Information Form for Healthy Subjects

TITLE OF THE STUDY
Mental Work: BMI and Kinetic sculptures exploring 200 years of human-machine interaction

Principal Investigator (responsible for the project):
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General Information
We propose your participation in this study in the frame of the Mental Work exhibition. For this purpose, we will record electrical activity of your brain to train a computer model to establish this so-called brain-machine interaction (BMI). A BMI cannot read your thoughts! It only is able to recognize pre-trained brain activity patterns. To this end, you first have to teach the computer how your brain signals look like whenever you perform a given task (e.g., to imagine hand movements, or relax). Only then the computer is able to partly re-recognize these intentions. BMI is not possible for everyone following a short training, but once this brain channel is established, you will be able to control the machines in the installation.

You can participate in this study if you are between 15 and 90 years of age, are in good general health and do not fit any of these exclusion criteria:

- Any condition that hampers the successful EEG acquisition (for example, skin infection, dermatitis, scalp wound, scalp reconstruction, intracranial implants, particularly dense hairstyle),
- Movement disorders leading to large involuntary movements or tremor (e.g., Dystonia, Cerebral Palsy, Parkinson disease),
- Presence or familiarity to epilepsy or any seizure in past (e.g. convulsion during childhood),
- Attention-deficit hyperactivity disorder ADHD (moderated to severe): Brain-machine interfaces require to the subject a certain amount of concentration and may lead to fatigue,
- Severe understanding disorders (Wernicke's aphasia, Alzheimer): participants need to be able to understand all the instructions rapidly,
- Severe visual impairment (not treated): participants need to be able to see the instructions and the feedbacks displayed on the screens.

If some points are obscure, you can ask the researcher for additional clarifications. If any sensitive information about your health status emerges, it will be treated as strictly confidential and not recorded elsewhere. Whatever will be your decision about participation, there will be no adverse consequences of any kind.

Please read this form carefully form and do not hesitate to ask questions if you do not understand something or if you wish supplementary information.

2 Aim of the study
This research study aims to explore several brain mechanisms as means of controlling machines and interacting with them. This study is performed in the context of a public installation to allow gathering data from a large population with little or no previous experience in brain-machine interfacing. Understanding these processes will allow us to improve and develop new and more reliable BMI methods and paradigms in the future, with potential applications in human-machine interaction, as well as assistive devices for people with disabilities. We will not only record brain activation (electroencephalography, EEG), but also muscular signals (electromyography, EMG) or ocular signals (electrooculography, EOG). Furthermore, user appraisal of the protocols and cognitive workloads will be obtained by means of post-experimental questionnaires.

3 General information about the study
This study is run in accordance with the Swiss legislation and international guidelines. Furthermore, it has been approved by the Cantonal Ethical Committee.

4 Study procedure
The study will be run at the ArtLab facilities and exhibition halls at EPFL, in Lausanne. More precisely, the study will be conducted in the exhibition space known as "Espace Art-Science", located in the central pavilion of the ArtLab building.

For the Mental Work project, said exhibition space benefits from a temporary exhibition design that converts it into a "thought factory" that welcomes both "workers" (called "*mental workers*" in the project lingo - participants to the present study belong to this first audience category) and simple "visitors". While these two categories of audiences ultimately join in the same principal exhibition zone, "mental workers" pass through an anteroom separated from said main space by temporary exhibition walls and curtains. This anteroom is called the "training space" in the project's jargon.

Once you, as a "mental worker", have been led into said training space, you must carefully read the present document and sign the Consent Form that follows it. A researcher will be present to answer all your questions. Once you have signed the Consent Form, you will be equipped with recording electrodes and you will familiarize yourself with the procedures and tasks to be accomplished over the course of your work session during a brief training phase. After the training session, you will be processed into the principal exhibition zone where you will be asked to use the BMI system to activate four different machines in a sequential manner. Please note that other people will be present during this period and will be able to observe you or take pictures of you while you perform the experiment. The duration of the experiment is between 1 and 1.5 hours (which is called a "session"), including the training phase.

During EEG recordings, you will wear a helmet that has previously been sterilized with rubbing alcohol. For the EMG and EOG recordings, electrodes will be attached with tiny stickers to the skin or self- adhesive electrodes will be used.

5 Subject's right
Your participation in this study is voluntary. Interrupting one's participation in the study or withdrawing one's consent to participate in it does not bear any consequence for the participant, and no justification will be asked of you.. Please note however that in the case of a withdrawal of consent, data collected priori to withdrawalcan still be analyzed and anonymized (HRO, Art.10). Note also that your participation can be interrupted at any time by the experimenter or by the principal investigator of the study, especially in case of health problems.

6 Subject's obligations
During your participation, you have:

- to follow the instructions of the experimenter and to comply with the aims of the study;
- to inform your experimenter or the staff about eventual alterations and modifications in your condition;
- to inform your experimenter about your taking medications, including medications prescribed by a doctor, purchased by yourself without prescription and/or alternative medicines.

7 Benefits for participants
Your participation in this study does not have any direct advantage for you. However, your participation is important because it allows the increase of scientific knowledge in this field. These experiments allow us to better understand how the human brain works, and perhaps in the long run they will contribute to improving rehabilitation training processes for spinal cord injuries, for traumatic or neurological patients with cognitive, motor disorders or pain.

8 Risks and inconveniences resulting from the study participation

No risk is estimated in this study if all the exclusion criteria are respected. Regarding the experimental tasks, no secondary effect is associated with these methods: we do not use any invasive technique nor any medication. In any case, any appearance of new symptoms/disorders has to be reported to the investigator. A moderate fatigue will be possible after the experiment, comparable to a normal exercise or playing on a computer.

9 Data confidentiality

Some of your personal data will be collected during this study. These data will be made anonymous, that is they will be associated with a unique code. The list of codes is established and kept by the principal investigator. Only the encoded data will be available to experts for scientific evaluation. An anonymized version of the collected data will be published in a public repository and made available to the scientific community at large. The privacy of these data remains guaranteed during and after the study. Your name cannot be in any case published in reports or publications following this study.

The project can be subject to inspection over its course. Inspections can be carried out by the Ethics commission tasked with initial control and authorization of the project, but they can also mandated by the organism that initiated the project.

10 Remuneration of the participants

You will not receive no remuneration for your participation in the study.

11 Damage compensation

If during or at the end of the experiment you should suffer from any health issue or any other type of damage, you can contact the relevant investigators (Prof. Millán), who will inform you of the correct procedure to follow. The promoter (EPFL ArtLab) is liable for compensating any damage you could potentially be the victim of during this study. For this purpose, the promoter is covered by EPFL's public liability insurance (La Mobilière - policy number: 501.42430.002).

12 Interlocutors

In case of an emergency, doubts or unexpected/undesirable events occurring during or after the study, as well as for questions regarding the study, you can contact the investigators of the study at any time, on site or per email (Ricardo Chavarriaga, PhD / ricardo.chavarriaga@epfl.ch; Arnaud Desvachez / arnaud.desvachez@epfl.ch)

13 Project funding

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Thank you very much for your participation.

The principal investigator, responsible for the project,

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