

Does Consciousness Perform a Function Independently of the Brain?

Jean Burns
Consciousness Research
1525 - 153rd Avenue
San Leandro, CA 94578

There is a great deal of empirical evidence that the information content of conscious experience is encoded in the brain.¹ Thus, based on this finding, various contemporary models of consciousness, both physicalist and dualist, postulate that all of such content is determined by the brain.² Physicalism holds that all aspects of consciousness derive from the physical world, and dualism holds that consciousness and the physical world are independent entities,³ and the distinction between models of physicalism and dualism can be seen in the following way: Even though the content of conscious experience is dependent on encoding in the brain, the qualities by which this content is expressed (e.g. the color blue) are different from qualities in the physical world (e.g. wavelength). In physicalism the qualities by which conscious experience is expressed can be called emergent qualities, and in dualism they are considered independent qualities which have an association with encoding in the brain.

Because of the evidence that the content of experience is encoded in the brain, many researchers, in such diverse fields as neurobiology and artificial intelligence, suppose that all processing of the content of conscious experience is also performed by the brain. Nevertheless, a number of models of consciousness, both physicalist and dualist, have proposed that consciousness can do processing independently of the brain.² Similarly to the above distinction, in physicalism independent processing can be viewed as an emergent phenomenon, and in dualism it is considered an independent phenomenon. (However, the hypothesis of independent processing is not compatible with epiphenomenalism, since the latter is a subcategory of physicalism in which consciousness is specified to be passive to the brain.)

Even if all of the content of conscious experience is encoded in the brain, there is a considerable difference between the view that consciousness does independent processing and the view that it does not. If all processing is done by the brain, then conscious experience is unnecessary and irrelevant to behavior. If consciousness performs a function, then its association with particular aspects of brain processing reflect its functional use in determining behavior.

Not all processes in the brain are associated with conscious experience, and it is the final stages of sensory and cognitive processing that have this association, rather than earlier, incomplete stages. If all processing is done by the brain, then this fact is only a coincidence. Thus, in the preliminary stage of vision processing, lines and bars are delineated, with no distinction made between objects and shadows.⁴ If consciousness has no function, you could be conscious of only this preliminary stage, and you would be able to carry out actions just as well as with your present visual experience.

Similarly, although consciousness can potentially associate with brain processes for a variety of sensory modalities, your focus of awareness is usually associated with the more significant or complicated aspects of what you are doing. If consciousness performs an independent function, then this association reflects a functional use. On the other hand, if consciousness has no function, you could be aware of familiar background noise, but not of a complicated task you are carrying out, and

be able to function just as well as with your present experience.

It might be argued that conscious experience is produced as an epiphenomenon by complex processes in the cerebral cortex. In that case, conscious experience could be associated with the final stages of brain processing, yet this association would be a coincidence with no functional significance. However, it is known from clinical evidence that the experience of pain is not dependent on the cortex.⁵ The cerebral cortex is also not necessary for the discrimination of sound intensity, and probably not necessary for the discrimination of tonal frequency.⁵ These considerations do not rule out the possibility that consciousness is passive to the brain; however, we presently have no explanation for its association with the later stages of brain processing or with the more significant or complicated aspects of behavior.

The above considerations imply, however, that if consciousness does perform a function, it makes a significant contribution to the total processing of the mind/brain system. Thus, if we had extensive knowledge of processing done by the brain, it would be possible to make an empirical determination of whether behavior can or cannot be completely accounted for in terms of brain processes. We do not presently have sufficient knowledge to make such a determination, and may not for many years. Nevertheless, the hypothesis that consciousness does independent processing can be empirically tested.

In recent models of consciousness two types of independent function have been proposed: free will and holistic information processing.² Free will is the ability to choose between alternatives. Consistent with the idea that the information content of conscious experience is encoded in the brain, free will can be considered to act as a switch to choose between alternative programs in the brain. Holistic information processing is the ability to activate, modify and/or coordinate programs in the brain.

If consciousness performs an independent function, then evolution could act not only to improve the processing ability of the brain, but also to increase the use of the mind/brain interface so that greater use can be made of the function consciousness performs. Such experiences as pleasure and pain could be understood as providing guidance about choices; emotions in higher animals and cognitive ability in humans could also serve this function.⁶ Thus there could be a gradual evolution in the use of consciousness in the animal kingdom, with primitive animals having relatively simple conscious experience, animals higher in the evolutionary line having more complex experience, and humans presumably having the most rich and complex experience.

Presumably there is a saving in neural programming if an animal, guided by pleasure, pain, or emotions, or the like, can simply make a selection among alternative actions presented by the brain, rather than having all actions completely brain determined. However, it would seem that in order to accomplish a saving in neural programming, consciousness must also be able to use different types of information encoded in different areas of the brain. Thus if independent processing by consciousness gives an evolutionary advantage, it would seem that not only free will, but also holistic information processing must be involved.⁶

Proposals made in recent models of consciousness about the functions that holistic information processing might perform include the following:² It might act to coordinate feature processors and motor programs in the brain, and thus coordinate behavior. It might contribute to the final stages of vision processing. And it might contribute to the process of insight, in which a person reaches a new viewpoint or conclusion.

Human beings can carry out actions to some extent when they are not conscious, and the contrast between conscious and non-conscious behavior also suggests that, if consciousness performs a function, holistic information processing must be involved. An epileptic who becomes

unconscious in a petit mal seizure may continue to carry out actions he has already begun. For example, as Penfield has noted, a piano student who had seizures could continue to play the piano with considerable dexterity.⁷ However, a person who becomes unconscious during a seizure does not respond effectively to what is happening around him. Also, sleepwalking mostly occurs in an unconscious (non-dream) state. In this state a person can walk, pick up and carry things, and even talk, but he does not respond well to events happening around him.

One of the most fascinating aspects of independent processing is that it violates the second law of thermodynamics, as has been shown by several researchers.^{6,8,9} One demonstration of this point is as follows: According to the second law physical processes can only go in certain directions: for instance, heat flows from hot to cold; at given conditions chemical reactions proceed in a certain direction; in a closed system molecular disorder can only increase. If consciousness does independent processing, then physical conditions in the brain must at times proceed in a different direction than the way they would otherwise have gone; in those instances the second law of thermodynamics is violated.⁶ Another argument is that holistic information processing, by making correlations, inherently produces order; since the second law can only produce a net disorder, the second law must be contradicted.⁸ Thus independent action by consciousness can produce changes in the brain which do not correspond to any physical process.

As we have already noted, empirical evidence indicates that the content of conscious experience is dependent on the brain; in this respect conscious experience follows the laws of the physical world, even though the qualities by which the content of experience is expressed are different from physical qualities. We presently have no empirical evidence as to whether consciousness performs any function independently of the brain. However, if consciousness does perform a function, it cannot be described entirely by known physical laws. Rather, even though the content of conscious experience can follow physical encoding in the brain, consciousness must then be governed in part by a principle--emergent or independent--which is different from any known physical principle.

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