

Understanding mechanisms of conscious and unconscious information processing is one of the most fascinating challenges of current neuroscience. There are many theories on how unconscious perception works and how subliminal stimuli may influence humans behavior. So far, none of them has provided ultimate answers to researchers' persistent questions.

The aim of this project is to investigate what is the processing of the visual information when stimuli are perceived consciously and unconsciously. As we know, stimuli which do not reach the conscious level may still have influence on our behavior. One of the hypothesis assumes that visual stimuli are processed both along a "conscious" ventral stream, specialized in shape and color analysis, and along an "unconscious" dorsal stream, being specialized in motor functions. For example, when we quickly jump away from the car on the street it is automatic reaction and can be done even before we realize that this car is coming. It is possible that in this case perception of the car was processed through the "unconscious" stream and we reacted without being aware of this. Scientific research also seems to support hypothesis about two visual pathways. For example, when observer is asked to press the left button when he sees left-pointed arrow, and to press the right button when he sees right-pointed arrow, reaction can be made more quickly when we present the same arrow just before the target presentation. Even when the presentation was subliminal! It seems that this unconscious information might be "too weak" to be processed through the "conscious" stream, however, it is strong enough to initiate certain motor reaction through the "unconscious" motor stream.

In the proposed project we plan to compare how processing of the conscious and unconscious information depends on the response type. Motor reaction (e.g., button press) seems to be more appropriate for processing through the "unconscious" stream. Verbal reaction might require different (more conscious) processing. Therefore, information available for motor response might not be available when verbal response is required. It is possible that these differences might be observed only in some tasks. In the current project we want to investigate how observers perform the task when it is based on conscious decision (e.g., when they have to judge whether they saw certain object or not), and how it is when perception of one object is influenced by the preceding object presented unconsciously.

By performing few experiments with different tasks and with two response modalities (manual and verbal) we will be able to gather more information on how perceived information (conscious or unconscious) is processed and what can influence our perception. Moreover, EEG analysis will tell us whether the object presented subliminally may activate similar brain areas independently on the required response type. According to dual-stream hypothesis, subliminal stimulus activates motor cortex, what facilitates motor reaction on the following target. Current project will show whether similar activity may be observed when verbal response is required. We may also find, that subliminal stimulus influences our behavior not only due to motor pre-activation, but also by pre-activation more parietal brain areas related to attentional processes.