

Equipment Information

This information sheet provides general information about the equipment used in the studies conducted by [lab]. The equipment mentioned here includes physiological recordings instruments as well as human-computer interaction interfaces. The use of this equipment is required to obtain a more detailed understanding of the processing done by human minds, brains and bodies.

Please read this information carefully if you consider participating in one of our studies and the specific study you are considering includes explicit mention of these tools.

EEG



Continuous electrical activities in the brain can be measured and recorded by using electrodes placed on the scalp. The result of such measurement is called an electroencephalogram (EEG).

The EEG measurement requires some amount of preparation, both by yourself at home and in the lab before the experiment. The procedure is safe and the electrical recording itself does not induce any pain or sensation to you.

Preparation at home

To make the EEG-measurement run more smoothly, you should:

- Wash and dry your hair. Do not use hair conditioner, gel, hairspray, etc.
- Do not use face cream or make-up.
- Wear clothes that you don't mind getting dirty if some electrode gel gets on them

Preparation in the lab

A cap (sort of bathing cap) will be put on to your head. In this cap, a large amount of measuring electrodes will be attached. Your eyes, nose, mouth, and the underside of your face will remain free. The cables will be held together with Velcro straps, so they do not get in the way of your movement.

To obtain good signals, it is important to maintain the conductivity between the electrode and skin. To that end, a small amount of conductive gel (0.2 to 0.3 ml) will be inserted in between the electrode and the skin on your scalp. Testing of the resistance and inserting the gel is done with a syringe with a blunted needle. You might feel the contact with the needle, but it will not pierce the skin.

The preparation will take about 30 minutes.

After the experiment

After the completion of the experiment, the experimenter will remove the cap with the electrodes. If you want, you can rinse out the gel from your hair, wash and dry your hair in a shower room adjacent to the experimental lab. You can use shampoo, towel and a hair dryer available in the lab, or bring your own ones if you wish.

EMG

Contraction of muscles produces electrical activity that can be detected by an electromyogram (EMG). In psychological studies in general, surface EMG is used, in which recording electrodes are placed on the skin over the target muscle group and the signals are amplified through additional apparatus.

Before the electrodes are placed, your skin will be cleaned with alcohol. The researcher will measure your area of interest (e.g. forearm, forehead) to determine the best placement for the electrodes and then apply some conductive gel to the skin. The electrodes will then be attached to your skin with a double-sided adhesive tape. The researcher will make sure the electrical properties of the setup are both safe for you and sensitive enough to capture the muscle activity. All steps in the EMG recording are noninvasive and there is neither pain nor risk to your body.

ECG

The heart is an organ that pumps blood through the body through contractions. These contractions can be felt, heard through a stethoscope and recorded with an electrocardiograph (ECG), which measures electrical currents produced by the heart and detectable on the body surface.

Electrodes can be placed on different parts of the body depending on the experiment. Typically, wrists or ankles are used but when the experiment requires you to use your hands, a placement on the torso is preferable to minimize the noise from your body movement on the recorded activity.

EDA

Just like brain and muscles, skin has electrical properties that can be recorded as electrodermal activity (EDA). These properties vary as a function of sweating activity, which, in turn, can be affected by such non-psychological factors as ambient temperature and humidity but EDA also can give indications of mental and physiological states of the person. Because EDA is not under conscious control, it is often used in psychological research.

The most typical way to record EDA is by placing 2 electrodes on the index and middle finger. However, other parts of your palm could also be used, depending on the experimental setup. Before the experiment, you will be asked to gently wash your hands with water and dry them thoroughly. The experimenter will make sure that your hands are warm. Then an electroconductive gel will be applied and the electrodes attached to your hand with adhesive rings. Typically, a non-dominant hand will be used.

You will not feel any pain or discomfort as recording is made. However, it is theoretically possible for the electrodes and cables to heat up. In extremely rare cases skin irritation might develop. You are encouraged to stop the experiment and signal to the experimenter should anything unexpected occur. You will then be sent to a medical professional in the OIST Clinic where you will receive appropriate care.

Respiration belt

One of the less obvious variables that can tell us something about psychological processing is respiration. For this measure, we attach a respiration belt in the location that seems most correlated with your breathing pattern: typically, around the chest or the waist. The belt contains a stretch-responsive sensor. The breathing movements stretch the device enabling the researcher to estimate the amount of air inhaled and record the breathing rhythm.

The belt is worn over the clothing and no special preparation is required. However, in order to prevent the signals from being distorted, cell phones must be left at the far end of the experimental room.

Eye Tracker



Eye trackers use the reflection of infrared light to record eye movements. These eye movements can be based on conscious decisions, such as gaze positions, or subconscious processes like pupil dilation. Using an Eye tracker therefore opens a window into different psychophysiological and psychological processes.

In some eye tracking experiments, it is necessary to put a small sticker on the participant's forehead to make the gaze tracking reliable. It is therefore necessary for the participant to have a clear forehead surface with no hair or headwear hiding it.

For high frequency eye tracking, the tracked person must place their head on a specifically designed headrest to ensure data quality, yet no sticker is required.

To ensure the data quality, it is necessary that no mascara or other eye makeup is worn during the experiment. For similar reasons, hard contact lenses are not allowed. People participating in eye tracking studies are asked to wear soft contact lenses instead of glasses if available, or we will ensure that their glasses are not reflective.

Leap Motion Controller



The Leap Motion Controller (LMC) is a hand-tracking device. Each LMC consists of infrared sensor cameras (850nm) and several infrared LEDs.

The LMC is a compact and lightweight device. This means that it can be freely moved and adjusted while keeping the hand movement as naturalistic as possible. No markers need to be attached to the hand for the tracking.