

Emotion regulation

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University of Alabama

PY 630 – Affective Neuroscience
Spring 2021



Don't forget to record!



Overview

- What is emotion regulation? Gross perspective
 - Perception change: Attentional control, distraction
 - Interpretation change: Reappraisal, distancing
 - Response change: Suppression, extinction
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The Emerging Field of Emotion Regulation: An Integrative Review

James J. Gross
Stanford University

The emerging field of emotion regulation studies how individuals influence which emotions they have, when they have them, and how they experience and express them. This review takes an evolutionary perspective and characterizes emotion in terms of response tendencies. Emotion regulation is defined and distinguished from coping, mood regulation, defense, and affect regulation. In the increasingly specialized discipline of psychology, the field of emotion regulation cuts across traditional boundaries and provides common ground. According to a process model of emotion regulation, emotion may be regulated at five points in the emotion generative process: (a) selection of the situation, (b) modification of the situation, (c) deployment of attention, (d) change of cognitions, and (e) modulation of responses. The field of emotion regulation promises new insights into age-old questions about how people manage their emotions.

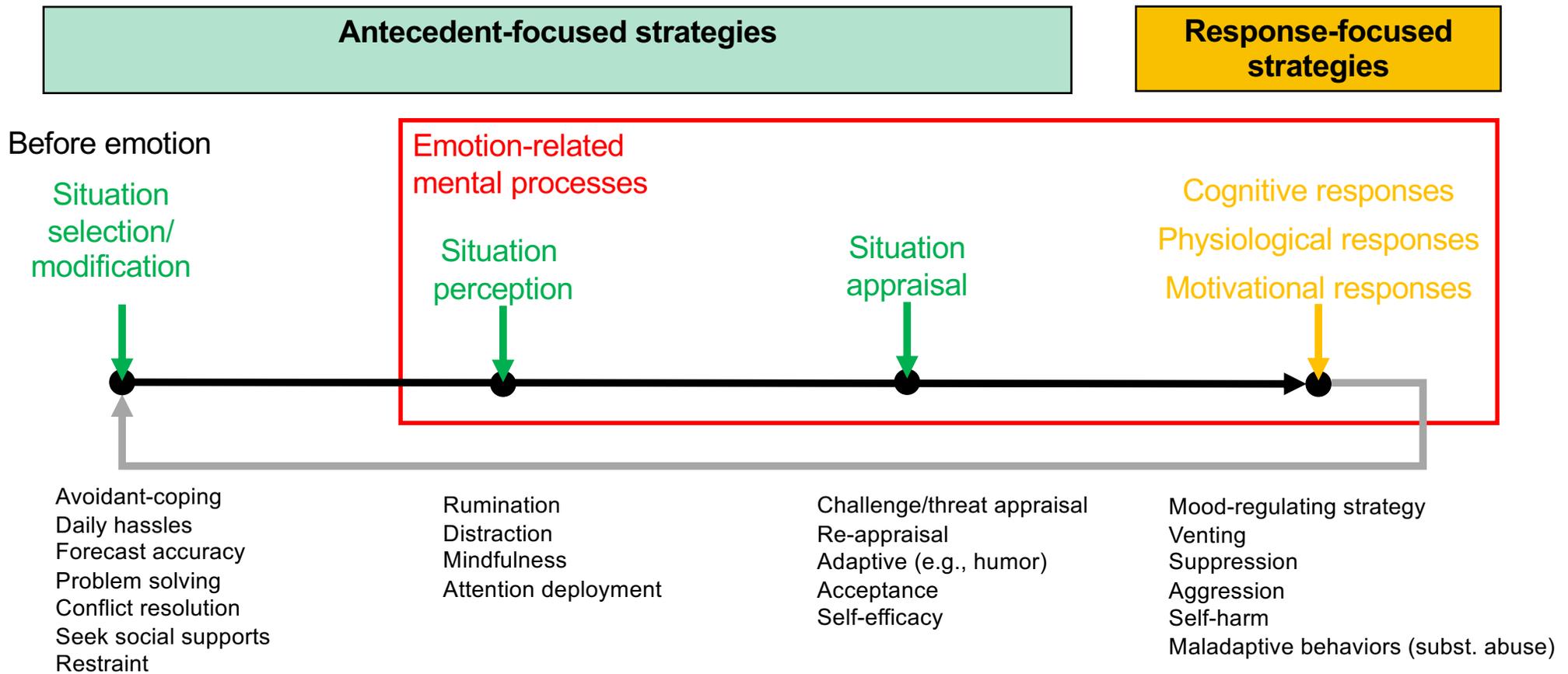
2020

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And 32 others from 2020 and 2021...

<https://sites.tufts.edu/emotiononthebrain/tag/emotion-regulation/>

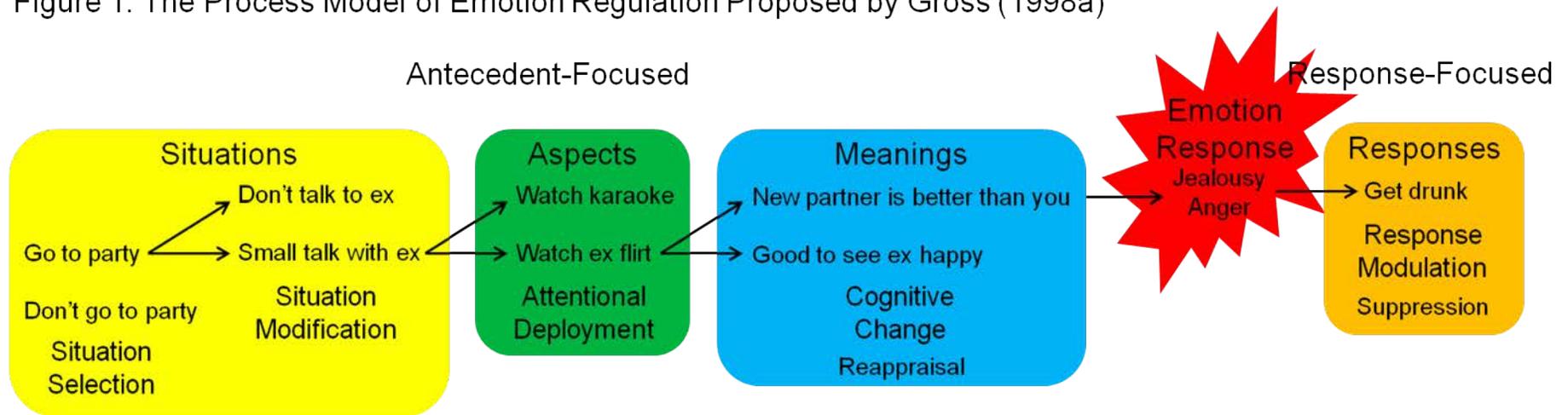
Emotion regulation - Gross perspective



Emotion regulation - Gross perspective



Figure 1: The Process Model of Emotion Regulation Proposed by Gross (1998a)

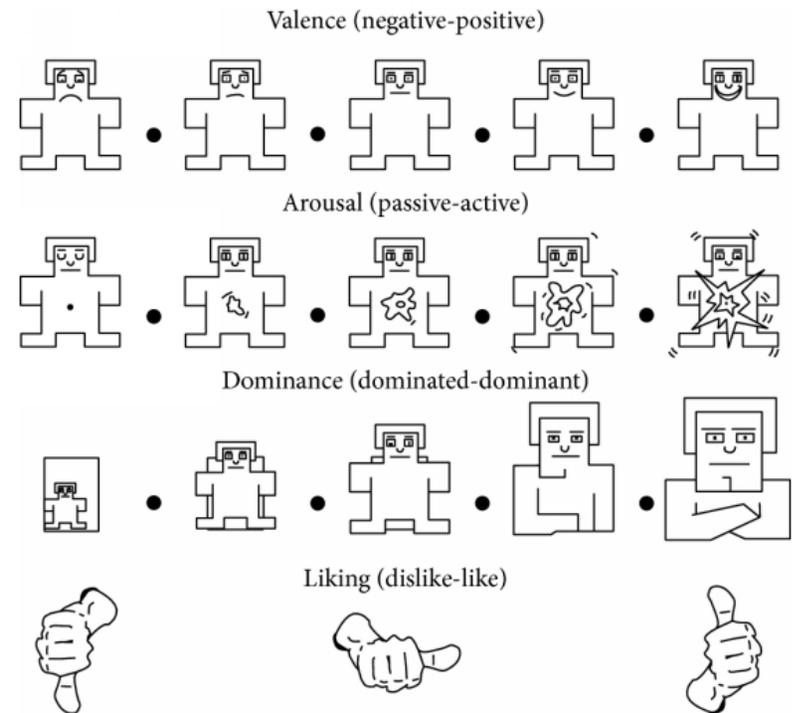


Important notes

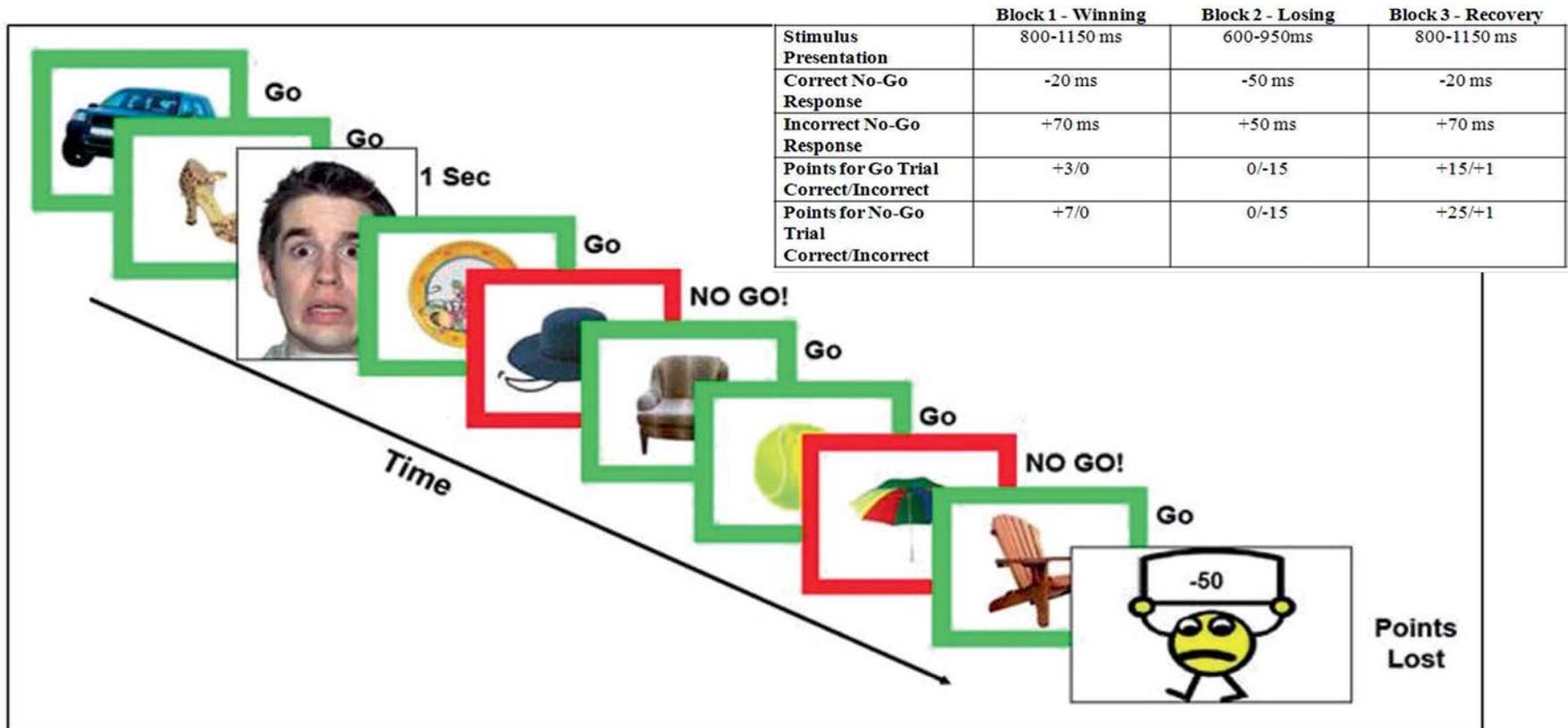
- 1. "Emotions" are distinct from "emotion regulation"**
 - "Cognitive regulation of emotion" rather than "*emotion regulation of thoughts/actions/cognition*"
- 2. Do we need to separate emotion/mood/affect when identifying mechanisms of regulation?**
 - Difficult challenge, currently unclear
 - Focusing on emotion may be broad enough
- 3. Considerations for temporal dynamics, interactions between strategies, and iterative/additive processes**
- 4. Limitations on experimentally testing antecedent strategies***
 - Keep in mind for Wed discussion

Empirical AffNeuro limitations

- Limitations on experimentally testing antecedent strategies
- How do we *know* there was “successful” regulation?
 - Subjective awareness
 - Physiological responses can map onto brain responses



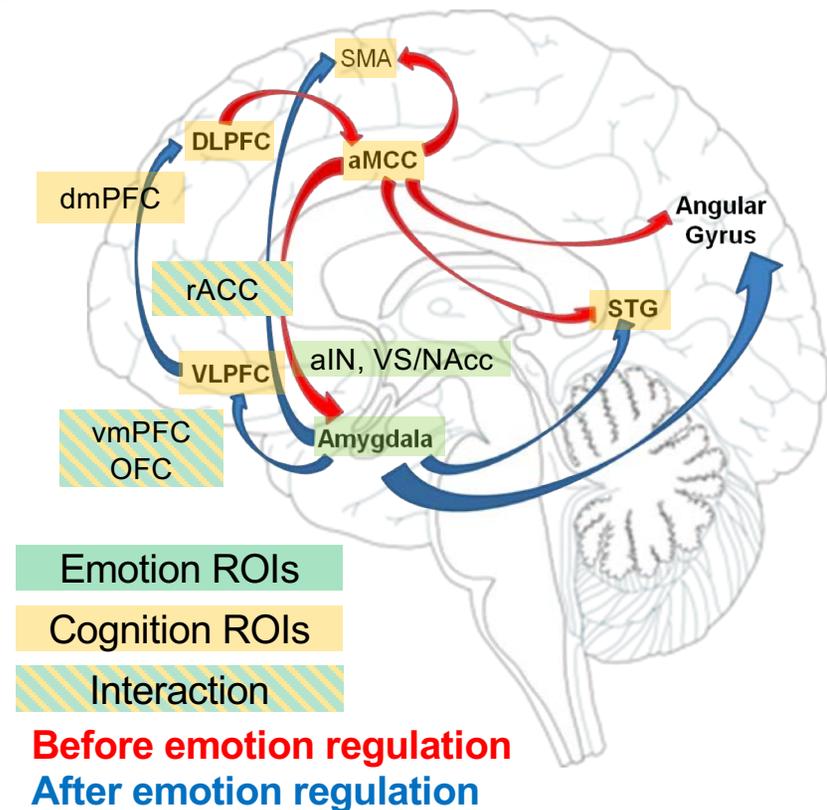
Empirical AffNeuro limitations

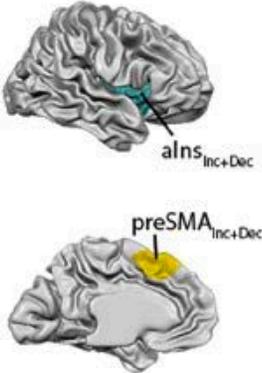
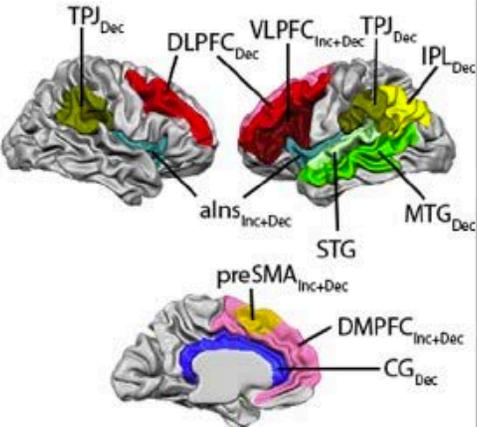
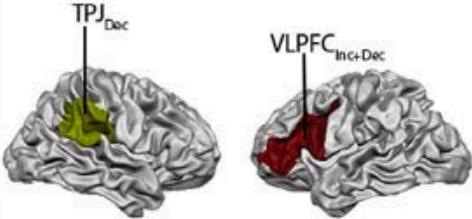


Central brain regions

- Sensing emotion and *maintaining* negative affect
 - AMY, anterior insula, ventral striatum, nucleus accumbens
- Reappraisal and cognitive strategies
 - Dorsomedial PFC, dorsolateral PFC, ventrolateral PFC, anterior ACC, superior temporal gyrus, supplementary motor area
- Bi-directional emotion-cognition interactions
 - Rostral ACC, ventromedial PFC, OFC

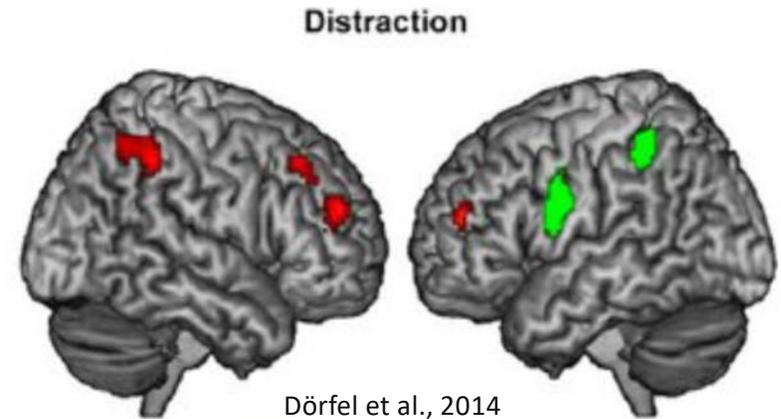
Figure 2: Neural Network of Emotion Regulation Proposed by Kohn et al., 2014



<i>Process</i>	Attention	Knowledge/ Appraisal	Body/ Response
<i>Strategy</i>	Distraction (active/ passive) Distraction (positive/ neutral) Concentration (feelings/ causes and implications)	Reinterpretation/ reappraisal (emotional stimulus/ emotional response) Distancing / perspective taking	Suppress the expression of emotion Suppress the experience of emotion Suppress thoughts of emotion-eliciting event Suppress the expression and experience of emotion
<i>Cognitive Functions</i>	Selective attention Interoception Working memory	Selective attention Memory (working memory, episodic memory) Social cognition (theory of mind, empathy) Language (semantic memory, inner speech) Response selection/inhibition	Selective attention Reorienting Embodiment Response inhibition
<i>Neural Networks</i>			

(1) Perception change: Attentional control, distraction

- Alter *HOW* we see it, smell it, feel it
 - Down-regulate: Look away from unpleasant
 - Up-regulate: Look towards pleasant
 - Attend to different part of stimulus
- Role for top-down regulation (e.g., AMY) → Ch 15 in Wk11



Increased activation:
Right SMA, dlPFC

ONLY FOR DISTRACTION:
Left IPC
Left postcentral/precentral

(1) Perception change: Attentional control, distraction

Possible Methods

- “Pay attention to non-emotional features”
 - ACC, dIPFC → AMY
- Increase cognitive load otherwise (e.g., add additional tasks)
 - Engage dIPFC, vIPFC, ACC, IPC & down-regulate amPFC, AMY
- “Suppress thoughts/feelings”
 - May be less effective, but some evidence of DLPFC

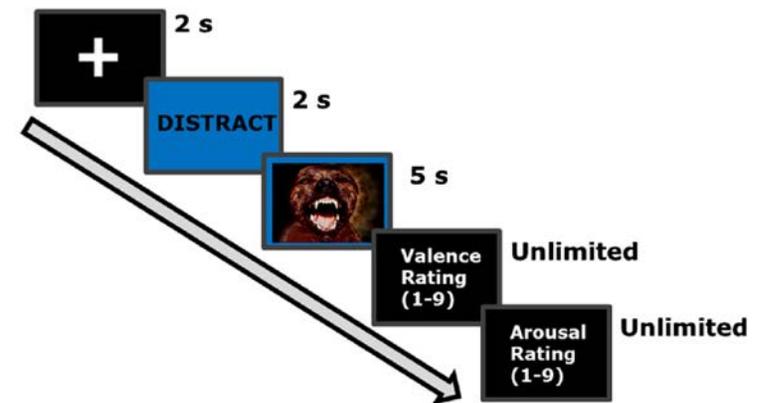
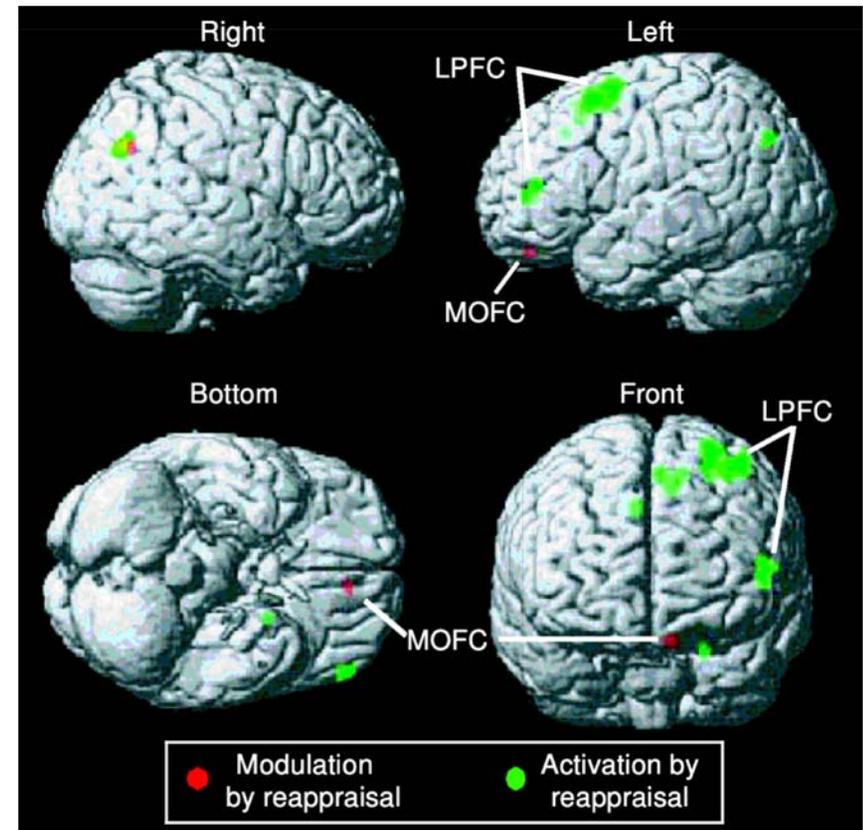


Fig. 1. Trial structure for the regulation task (an example of a DISTRACT trial).

Explicit processing of emotional features → Increased AMY
Implicit processing (i.e., less focus on emo features) → Decreased AMY

(2) Interpretation change: Reappraisal, distancing

- **Volitional, effortful, conscious process to reframe emotional content of an emotionally evocative situation**
- Often negative → positive
 - “Imagine those are tears of joy”
- Ochsner 2002: Increase/decrease trials vs. “maintain”
 - Increased activation in dlPFC, vlPFC, dmPFC (↑emotion reappraisal)
 - Decreased AMY, OFC (↓emotion appraisal/generation)



(2) Interpretation change: Reappraisal, distancing

Split-half comparisons based upon resting vagally-mediated HRV

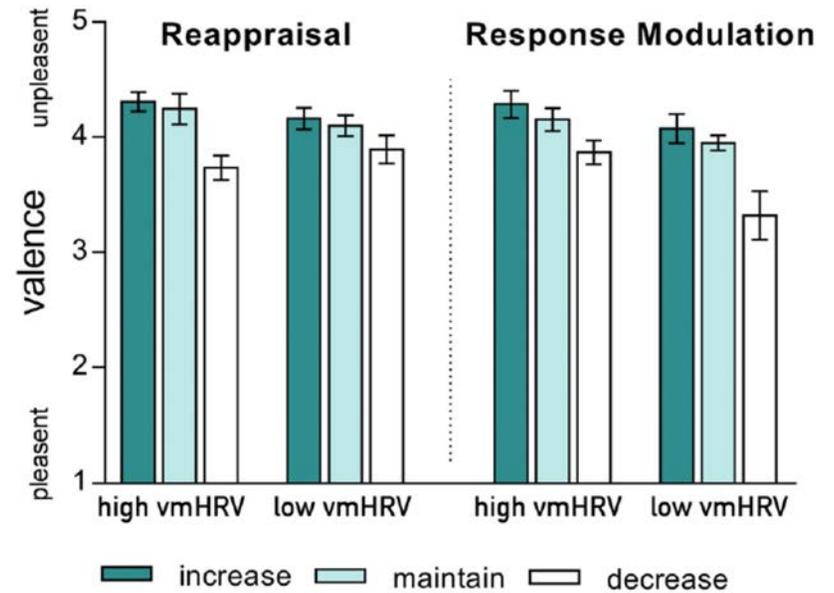
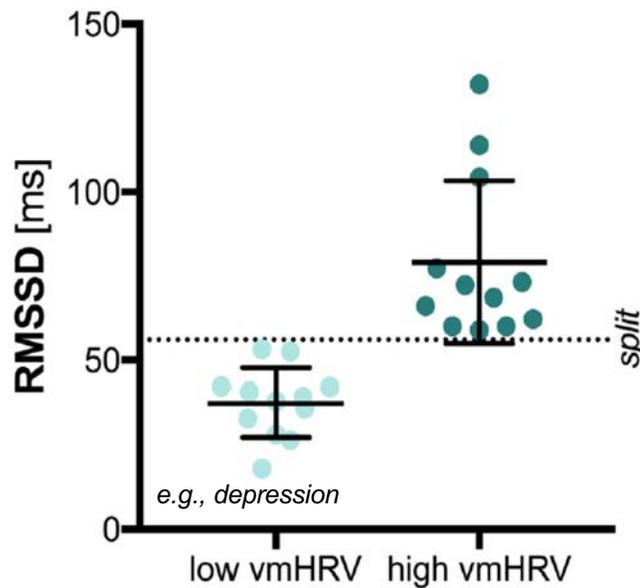


FIGURE 2 | Valence ratings of the current emotional state after regulating emotions evoked by unpleasant pictures using either reappraisal (left) or response modulation (right) in participants with high and low resting state vagally mediated heart rate variability (vmHRV). Bars represent group means with standard errors.

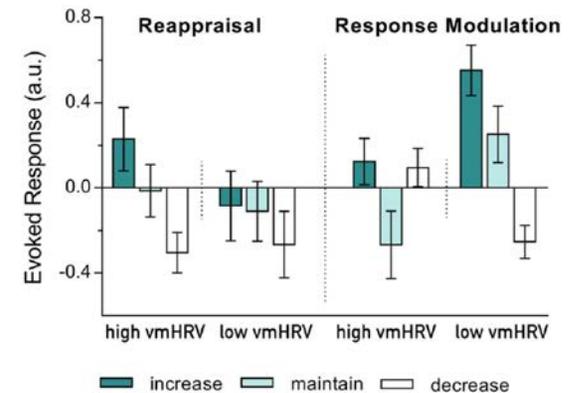
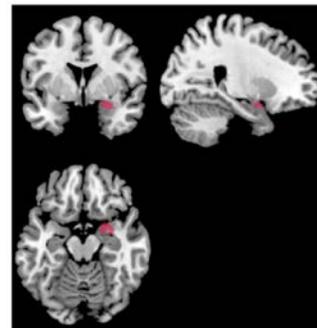
(2) Interpretation change: Reappraisal, distancing

Reappraisal strategies (Increase, maintain, decrease) x **Valence** (pleasant, unpleasant)

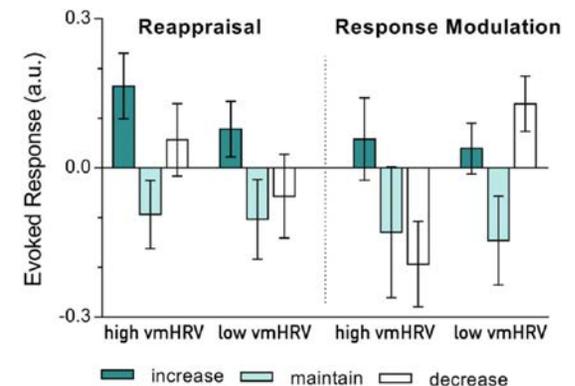
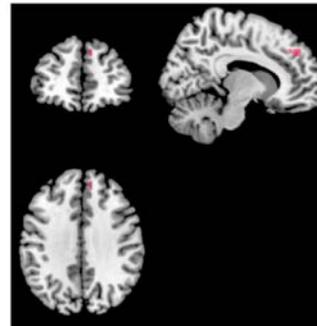
AMY and dlPFC influenced by resting vmHFV levels as a function of the used strategy:

- Low vmHRV → only unpleasant pictures
- Appraisal:

A Right Amygdala

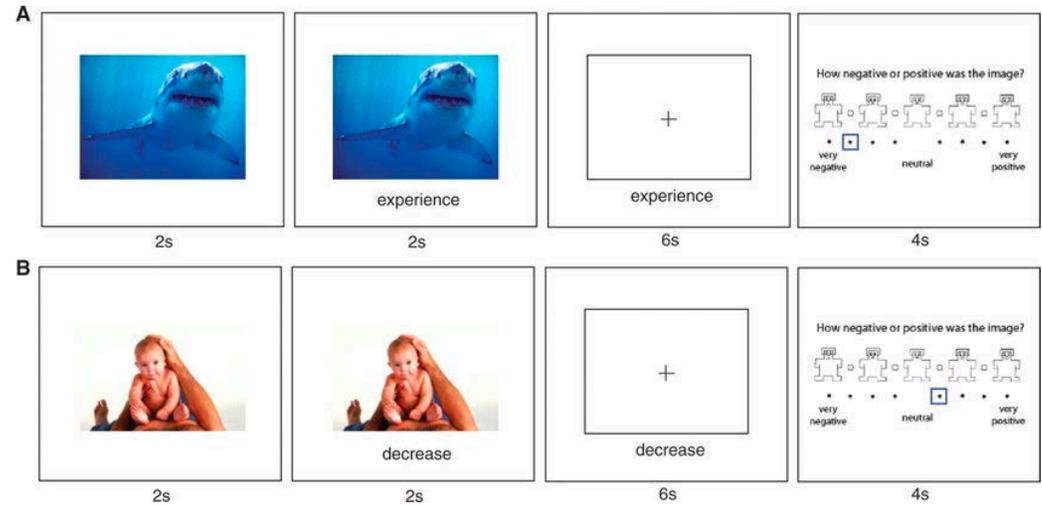
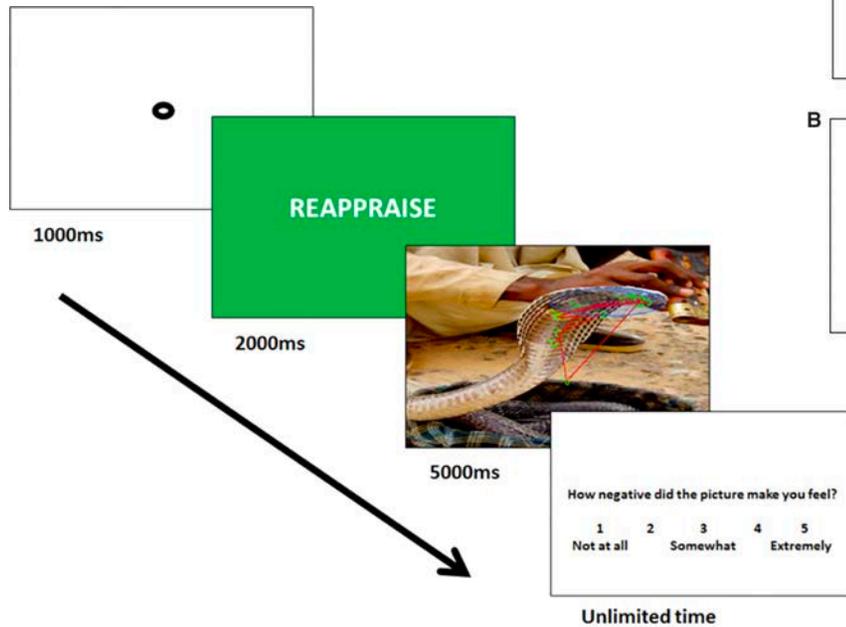


B Right dorsomedial PFC



(2) Interpretation change: Reappraisal, distancing

Possible methods



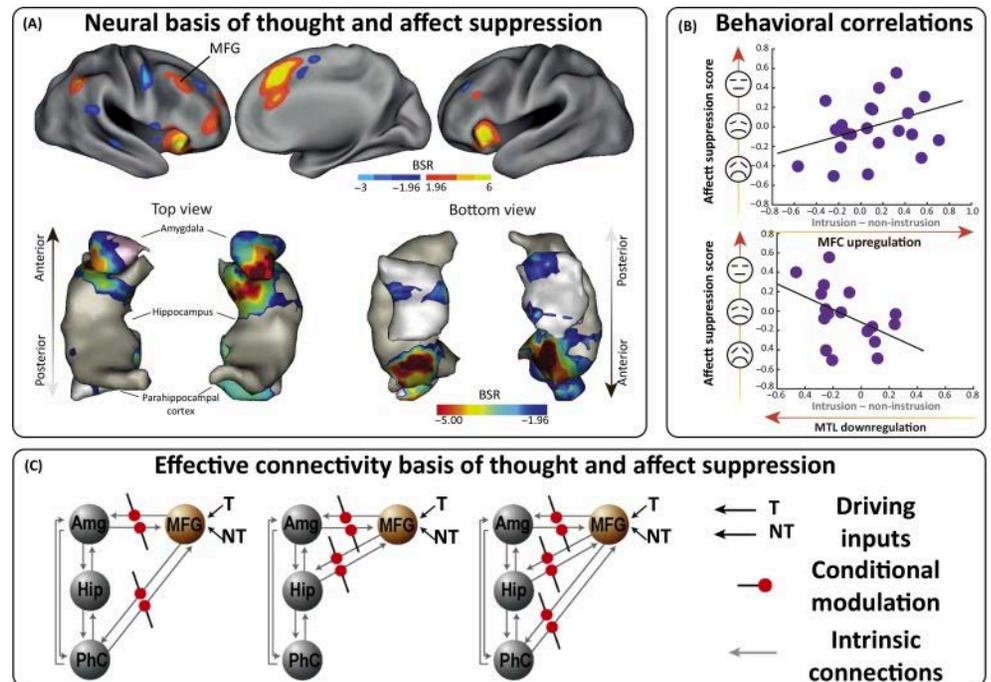
IAPS

DECREASE



(3) Response change: Suppression, extinction

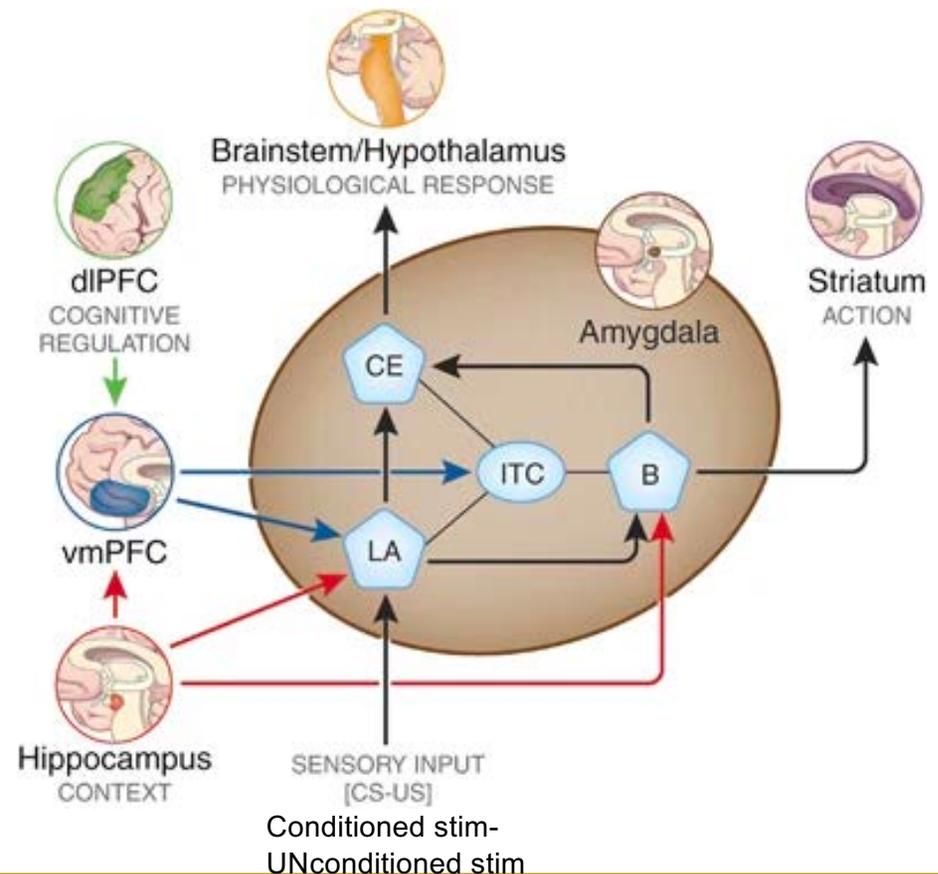
- **Suppression:** Direct attempts to influence cognitive, physiological, or behavioral manifestation of emotional responses
 - Increases bilateral OFC, r/vACC, SPG, dIPFC
 - Increases skin conductance



Trends in Cognitive Sciences

(3) Response change: Suppression, extinction

- **Extinction:** Suppression of responses that have been acquired through stimulus-reinforced/conditions associations
 - Involves active learning, inhibition – fits less into the Gross model of ER
 - More automatic, less effortful
 - Examples from anxiety treatment (fear extinction)
 - Potentially degrades over time



Outstanding questions

- Interactions at a chemical level – considerations for drug treatment
 - Development of methods?
 - Improve ability to capture dynamic feelings rather than posthoc behavioral rating
 - Opportunity for more multi-methodological assessments?
 - Utility of emotion regulation measurements as treatment (e.g., neurofeedback) or treatment markers
- 

Wednesday's readings for discussion

- **Discussants:** Shayne, Betty
- **Classic regulation task**
 - Thiruchselvam, R., Blechert, J., Sheppes, G., Rydstrom, A., & Gross, J. J. (2011). [The temporal dynamics of emotion regulation: An EEG study of distraction and reappraisal](#). *Biological psychology*, 87(1), 84-92.
- **Cultural differences**
 - Liddell, B. J., & Williams, E. N. (2019). [Cultural differences in interpersonal emotion regulation](#). *Frontiers in psychology*, 10, 999.
- **Brain networks supporting emotion regulation**
 - Bartholomew, M. E., Yee, C. M., Heller, W., Miller, G. A., & Spielberg, J. M. (2019). [Reconfiguration of brain networks supporting inhibition of emotional challenge](#). *NeuroImage*, 186, 350-357.

Reminder: Exam open until 3/15

- Covers weeks 1-6
 - Major theories (*short answer, multiple choice*)
 - Anatomy and autonomic nervous system (*matching labels to picture*)
 - Basic methods of emotion perception (advantages, disadvantages) (*multiple choice, matching, short answer*)
 - fMRI/fNIRS, BOLD signal
 - Physiology, eye tracking
 - EEG/ERP
 - 40% short answer, 60% automatic grading (e.g., MC, matching)
- Can access it *twice*

Extra credit option open (up to 20 points)

- This extra credit assignment is designed to help you prepare your research proposal (intro/methods).
 - Enter your title
 - Describe your topic
 - State your anticipated methodological approach (fMRI/fNIRS, physiological, eye tracking, EEG/ERP, MEG).
 - Lastly, there is a space for you to ask Caitlin specific questions
- Informal discussion board style writing is perfectly acceptable.

Upcoming schedule

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
2/28 W8	3/1: Emotion and affect regulation	3/2	3/3	3/4	3/5	3/6
	<i>*Recommended to schedule time to discuss paper topic w/Caitlin</i>	DB due	Discussion led by Shayne & Betty			
3/7 W9	3/8: Stress and interactions with health (sleep emphasis Mon)	3/9	3/10	3/11	3/12	3/13
	Special guest: Dr. Veronica Guadagni	DB due	Discussion led by Kelly & Andrea			
3/14 W10	3/15: Pediatric/ nonverbal considerations	3/16	3/17	3/18	3/19	3/20
	NO CLASS Videos posted on website, <i>not required</i> Test due	DB due	Discussion led by Caitlin			

Upcoming schedule

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
3/21 W11	3/22: Role of cognition/attention & AffNeuro as treatment	3/23	3/24	3/25	3/26	3/27
		DB due	Discussion led by Hannah & Nicole			
3/28 W12	3/29: Clinical and environmental considerations	3/30	3/31	4/1	4/2	4/3
	Week 14 presenters: paper draft due	DB due	Discussion led by Haley & Brandon			
4/4 W13	4/5: Love & cultural considerations	4/6	4/7	4/8	4/9	4/10
	Special guest: Dr. Mengya Xia Week 15 presenters: paper draft due	DB due	Discussion led by Bobby & Caitlin			
4/11 W14	4/12 4-5 presenters	4/13	4/14 4-5 presenters	4/15	4/16	4/17
4/18 W15	4/19 4-5 presenters	4/20	4/21 4-5 presenters	4/22	4/23	4/24
4/25 FINAL	4/26 Due Monday: Final edits of paper due @ 11:59 pm					