Building confidence estimates about the presence and absence of audiovisual stimuli

Imagine being in a bedroom and having to decide if a mosquito is present before going to sleep. In this context, the ability to infer the presence or absence of stimuli through multiple sensory signals, but also to establish a feeling of confidence based on these signals is crucial. The ability to make such accurate confidence judgments about the results of our perceptual processes is called metacognition. More generally, metacognition refers to the ability to evaluate and control our own cognitive processes. In recent years, there has been growing interest in the study of perceptual metacognition and we now know better how we perform confidence judgments about discrimination decisions involving one sensory modality. However, as the majority of studies have only used unimodal stimuli, the nature of multisensory integration processes at the metacognitive level remains poorly understood, even though our everyday life is essentially multisensory. Moreover, most studies on metacognition involve discrimination tasks, so we know little about metacognitive judgments pertaining to the presence and absence of stimuli in detection tasks.

The proposed project aims to characterise how metacognitive processes monitor the presence and absence of multiple sources of sensory signals. To this end, we will ask healthy volunteers to perform a mosquito-like detection task where they will indicate if a stimulus is present or absent. The stimulus will be presented only visually, only auditorily, or audio-visually, at various intensities. Participants will also perform amodal and modality-specific confidence estimates, allowing us to quantify the metacognitive judgements they form about stimulus presence and absence.

The selected candidate will collect and analyze behavioral data. They will interpret these data in light of stereoelectroencephalographic data that we are currently collecting, and predictions made by a computational model we will be developing during the internship. Applicants should be comfortable programming with Python and/or R, with basic knowledge of statistics and/or computational modeling.

Applicants should speak basic French to interact with participants. Applicants with a background in engineering, computer science or physics are also encouraged to apply.

The work will take place at the *Laboratoire de Psychologie et Neurocognition* in Grenoble.

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