Correlating neural activity with changes in visual experience

Published: 24-11-2008
Last updated: 07-05-2024

How do a spatial shift of attention and an increased working memory load influence the dynamics of neural competition?

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

Summary

ID

NL-OMON32189

Source
ToetsingOnline

Brief title
Visual Experience and EEG

Condition

- Other condition

Synonym
healthy individuals

Health condition

gezonde mensen

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Binocular rivalry, Consciousness, EEG, Visual experience

Outcome measures

Primary outcome

Main study parameter is the differentiation between the two rivalry conditions

which will be analyzed in the EEG.

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 habits, caffeine intake, sex, etcetera.

Study description

Background summary

In the proposed research project, we intend to find evidence to assess to what extent neural competition occurs in absence of perceptual rivalry. To answer this question, we intend to use a frequency-tagging approach to binocular rivalry, and supplement this approach with an n-back task to capture the subject*s attention in a part of the experiment. Measuring EEG with 64 electrodes will result in a spatial resolution that makes it possible to investigate the amplitudes in the SSVEP as well as its spatial extend. Furthermore, the spatial resolution will be reasonable for the analysis of changes in neuronal synchrony. If successful, the proposed research will fill a void in our knowledge of the neural basis of binocular rivalry, which is a model phenomenon in the study of conscious perception.

Study objective

How do a spatial shift of attention and an increased working memory load influence the dynamics of neural competition?

Study design

The stimuli for rivalry are presented each on one side of a computer display;

an opaque screen bisecting the display makes sure that each eye only receives stimuli from one side of the display. Both the stimuli will be tagged with a unique frequency which will permit to study the neurodynamics of the alternating percepts. Participants are instructed to fuse the images so that binocular rivalry is the result. Above the stimuli for rivalry, identical letters for the n-back task are shown so that fusion of the images results in a perception of a single letter. Between the letters and the images, dots are presented, and the subjects are asked to direct their focus to these dots.
In one part of the experiment, subjects are asked to ignore the letters, and report their perceptual experience, using one key to report experience of the left image and another for the right image. In the other part of the experiment, the subjects are asked to do the n-back task. This way, attention has to be directed at a different spatial location and the subjects* working-memory load can be manipulated.
The relation between perception and dynamic changes in brain activity will be investigated neurophysiologically, by correlating perceptual reports with patterns of alternation in stimulus-evoked amplitude and synchronization of EEG activity in the brain. Behavioral measures of response accuracy for the n-back task will be analyzed to make sure that subjects are performing the task sufficiently well.

Study burden and risks

The application of the electrocap on participants head takes about 45 minutes in total. The experimental task during which the EEG is measured takes about one hour, depending on the duration of the breaks participants decide to have between the conditions. The task is presented in 4 blocks of about 15 minutes, including small breaks between conditions. When the experimental session is concluded the electrodecap will be removed and participant*s hair washed. There are no risks in participating in the experiment.

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

Exclusion criteria

1 Use of drugs or medicines that could impair cognitive abilities
2 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:	Recruitment stopped
Start date (anticipated):	22-07-2019
Enrollment:	11
Type:	Actual

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	NL21604.042.08