

## Measure brain activity with EEG!

**Why measure brain activity?** The brain coordinates the regulatory system of the body and is the centre for memories, emotions and decisionmaking, and encodes our behaviour relative to our environment. Thus there are a range of applications from pathology to research about emotions, decisionmaking, memory processing and sleep where you are interested in brain activity, and you often want to correlate this with other psychophysiological parameters.



### EEG

Brain activity consists of a complex network of neurons that are communicating with each other by means of electrical impulses. EEG measures the projection of the electrical field onto the skull. This method has the advantage that it is well established, has excellent temporal resolution, is a DIRECT method, and has a reasonable cost.

#### What is an EEG signal and how is it measured?

The EEG signal is the difference in electrical potential between two positions on the skull. You attach conducting electrodes either by means of a multi-electrode CAP, or you can glue them one by one. Normally you have several active positions and one common reference point. Then you measure the voltage between the active position and the reference electrode.

Scalp signals can be in the 0.2-200 $\mu$ V range and contain frequencies 0.01-100Hz. One usually separates discussions of very fast transient signals (ERP) and very slow cortex potential changes (SCP) from the typical EEG range 0.4-44 Hz.

The EEG signal is often decomposed in frequency bands because it happens that the energy in the different frequency bands typically contains information about various states and areas of the brain. Below is a simplified table to get a perspective:

Name	Frequency	Increased level associated with
	0.01-3Hz	SCP – Slow Cortical potentials
delta	0.5-4Hz	deep sleep, dominant in small children < 2y
theta	4-8Hz	sleep, drowsiness and lack of attention
alfa	8-13Hz	inactive occipital lobe (eyes closed)
beta	13-30Hz	increase attention
gamma	36-44Hz	brain activation/glucose metabolism, attention, arousal
	<1 kHz	fast ERP, transient responses

### What equipment do you need to measure and analyse EEG?

You need a data acquisition system with filters and amplifiers optimized for EEG (or ERP) and then you need a set of single electrodes or an electrode CAP. You also need a software that in can acquire, do postprocessing and compute the desired measures. Another very important thing is a system that allows synchronization the data with stimuli and any other simultaneously recorded physiological measures.

### Great solutions from BIOPAC for measuring and analysing EEG:

**MP160 and EEG100C with 10/20 cap or single electrodes »**

**Mobita 31ch wireless EEG / logger with plain water electrodes! »**

**b-Alert 9ch wireless s EEG med cognitive state metrics »**

**Bionomadix 2-ch wireless EEG-amplifiers. Use with MP160 or logger »**

**epoch wireless EEG implants for mice/rats »**

## Read more about EEG »

For further questions please contact Fredrik Rådebjörk [fredrik@jor.se](mailto:fredrik@jor.se) that is responsible for these products. We encourage you to tell us about your project details and goals and we will get back to you with more specific proposals and discussions for your specific project.

## Don't miss the webinar on EEG!

**EEG WEBINAR | EEG for Psychophysiology Research  
THURSDAY, APRIL 20, 2017, 17:00 - 18:00 CEST**

In this Webinar, attendees will learn the system options for adding EEG data to psychophysiological research applications, proper setup, and identification of usable EEG data for a variety of systems recording up to 32 channels of surface EEG from human subjects with traditional Ag/AgCl electrodes and water electrodes.

Additionally, this webinar will review system solutions for wired, wireless, mobile applications. A hardware solution for applications where cognitive state metrics are desired will also be presented, as will an overview of selected EEG fundamentals.

**Topics and free registration »**



Skulle du föredra att få dessa nyhetsbrev på svenska i fortsättningen?  
Skicka ett mejl till [biopac@jor.se](mailto:biopac@jor.se) och meddela oss.

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