Can we be intelligent about consciousness?

Almost twenty years ago I wrote a piece on consciousness for an otherwise splendid book with a wonderful title: *The Encyclopaedia of Ignorance* (1977) edited by Miranda Weston-Smith and the poet Ronald Duncan. At that time it was hardly respectable for a scientist to write on consciousness. When there was a move to change the title of *Encyclopaedia of Ignorance* I threatened to withdraw, and would have withdrawn this, my first-ever speculation on consciousness under a rubric other than ignorance. Perhaps because of the far greater attraction of the other contributors my piece was probably never cited and quite likely never read. The counterattractions in the *Life and Earth Sciences* volume included: Sir John Kendrew (Introduction), John Maynard Smith ("The limitations of evolutionary theory"), Sir Vincent Wigglesworth ("The control of form in the living body"), Horace Barlow ("The language of the brain"), Francis Crick ("Developmental biology"), Pat Wall ("Why do we not understand pain?") Ewan Cameron and Linus Pauling ("Ascorbic acid and the glycosaminoglycans"), and Roger Sperry ("Problems outstanding in the evolution of brain function"). This is competition indeed. So what did my humble contribution ("Consciousness"), try to say? Not a lot. Near the start it raises the question:

We may be unable to doubt sensations of red and pain and so on; but does this make it certain that we know ourselves—as origins or centres of sensations?

This naturally leads to Descartes and all that, concluding:

Perhaps we know ourselves very much as we know other people—from reactions or behaviour in various situations. We may also derive the notion of I, or self, from the syndrome of sensations, which (as the spots and high temperature of measles) seems to need a unifying concept, or even a substance—consciousness?—having or producing the collection of sensations we know.

Following a bit on multiple personalities it dares the bold subtitle "How is consciousness related to the brain?" Are we enlightened, at this critical point?

From the subtle changes of consciousness produced by drugs believed to act on the brain, and other evidence, we infer a close, highly intimate relation between brain and consciousness. But there is a conceptual gap between the brain as physical object and mental consciousness.

The next step points out (if a step can point out) that consciousness is not the only weird gap:

Large gaps are not uncommon in science. There is a large conceptual gap between the voltage across an electric motor and its shaft rotating. This is bridged by theories of electricity and magnetism. But somehow the mind/brain gap seems wider, and much harder to bridge. Why should this be so?

Why indeed. This leads to isolating phenomena for study and experiment: suggesting that Artificial Intelligence (AI) might, like chemists' test tubes, allow normally interacting functions to be investigated without overcomplicating contaminating complexities:

By isolating phenomena, it has been possible to describe and map the physical world conceptually ... one trouble about consciousness is that it cannot (or has not yet been) isolated from brains, to study it in different contexts. So the classical methods of scientific enquiry are not fully available to study it in different contexts.
It is then pointed out that correlations, though useful, are not sufficient for establishing causes.

Does consciousness causally affect the brain? Is it enough of a thing (or force or whatever) to be a causal agent? If not, what use is consciousness.

The next step: “The physical sciences have succeeded largely by rejecting consciousness and intelligence from the Universe they describe”, and:

This dropping of intelligence as causal in Nature extended from physics to Darwin’s Natural Selection. This is seen as creating intelligent solutions to design problems, but not by means of a guiding conscious intelligent entity .... This generates intelligent solutions without itself being intelligent or conscious.

I no longer take this view. Now, it seems better to allow that the processes of Evolution are (supremely) intelligent, though they are not directed or conscious. Of course this depends on a definition of ‘intelligence’. Why not define it purely in terms of success at problem solving? After all we don’t know the state of mind—the intention—the consciousness—of Newton or Darwin or Helmholtz or Picasso. We judge them from their results. They, and none of us, would exist without the incredible problem-solving successes of Evolution. Surely the processes of Evolution, especially Natural Selection, are processes of intelligence though they lack direction or consciousness.

Does this make consciousness more or less mysterious? At least it frees AI from these issues of subjectivity. Machines are, however, judged from notions of purpose: for it is impossible to assign efficiency without specifying efficiency for what. A hairdryer is an electric motor providing useful hot air; the hot air blown from a vacuum cleaner is waste. This is our judgment, as we use the dryer or the cleaner; but in error-correcting machines, such as thermostats, the machine operates itself according to criteria for success and failure—though it is not conscious. These criteria are usually provided by human designers, or users; but there is no reason why a machine should not discover at least sub-goals, useful for attaining greater goals, and indeed there are machines of this kind. So at least sub-purposes and sub-goals are within engineering and not trapped within metaphysics. And surely our Top Goals are outside mechanistic cause and effect, perhaps only explicit in aims of religion, science, and art. So far as we know Top Goals are beyond sub-goals of the most sophisticated machines, but is it impossible for a machine to make an independent value judgment? Would consciousness be necessary?

Robots are so useful in industry because they do not get bored. Repetitive tasks are hard to maintain, and in war and peace lapses of vigilance are responsible for the loss of ships and much else.

Vigilance seems to be attached to consciousness. Relatedly, surprise seems important. For those of us who have ticking or striking clocks in our sitting rooms it is a common experience to notice them only when they stop. And we notice them when a visitor calls our attention to them; otherwise, they are silent in our minds. We can, however, become aware of familiar things by selective attention. Thus examining a too-familiar picture reveals new features; looking for the umpteenth time at a visual phenomenon may elicit a new idea about it (which is a great benefit of students’ practical classes). The Ignorance piece rather fizzes out at this point. It might have continued on these lines:

Ever since Shannon and Weaver’s theory of information (Shannon and Weaver 1949) we have been tuned in to the thought that unlikeliness is necessary for information; the more unlikely, the more the information. The unlikely is surprising (when recognised) and surely the more surprised one is, the more aware one is—as one
handles more information. Thus, when driving, one is on internal Cruise Control until something surprising happens; then one is suddenly highly aware. And we can generate surprise by attending to the mundane; which, surely, is how the familiar can produce new ideas in science and art. Isn't it in surprise that we should look, psychologically, for consciousness?

Where is consciousness, or awareness, in the brain? In a recent article in Nature, Crick and Koch (1995) give their latest ideas, following Francis Crick's tour de force The Astonishing Hypothesis (1994). Isn't it striking that scientists of the highest standing can now write on consciousness without embarrassment. Now Francis Crick and Christof Koch provide evidence against consciousness in the primary processing of vision, visual area V1; though do regard V1 as highly important for vision. It seems that (at least in the macaque monkey for which detailed anatomy is available) V1 does not project directly to any frontal area. The surely very reasonable suggestion is that awareness depends on: "multilevel, explicit, symbolic interpretations of the visual scene" in frontal regions far removed from primary processing that are involved with planning behaviour. Would it be surprising if activity in these brain locations is greater during surprise? Brain scans might give the answer.

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References
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