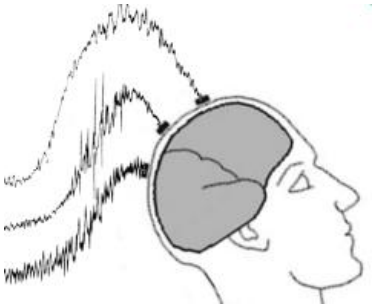

## Introduction to BCI



BCI (Brain Computer Interfaces) are systems enabling communication between a person and a computer without muscular intervention that is to say that only cerebral activity is used. In the world several millions of person with heavy neuromuscular handicap could benefit from those systems

Mainly two kinds of techniques can be distinguish. Non invasive techniques which used signal coming from surface electroencephalographic record and invasive techniques which used the signal coming from deeply implanted electrodes on the brain. Invasive methods obtain a signal of better quality and enable complex application like control of artificial organ. However, they required a heavy surgical intervention. The non invasive method like the P300 speller are enough to give back a communication potential emulating a keyboard or a mouse.

## Event related potential

The P300 speller is based on Event related potential (ERP) which are cerebral waves propagated un the cortex after stimulation (visual, hearing or tactile) To type of ERP can be distinguish :
- Exogenous potentials, corresponding to non cognitive activity. They appear after luminous flash, a noise or a sudden action. Their location on the cortex depends on stimulation type. For example, a visual stimulation causes a decrease of electrical potential 100 ms after the stimulation (called N100), in the occipital area.
- It exists as well endogenous potential corresponding to cognitive activity. For example, a patient is asked to differentiate two visual stimulations X and O. The X are less common than the O. The patient has to count the number of appearing X. At each X, an endogenous ERP appears 300 ms after the stimulation on central and parietal area (called P300). It's this kind of potential which is used by the P300 speller.

## Le P300 speller

This paradigm use visual stimulation enabling to write by spelling. The method consists in displaying a 6x6 matrix composed by the figures and letters. Lines and columns of the matrix are successively highlighted. When the line or the column contain the chosen letter, a P300 ERP appears. A classifier is then used to determine if this signal correspond to a positive response or not.

Video coming from [http://www.bci2000.org](http://www.bci2000.org)

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 | Administration