Scholars and scientists have pondered the nature of human consciousness for ages. Although various theories have been proposedd by philosophers, psychologists, and neurobiologists, consciousness remains one of the most elusive and mysterious scientific concepts. Paradixically, being conscious human beings, we all have serious difficulties defining what consciousness is. At the same time, we still do not understand which biological processess give raise to consciousness, and how particular content of conscious experience is represented in the brain.

The goal of the present project is to advance understanding of the brain mechanisms giving raise to consciousness. We will foucs on studing conscious access of percptual stimuli, i.e. the moment when external objects and stimuli gain access to the subjective representation of the world created by our mind.

The brain is divided into anatomical regions processing information incoming from different modalities. Fo instance, visual cortex occupies arge areas at the back of the brain, while much smaller auditory cortex is located in the lateral part of the brain. Yet, there are also numerous multi-modal brain areas, not related to any particular modality, which are rather involved in abstract, modality-independent processess, like planinng or reasoning. Thus, the structure of the brain is assumed to be hierarchical, with sensory areas being at the bottom of the hierarchy, and modality-independent areas being at the top. Such organization is reflected by the neurobiological theories of consciousness, which can be divided into local and global. "Local" theories assume that the mechanisms giving raise to consciousness can be found in the low-level sensory regions. Contrary, "global" theories assume that consciousness emerges from integration of information from different modalities in the higher-level modality-independent brain regions.

In the present project we will test the assumptions of the local and global brain theories. In the planned experiment subject will be presented with trains of sounds, weak enough so that the subjects will be able to detect only about half of them. Identical experiment will be conducted in the visual domain, where small dots of light presented on a monitor screen will be used as stimuli. In both experiment subjects will be asked to report with a button press whether they detected the stimulus or not. During the experiment subjects' brain activity will be recorded with two non-invasive methods: electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). Using the recorded data we will be able to assess which brain areas are activated when the stimulus reaches consciousness. We will compare activity patterns evoked by the consciously and unconsciously processed stimuli. Based on the hitherto published studies we expect stronger and more widespread activations during conscious perception. In the next stage of the analysis we will compare activity patterns evoked by the conscious visual and the conscious auditory stimuli. Such comparison will reveal whether the same neurobiological mechanisms give basis to visual and auditory consciousness.

The questions regarding consciousness are among the most important and difficult science is currently tackling. The present project has the ambitious goal to pinpoint the brain mechanisms allowing extranal stimuli to gain access to the subjective representation of the outside world created by our minds. Beacuse consciousness is disturbed in various psychiatric and neurological disorders, gaining insight intry o biological basis of consciousness will allow better diagnosis and treatment of these conditions. Yet, solving the mystery of consciousness will not only have practical consequences, but will likely redefine the way we understand ourselves.