

Filling in Gaps in Logic: Some Comments on Dennett

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Dennett has written a delightful book with a snappy title, “Consciousness Explained.” His purpose in writing this book was to promote the idea of “multiple drafts” (multiple parallel modules in the brain) and to debunk the myth of the homunculus. He succeeds admirably. The notion of multiple drafts is not new and I have never met anyone in my profession who still believes in homunculi, but I think Dennett has done a marvellous job in getting this message across to people outside the field. For sheer clarity of exposition Dennett is surpassed only by Russell and Medawar.

There are, however, several general problems with his approach and I will begin by mentioning two. First, in expounding his thesis, Dennett often adopts an engineering standpoint, i.e., he argues if something ought not to be done in a certain way then it probably isn't. This is a dangerous game to play in biology, since Natural Selection has no “foresight” and has often evolved mechanisms that would surprise most engineers (e.g., the two bones in our ear that are used for amplifying sound were originally part of the lower jaw, used for chewing food. No engineer in his right mind could have come up with such an inelegant solution!). Second, Dennett often gets his facts wrong, even when the facts are crucial to the idea he is trying to promote. “Filling in” is a case in point.

Blind Spots

Dennett argues that you cannot possibly be filling in the blind spot because “there is no neural machinery” (p. 324, line 17) to do the filling in. This statement is incorrect. Although each eye's blindspot is devoid of photoreceptors there is no “gap” or discontinuity in the brain corresponding to it; there is in fact a patch of cells that responds to input *from the other eye* (e.g., the part of the visual cortex that corresponds to the left eye's blind spot has a patch of cells that gets an input from the retina of the right eye). Now Dennett could argue that this patch of cells cannot be involved in “filling in” phenomena associated with the left eye but the recent work of Gattass and his collaborators (1992) shows that it *is* involved. For example, if two vertical line segments are presented on either side of the left eye's blindspot these cells respond vigorously, but they respond very poorly to either segment presented alone. It would be pedantic to argue that these cells are not, in some sense, “filling in” the gap, i.e., interpolating between the segments. (Of course, the cells also respond, as expected, to stimuli in the other eye, but that is beside the point.)

Commentary on D. Dennett (1991). *Consciousness explained*. Boston: Little, Brown.

Dennett also suggests that you “ignore” the blind spot. This argument is refuted by the bagel “popout” experiment reported by me (Ramachandran, 1992a,b) and described in McCauley’s essay in this volume.

Metacontrast

Dennett argues against “stalinesque” accounts of metacontrast, e.g., the notion that information from a “fast” (magno?) system arrives earlier and inhibits the passage of the disc seen by the slow (parvo?) pathway (p. 142).

I wonder what Dennett would have said about the perception of pain where there is clear physiological evidence for a fast pathway (dorsal columns) inhibiting or “closing the gate” for slower impulses from the pain (spinothalamic pathways) at the level of subcortical relays. What Dennett would call a Stalinesque fallacy is precisely what physiologists actually find! (In fact this principle is the central idea behind the “gate control” theory of pain and it has led to some useful therapeutic devices.) And if this sort of thing can happen for pain, why not for metacontrast?

Stages of Information Processing

Dennett argues that “discriminations only have to be made once”: once a discrimination has been made by a specialized module it does not have to be “sent” somewhere else to be further analyzed. . . . This argument is contradicted by the available empirical evidence. For example, cells in 17 respond to physical wavelength but when you get to V4, they respond to *perceived color*—clear evidence for successive *stages* of discrimination.

Artificial Scotomas

Dennett argues that we do not need to speak of “filling in” the blind spot because there is no “epistemic hunger” for this region of the visual field—there are (in his view) no cells corresponding to this region (p. 355). This is not strictly true since, as we noted earlier, there *is* a patch of cells here.

And in the case of artificial scotomas there is (or ought to be) epistemic hunger for this region of the visual field since there are cells there that would normally signal visual stimuli—they have only been temporarily silenced (Ramachandran, 1992a; 1993). So by Dennett’s own argument you should not fill in artificial scotomas.

Denial of Qualia

The problem with the “more Marilyns” argument (p. 354) is that it does not make a distinction between true *perceptual* filling in and *conceptual* filling in. For example, if I stand in a bathroom I consciously perceive (i.e., “see”) the wallpaper in front of me and I *infer*, at a conceptual level, that there is wallpaper behind my head. Obviously I do not actually “fill in” or consciously *perceive* wallpaper behind my head. The question is do you perceptually fill in scotomas or is it like the back of your head? Our results suggest that you do indeed create a perceptual

representation in the region of the scotoma (or natural blind spot) that is in many ways *indistinguishable* from the representation of the rest of the visual field. And in this sense, at least, you really fill in scotomas with “qualia.” The problem with Dennett’s view is that it does not explicitly acknowledge this distinction between neural events that are associated with Qualia and those which are not. In fact he seems to deliberately blur the distinction. And by doing so Dennett *removes the incentive* of trying to find out how the brain handles different types of information. This is the main danger with armchair physiology—it prejudices the empirical evidence.

Homunculi

Dennett’s argument that you do not need to fill in because there is no “little man watching a screen” is a red herring. The point is, surely, that at some point in evolution the brain might have found it convenient to create *intermediate level* representations of a certain kind to *facilitate subsequent computations*. “Filling in” may be one example of such an intermediate level representation (the sort of thing that is anathema to Gibsonians).

Also, Dennett’s argument about homunculi could be raised against any aspect of perception—not just filling in. For example, it is well known that the visual system “compensates” or “corrects for” distance when perceiving the sizes of objects (size constancy). If you look at a young lady lying on the grass and her feet stretched out toward you the retinal image of each foot can be (say) twice the size subtended by her head but you do not see a lady with a tiny head and enormous feet. This is because the visual system “corrects” for relative distances. Now one could argue, following Dennett’s line of reasoning, that you do not *need* to perform such corrections since there is no little man in the head looking at the corrected image. But the interesting thing is that the visual system does perform such a correction and it is a perceptual correction—not a conceptual one. We actually *see* the relative sizes correctly—with the appropriate size Qualia. Why the brain found it convenient to associate certain types of computations with Qualia is a fascinating question, but one cannot solve a problem by simply denying its existence!

Blindsight

This poses an embarrassment for behaviorists like Dennett since they do not believe in qualia. Indeed, if their view is correct *all of us* are suffering from blindsight! He seems to be saying that blindsight and malingering are indistinguishable.

Dualism

Believing in “qualia” does not make us dualists. We are not talking about spooky stuff or “brain glow” here. It may be that only certain strategies of information processing (or certain types of representation) have qualia. *So in a sense the filling in experiments get at the very heart of this distinction between*

neural events that have qualia and those which do not. The "identity" theory (e.g., Russell, Campbell) does not get rid of the problem either because it does not explain why some neural events (e.g., blindspot filling in) have qualia and others (pupil constriction with low ambient light) do not. Ultimately, any theory of consciousness must come to grips with this distinction and explain what selective advantage is conferred on the organism by subjective qualities for, otherwise, they would never have evolved. As Julian Huxley (1953) pointed out: "Granted that natural selection is the only effective agency for producing change in biological evolution, a high degree of mental activity and mental organization could only have come into being if it was of biological advantage to its possessors. This at one stroke overthrows all theories of materialism, for they deny the effective reality of mind, or reduce it to a mere fly on the material wheel."

I hasten to add these criticisms do not in any way detract from the value of Dennett's contribution. He has an important message for scholars of all disciplines and is obviously much more knowledgeable about the brain than most philosophers, physicists, or even psychologists who write about consciousness. I began with the prejudice that there was nothing I could learn from this book, but once I started reading it I found that I couldn't put it down.

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