A Synesthesia Experiment: Consciousness of Neural Activity

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1. The Direction of Perceptual Pathways

1.1 Cytowic proposes that individual experiences in synesthetics differ because intermediate stages of neural processing are being drawn into consciousness, rather than their (neocortical) terminal outputs. He assumes that some perceptual information flows from limbic and hippocampal structures to the calcarine cortex.

1.2 The fact that "all these [synesthetic] phenomena... have in common... a disruption, inhibition, or suppression of higher cognitive activity" (Cytowic, 1989, page 114), may only imply that synesthesia is the result of impoverished perceptual inputs that project to the limbic system and hippocampus. Currently, there is no anatomical or neurological evidence that visual memory has projections from either limbic or hippocampal structures to the calcarine cortex. Thus, I propose the following experiment to resolve this issue.

2. A Proposed Experiment

2.1. Consider the perception of a color (e.g., "blue") while hearing a given tone in synesthesia. If the synesthetic color, "blue", is a percept, it must have some extent in space making it different from its corresponding linguistic color name. Therefore, the

synesthetic percept, "blue", implies that the actual color of the surface sharing the same perceptual space is either neutral or being suppressed.

2.2. Consequently, adding a certain amount of real "yellow" light in the same spatial region where "blue" is a synesthetic percept will have one of three possible effects. (A) It may make that region appear "gray", as when mixing colored lights (Hurvich & Jameson, 1957). This would demonstrate that a given individual's cortical color-opponent system interacts with lower level neurological structures, such as color memory. (B) If the synesthetic individual is using language to 'imagine' colored surfaces, mixing synesthetic "blue" and real "yellow" light will create the appearance of a "green" surface (as when mixing paints). A "green" percept implies that the 'blobs' in areas 17 & 18 are probably not involved (see simple synesthesia with gross brainstem lesions and analysis of color; Cytowic, 1989, page(s) 108 and 163-5, respectively). (C) If the synesthetic experience suppresses the 'real' sensory experience, adding "yellow" light will not effect the percept, and the region will remain "blue". In this case, the percept of "blue" is occurring as a result of hippocampal stimulation, which subsequently suppresses either the input (or output) from the calcarine cortex.

References

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