INTEROCEPTIVE CONTRIBUTION TO TIME PERCEPTION IN A CUE COMBINATION FRAMEWORK

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Background: Several findings demonstrate that bodily signals tightly affect time perception. However, how signals arising from the body interact with those provided by exteroceptive sensory modalities to derive time estimates is still unknown. A promising approach to investigate multisensory integration during time estimation is provided by the Bayesian cue combination framework, positing that the brain combines sensory information by weighing each cue based on its reliability, to optimize the precision of perceptual estimates. Although this approach has allowed to successfully model the integration of different sources of information during time perception, whether the role of interoceptive processing in the perception of time may also be understood within such a framework has never been investigated.

Aims: This ongoing project aims to test the hypothesis that interoceptive information is optimally integrated with that provided by exteroceptive sensory channels during time perception, in order to derive more precise estimates of time. To this goal, the project entails a psychophysiological/behavioral experiment in healthy volunteers (currently in progress), followed by formal testing of the hypothesis through the development of a computational model.

Methods: The ongoing psychophysiological experiment involves the reproduction of time intervals in the range of seconds; the reliability of exteroceptive information is manipulated by adding sensory noise to auditory and visual stimuli in a 2x3 within-subjects design (Sensory modality: auditory, visual x Noise level: no-noise, low-noise, high-noise). Heart rate is continuously recorded during the task using a BIOPAC MP160 device with an ECG100C module; individual differences in interoceptive accuracy and sensibility are also assessed.

Preliminary Results: Results of preliminary analyses (N = 28) suggest that the degree of reliance on prior information during duration reproduction, as indexed by central tendency, is especially increased for visual stimuli in presence of sensory noise, and is associated with individual variations in vagal activity during the same conditions. These results provide very preliminary evidence that cardiac dynamics may affect timing performance differently depending on the reliability of exteroceptive sensory information defining the intervals to be timed.

Keywords: Time perception, Interoception, Bodily signals, Duration processing

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