physiological data help set bounds that constrain the development of a theory of object recognition. I will compare the physiological responses with a computational implementation of a theory of object recognition that aims to account for the first ~100-200 ms of visual processing along the primate ventral visual pathway. During the talk, I will highlight some of the points of agreement between the computational models and the physiological responses as well as the multiple open questions and lacuna that will require further experimental and theoretical work.

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