

Research Offer for External Entities

Usability research - function, form & technology

The Cognition and Communication Science Laboratory offers services consisting of expert analysis and auditing of the usability, availability and effectiveness of internet and advertising messages. Offered expertises are based on research applying both eye-tracking technique and other methods used in research on usability and accessibility of web interfaces.

In **usability projects** implemented in our Laboratory, we use a **complementary research model**. It is based on mutual complementation of three different research perspectives:

- **Expert**, based on evaluation and development of utility by an expert team,
- **Declarative**, based on interviews with participants/users during the study,
- **Measuring**, containing eye tracking tests and psychophysical methods.

Thanks to this approach we get a complete and holistic view of the various research problems, which translates into the optimal effectiveness of the usability evaluation (depending on the budget, a single component approach is also possible).

Due to its specificity, **eye tracking** is one of the most effective research tools. Firstly, it can be treated simultaneously as a qualitative and quantitative study. Secondly, due to the measuring potential and physiological nature of the method based on the measurement of the eye movement, it enables the acquisition of hard representative quantitative data. On the other hand, it allows the access to measurable qualitative material, that can be considered as the starting point for another type of quantitative research such as questionnaire surveys.

The eye tracking devices, that we have at our Laboratory, enable us to obtain results from an eye tracking test in the form of:

1. **Scanning path** - presents the sequence of perceiving individual areas. It allows to specify whether the elements crucial for the Client are perceived first. It helps to identify elements distracting from the main contents.
2. **Heat maps** - summary results of attention focus of a particular user or a group of participants. It allows to determine which elements of a website/application interface/advertisement drew the attention to the greatest extent and which were ignored;
3. **Reverse heat maps** - highlights clearly for the Client which elements of a website/application interface/advertisement were noticed by a user.
4. **Areas of interest (AOI)** – user-defined subregions of displayed stimulus. They are separate areas with percentage record of attention distribution shown for example in the form of semi-transparent layers superimposed on the advertisement, containing the percentage description of how particular elements attracted the attention. Various statistic may be gathered for such areas:

- **Time to First Fixation (TTFF)** – amount of time it takes a respondent to look at specific AOI from stimulus onset,
 - **Time spent** – quantifies the amount of time that respondents looking at an AOI,
 - **Percentage of time** – time devoted to viewing a specific AOI to the total viewing time,
 - and others.
5. **Statistics** - averaged or summed up data concerning chosen issues, e.g. the duration of fixation on particular areas of interest, mean time necessary to find certain information, attention distribution according to respondents' sex, age, proficiency in navigation, etc.
 6. **Videos of conducted studies** - precise record of what the respondents did during the study. Where they looked, for how long and in what sequence, which contents escaped their attention. The film may be supplemented with a preview from a camera recording respondents' reactions. They allow to analyse user's exploration path of the material.

Additionally, it is possible to **track mouse movements** and **register mouse clicks** on the presented material. During the experiments, participants can use the mouse and keyboard to provide **answers to questions on an ongoing basis**.

The true power of eye tracking unfolds as it is combined with other sources of data to measure complex dependent variables (this is ensured by **additional equipment** that is available in our Laboratory). These **biometric sensors** are perfect complement to eye tracking:

1. **GSR (EDA)** – galvanic skin response (or electrodermal activity) monitors the electrical activity across the skin generated by physiological or emotional arousal. Skin conductance offers insights into the respondents' subconscious arousal when being confronted with emotionally loaded stimulus material,
2. **fEMG (facial EMG)** – electromyographic sensors monitor the electric activity of facial muscles. We use EMG to monitor muscular responses to any type of stimulus material to extract even subtle activation patterns associated with emotional expressions,
3. **HR** - heart rate,
4. **breath measurement**,
5. **body temperature**, e.g. on the palms.

When **analyzing GSR data**, we focus primarily on the event-related SCRs (skin conductance response) as they can be interpreted as direct measures of arousal and engagement of respondents. Individual SCRs can be characterized by the following four metrics:

1. **Latency** – the duration from stimulus onset to the onset of the phasic burst,
2. **Peak amplitude** – the amplitude difference between onset and peak,
3. **Rise time** – the duration from onset to peak,
4. **Recovery time** – the duration from peak to 100% recovery.

The psychophysical approach enables the acquisition of information concerning different audio-visual aspects of GUI and website experience. Thanks to the interdisciplinary approach we can test not only users' opinions but also the influence of psychological factors on consumer behavior. The psychological factors are based on the selection and variations in the audio-visual material provided as the analyzed content.