Computational and Neural Mechanisms for Visual Suppression

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Abstract: I investigate the computational and the neural mechanisms for suppressing retinal vascular image (RVI) and attempt to generalize some conclusions to other visual suppression phenomena. First I present a new observation demonstrating RVI in negative afterimages. Then I discuss RVI suppression from a computational perspective and suggest: (1) RVI is always there in the retinal stimulation; (2) RVI must be actively suppressed on a moment-by-moment basis; and (3) in order to suppress RVI, there must exist an internal representation of RVI at a monocular stage. Mapping onto the organization of the primate visual system, particularly based on Adams and Horton's neuroanatomical demonstration of a complete representation of retinal blood vessels in layer 4C of V1, I propose that layer 4C is in fact the neural site for RVI suppression. Finally, I suggest that layer 4C is the neural substrate for phenomenal visual consciousness (particularly, color and brightness consciousness).