

Some Necessary Conditions for the Emergence of Conscious Visual Experience

by

Daniel A. Pollen, M.D.

Professor of Neurology and Physiology

University of Massachusetts Medical School

and

Associate in Psychology

Harvard College

email: pollend@ummhc.org

Abstract

The emergence of conscious visual experience requires the elaboration via recursive neuronal networks of explicit retinocentric representations of visual *content* such as shape, color and motion within specific “nodal” occipito-temporal cortical areas (Zeki) that are concurrently “projected” within explicit egocentric representations of extrapersonal spaces (see Grüsser and Landis, for review). The latter spaces, which also provide attentional control over ventral loop image representations and subserve sensorimotor integration, are largely generated within the parietal lobe (Driver and Mattingly) but not exclusively so (Karnath). Representations of both visual content and visual space must likely also be referential to neuronal representations subserving personal space, the latter irrevocably interrelated to visual space (W. Russell Brain), before conscious experience emerges together with a pre-verbal sense of *self* or *ownership* of visual experience (Humphrey, Damasio).

I have distinguished *Phenomenal* visual perception which I take to encompass subjective experiences based upon current sensory input from *phenomenal* experiences based upon visual imagery. The latter are self-generated and generally accessed from memories that are, at least initially, centered within *allocentric* or world-centered coordinates. I believe that this distinction between two types of subjective experience is strongly supported by evidence within the neurological and neurobiological literature and distinguishes differences between those perceptual experiences that are the province of posterior cortical regions

from those sustained or initiated by anterior brain regions in the absence of a current salient visual stimulus.

“Access consciousness” (Block) which includes functions such as “perceptual categorization, reasoning, planning, evaluation of alternatives, decision-making, voluntary direction of attention, and more generally, rational control of action” is based upon working memory (Baddeley) and long-term memory. Access consciousness achieves its imagery-based phenomenological status via maintenance of secondary phonological and visual representations (Jackendoff) that may persist in the absence of concurrent sensory stimulation. Prefrontal cortices, although indispensable for access consciousness and activating the “global workspace” of Baars (Dehaene and Naccache), select from and act upon our most currently salient representations within phenomenal space (Rees et al). However, these prefrontal areas are not likely essential for the emergence of immediate Phenomenal experience because such conscious visual experience survives extensive unilateral and even bilateral prefrontal lobe ablations (Penfield, Brickner, B. Milner, Petrides, Damasio), a conclusion in agreement with the more recent work of Block and Lamme’s group.

The present model, giving indispensable if not equal epistemological status to visual content, visual space and personal space, also has properties consistent with the “character” if not yet the feel or qualia-like aspects of the various sensory modalities. The model also provides some novel theoretical and experimental

approaches towards trying to define sufficient conditions for the neurobiological basis of subjective experience.