Oral Presentation: *#O2*
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The role of top-down and bottom-up factors in facilitating threat-related perceptual decision-making

To survive, human beings need to *detect* the presence of threats quickly and accurately. Threat detection relies on perceptual decision-making (PDM). The PDM process requires the brain to efficiently extract the threat-related signal from noise. Previous research has highlighted bottom-up perceptual prioritization (i.e., driven by exogenous threatening stimuli) and a neural pathway for fast and automatic processing of threat-related sensory information. Basic (non-affective) cognitive and neuroscience research has shown that top-down endogenous factors such as attention and expectation that are in place *before* stimulus-encounter can impact perception. This position has been supported by affective neuroscience research, showing that threat-related perceptual decision-making (TRPDM), both behavioral and neural, is enhanced when top-down attention is directed towards threatening stimuli compared to neutral stimuli. However, it remains unclear *how* top-down threat-related attention differentially modulates bottom-up processing of signals from threatening versus non-threatening stimuli. This is an important research question as TRPDM occurs frequently in familiar contexts where environmental cues inform expectations of certain stimuli over others, directing top-down attention and potentially enhancing bottom-up stimuli processing. Thus, this research aims to examine the impact of top-down threat-related attention and bottom-up stimulus features on TRPDM.

This research will examine the effects of manipulating top-down threat-related attention in TRPDM using emotional face stimuli. Two stimuli-related factors will be manipulated. First, face stimuli comprising 3 emotion categories (happy, fearful and neutral) with 5 emotion values (EV) spanning very fearful, mildly fearful, neutral, mildly happy and very happy will be presented. Second, stimuli of each EV will be further processed to create three spatial frequency (SF) versions of images: unfiltered broad-(BSF), low- (LSF) and high-spatial frequency (HSF). Using a two-alternative-forced choice (2AFC) design, participants will make a perceptual decision (yes/no) to determine if the image that is briefly presented is “fearful or not” in a fear-attention block, “neutral or not” in a neutral-attention block and “happy or not” in a happy-attention block, while accuracy and response time measures are recorded. Importantly, this “A or not A” design can facilitate emotion-oriented-attention to a single facial expression category for TRPDM. Signal Detection Theory and Drift Diffusion Modelling will be applied to compute parameters to explain how top-down attention and bottom-up stimulus factors interact in TRPDM.

This research aims to improve our understanding about a critical survival skill in humans and its potential impact on mental disorders associated with maladaptive responses to TRPDM, such as in anxiety disorders.