

## THE RELATIONSHIP BETWEEN PHYSIOLOGICAL AROUSAL AND PERCEIVED DURATION

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**Background:** Previous research shows that our perception of duration is distorted by emotion. Typically, negatively valenced events last for subjectively longer than neutral events whereas positively valenced events last for subjectively less time than neutral valenced ones. These distortions are theorized to be caused by changes in physiological arousal.

**Aim:** To test the theory that changes in physiological arousal are predictive of emotional distortions to time.

**Method:** Experiment 1: Participants completed a time estimation task in which they judged the duration of high and low arousal positively, negatively and neutrally valenced images. Experiment 2: Participants completed a time estimation task in which they judged the duration of negatively and neutrally valenced images flowing a period of normal breathing or a period of paced breathing designed to increase PSNS activity. In both experiments, HF-HRV, to index parasympathetic nervous system activity (PSNS), and PEP, to index sympathetic nervous system activity (SNS), were recorded throughout. The relationship between changes in SNS and PSNS activity and perceptions of duration in each condition were established.

**Results:** Experiment 1: SNS reactivity was predictive of perceived duration, but only for high arousal negatively valenced stimuli, with decreases in PEP being associated with longer duration estimates. SNS and PSNS activity was not predictive of perceived duration for the low arousal negative stimuli or the low and high arousal positive stimuli. Experiment 2: Paced breathing increased PSNS activity and reduced the perceived duration of the negative and neutrally valenced stimuli relative to normal breathing. PSNS activity was not however predictive of these reductions in perceived duration.

**Conclusions:** Physiological arousal is only predictive of distortions to the perceived duration of highly arousing negative stimuli. We therefore propose a new model suggesting that emotional distortions to time result from a combination of bottom-up (physiological arousal) and top-down (threat detection) factors.

**Keywords:** Time perception, Arousal, Emotion.

### Publications:

Ogden, R. S., Henderson, J., McGlone, F., & Richter, M. (2019). Time distortion under threat: Sympathetic arousal predicts time distortion only in the context of negative, highly arousing stimuli. *PloS one*, 14(5).

Ogden, R. S., Henderson, J., Slade, K., McGlone, F., & Richter, M. (2019). The effect of increased parasympathetic activity on perceived duration. *Consciousness and cognition*, 76, 102829.

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