Functions of Consciousness[1]

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integrate information or to mediate planning and flexible behavior in response to novelty. Finally, we consider the possibility that cons

Furthermore, as Libet notes, conscious causal powers are arguably preserved if consciousness can be assumed to have a ‘veto power’ over unconsciously initiated actions (free ‘won’t’ rather than free will). However, in this case there now arises the counter-problem of the possible existence of unconscious precursors to the conscious intention to veto an act. Moreover, there is an important methodological issue with the

3.0 Functional analysis

To ask about the function of consciousness is to make at least two related inquiries: (i) Why did consciousness evolve? (ii) What does consciousness do?

3.1 Why did consciousness evolve?

For many people an adequate functional explanation of a biological feature is one that plausibly accounts for its origin by natural selection. In this view, the function(s) of consciousness are the same as those features of consciousness that explain why it came to be present and maintained in certain organisms: The function of X is the effect that X has which explains why it is there. This interpretation of function can be called a 'teleological function', 'etiological function', or 'proper function' (Millikan 1989): Following (Godfrey-Smith 1996) I will refer to this sort of function as a teleo-function.

Coming up with a plausible teleo-function for consciousness is challenging for a number of reasons. First, in complex highly interactive systems such as the brain it can be very difficult to make a direct connection from any effect of a part to a selective advantage enjoyed by the whole (Gould & Lewontin 1979). Second, the function a biological feature has in the present is not necessarily the function (if any) for which it was selected during evolutionary history. Our brains presumably were not selected for reading ability, yet reading is an important brain-dependent function for contemporary humans. Third, not all present-day biological features exist as a result of natural selection. For example, it is unlikely that the color of blood or the structure of the human chin were driven by natural selection (i.e., these features are not traits).[3] Although such biological EP may be more readily suspected for simple features than for apparently complex features such as consciousness (Grantham & Nichols 1999), we have seen in the foregoing that the EP suspicion is difficult to rule out.

A further problem lies in coming up with the right sort of evidence that can turn a 'how possibly' account into a 'how actually' account (Brandon 1995). That this is difficult for adaptationist explanations in general has led to the criticism that they are often little more than 'just so stories' (Gould & Lewontin 1979), although responses to this criticism have become increasingly vigorous over recent years [e.g., (Andrews et al. 2002)]. For consciousness in particular there is the additional hurdle of widespread skepticism that empirical evidence has anything to do with consciousness. This skepticism derives from the idea that consciousness, as a subjective phenomenon, does not directly engage with objective evidence. However, a science of consciousness requires only that we be epistemologically objective, a position which is quite consistent with the correct characterization of consciousness as ontologically subjective (Searle 1992).

According to (Brandon 1995), the sorts of evidence that are required for establishing teleo-functionality are: (i) evidence that selection has occurred (i.e., fossil evidence or

[3] Of course this does not exclude that the color of blood presently has functional significance for organisms, for example as an indicator of predatory threat or disease.

other experimental evidence); (ii) an ecological explanation of relative adaptedness; (iii) evidence that the traits in question are heritable; (iv) information about population structure; and (v) phylogenetic information about trait polarity (i.e., evidence that conscious organisms evolved from non-conscious organisms and not *vice-versa*). These criteria are not easy to satisfy (Polger in press). For example, fossil evidence for consciousness is difficult to imagine and the relevant experiments are hard to design and likely to be unethical; direct evidence for heritability is also hard to come by, and population structures in proposed adaptive environments for consciousness are mostly left unspecified. In short, coming up a solid adaptationist account of the evolution of consciousness is difficult and requires going well beyond establishing what consciousness *does* for an organism.

3.2 What does consciousness do?

Instead of asking why consciousness evolved, we can ask instead what causal effects consciousness has with regard to present-day brains, bodies, and behaviors. In this view we are trying to isolate salient causal effects from among a multiplicity of effects that a given biological feature might have. A useful way to think about this is to consider the role played by the functionally characterized thing in how some larger system, of which the functionally characterized thing is a part, is able to exhibit a more complex capacity or behavior (Cummins 1975). For example, hearts have the function of pumping blood because this effect helps explain the capacity of the body to achieve circulation of oxygen. Following (Godfrey-Smith 1996) this sort of function can be called a 'Cummins-function' (another equivalent term is 'causal role function').

Of course in many cases, including the example just given, a teleological interpretation may be granted to the larger capacity (i.e., achieving oxygen circulation is likely to have

Many types of mental content can be either conscious or unconscious. For example, during normal waking consciousness we can either hold the implicit (unconscious) belief

independently of HOC. Indeed, this may be case in many animals and perhaps as well in newborn infants (Seth et al. 2005).

evidence weighs against there being a direct connection: Not all conscious thinking is rational, and not all rational behavior is conscious. The dissociation between rational thinking and rational acting is strikingly illustrated by episodes in which subjects provide false (confabulatory) rationalizations for the causes of their actions. The classic

integration of emotional valence into conscious content related to the decision options (Damasio 1994; Damasio 2000).[9]

5.3 Summary

Consciousness should not be excluded from functional roles in volition and rationality. Consciousness may be necessary for many aspects of volition; conscious decision making and conscious actions in general are often rational, and in many cases conscious

present even in inverterbrates (Ferguson & Benjamin 1991a; Ferguson & Benjamin 1991b), although whether a GW architecture is is present in these cases remains an open question.

6.2 Skill acquisition and learning

Flexible control is needed especially during acquisition of new skills. Many behavioral observations have indicated that acquiring a new skill requires conscious attention during initial phases, but that as learning progresses the execution of the skill becomes increasingly automatic (Schneider et al. 1994; Schneider & Shiffrin 1977). Consistent with this result, a recent fMRI study of motor sequence learning showed a shift from

underlying conscious experience consist of a functional cluster in the thalamocortical system, this being the dynamic core.

A recent variant of the DCH, the ‘information integration theory’ (IITC), proposes a different quantitative measure, Φ, which is based on identifying the informational ‘weakest link’ within a system (Tononi 2004). Whereas the DCH proposes that high

development and deployment of more sophisticated, flexible, and adaptive actions and action plans.

6.6 Summary

According to the integration consensus, consciousness functions to bring together diverse signals in the service of enhanced behavioral flexibility and discriminatory capacity. Theoretical proposals within this consensus are among the most highly developed and are increasingly open to experimental testing. However, integration theories must explain *why* consciousness is necessary since many integrative functions seem plausibly executable by unconscious devices. The DCH and the IITC address this issue by relating phenomenology and complexity, but for these theories it remains unclear whether high values of neural complexity (or Φ, or causal density) are sufficient for consciousness.

7.0 Beyond the integration consensus: Alternative functions

To finish we discuss several alternative ideas which both compete with and complement integrative functions. Because these proposals tend to associate consciousness with one or more existing cognitive functions they are, as usual, vulnerable to both EP and CI.

7.1 Error correction

Rodolfo Llinas has argued that the most ge

effortlessly attributing to other people mental content such as beliefs, desires, moods,

8.0 Conclusions

While there may always remain suspicious epiphenomenalists and die-hard conscious inessentialists, there is abundant and increasing evidence that consciousness is functional. This evidence pertains both to the functional utility of being a conscious organism, and to having particular conscious content. According to the integration consensus, being a conscious organism allows for the adaptive integration of many input and output signals in the service of behavioral flexibility, and the particular conscious content that is integrated functions to elicit a particular adaptive response. But because consciousness is a constellation concept covering a range of possible distinguishable processes, future

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