Consciousness

Consciousness is a quality of the mind generally regarded to comprise qualities such as self-awareness, sentience, sapience, and the ability to perceive the relationship between oneself and one's environment. In common parlance, *consciousness* denotes being awake and responsive to one's environment; this contrasts with being asleep or being in a coma.

Consciousness is notoriously difficult to define or locate. Many cultures and religious traditions place the seat of consciousness in a soul separate from the body. Conversely, many scientists and philosophers consider consciousness to be intimately linked to the neural functioning of the brain.

An understanding of necessary preconditions for consciousness in the human brain may allow us to address important ethical questions. For instance, to what extent are non-human animals conscious? At what point in fetal development does consciousness begin? Can machines ever achieve conscious states? These issues are of great interest to those concerned with the ethical treatment of other beings, be they animals, fetuses, or in the future, machines.

Consciousness and language

Because humans express their conscious states using language, it is tempting to equate language abilities and consciousness. There are, however, speechless humans (infants, feral children, aphasics), to whom consciousness is attributed despite language lost or not yet acquired. Moreover, the study of brain states of non-linguistic primates, in particular the macaques, has been used extensively by scientists and philosophers in their quest for the neural correlates of the contents of consciousness.

Cognitive neuroscience approaches

Several studies point to common mechanisms in different clinical conditions that lead to loss of consciousness. Persistent vegetative state (PVS) is a condition in which a person loses the higher cerebral powers of the brain, but maintains sleep-wake cycles with full or partial autonomic functions. Studies comparing PVS with healthy, awake subjects consistently demonstrate an impaired connectivity between the deeper (brainstem and thalamic) and the upper (cortical) areas of the brain. In addition, it is agreed that the general brain activity in the cortex is lower in the PVS state. Some non-Angloamerican traditions in electroneurobiology (a technical term to search the Web for them) view this loss of consciousness as a loss of the ability to resolve time (similar to playing an old phonographic record at very slow or very rapid speed), along a continuum that starts with inattention, continues on sleep and arrives to coma and death.

Loss of consciousness also occurs in other conditions, such as general (tonic-clonic) epileptic seizures, in general anaesthesia, maybe even in deep (slow wave) sleep. The currently best supported hypotheses about such cases of loss of consciousness (or loss of time resolution) focus on the need for 1) a widespread cortical network, including particularly the frontal, parietal and temporal cortices, and 2) cooperation between the deep layers of the brain, especially the thalamus, and the upper layers; the cortex. Such hypotheses go under the common term "globalist theories" of consciousness, due to the claim for a widespread, global network necessary for consciousness to interact with non-mental reality in the first place.

Brain chemistry affects human consciousness. Sleeping drugs (such as Midazolam = Dormicum) can bring the brain from the awake condition (conscious) to the sleep (unconscious). Wake-up drugs such as Anexate reverse this process. Many other drugs (such as heroin, cocaine, LSD, MDMA) have a consciousness-changing effect.

The bilateral removal of the Centromedian nucleus (part of the Intra-laminar nucleus of the Thalamus) appears to abolish consciousness, causing coma, PVS, severe mutism and other features that mimic brain death. The centromedian nucleus is also one of the principle sites of action of general anaesthetics and anti-psychotic drugs.

Philosophical approaches

Philosophers distinguish between *phenomenal consciousness* and *psychological consciousness*. Some suggest that consciousness resists or even defies definition. There are many philosophical stances on consciousness, sometimes known as 'isms', including: behaviorism, cognitivism, dualism, functionalism, phenomenalism, physicalism, pseudonomenalism, and mysticism.

Phenomenal consciousness

There is, in the view of very many philosophers, one mental function that accompanies some, or perhaps all, mental events, namely, consciousness. In a philosophical context, the word "consciousness" means something like awareness, or *that a mind is directed at something.* (That sounds more like a definition of that philosophical term "intentionality" often referred to with the layman's term "aboutness".) So when we perceive, we are conscious of what we perceive; when we introspect, we are conscious of our thoughts; when we remember, we are conscious of something that happened in the past, or of some piece of information that we learned; and so on.

In this philosophical sense of the word "conscious", we are conscious even when we are dreaming; we are conscious of what's happening in the dream. But, although currently it is doubtful that any sleep state without mentation exists, some sleep researchers believe there is a sleep stage that happens, called "deep sleep", in which apparently we are not conscious of anything in

any sense. No mental processes that involve consciousness in an ordinary or in a philosophical sense seem to be going on. So dreamless deep sleep is often pointed out as an instance in which one is alive and one's brain is functioning, but there are no mental events occurring in which there is any element of consciousness. This is a typical situation in which some electroneurobiological researchers see a change in time acuity or the ability to distinguish moments, assumed to arise from relativistic interval-dilation effects at work in brain biophysics.

Modern investigations into and discoveries about consciousness are based on psychological statistical studies and case studies of consciousness states and the deficits caused by lesions, stroke, injury, or surgery that disrupt the normal functioning of human senses and cognition. These discoveries suggest that the mind is a complex structure of various localized functions held together by a unitary awareness.

There has been some debate about the following question: Must one be conscious, in the philosophical sense, whenever a mental event occurs? For example, is it possible to have a pain that one does not feel? Some people think not; they think that in order for something to be a pain, one has to feel it and hence be aware of it. Philosophers call this the "incorrigibility" of certain mental states. Similarly, if anything is a thought, then one has to be aware of that of which one is thinking (indeed, that seems nearly a tautology); if there is no consciousness, then one is not thinking. This raises these questions: do mental events *necessarily* involve consciousness? What about functioning of the brain of which we are unaware?

Suppose we answer "No." Then, of course, what we'd be saying is that there are some mental events that do not include an element of consciousness. These events are going on even though we aren't aware of them. In other words, part of the mind is *unconscious*. Cognitive scientists believe that many cognitive processes are unconscious in this manner; we are aware of only *some* of the events that are occurring in our minds.

Some view consciousness as an emergent phenomenon, somehow arising from a hierarchy of unconscious processes. These are fairly recent views, made popular only after Freud.

The description and location of consciousness

Although it is the conventional wisdom that consciousness cannot be defined philosophers have been describing it for centuries. Rene Descartes wrote 'Meditations' in the seventeenth century and this contains extensive descriptions of what it is to be conscious. Descartes described consciousness as things laid out in space and time that are viewed from a point. Each thing appears as a result of some quality such as colour, smell etc. (philosophers call these qualities 'qualia'). Other philosophers such as Nicholas Malebranche, John Locke, David Hume and Immanuel Kant also agreed with much of this description although some avoid mentioning the viewing point.

The extension of things in time was considered in more detail by Kant and James. Kant wrote that "only on the presupposition of time can we represent to ourselves a number of things as existing at one and the same time (simultaneously) or at different times (successively)". William James stressed the extension of experience in time and said that time is "the short duration of which we are immediately and incessantly sensible". These philosophers also go on to describe dreams, thoughts, emotions etc .

Philosophers have provided a description of consciousness that is like our own experience. When we look around a room or have a dream, things are laid out in space and time and viewed as if from a point. However, when philosophers and scientists consider the location of the contents of consciousness there are fierce disagreements. Some philosophers and scientists do not hold that every mental event has a direct physical event (weak or no 'Supervenience'). As an example, Descartes proposed that the contents of consciousness are images in the brain and the viewing point is some special, non-physical place without extension (the Res Cogitans). This idea is known as 'Cartesian Dualism'. Another example is found in the work of Thomas Reid who thought the contents of consciousness are the world itself which becomes conscious experience in some way through a chain of cause and effect. The precise physical substrate of conscious experience in the world, such as photons, photochemicals, quantum fields etc. is not specified. This idea of a chain of cause and effect or chain of relations causing conscious experience to supervene on the world is found in post-modernism and some forms of behaviourism. There are few examples of scientists and philosophers who adhere to the idea that mental events are directly physical events in the brain. Those who do propose this usually argue that we only think that the descriptions of consciousness occur (eg: Daniel Dennett) although some proponents of Quantum mind, space-time theories of consciousness and Electromagnetic theories of consciousness suggest a direct correspondence between brain activity and experience.

Quantum mechanical approaches

The physicist Roger Penrose, in his book *The Emperor's New Mind*, argued for a quantum mind approach, suggesting that non-local quantum mechanical effects within sub-neural structures give rise to conscious states. He has argued for the need for a fundamentally new physics in order to explain consciousness, which he conceives as a fungible material: one of which any portion can substitute another.

This central feature of the quantum approach is of much importance: quantum mechanical theories of consciousness investigate such an entity, namely an experience having the property of being fungible, and their work has not hitherto faced the problems set by experience as it is found, namely as distinctively exclusive and "unbarterable". This for other researchers makes a main controversial point.

Penrose was not the first to suggest a link between consciousness and QM; Michael Lockwood and Henry Stapp got there first, and so did Brian Flanagan. Before them there was Bohr, the father of quantum mechanics (QM), who, as David Bohm tells us, "suggests that thought involves such small amounts of energy that quantum-theoretical limitations play an essential role in determining its character." Also of interest are the ideas of Weyl, Wigner, and Schrodinger. All of them shared in the view of consciousness as a fungible reality; adversaries of this stance call it "antipersonalism" and argue that such a construct has never been factually found.

In sum, no real evidence has been found to support any specific relationship between quantum mechanics and the occurrence of consciousness.

Spiritual approaches

Buddhism

In Buddhism, consciousness-only (Sanskrit *vijñapti-mātratā*, *vijñapti-mātra*, *citta-mātra*; Chinese □ □ , pinyin *wei shi*) is a theory according to which all existence is nothing but consciousness, and therefore there is nothing that lies outside of the mind. This means that conscious-experience is nothing but false discriminations, imaginations; a provisional antidote; thus, the notion of consciousness-only is an indictment of the problems the activities of consciousness engender.

Integral Approach To Consciousness

Ken Wilber has attempted to develop an integral approach to consciousness that unifies truths from science, philisophy, and spirituality.

Tests of consciousness

As there is still not a clear definition of consciousness, no empirical tests currently exist to test consciousness as a whole. Some have even argued that empirical tests of consciousness are intrinsically impossible. However, some researchers have devised tests to detect what they feel are certain aspects of consciousness. A test similar to this was used in the fictional novel Blade Runner by Philip K. Dick to see if a person was a robot or an actual human.

Mirror test

With the mirror test, devised by Gordon Gallup in the 1970s, one is interested in whether or not animals are able to recognize themselves in a mirror. Such self-recognition is said to be an indicator of consciousness. Humans (older than 18 months), great apes (except for gorillas), and bottlenose dolphins have all been observed to pass this test.

See also

Cognitive Neuroscience

- Attention, Blindsight, Change blindness, Cognitive science, Iconic memory, Short term memory Society of Mind, Neural correlate of consciousness, Neural Darwinism, Unconscious mind, Visual short term memory

Philosophy

- Philosophy of mind, Mind. New Mysterianism, Stream of consciousness, Supervenience, Qualia

Quantum Mechanical Theories

- Quantum mind, space-time theories of consciousness, Electromagnetic theories of consciousness, Spin-Mediated Consciousness Theory

People

- Bernard Baars, Ned Block, David Chalmers, Francis Crick, Christof Koch, Daniel Dennett, Gerald Edelman, Sigmund Freud, Thomas Metzinger, Marvin Minsky, John Searle, Larry Weiskrantz

Misc

- Altered state of consciousness, Simulated consciousness

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