

Commentary on the paper: “The contents of consciousness: a neuropsychological conjecture” by J.A. Gray, in: Brain and Behavioral Sciences.

Facing the Hard Question

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Abstract: The following points are commented upon: why is it difficult to create theory of consciousness, what is the contents of consciousness, what kind of theory is acceptable as transparent and what is the value of conscious experience.

Gray claims that we are still a long way from creating a transparent theory of consciousness and a completely new kind of theory is needed. Neither in his article nor in the commentaries much progress was made on the Hard Question: how to create a scientific, casual theory of the links between consciousness and brain-and-behavior. The article leaves rather pessimistic impression. Is the Hard Question really so hopelessly difficult and what are the reasons for this lack of progress?

Lesions have taught us a lot about localization of various mental functions but consciousness is much more robust than such cognitive abilities as recognition of words or faces. As Newman pointed out in his commentary destruction of several regions of the brain, notably RAS (reticular formation of the brain

stem) and ILC (intralaminar complex of the thalamus), induces coma. Extensive damage of subcortical structures, as described by Gray in his response to the commentaries, may lead to alterations of conscious experience. Many drugs produce also various changes in conscious experience, from enhancing certain qualia to producing a zombie-like state. Since conscious experience does not seem to depend on localizable neural tissue we have to assume that a number of structures are necessary to generate it, and part of the relevant circuits have been presented by Gray in Figure R1.

Consciousness is a particularly difficult subject to study because experiments on animals are of limited usefulness and there is little data relating human conscious experience to brain damages. We cannot cut off all memories of things red and then see how it will influence the qualia of looking at the red color. In addition, as Freeman (1995) has shown, the same stimulus and the same behavior do not imply similar neural activity. The approximately invariant entrainment of smaller groups of neurons may be embedded in chaotic activity of larger neuronal groups and therefore could be difficult to find. It is not just the activity or lack thereof, but also the proper synchronization of activities (entrainment) of several brain structures that is important for conscious experience.

Although the empirical difficulties are serious suppose that some day we will be able to determine how the proper entrainment of thalamo-cortical reverberations correlates with subjective, conscious experiences. It may even be possible to selectively “switch off” some neural nuclei for a limited time and observe the effect of such changes of brain processes on perception and qualia. Will the knowledge obtained in this way constitute a brute correlation of brain

and mind events or will it lead to a transparent theory that Gray is hoping for?

This is the central question considered here.

Is consciousness dependent on information processing or on brain states? Information processing in the brain is ultimately done by molecules (Black 1994) and therefore it is based on the real physical states of very complex matter. No amount of information processing will change a simulated vibration into a real vibration. I do not see any reason to believe that qualia and consciousness may arise out of pure information processing. Conscious experience depends on activation of real biological matter. Experiences recalled from the memory are similar, although not quite identical brain activations as the original experiences and thus the corresponding qualia are somewhat different. Subjective, first person perspective is about my states of the brain and body while objective, third person perspective is about the description of these states. As Rachlin wrote in his commentary on Gray, sensation is located in the functional interaction of the whole body and the environment. Digital processing of information misses not just the casual properties of neurons, as Searle (1980) points out, it does not reproduce the physical states of the gray matter. Evolution of these physical states may be described as information processing, but description is not reality. The states of reticulo-thalamo-cortical (RTC) feedback loop give rise to a particular experience called consciousness. Can we understand how does it happen?

The content of consciousness may result from the output of a number of comparators, of which the subicular comparator may be the most important. However, when I reflect on my own experience – despite problems of introspectionist psychology I believe that in this case we really need a better phenomenol-

ogy and books like Varela et. al. (1993) are a good start in this direction – my subjective feeling of being conscious does not depend on novelty of stimuli but rather on arousal, i.e. processes of attention mediated by the RAS system. Zen monks practicing concentration for many hours a day report a strong feeling of being conscious although they have no novel stimuli that could mismatch their expectations. In this case it is the RAS system itself which seems to maintain the high degree of vigilance and conscious feeling. It is possible that such states of concentration are just well synchronized (focused) neural RTC states leading to a strong qualia. The essence of conscious experiences does not seem to lie in the evolution from one mind object to the other. It lies rather in exploration of a single multimodal object: a thought, a sound, a visual scene, each having many features inducing a complex brain/body reactions, leading to the specific physical states of the whole organism, states dependent on individual history and hence subjective. Bodily reactions in anxiety are not just symptoms but are essential part of the experience: symptoms and causes are not separable, therefore body therapy may have strong psychological consequences.

The theory of consciousness that I find satisfactory is based on physical states of the brain, evolving according to internal dynamics created by the genetic as well as environmental factors, and on correlation of these physical states with subjectively reported qualia. The question “Why should the brain create conscious experience?” does not seem to be more reasonable to me than such question as “Why should two gases, such as hydrogen and oxygen, create water?” Indeed in the early days of chemistry this was something very difficult to accept. We can predict now some properties of water starting from quantum mechanics, and we should be able to predict (from the third person perspective)

existence of qualia expressed as subtle behavior arising from comparison of the stimuli with memorized experiences. We learn at school that water is a mixture of two gases and accept it as a fact. Why should learning that our mental experiences are an emergent property of the brain be harder to accept? Theory will never reduce “being it”, or the first person perspective, to “describing it”, or the third person perspective (in this sense mystery of consciousness will never go away, as Dennett wrote in his commentary).

Such a theory should also account for the survival value of consciousness. The ability to empathise with others, contrary to what Gray claims in his reply (R2), does not require other conscious minds and may be accumulated gradually. Internal dynamics of the physical states of the brain, from which conscious experiences emerge, allows to escape the animal “hear and now”. The evolutionary advantage of consciousness lies in the ability to avoid inflexible behavior patterns (based mostly on genetic learning) that animals follow. Consciousness and intelligence, adaptation to complex environment, are inseparable.

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