Effects of Caffeine and Mental Fatigue on Selective Attention

Published: 21-12-2010
Last updated: 04-05-2024

The main research questions are whether caffeine influences the development of mental fatigue during task performance as reflected in task performance and how caffeine influences the strength of visual selective attention, reflected in...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON34588

Source
ToetsingOnline

Brief title
Caffeine, mental fatigue and attention

Condition

- Other condition

Synonym
Not applicable

Health condition

geen

Research involving
Human

Sponsors and support

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

Intervention

Keyword: caffeine, event related potentials, mental fatigue, selective attention

Outcome measures

Primary outcome

Experimental research parameters are caffeine versus placebo, size of target,

size of flankers, stimulus congruence, and block (measure for time on task).

The outcome variables are the reaction times, response accuracy and brain

activity, reflected in event related potentials (ERPs).

Secondary outcome

Subjective fatigue ratings, as determined by the AD-ADL (Thayer, 1989)

Study description

Background summary

When people are working on a cognitively demanding task for a prolonged period of time, they start experiencing mental or cognitive fatigue, reflected in deteriorated task performance. An important observation is that mentally fatigued people often report having a hard time keeping their attention focused and that they are easily distracted. In a previous study that we performed, we found neurophysiological evidence that selective attention is indeed negatively affected by mental fatigue. Mentally fatigued people find it mainly harder to block out irrelevant information.
Caffeine is a stimulating substance, that is used to counter fatigue. Little is known about the effects of caffeine on mental fatigue, as induced by time on task, and the sustainability of the it's effects. Nevertheless it is not unlikely that caffeine does have a attenuating effect on mental fatigue as well, because of similarities between the two. Under normal circumstances, mental fatigue causes gradual changes in both overt behaviour and neurophysiological markers of attentional processing, however, how caffeine

influences this remains unknown. Therefore, the main question that we seek to answer is how caffeine alters the development of the effects of mental fatigue over time.
Besides investigating performance degradation, this study will specifically investigate how caffeine changes the relation between processing of relevant and irrelevant sensory information during different stages of mental fatigue. The method that we used in our previous study has shown that it can be used to specifically discriminate between these two effects of selective attention.

Study objective

The main research questions are whether caffeine influences the development of mental fatigue during task performance as reflected in task performance and how caffeine influences the strength of visual selective attention, reflected in electrophysiological differences in the processing of relevant and irrelevant visual information.

Study design

The experiment is divided into two sessions for the two conditions, the caffeine and control/placebo condition. The order of these conditions will be assigned randomly. In both conditions the participant will have to drink a cup of decaffeinated coffee. In the caffeine condition 3mg of caffeine per kg of body weight will be added. In the control condition a similar amount of a physiologically inert substance will be added. The order of assignment to the experimental or control condition will be determined double blind.
During the experimental session, EEGs will be recorded, while subjects are performing on an adapted version of the flanker task (Eriksen & Eriksen, 1974). In order to measure specific effects of attention on relevant and distracting information, a size manipulation will be applied. Our interest will go out to electrophysiological effects that have sources in visual processing areas. Here interaction effects between flanker size and other independent variables can be interpreted as the influence of these variables on the gain modulation of distracting sensory signals and interaction effects between target size and other independent variables can be interpreted as the influence of these variables of the gain modulation of relevant sensory signals.
Subjects have to report the identity of the central target stimulus, by pressing a button (left button for H and right button for O). In total, they will have to perform this task for two hours. In order to acquire subjective measures of fatigue, participants will be asked to fill out a short form, consisting op 20 questions with 4 response options (AD-ADL; Thayer, 1989), before and after each experimental session.

Intervention

Pseudo random and counter balanced administration of caffeine.

Study burden and risks

The subjects may experience the experimental task as fatiguing, because of it's duration. The recording of EEG poses no risks.

Contacts

Public
Rijksuniversiteit Groningen

Ganzevoortsingel 21
9711 AJ Groningen
NL
Scientific
Rijksuniversiteit Groningen

Ganzevoortsingel 21
9711 AJ Groningen
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

Healthy males or females
Normal sleep patterns
Between 18 and 30 years of age
Normal or corrected to normal vision
Right handed

Having a taste for coffee
Have signed the informed consent form

Exclusion criteria

Neurological complaints
Working night shifts
Use of medication/drugs that may affect task performance or the neurophysiological results of the study

Study design

Design

Study type: Interventional

Masking:	Double blinded (masking used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	08-03-2011
Enrollment:	20
Type:	Actual

Ethics review

Approved WMO

Date:	21-12-2010
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	NL33708.042.10