Title: Seeing with your ears and hands. What is sensory substitution experience like?

Presenting Author: Magdalena Reuter

Author(s): Magdalena Reuter*, Consciousness Lab, Institute of Psychology, Jagiellonian University, Krakow, Poland, Paweł Gwiaździński, Consciousness Lab, Institute of Psychology, Jagiellonian University, Krakow, Poland, Katarzyna Hat, Consciousness Lab, Institute of Psychology, Jagiellonian University, Krakow, Poland, Patrycja Bizoń, Consciousness Lab, Institute of Psychology, Jagiellonian University, Krakow, Poland, Dominik Osiński, Department of Electronic Systems, Faculty of Information Technology and Electrical Engineering, Norwegian University of Science and Technology (NTNU), Trondheim, Norway, Michał Wierzchoń, Consciousness Lab, Institute of Psychology, Jagiellonian University, Krakow, Poland

Abstract:

Sensory substitution (SS) occurs when information taken from one sensory modality (e.g. vision) is translated into another sensory modality (e.g. audition or touch). SS is possible thanks to sensory substitution devices (SSDs). SSDs could be used e.g. to recognise objects, represent colours and navigate in space. They are usually designed to aid blind people but could be also used in experiments with sighted participants when neural, behavioural and phenomenological consequences of SS are investigated.

Here we present three studies on sighted, blindfolded participants with two SSDs: two studies with Colorophone (visual-to-auditory SSD) and one study with Enactive Torch (a visual-to-touch SSD). First, we will show the SSDs enable recognition of simple characteristics of research environment. The Colorophone study shows that participants are able to recognise six different colours and four different shapes after two hours of training. With Enactive Torch experiment, we also demonstrate that SSDs enable performance of more complex tasks, like navigation in space. Finally, we present an auditory virtual reality environment based on the Colorophone and show how participants can realise easy and more difficult tasks in this interactive SS environment. The study shows that participants are able recognise shapes, colours as well as simple spatial characteristics of the environment after three days of training. Our experiments show participants are able to learn simple and complex visual characteristics with SSDs. We also discuss the phenomenal characteristics of the SS showing that SS experience might not be restricted to substituted or substituting modalities.