

# STATE ANXIETY MODULATES THE LINK BETWEEN NEURAL PROCESSING OF HEARTBEATS AND SPONTANEOUS FLUCTUATIONS IN SUBJECTIVE AROUSAL



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How are subjective qualities of ongoing experience related to interoceptive processing of heartbeats and state anxiety?

Interoception is neural processing of bodily signals and can be measured using the **heartbeat evoked potential (HEP)**, which involves averaging neural electrophysiological signals time-locked to features of the electrocardiogram (ECG).<sup>1</sup>

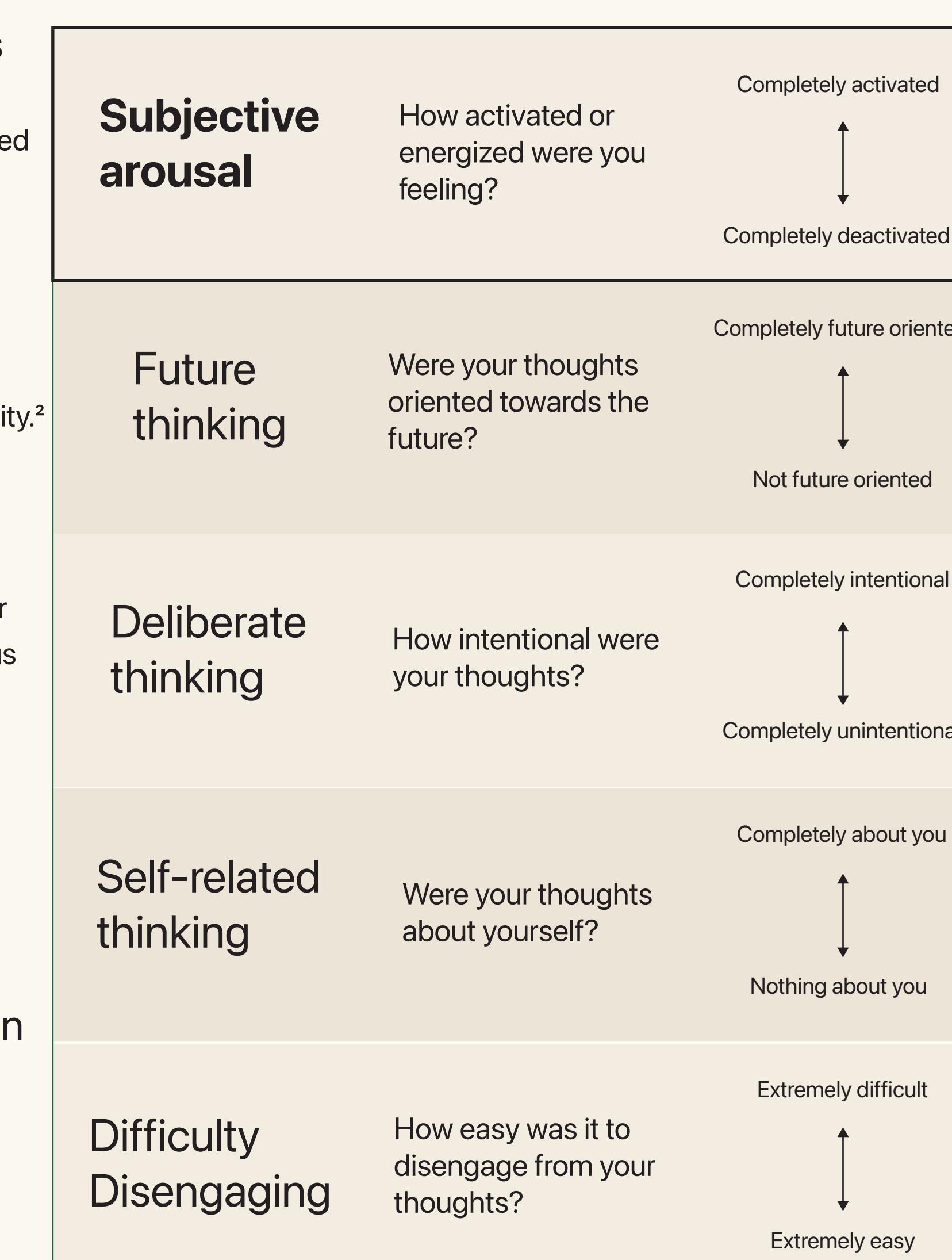
Subjective arousal is an inner sense of energy or activation, often measured through self-report, and is distinct from **physiological arousal**, which is often measured using cardiophysiological measures such as heart rate and heart rate variability.<sup>2</sup>

Interoceptive processing of heartbeats and subjective arousal spontaneously fluctuate at rest and HEP amplitudes vary based on spontaneous fluctuations in self- or other-referenced thoughts,<sup>3</sup> but the link between HEP and spontaneous fluctuations in subjective arousal is unclear.

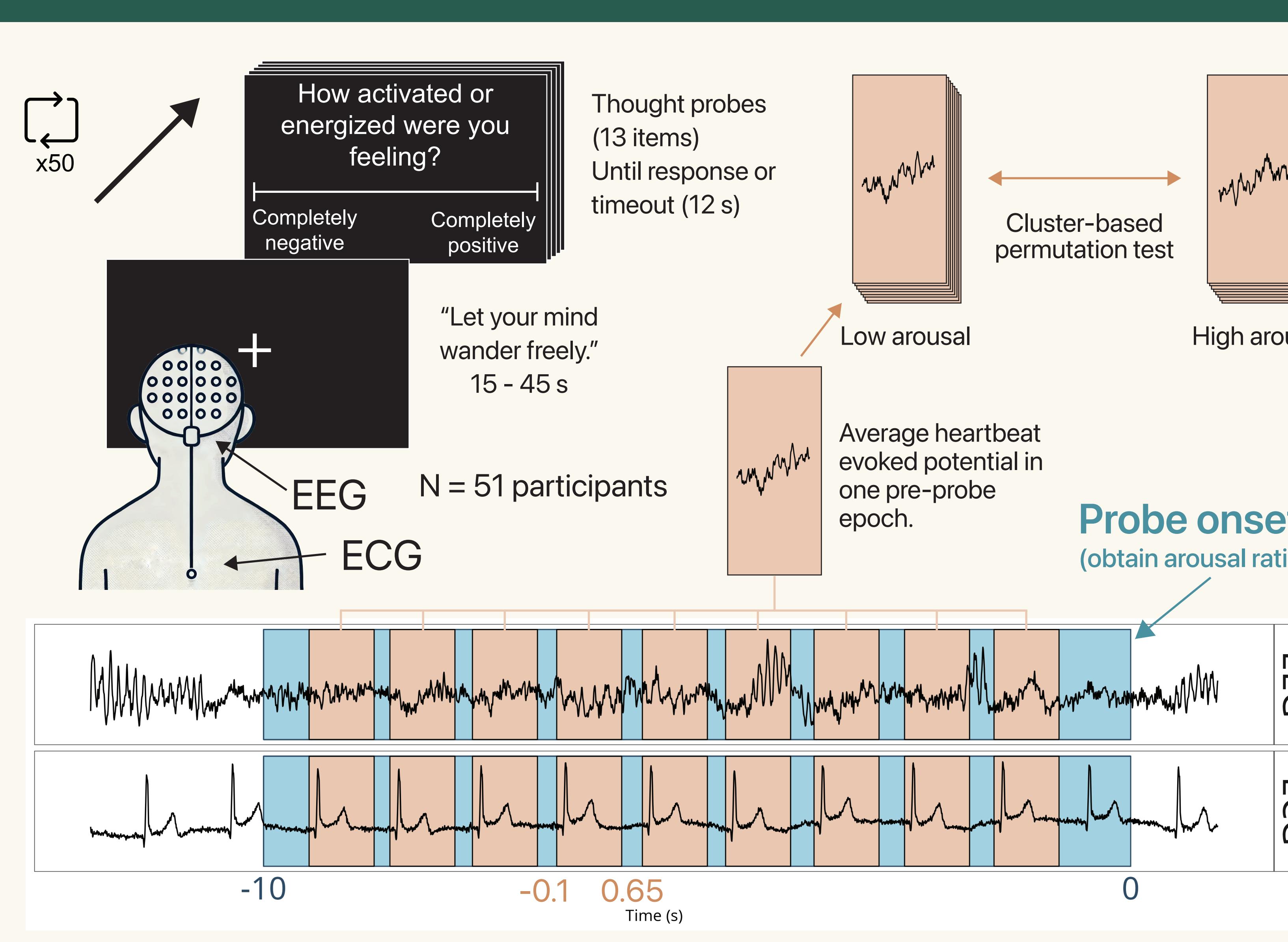
How HEP interacts with subjective arousal has implications for anxiety

Anxiety involves dysregulated interoception, such as heightened or inconsistent sensitivity to bodily signals.<sup>4</sup>

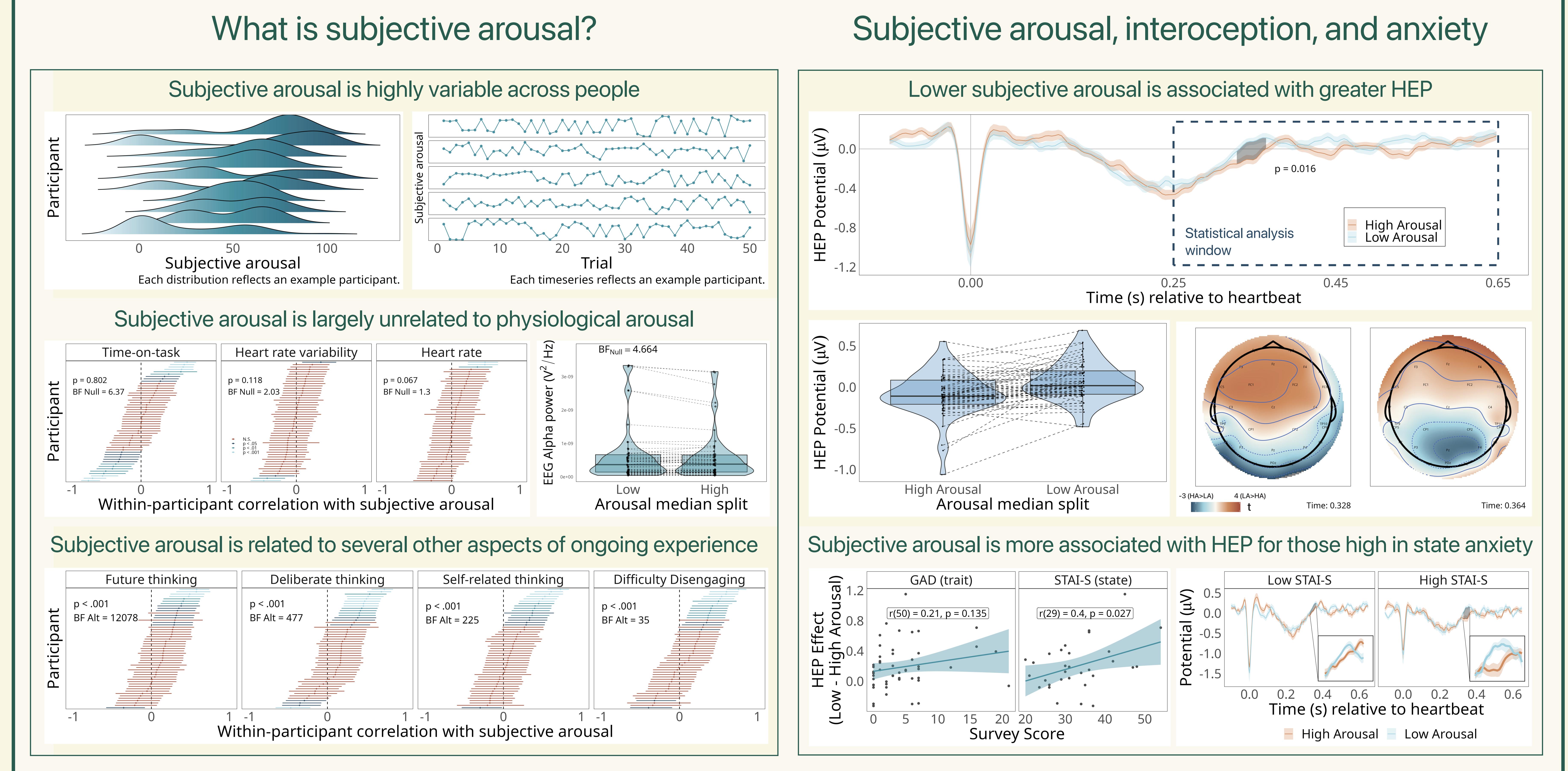
How anxiety influences spontaneous fluctuations in subjective arousal and HEP is unclear. Given associations between (i) anxiety and HEP<sup>5</sup> and (ii) anxiety and abnormal spontaneous thinking,<sup>6</sup> the interoceptive underpinnings of subjective arousal fluctuations could prove crucial to understanding anxiety.



Participants let their mind wander and occasionally reported the nature of their experience while we recorded EEG & ECG



Subjective arousal was inversely related to HEP, a pattern that was amplified for those higher in state anxiety



Increased subjective arousal may suppress interoceptive processing of heartbeats, which may be adaptive during state anxiety

