

Role of cognition and attention

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PSYC 888– Affective (Cognitive) Neuroscience

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Don't forget to record!



Two primary views on emotion & attention interactions:

Bottom-up automaticity

Relevance for survival

- *Patrick Vuilleumier, John Gabrieli, Matthew Lieberman*

Top-down (cognitive) regulation

Reliant on attention availability – attention as redirection

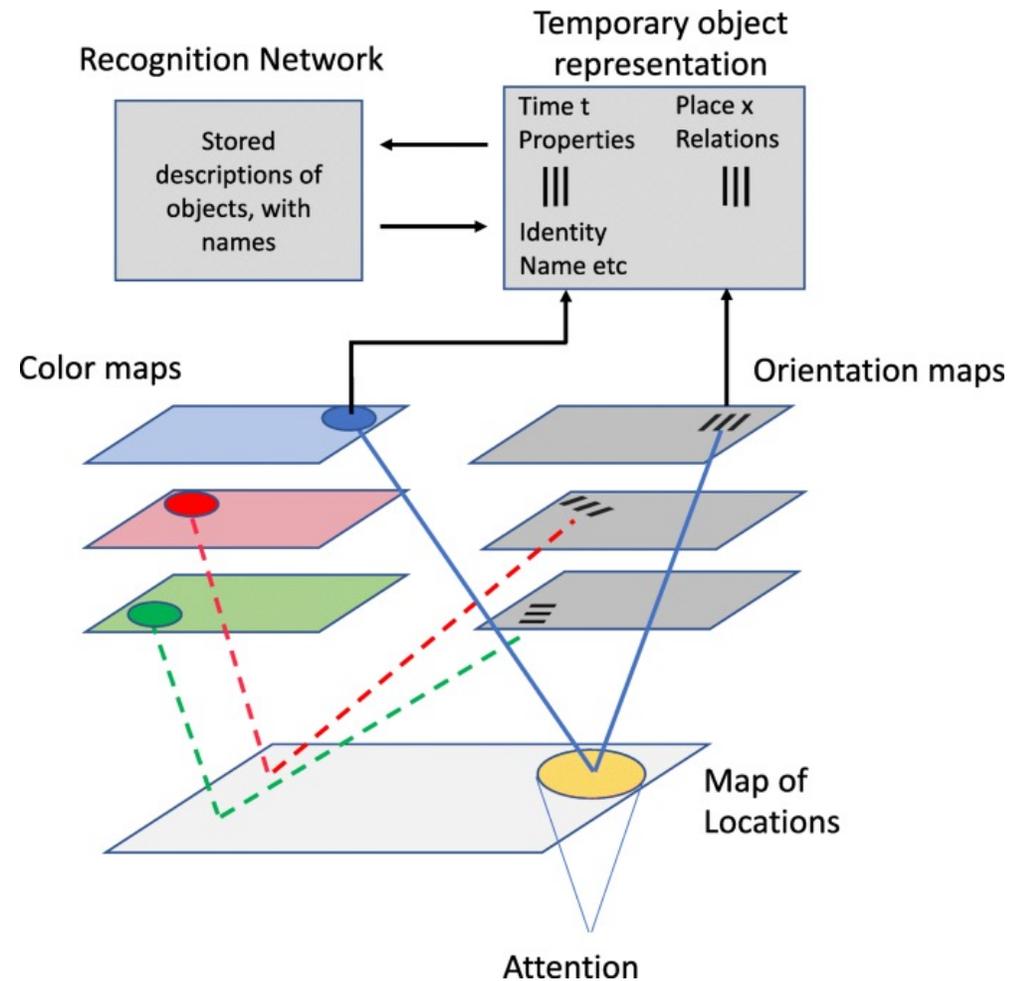
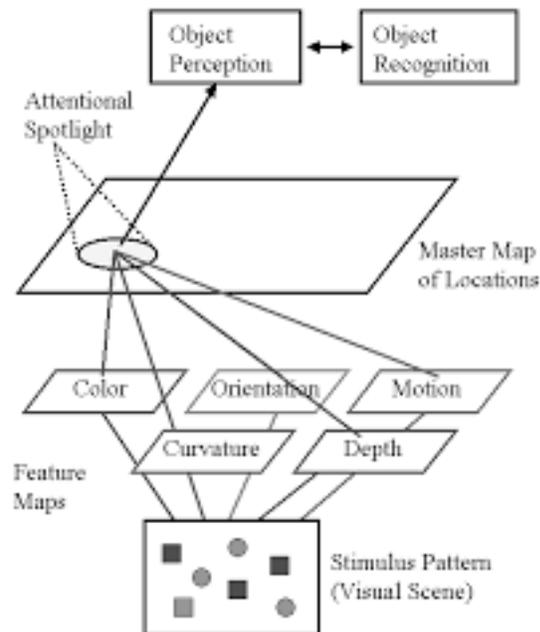
- *Luiz Pessoa, Leslie Ungerleider, Liz Phelps*

“Automaticity” of emotion and the need for emotion regulation

- Independent processing – not affected by intentions, strategies, conscious processing
 - Even if resources are not available
- Why?
 - Freudian notions of defense
 - Management of stressful situations
 - Cognitive concept of self-regulation (broadly)

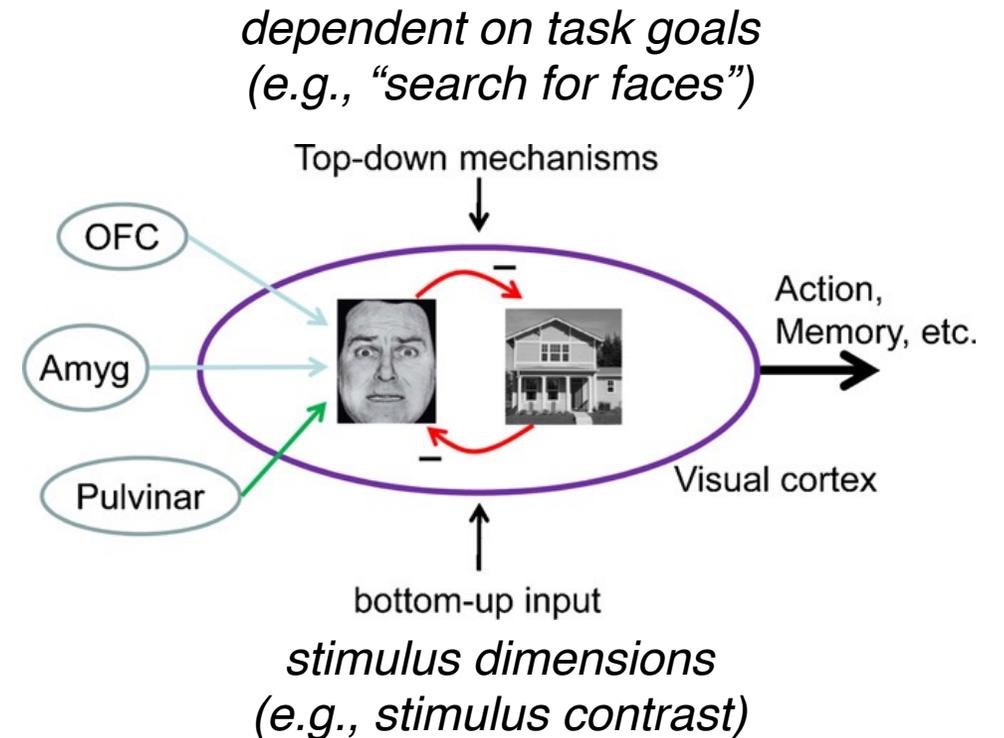
Emotional stimuli elicit attentional blinks

- Feature integration theory: Treisman & Gelade, 1980
 - Pre-attentive → Attentive stage



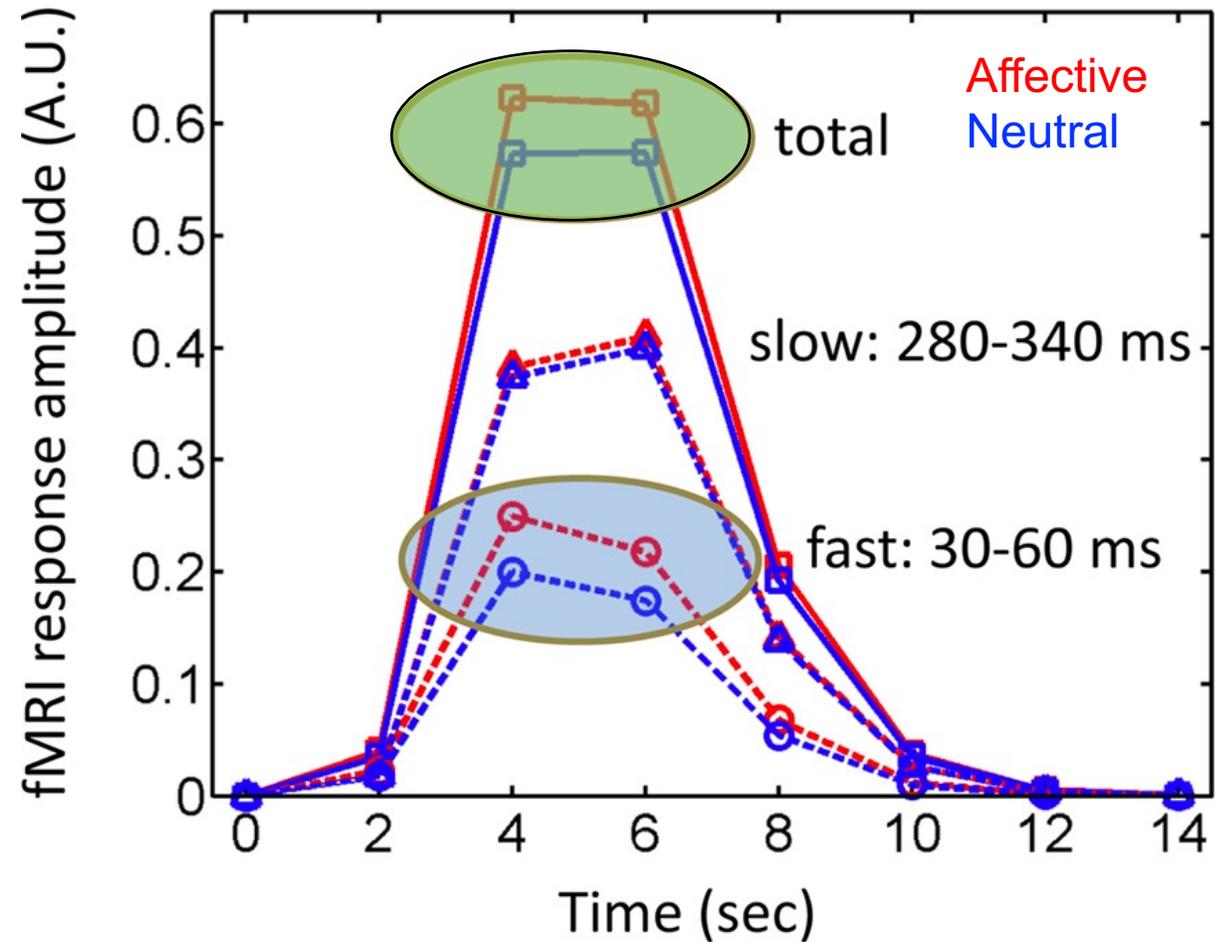
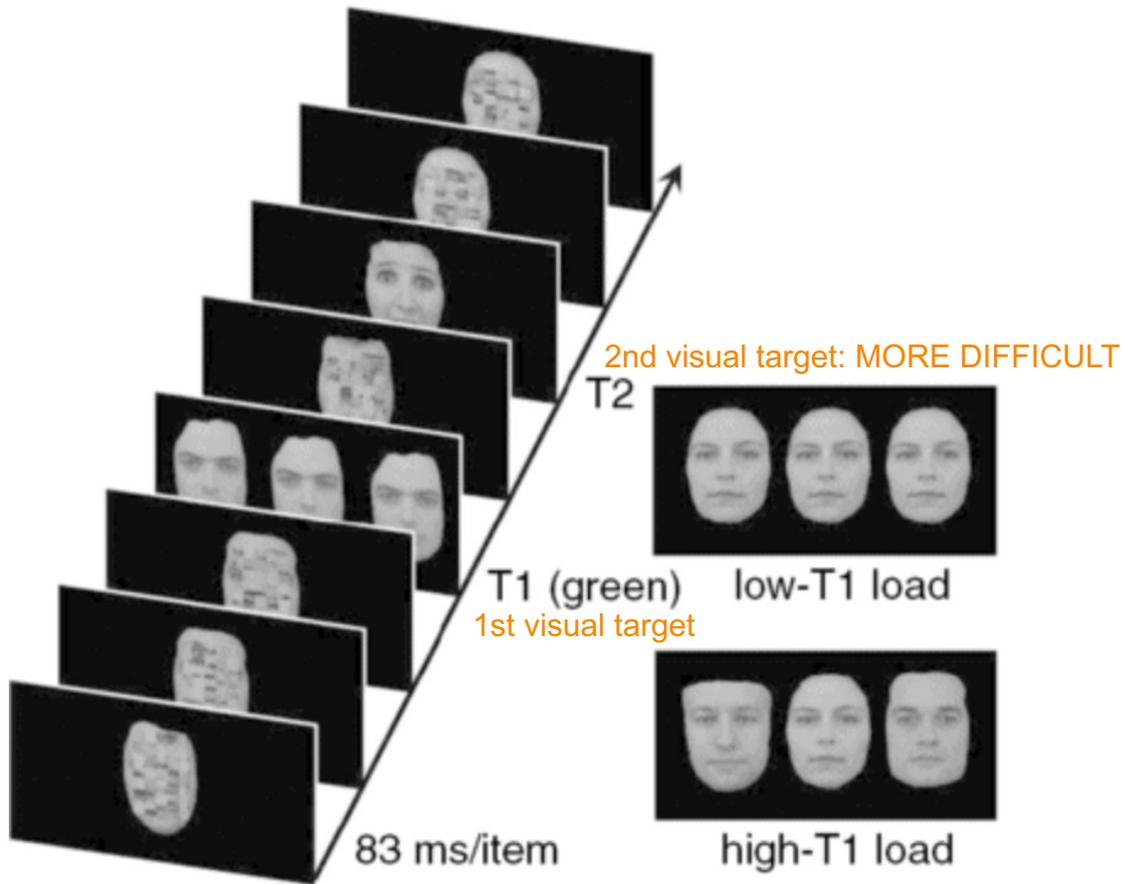
Emotional stimuli elicit attentional blinks

- “Attentional Blink”: Difficulty identifying targets when presented rapidly after another
 - Due to limited cognitive processing resources
 - Thought that AMY modulates visual cortex
 - Neutral >> Emotion a little easier



In a moment, you will see
a series of shapes.

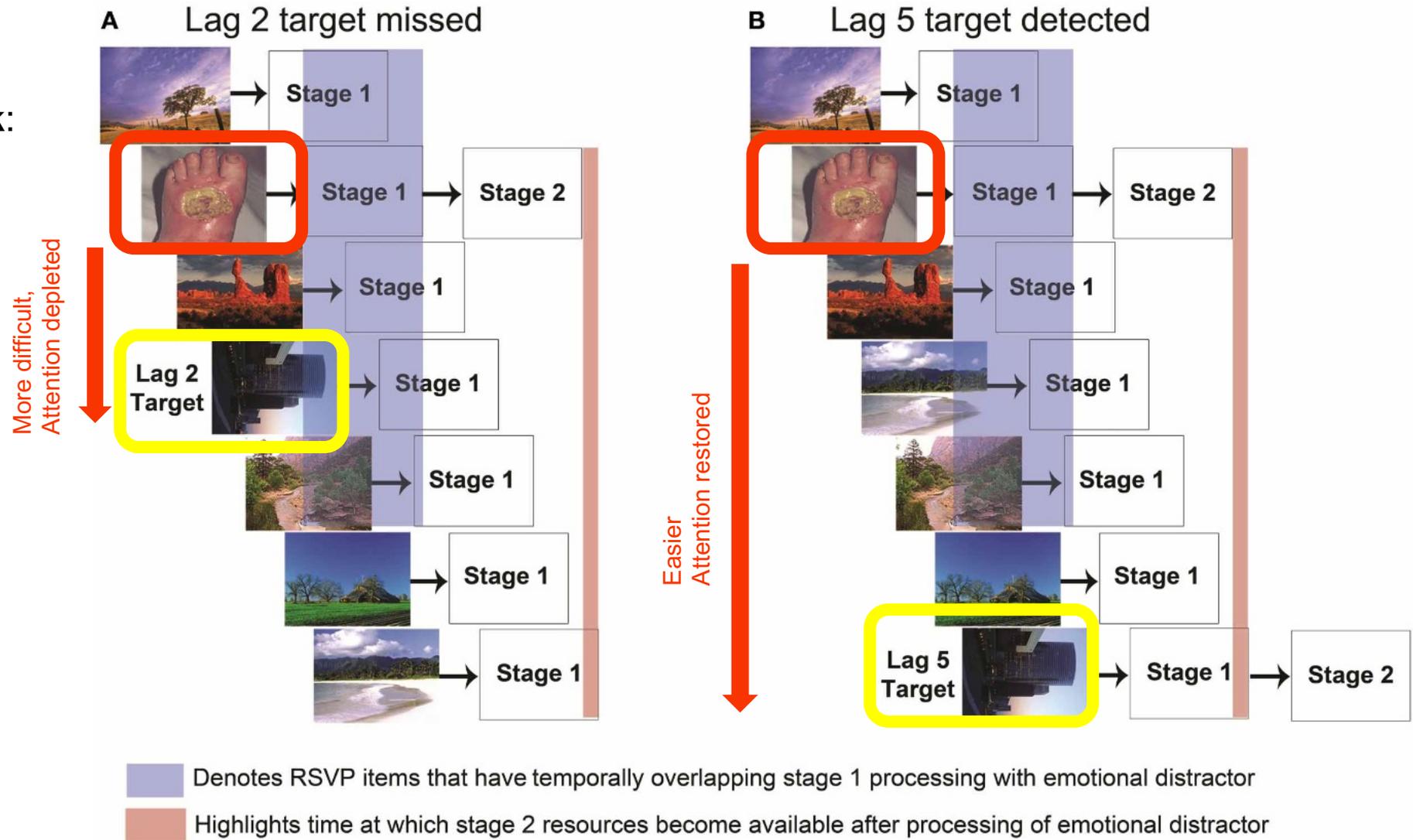
Attentional blink paradigm



fMRI captures the TOTAL of both slow and fast processing

“Emotion induced blindness”

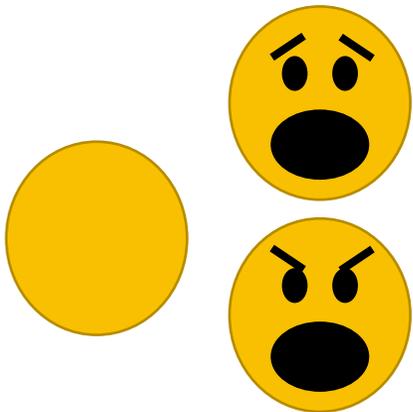
Rapid serial visual presentation (RSVP) Task:



Temporal model of attention to emotions

Cognitive stages occur in a series

1. Visual detection/perception
2. Structural encoding
3. Higher-order processing
4. Action understanding

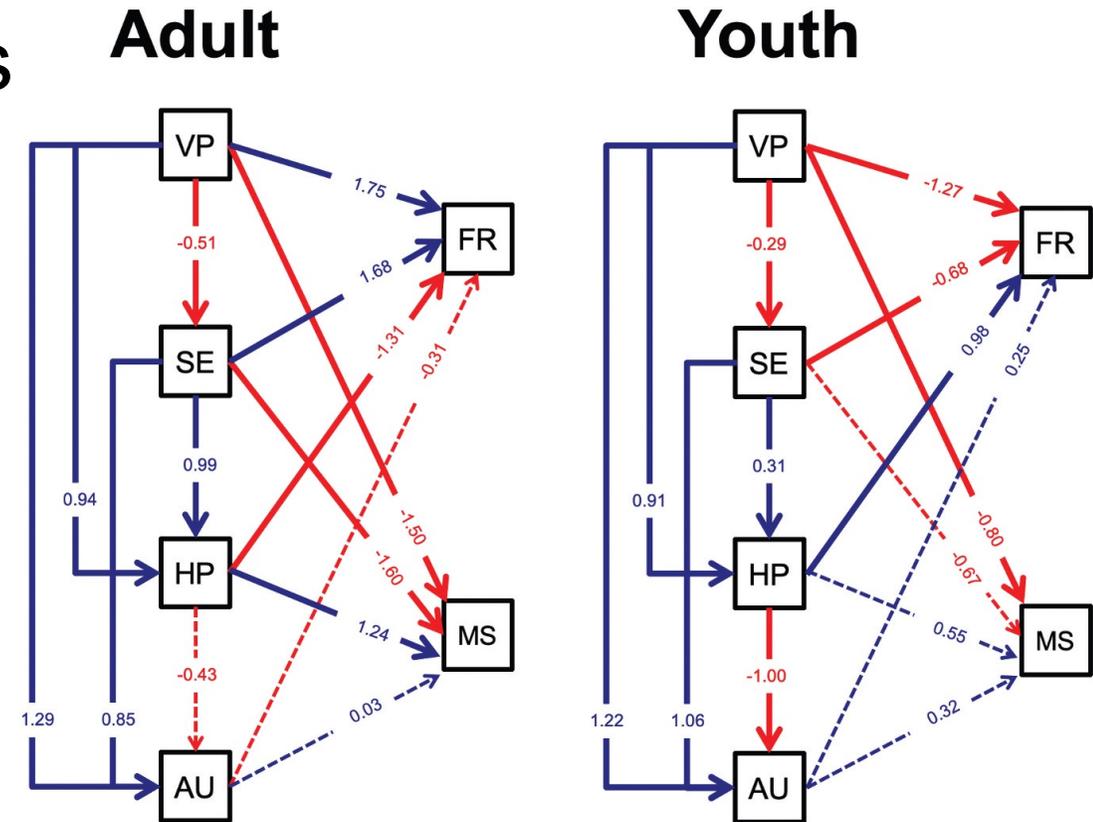


“Eyebrows sunken” +
“Mouth open” = Scared

RUN AWAY!

“Eyebrows raised” +
“Mouth open” = Angry

RUN AWAY!



Temporal model of attention to emotions

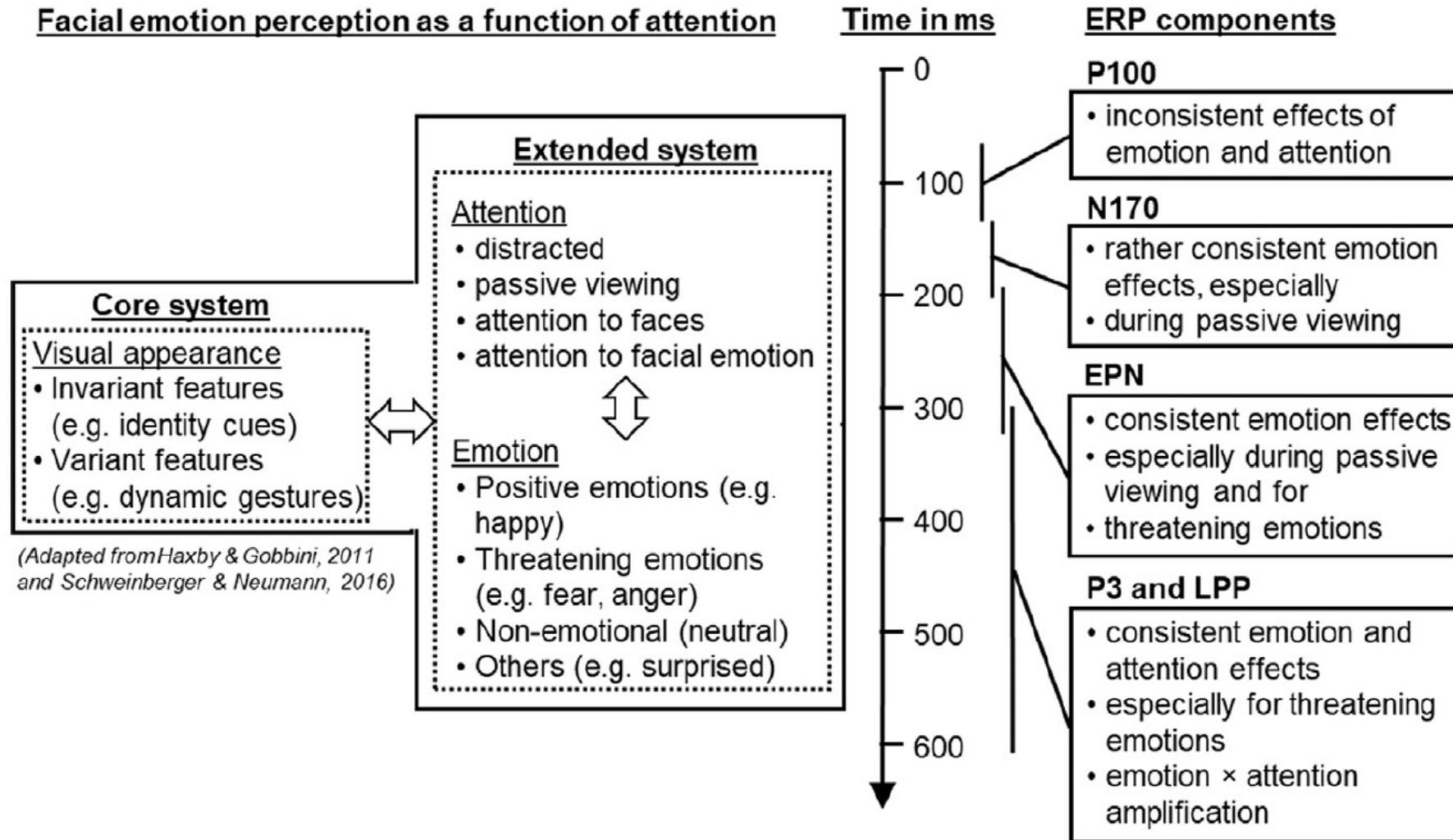
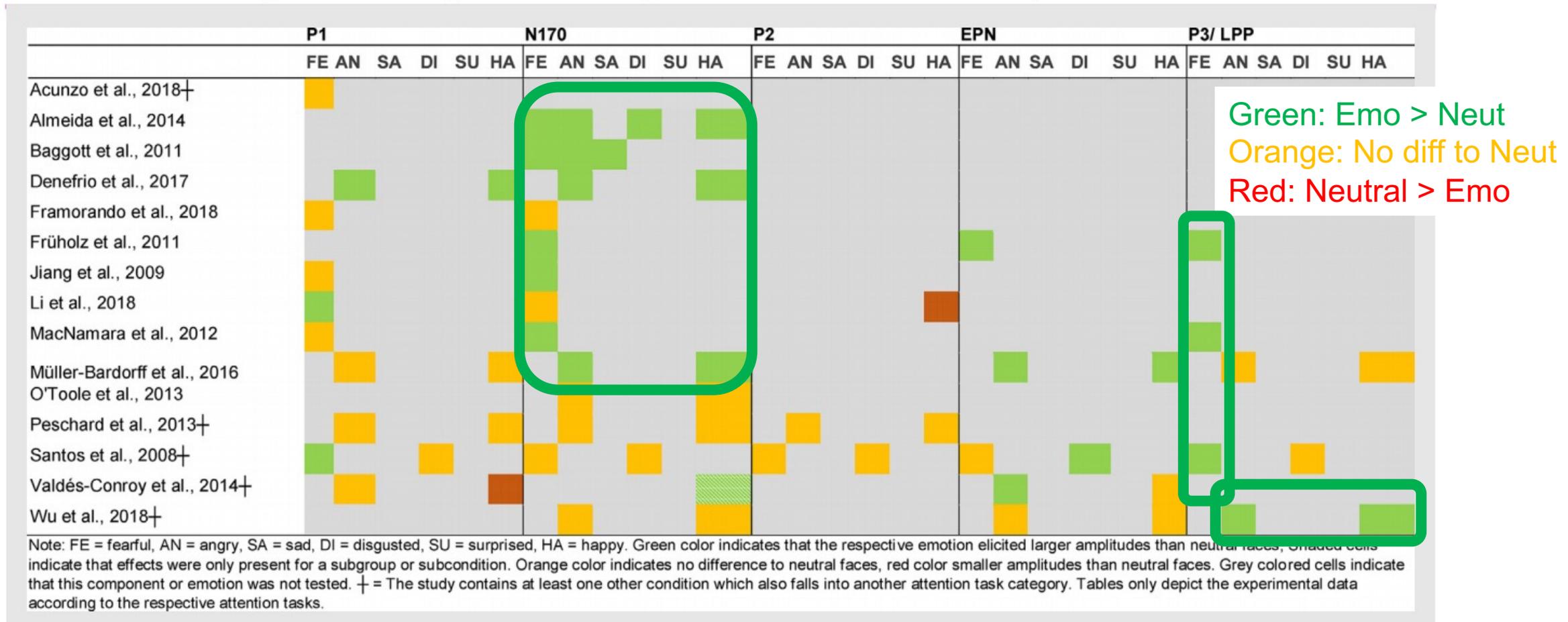


Table 2 – Faces serving as distractors (Attention Task 1): Emotion effects across ERP components.



Green: Emo > Neut
 Orange: No diff to Neut
 Red: Neutral > Emo

P1: Weak evidence, maybe fear?

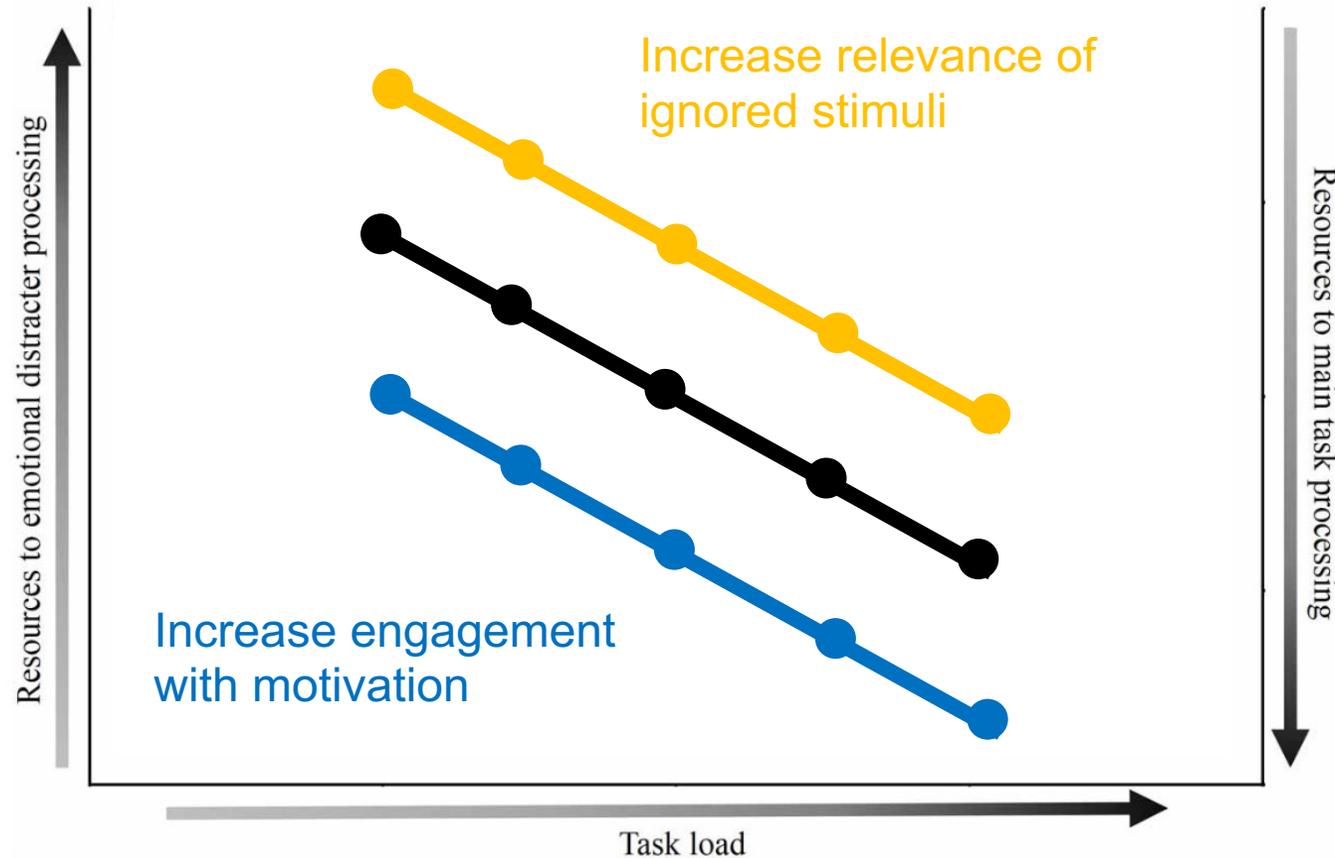
N170: responsive to emotions

P3: Mixed evidence? Fear?

- Other varying factors: passive viewing, explicit attention to faces, explicit attention task w/ emotion

Reading preview: Allocation of cognition/processing resources

Resources mostly on emotional distraction



Resources mostly on task

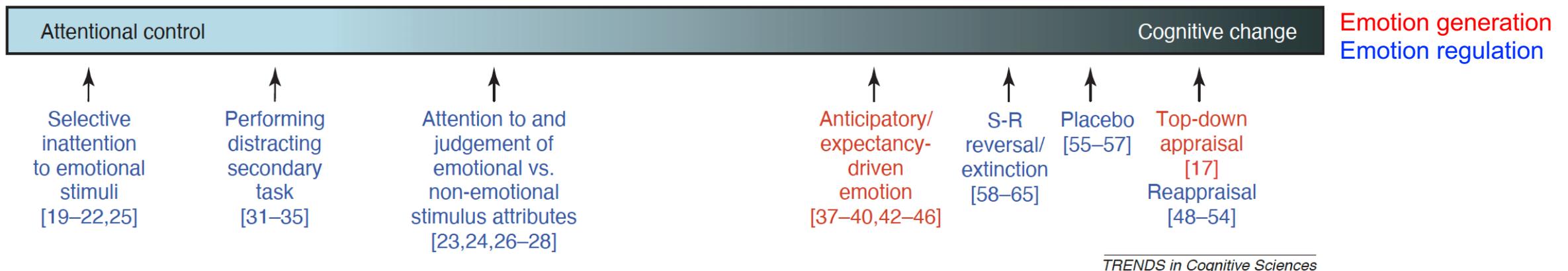
Reading preview: Cognitive control of emotion

Attentional control

- Selective aspect of information processing
- Permits focus on goal-relevant information

Cognitive change

- Higher-order cognitive abilities: Working memory, long-term memory, and mental imagery
- Supports learning, judgment and reasoning of information



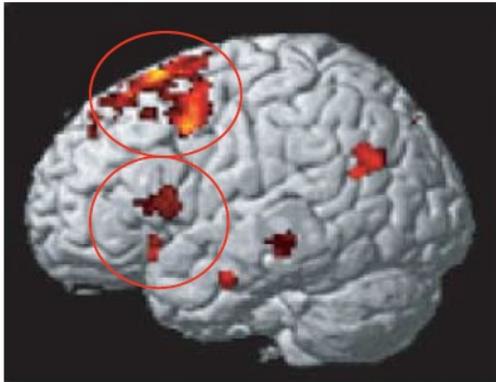
Reading preview: Cognitive control of emotion

Irrespective of goal:

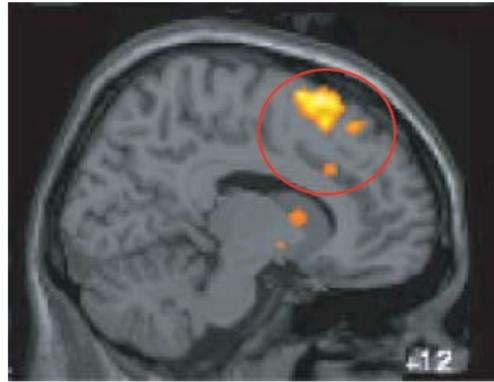
Decrease:
Lateral PFC, OFC

Increase:
Medial PFC

(a)

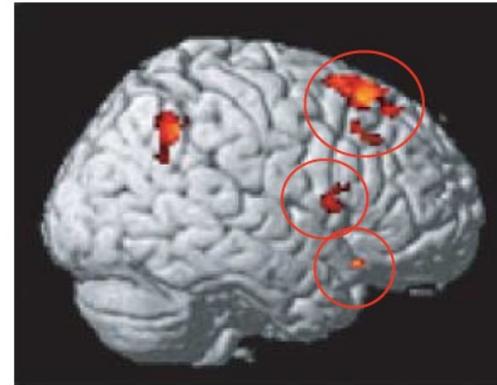


Increase or Decrease
Left LPFC

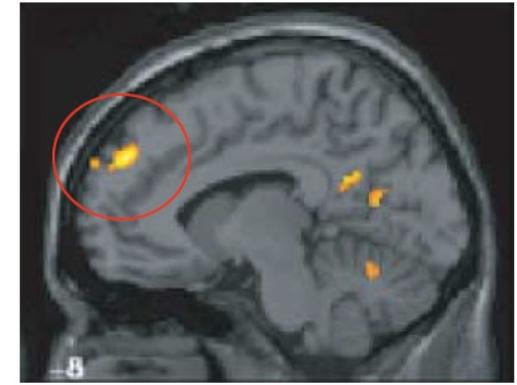


Increase or Decrease
Dorsal MPFC, ACC

(b)



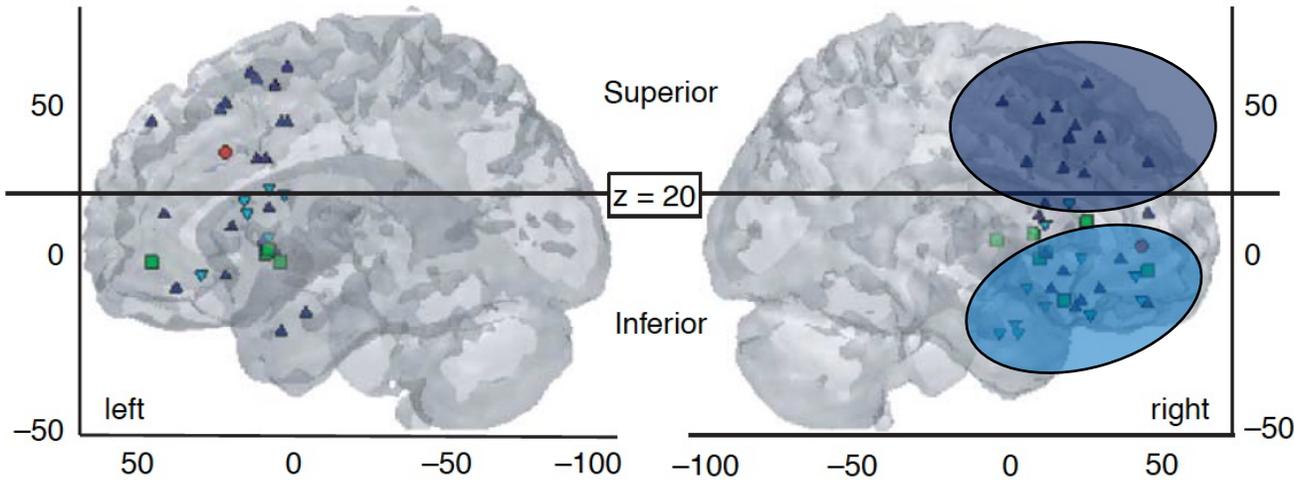
Decrease > Increase
Right LPFC, OFC



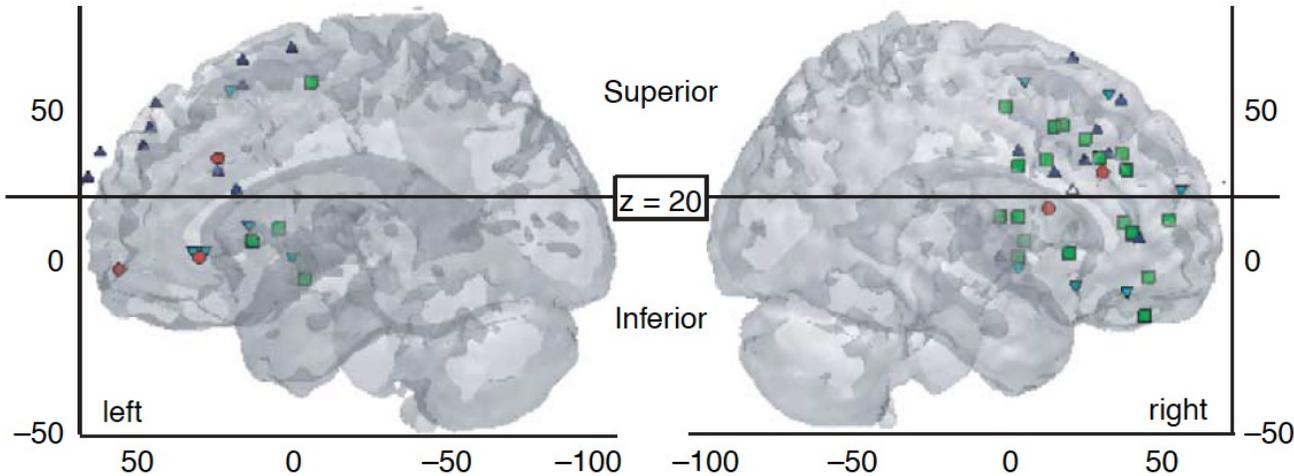
Increase > Decrease
Left MPFC

Reading preview: Cognitive control of emotion

(a) Lateral



(b) Medial



(c) Activation key

- Attentionally distracting secondary task
- Emotion generation via anticipation
- ▲ Emotion regulation via reappraisal or placebo
- ▼ Emotion regulation via extinction or reversal

Dorsal PFC: Re-describe emotional associations

Ventral PFC: Alter emotion via choice and learning

Next week

C04 - 2/6: (1) Discussion [led by J.C.] - cognition & attention

- [LaBar](#), K. S., & Cabeza, R. (2006). Cognitive neuroscience of emotional memory. *Nature Reviews Neuroscience*, 7(1), 54-64.
- [Ochsner](#), K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in cognitive sciences*, 9(5), 242-249.
- [Plass](#), J. L., & Kalyuga, S. (2019). Four ways of considering emotion in cognitive load theory. *Educational Psychology Review*, 31(2), 339-359.
- [Oliveira](#), L., Mocaiber, I., David, I. A., Erthal, F., Volchan, E., & Pereira, M. G. (2013). Emotion and attention interaction: a trade-off between stimuli relevance, motivation and individual differences. *Frontiers in Human Neuroscience*, 7, 364.