Dataset description: EEG recordings of a c-VEP Brain-Computer Interface (BCI)

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This document describes the dataset[1] we recorded for a previous publication [1], in which EEG data was recorded from 9 subjects who controlled a c-VEP Brain-Computer Interface (BCI).

Data acquisition

EEG Data was recorded from 9 healthy subjects who used the c-VEP BCI, which has been described in detail in a previous publication [1]. All subjects had normal or corrected-to-normal vision. A summary over age, sex and previous BCI experience of the subjects can be found in table 1. EEG data was recorded with two g.tec g.USBamp at a samplingrate of 600 Hz and a Brainproducts Acticap system with 32 channels. Two electrooculogram (EOG) electrodes were placed beside the left eye and at the center above the eyes. The location of the 30 EEG electrodes is depicted in figure 1. The ground electrode was positioned at FCz and the reference electrode at Oz. The data was bandpass-filtered by the amplifier between 0.5 Hz and 60 Hz using a Chebyshev filter of order 8 and an additional 50 Hz notch filter was applied.

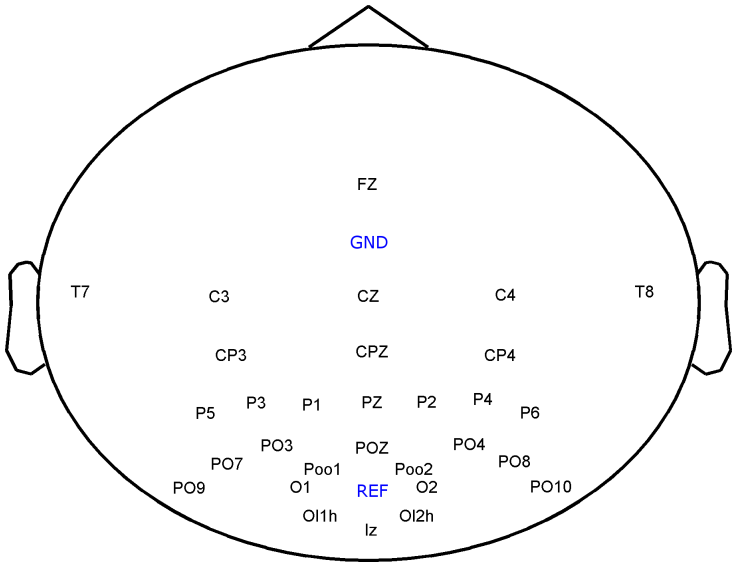

Figure 1. Location of the 30 EEG electrodes. Ground electrode (GND) was positioned at FCz and reference electrode (REF) at Oz.

Each subject participated in two sessions. For 4 subjects session 1 and session 2 were performed on different days, since they also participated in another EEG study that was done on two different days. For the other subjects both sessions were performed on the same day with a break of about 10 minutes.

[1] can be downloaded at: `http://www-ti.informatik.uni-tuebingen.de/~spueler/eeg_data/`

Each session lasted about 30 minutes and consisted of 10 runs. In each run the subject was instructed to spell 64 letters using the c-VEP BCI system, so in total one session consisted of 640 trials.

Table 1. Age and sex of the subjects as well as the number of days between session 1 and session 2 and the previous BCI experience of the subject: **-** subject has no experience with that kind of BCI, **x** subject has previously used that kind of BCI and was able to control it, **o** subject has previously used that kind of BCI but was not able to control it. Subject AJ was excluded from the study due to excessive blinking.

				previous BCI experience			
Subject	Age	Sex	Days between	c-VEP	SSVEP	SMR	P300
AA	26	f	1	-	-	x	x
AB	29	f	3	-	-	x	-
AC	28	m	1	-	-	x	x
AD	26	f	0	-	-	x	x
AE	29	m	0	-	-	x	-
AF	28	m	1	-	-	x	-
AG	28	m	0	-	-	o	-
AH	28	m	0	x	-	x	-
AI	28	m	0	-	-	-	-

Structure of dataset

In total the dataset consists of 18 sessions (9 subjects with 2 sessions each). The data for each session is saved in a separate *.mat* file which can be read using MATLAB software. The EEG data for each session has already been cut into trials with the corresponding labels. Each *.mat* file contains the following variables:

- *data_x* - this variable has dimensions *trials* × *channels* × *samples*. It contains all 640 trials for one session. Each trial contains 630 samples from 32 electrodes. The data was recorded at a samplingrate of 600 Hz.
- *data_y* - this variable contains the label for each trial. In total there are 32 different classes corresponding to the 32 possible letters that can be spelled using the c-VEP BCI system.
- *subjectinfo* - this variable contains information about the subject, the electrode placement and the samplingrate of the data.

Please cite [1] when you use this dataset in a publication.

References

1. Spüler M, Rosenstiel W, Bogdan M (2012) Online adaptation of a c-VEP brain-computer interface (BCI) based on error-related potentials and unsupervised learning. PloS one 7: e51077.