Synesthesia - A Real Phenomenon? Or Real Phenomena?

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ABSTRACT: This text comments on Cytowic's recent review on the current knowledge on synesthesia. Recent neurophysiological findings are discussed that suggest cross-modal interference in the mammalian brain. Based on these results, it is proposed that synesthesia may not be restricted to the phenomenologically characterized abnormality described in Cytowic's review, but rather that it may encompass a series of related physical phenomena in the brain. Some additional remarks on the relationship between emotions and consciousness have also been included.

1. Introduction

1.1 Cytowic's review presents a survey about the current knowledge on synesthesia (joint perception). A number of interesting points are discussed that bear direct implications for consciousness studies, especially the phenomenon of cross-modal interference and the usually neglected role that emotions may have over our actions. Although I have little doubt that inter-modal interference actually takes place in the human brain, I believe that the precise characterization of synesthesia as a neurological abnormality is not completely clear, at least in the way in which it was reviewed in Cytowic's article. On the

contrary, it seems that synesthesia is a much more generalized effect that may take place throughout a range of scales in the brain. The implications of cross-modal association are particularly important with respect to the everlasting riddle of qualia. This review ellaborates on these issues. Some comments have also been included regarding the relationship between emotions on consciousness.

2. Synesthesia - When Phenomenology is not Enough

2.1 The principal problem with synesthesia is that it has been almost exclusively characterized in phenomenological terms. The very features considered for its diagnosis, as described in section 4 of Cytowic's review, rely heavily on phenomenological evidence which, of course, is subjective. There is no doubt that as such, i.e. without cogent physiological or anatomical substantiation, synesthesia is destined to be treated with understandable scientific caution. I am not fully acquainted with the statistical data gathered by Cytovic and other researchers, but even if thousands of documented cases were available, that would not be enough to qualify synesthesia as a real physical phenomenon. It should be stressed at the outset that this does not necessarily mean dismissing synesthesia as a real phenomenon, but rather that more substatial physical evidence is needed. If not, based on thousands of reports, we should take for granted that UFOs have been visiting earth and abducting people.

2.2 Would that mean that synesthesia is destined to remain an elusive concept? The surprising answer is no! For, although overlooked in Cytowic's review, there is new neurophysiological evidence strongly supporting the fact that cross-modal associations do take place in the mammalian brain. In one experiment described in Rauschecker (1995), portions of the anterior ectosylvian cortex typically dedicated to vision (AEV) became responsive to auditive and somatosensory input as a consequence of cortical plasticity responses to visual deprivation in cats. Such a phenomenon implies not only improved accuracy for analysis of auditory and somatosensory information, but also raises the hypothesis that part of the auditory (or somatosensory) stimuli can be "seen" by some individuals with specific lesions or developmental abnormalities. Similar results have also been reported respectively to monkeys and humans (PET and ERP were used in the latter case). Based on such findings, it seems that cross-talk between different modalities can indeed be produced by rewired afferent connections. It is also possible that cross-modal interferences are present even in the normal cortex, though their diminished scale prevents them of being clearly perceived.

2.3 It is important to point out that such neurophysiological evidence was obtained from a neocortical region, not the hippocampus as suggested by Cytowic. In fact, given the distributed functional organization of the brain, it would be hardly surprising that cross-talk between modalities does take place. Thus, it seems we could have many manifestations of synesthesia throughout most of the brain, not just the kind of synesthesia described in Cytowic's review. This leaves us with some interesting implications. Firstly, it would be expected that blind people are more susceptible to

synesthesia. Secondly, the hypothesis that qualia perception is localized in the brain would be substantiated.

3. Emotions, Qualia And Consciousness

3.1 The proposal that the hippocampus possesses a key role in synesthesia motivated Cytowic to discuss emotions. Although I do agree with his position that the limbic system has received little attention, I question his hypothesis that the limbic system dominates the neocortex. I also believe his two clinical examples used to support such a thesis are mistaken, for: (i) low threshold does not entails dominance (the fact that we are highly susceptible to cardiac malfunctions does not mean that the heart rules over the brain) and (ii) the sequence of events that are experienced by those emerging from coma seems in fact to provide a counter-example for Cytowic's thesis, for the individual has to wait for the neocortex to dominate the rest of the brain before consciousness is recovered. The question about which part of the brain rules seem to me to transcend our current knowledge about the brain workings and be related to controversial issues such as whether consciousness is distributed or localized.

3.2 Be that as it may, the interplay between emotions and consciousness is undoubtedly an interesting issue. The reasons why emotions are important for consciousness includes: (i) they play a major role in determining our actions; and (ii) they are closely related to the elusive concept of qualia. It should be observed that emotions have been so difficult to scrutinize because they are associated with large scale brain processes. More precisely, emotions are to a large extent governed by biochemical processes, such as the release of specific neurotransmitters and enzymatic processes (see Black 1994), which influence great portions of the brain. The close relationship between emotions and qualia consists of another important topic deserving more attention.

4. Concluding Remarks

4.1 Cytowic's review provides some interesting insights about cross-modal associations. The characterization of synesthesia as a well defined phenomenon is however elusive, since it relies on subjective phenomenological evidences. New neurophysiological findings, which are briefly outlined in the present text, provide more substantial evidence supporting the possibility that cross-modality interference may be a real and even fairly common feature of the brain. Such results are however related to cortical regions and not the hippocampus as proposed by Cytowic, which indicates that synesthesia can be a much more generalized phenomenon. Some of the views expressed in the original review regarding emotions have also been commented upon.

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