“How the brain represents one’s feelings: mapping the pleasantness and intensity of the emotional experience during naturalistic stimulation”.

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Emotions are intense and immediate reactions of the body and the brain to an external or internal event occurring in the present, happened in the past or may occur in the future. In daily life, the temporal trajectory of emotions is characterized by regularities in features, such as the time to rise and the duration or the probability of resurgence, which then inform mental models of emotion transitions and support affective forecasting (Thornton and Tamir, 2017). Therefore, it appears that the study of diachronicity is crucial for building a more comprehensive understanding of emotion processing and conceptualization in humans. However, studies on the brain correlates of affective dynamics are limited and the majority of them have employed static or relatively brief stimuli that may not be adequate to account for the complex temporal trajectory of lifelike experiences.

A possible strategy to overcome this limitation is measuring brain activity elicited by movies using functional magnetic resonance imaging (fMRI). Indeed, movies are ecological and dynamic stimuli that synchronize brain response across individuals and elicit a wide variety of emotional states in a few hours (Lettieri et al., 2019).

In the current talk, I will present findings from a recent study investigating whether changes in brain connectivity reflect the temporal properties of emotion dynamics experienced by individuals during a naturalistic stimulation.

Specifically, we used time-varying intersubject brain synchronization and real-time behavioral reports to test whether connectivity dynamics track changes in affect during movie watching. The results show that polarity and intensity of experiences relate to the connectivity of the default mode and control networks and converge in the right temporoparietal cortex. We validate these results in two experiments including four independent samples, two movies, and alternative analysis workflows. Finally, we reveal chronotopic connectivity maps within the temporoparietal and prefrontal cortex, where adjacent areas preferentially encode affect at specific timescales.

Our results provide a multifaceted description of the brain temporal dynamics in emotional processing.