Functions of Consciousness

Graziano and Kastner begin their brilliant analysis of consciousness by asking whether it performs some function that is beneficial to survival, or is just an inevitable by-product of a large, complex brain. The by-product argument doesn't get far – it would predict that any large complex information processing device should be conscious, such as supercomputers, the internet or the network of telephone landlines. Clearly, size alone doesn't support consciousness.

Evolutionary theory indicates that consciousness does have a function. The argument requires only the assumption that consciousness be something complex, instantiated in a brain organization guided by many genes. It isn't something developmentally incidental, such as the navel.

Since consciousness is culturally universal, we can infer that it is supported by genetically influenced brain mechanisms. The corresponding genes must have been selected for during human evolution and are presently maintained by evolutionary selection. Most of the influence of natural selection is not to foster change, but to enforce retention of advantageous adaptations. Because brain tissue is energetically expensive the machinery of consciousness would be selected against if it bestowed no benefit. An analogous process is more visible in organisms such as fish that become trapped in caves, living generation after generation in darkness. Released from the natural selection that normally maintains the structure of their eyes, these fish gradually evolve to become blind. The fact that we retain the capability for consciousness indicates that natural selection is maintaining it in us; it has a function. Evolutionary theory, though, does not tell us what that function is.

The idea that self-consciousness arose from mechanisms that evolved to assess the intentions of others is compelling and convincing. Once it appeared, there is evidence that the conscious mode of brain function facilitated other functions as well, functions that enhance the ability to plan sequences of actions and to execute those plans driven by an internal structure rather than by the vicissitudes of the sensory environment of the moment.

An empirical example reveals the advantages of such a mechanism. Priming can be used as a probe by giving a person a word stem, such as fi___, and asking the observer to generate a word with that stem, such as 'final' or 'fists'. Now the observer is briefly exposed to target words, with each target word followed immediately by its stem (Merikle, Joordens & Stolz, 1995).

Instructed to complete the stem with a word other than the target word, observers sometimes correctly generated an alternative stem completion and at other times incorrectly blurted out the target word. If they were shown the target word for a relatively long time, such as a quarter of a second, they usually saw it and were able to complete the task successfully. After a shorter exposure, however, such as 50 msec, they often were unable to report the word, and were more likely to produce the target word than to choose another one. In fact, they picked the target word more often than would be expected at random. Picking the target word indicates that information about it had entered the nervous system.

Without a consciousness of that event, however, the observers were unable to prevent it from affecting their behavior as instructed.

One function of consciousness, then, is to prevent behavior from bending to the momentary availability of information in the environment. It allows behavior to be driven by one's own plans, escaping the tyranny of the environment. This and similar experiments lead to the conclusion that consciousness enables internal plans to overcome environmental nudges.

This line of evidence points to consciousness as important in cognitive processes; in fact the journal Consciousness and Cognition is based on exactly that idea (this is a shameless plug, because I am that journal's editor in chief). Though there is a convincing case for origins of consciousness in the ability to infer the mental states of others, the cognitive advantages that consciousness affords extend beyond social- and self-perception.

A corollary of the social origin of consciousness is that other animals should also have it in some form. If an animal can predict what a conspecific will do based on inferring its moods and motivations, all of the cognitive machinery that Graziano and Kastner specify will function. A tragic counterexample is severe autism, in which autistics cannot use social cues to infer the states of others; they seem conscious of events, but not of the self.

Consciousness as arising from perception and interpretation of social interactions can also be applied to speech, a uniquely conscious and uniqely human behavior. Hearing one's own speech, originally intended to communicate with others, allows a recursion where the speech stream re-enters the brain through auditory channels originally evolved to interpret the speech of others. The perceived self-speech can then make another pass through the brain, and thinking results. The process can be speeded with internal speech, using much of the same neurological machinery.

All of these processes also depend on memory, which is the normal test for conscious awareness. A teacher asking "Johnny, what did I just say?" is using a memory test for consciousness. A drunk might remember nothing of the night before. Was he conscious of those events?

The ability to infer mental states of others can also cause trouble. We evolved in environments consisting of a few hundred people at most, and even today people know by name about that number regardless of the size of the community in which they live. How, then, do we cope with a species of billions? One answer is that we treat groups as though they were individuals, assigning them personality traits and other characteristics of individuals – Italians, moslems, republicans. Our evolved capabilities for social reasoning revolve around individual people with distinct traits and personalities; when this capability assigns characteristics to groups, we use the mental machinery that evolved to understand individuals (Bridgeman, 2003, pp. 178-179). The result is stereotyping and prejudice that we can counteract more effectively if we know why it is happening.

Bruce Bridgeman