The emotion filmmaker: Time-emotion integration and affective style

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Summary A plethora of emotional processing and regulatory deficits appear to emerge from errors in emotion-temporal integration. For instance, lower temporal context encoding may account for affective spillover from emotional onto neutral events, which results in biased emotional memories (Lapate et al., 2017). However, emotion-temporal integration capacity has not been systematically investigated or directly linked to adaptive emotional functioning. Here, we test the following novel hypotheses: i) emotion-temporal binding capacity explains well-known biases in retrospective judgments of emotional episodes; ii) risk for psychopathology is associated with lower emotion-temporal binding capacity and greater biases in retrospective emotion judgments.

Keywords Emotion-temporal integration · Experience of emotion · Dispositional negativity · Human behavioral experiment · Model comparison

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Background We are constantly bombarded with a stream of inputs, which includes emotionally provocative events. Yet, our capacity to integrate emotional information over time is far from perfect: Seemingly irrational biases such as duration neglect and peak-end effects are well-documented in retrospective emotion evaluations (Fredrickson & Kahneman, 1993). Accurate emotion-temporal binding is crucial for context-appropriate causal attributions and likely contributes to adaptive emotional functioning, yet its normative variation and relevance for psychopathology remain unclear.

Aims To determine whether: i) emotion-temporal binding (measured by emotion-temporal order memory) is associated with lower retrospective emotional bias; ii) retrospective bias increases as emotion-temporal binding capacity is challenged by longer emotional sequences; iii) psychopathology risk is associated with lower emotion-temporal binding and greater bias in retrospective emotion evaluations.

Methods N=300 participants will perform the *Emotion Sequences Task* online, in which they view 36 emotional sequences of varying lengths (i.e.: 4, 5, 6, 7) consisting of movie clips drawn from a large database (Cowen & Keltner, 2017) (**Fig. 1**). Participants will provide momentary emotion evaluations continuously throughout the sequence and a retrospective emotion evaluation at the end of each sequence. Emotion-temporal binding accuracy will be assessed using the *Temporal Order Task*, wherein participants are shown movie clips from previously viewed sequences and asked to arrange them according to their original order (cf. Huntjens et al., 2015). Finally, participants' trait dispositional negativity will be measured using factor analyses of self-reported mood questionnaires (PANAS, ATQ, MASQ, and STAI).
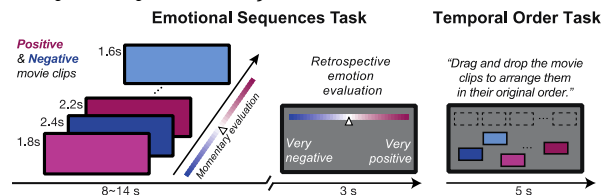
Fig. 1: Experimental procedure

Results First, GLMMs will be used to test two models that predict retrospective valence evaluations. The *Temporal integration model* (Model 1) includes the following parameters: average, primacy, peak, and end time-emotion integrated rating (momentary rating × duration). The *Duration neglect model* (Model 2) includes the same parameters based on momentary ratings only. Peak-end effects are confirmed if peak-end parameters predict retrospective evaluations better than the average. Sequence length, accuracy in the *Temporal Order Task*, and dispositional negativity will be entered into both models to examine if they interact with peak-end effects. Secondly, we will examine whether sequence length, *Temporal Order Task* accuracy, and dispositional negativity correlate with the best fitting model (i.e., ΔAIC for Model 1 – Model 2). We predict that i) longer sequences will be associated a greater peak-end effect and a worse fit of Model 1 vs. 2; ii) lower *Temporal Order Task* accuracy and higher dispositional negativity will be associated with a larger peak-end effect and a worse fit of Model 1 vs. 2.

Conclusions This study will provide novel insights into the significance of emotion-temporal integration for adaptive emotional functioning and characterize the normative limits of emotion integration over time.

References

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