Brain Computer Interfaces (BCI) and Neuroprosthetics

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Brain Computer Interfaces are a direct communication pathway between a human or animal brain and an external device. They serve as an interface between the brain and computer and are designed to improve or restore aspects of the human body such as damaged hearing, sight, movement.

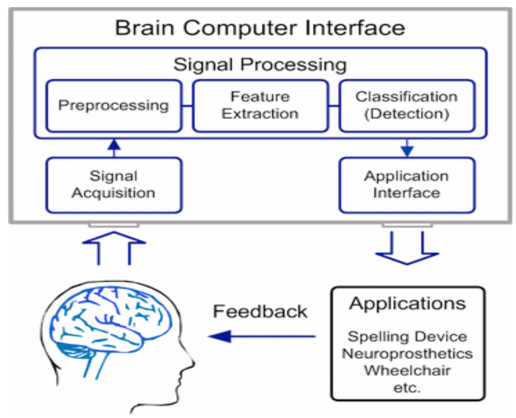
A Brain Computer Interface is an interface between the brain and computer through direct dialog between man and machine. Cerebral electric activity is recorded via the electroencephalogram (EEG) electrodes attached to the scalp which measure the electric signals of the brain. Signals are amplified and transmitted to the computer and then transformed into device control commands.

Electric activity on the scalp surface reflects motor intentions. BCI detects the motor-related EEG changes and uses this data to perform a choice between two alternatives, the detection of the preparation to move the left hand leads to the choice of the first and the right hand intention would lead to the second alternative. By this means it is possible to operate devices which are connected to the computer.

Neuroprosthetics is a process in the Biomedical Engineering Field concerned with developing artificial devices to replace or improve the function of an impaired nervous system. Cochlear Hearing Implant is an example being currently implanted in approx. 100,000.people in the U.S as of 2006.

Neuroprosthetics typically connects the nervous system to an electronic device while BCIs usually connect the brain with a computer system. Neuroprosthetics and BCI seek to achieve the same goals such as restoring sight hearing, movement, and the ability to communicate. Both use similar experimental methods and surgical techniques.

A major reason why BCIs are able to work with the body is the concept of Cortical Plasticity. When you are a growing, learning child, your brain shapes itself and adapts to new experiences, but eventually it settles into an unchanging state. In the 1990s, research showed that the brain actually remains flexible even into old age. Known as cortical plasticity, it shows that the brain is able to adapt in amazing ways to new circumstances. Learning something new or partaking in novel activities forms new connections between neurons and reduces the onset of age-related neurological problems.
If an adult suffers a brain injury, other parts of the brain are able to take over the functions of the damaged portion.



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