

Consciousness after death

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The question of **consciousness after death** is a common theme in society and culture in the context of life after death. Scientific research has established that the mind and normal waking consciousness are closely connected with the physiological functioning of the brain, the cessation of which defines brain death. However, many people believe in some form of life after death, which is a feature of many religions.

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Neuroscience

Neuroscience is a large interdisciplinary field founded on the premise that all of behavior and all of the cognitive processes that constitute the mind have their origin in the structure and function of the nervous system, especially in the brain. According to this view, the mind can be regarded as a set of operations carried out by the brain.^{[1][2][3][4][5]}

There are multiple lines of evidence that support this view. They are here briefly summarized along with some examples.

- **Neuroanatomical correlates:** In the field of neuroimaging, neuroscientists can use various functional neuroimaging methods to measure an aspect of brain function that correlates with a particular mental state or process.
- **Experimental manipulations:** Neuroimaging (correlational) studies cannot determine whether neural activity plays a causal role in the occurrence of mental processes (correlation does not imply causation) and they cannot determine if the neural activity is either necessary and sufficient for such processes to occur. Identification of causation and necessary and sufficient conditions requires explicit experimental manipulation of that activity. If manipulation of brain activity changes consciousness, then a causal role for that brain activity can be inferred.^{[6][7]} Two of the most common types of manipulation experiments are loss-of-function and gain-of-function experiments. In a loss-of-function (also called "necessity") experiment, a part of the nervous system is diminished or removed in an attempt to determine if it is necessary for a certain process to occur, and in a gain-of-function (also called "sufficiency") experiment, an aspect of the nervous

system is increased relative to normal.^[8] Manipulations of brain activity can be performed in several ways:

Pharmacological manipulation using various drugs which alter neural activity by interfering with neurotransmission, resulting in alterations in perception, mood, consciousness, cognition, and behavior. Psychoactive drugs are divided into different groups according to their pharmacological effects; euphorants which tend to induce feelings of euphoria, stimulants that induce temporary improvements in either mental or physical functions, depressants that depress or reduce arousal or stimulation and hallucinogens which can cause hallucinations, perception anomalies, and other substantial subjective changes in thoughts, emotion, and consciousness.

Electrical and magnetical stimulations using various electrical methods and techniques like transcranial magnetic stimulation. In a comprehensive review of electrical brain stimulation (EBS) results obtained from the last 100 years neuroscientist Aslihan Selimbeyoglu and neurologist Josef Parvizi compiled a list of many different subjective experiential phenomena and behavioral changes that can be caused by electrical stimulation of the cerebral cortex or subcortical nuclei in awake and conscious human subjects.^[9]

Optogenetic manipulation where light is used to control neurons which have been genetically sensitised to light.

- **Symptoms of brain damage:** Examining case studies (like the case of Phineas Gage) and lesion studies are the only sources of knowledge regarding what happens to the mind when the brain is damaged. Various symptoms have been documented.^{[10][11]}
- **Mental development/brain development correlation:** The brain grows and develops in an intricately orchestrated sequence of stages, and this development is correlated with the development of various mental capabilities.^{[12][13][14]} Impairments in the growth and development of the brain also result in various neurodevelopmental disorders.

Death

Death was once defined as the cessation of heartbeat (cardiac arrest) and of breathing, but the development of CPR and prompt defibrillation have rendered that definition inadequate because breathing and heartbeat can sometimes be restarted. Events which were causally linked to death in the past no longer kill in all circumstances; without a functioning heart or lungs, life can sometimes be sustained with a combination of life support devices, organ transplants and artificial pacemakers.

Today, where a definition of the moment of death is required, doctors and coroners usually turn to "brain death" or "biological death" to define a person as being dead; brain death being defined as the complete and irreversible loss of brain function (including involuntary activity necessary to sustain life).^{[15][16][17][18]}

According to the current neuroscientific view, consciousness fails to survive brain death and ceases to exist.^{[19][20]}

Near-death experiences (NDEs)

A near-death experience (NDE) refers to a personal experience associated with impending death, encompassing multiple possible sensations including detachment from the body, feelings of levitation, total serenity, security, warmth, the experience of absolute dissolution, and the presence of a light.^{[21][22]}

Research from neuroscience considers the NDE to be a hallucination caused by various neurological factors such as cerebral anoxia, hypercarbia, abnormal activity in the temporal lobes or brain damage, whilst some parapsychologists and NDE researchers have pointed to them as evidence for an afterlife and mind-body dualism.^{[23][24][25][22][26][27]}

See also

- Biogerontology, the science of biological aging
- Death anxiety (psychology)
- Disorders of consciousness, including brain death
- Dualism (philosophy of mind)
- Eternal oblivion
- Life extension
- Neural correlates of consciousness
- Self
- Senescence, biological aging
- Thanatophobia, fear of death
- Unconsciousness

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Further reading

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