

FROM THE BODY TO VISUAL AWARENESS: INTEROCEPTIVE INFLUENCES ON THE PROCESSING OF CONSCIOUSLY AND NON-CONSCIOUSLY PERCEIVED EMOTIONAL VISUAL STIMULI

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Background: While it is widely accepted that body and brain interact dynamically to shape cognition and emotion, most empirical research tends neglect the contribution of internal bodily signals. One reason for this may be the difficulty in disentangling afferent, i.e. body-to-brain, signals from efferent, i.e. brain-to-body, autonomic activity.

Aims: In this project we are investigating the neurocognitive processes underlying the modulation of emotional visual processing by cardiac afferent signals.

Method: A new line of research identified an interoceptive pathway through which the heart communicates with the brain to selectively facilitate the processing of motivationally salient stimuli. This experimental approach capitalizes on the fact that the timing and strength of each heartbeat is conveyed to the brain in bursts by baroreceptors, i.e. sensors close to the heart and main arteries that detect changes in blood pressure at cardiac systole. By synchronizing the presentation of brief stimuli to specific phases of the cardiac cycle – systole (when baroreceptors are active) or diastole (when baroreceptors are silent) – we can test how these cardiac signals impact stimulus processing. Research has shown that visual stimuli signaling threat, such as fearful faces, are more easily detected and engage more attentional resources when perceived during cardiac systole (vs diastole). In Study 1, we combined the cardiac cycle paradigm with computational analyses – the Drift Diffusion Model – to dissect the impact of cardiac afferent signals on perceptual processes, and non-perceptual processes on the identification of fearful faces presented supraliminally. The influence of cardiac afferent signals on the processing of non-consciously perceived emotional stimuli will be also investigated in health subjects, through the use of Continuous Flash Suppression paradigms and in blindsight patients.

Preliminary results: Results from Study 1 did not support our hypotheses as we observed no modulation by the cardiac cycle on the processing of fearful faces presented supraliminally. We are now investigating if these interoceptive signals contribute to the facilitated breakthrough to awareness of emotional visual stimuli in a Continuous Flash Suppression paradigm (Studies 2-3). The interoceptive modulation of nonconscious visual processing will be further investigated by the use the cardiac cycle approach in blindsight patients (Studies 4-5).

Keywords: Interoception, Cardiac cycle, Threat, Blindsight, Nonconscious perception

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