Frequency tagging and the steady state evoked potentials

Published: 24-11-2008
Last updated: 10-05-2024

Understand the influences of repeated sensorial stimulations on brain*s activity. Specific questions will be: 1) induction of alpha synchronization and its relation with individuals* performance; 2) neural correlates of divided attention in a within...

Ethical review	Approved WMO
Status	Pending
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON31520

Source
ToetsingOnline

Brief title
Brain FM

Condition

- Other condition

Synonym
helathy individuals

Health condition

gezonde mensen

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen
Source(s) of monetary or material Support: NWO

Intervention

Keyword: attention, electroencephalography, frequency tagging, steady steate evoked potentials

Outcome measures

Primary outcome

In experiment 1 main study parameter is the difference in behavioural performance between when an oscillating object is displayed in the background or not. EEG will be used to verify that the frequency tagging techniques has induced the brain synchronization when the oscillating object was displayed. The EEG should not be synchronized when the oscillating object is not displayed.

In experiment 2 and 3 main study parameter is the electrophysiological measure of attention allocation. This is quantified computing the power spectrum of an EEG trace. Additionally the study underpins a fundamental psychological mechanism (i.e. attention) which is not known to be influenced from physical characteristic of healthy participants (i.e. sex, body weight, etcetera). It should also be noticed that we are comparing different levels of attention, for instance pay attention or ignore something(s). The effects that will be observed at an electrophysiological level are thus exclusively induced from the experimental setting. For this reason we can exclude that there are other variables than the experimental manipulations which affects the results of our

study.

Secondary outcome

There are no parameters which might intervene with the main study parameter.

The fundamental nature of this study permits to exclude any confounders like

body weight, smoking, sex, etcetera.

Study description

Background summary

we aim to conduct three studies to clarify the influence of frequency tagging on the brain response. The effects of frequency tagging will be analyzed considering intrinsic aspects of the stimulation (i.e., topography and likelihood of the response, questions analysed in all the experiments) as well as aspects related to the effect of the use of the frequency tagging technique (i.e. does the technique disturb the execution of a task, or may it provide some advantage in some case, questions addressed in experiment 1). Experiment 2 and 3, will use frequency tagging as a tool to underpin the neural dynamics of divided attention addressing differences between within modality (visual and auditive, experiment 2) and cross modal (experiment 3) divided attention.

Study objective

Understand the influences of repeated sensorial stimulations on brain*s activity. Specific questions will be: 1) induction of alpha synchronization and its relation with individuals* performance; 2) neural correlates of divided attention in a within and cross modal divided attention context.

Study design

individuals will participate to one experiment where EEG will be measured while performing a task. Experiment 1 will use the attentional blink paradigm (AB, Raymond et al, 1992) as a cognitive task to test if increases in alpha rhythm increases performance. In the AB paradigm 2 letter targets are embedded in a stream of 12 digit distractors. Participants* task is to identify the two targets. Usually the second of the two targets is missed when it follows 500 ms after the first. In our version of the paradigm half of the trials will be displayed with an oscillating object on the background. The oscillating object will induce synchronization of the alpha rhythm, thus should improve individuals* performance.

In Experiment 2 individuals will participate to one experimental session where EEG will be measured while performing a letter detection task. Two streams of alphanumeric characters (letters A to K and the digit 5) will be displayed on the left and right side of the screen. Participants*task is to detect the 5 on the stream while their eyes will be fixed on a *+* in the centre of the screen. Attentional conditions will require the participants to direct their attention either to the left, right, or to divide attention between both streams. Experiment 3 will be performed in two sessions. In one session (i.e. visual divided attention) the participants will have to detect colour or shape changes in 4 squares oscillating with 2 different frequencies. The squares will be arranged at the vertexes of a fixation cross (+). In the other session (cross modal divided attention) two squares will be displayed on the horizontal mid line of the computer monitor and simultaneously a sound will be played. Participants will have to detect the changes in colours or dimensions of the squares or the frequency change of the sound.

Study burden and risks

(valid for the three experiments): EEG measurements are not invasive. The nature of the stimulation (a flickering square) can induce epilepsy in epileptic individuals. Photosensitivity (or epilepsy history) will be specified as exclusion criteria on the experiment advertise. The experiment is not harmful for the participants.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

1 Healthy individuals
2 between 18 and 40 years old
3 Participants should understand English

Exclusion criteria

1 History of epilepsy (also in the family)
2 Use of drugs or medicines that could impair cognitive abilities
3 Participants older than 40 years.

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-02-2008
Enrollment:	48

Type:	Anticipated

Ethics review

Approved WMO Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL20994.042.07