DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Sensory substitution is possible thanks to sensory substitution devices that are simple robotic systems equipped with sensors (e.g. camera) and stimulators (e.g. headphones). Sensors gather environmental data typically available through substituted modality (e.g. vision). The data is then translated by a coupling system into a signal (e.g. sound of given characteristics) and delivered to a substituting modality by stimulators. Thus, we can "see" through a sensory substitution device by touch or auditory information. An example of a sensory substitution device is a system that provides auditory information about distance between object and participant (similar to a parking sensor in a car that informs the driver when the vehicle is approaching an invisible obstacle).

The project proposes a systematic empirical study that investigates aspects of sensory substitution that were either discussed only on a theoretical level (e.g. experience of substitution) or were not discussed at all (e.g. integration of the signals delivered by more than one of the sensory substitution devices). We aim to propose a research paradigm that will allow us to test theories investigating the cognitive and neuronal underpinnings of the formation of conscious perceptual experience. In the longer term, the project may also influence studies on sensory substitution in the blind population and influence the everyday life of blind people.

The proposed project will investigate how the substituted information provided by three sensory substitution devices (BrainPort, Enactive Torch, Colorophone) influences participants' behaviour and the subjective experience of substitution. Participants will perform a variety of tasks that will require sensory substitution (e.g. object recognition by blindfolded participants). Each person will take part in approximately one two-hour study every two weeks throughout the year. We will also investigate how prolonged exposure to sensory substitution influences the plasticity and the functional organisation of the brain by testing the reorganisation of neuronal structures and connection patterns using magnetic resonance imaging (MRI). We also aim to propose an optimal set of sensory substitution device settings that may be applied in future studies with blind participants.