

## The Social Cognition and Emotion Sampler Plate

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### What is the relation btw. Soc-Cog and Emotion?

**Social Cognition** What do you feel, think, want right now?  
What are your traits/dispositions?

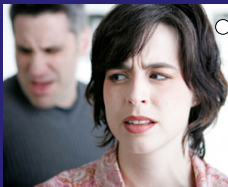


Did he intend to be mean?  
Is he an aggressive guy?

### What is the relation btw. Soc-Cog and Emotion?

**Social Cognition** What do you feel, think, want right now?  
What are your traits/dispositions?

**Emotion** What are you expressing?  
How am I feeling (expressing, physio responding)?



Does he look angry?  
How upset am I?  
(Is her heart racing, etc.)

### What is the relation btw. Soc-Cog and Emotion?

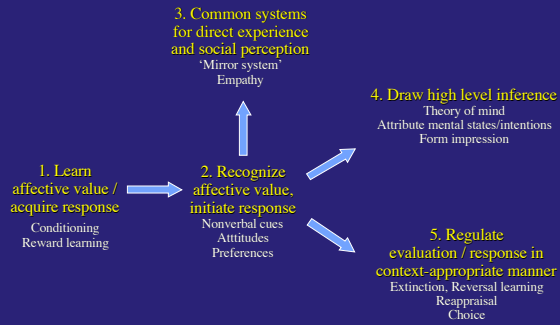
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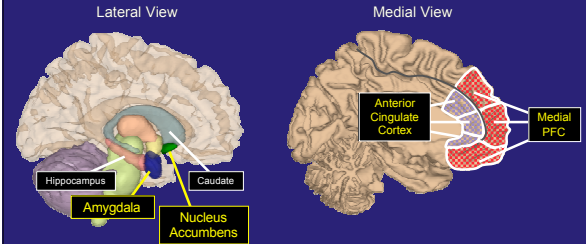
**Social Cognition and Emotion depend upon  
Common (& distinct) processes & neural systems**

- Social (perception & cognition) tasks often involve emotion
- Emotion tasks often use social stimuli (faces, pics of people, memories)
- Much of our emotional life arises in social contexts

## Socioemotional processing stream

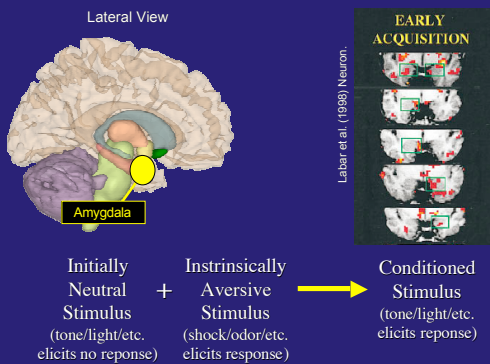


## 1. Learn affective value / acquire response

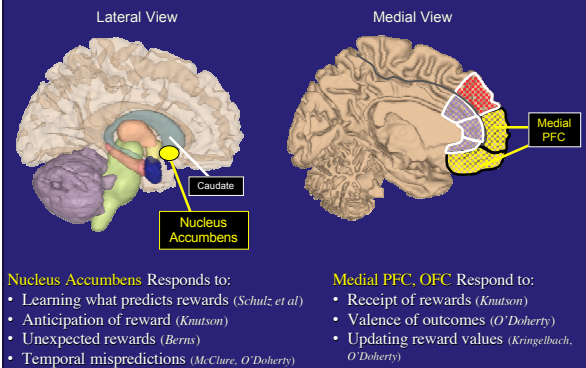


Brain Figure modified from Wager et al., in press

## 1. Learn affective value / acquire response

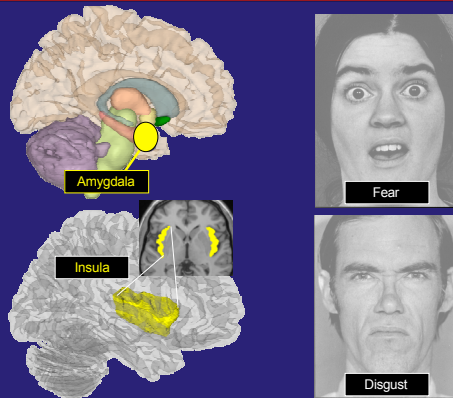


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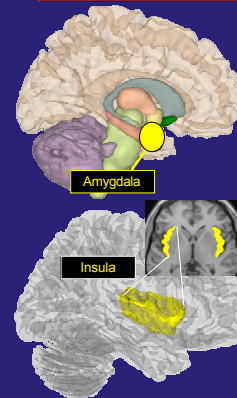


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## 2. Recognize affective value, initiate response



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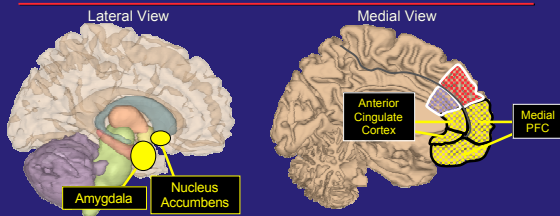
### Fear faces

- May be attention-independent (*Anderson, Vuilleumier, Whalen*)
- Influenced by anxiety, depression (*Bishop, Sheline*)
- Response enhancement related to short 5-HTT allele (*Hariri*)
- Arousing stimuli in general (*Anderson, Hamann*)
- Affective Salience? Potential threats?

### Disgust faces

- Inputs from viscera (*Craig*)
- Disgusting Odors (*Keyser*)
- Responds to other negative face types and aversive memories, images (*Phan, Wager*)
- Aversive stimuli in general?

## 2. Recognize affective value, initiate response



### Evaluative Judgments

Rostral, ventral ACC and medial PFC respond during:

- Like/dislike judgments (*Cunningham, Zysset*)

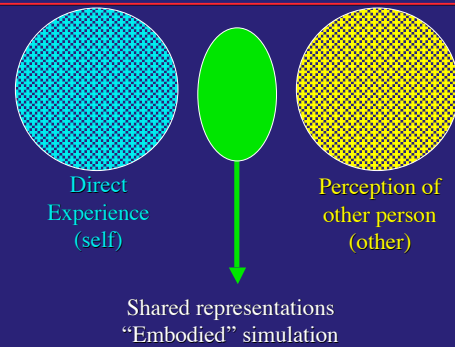
Amygdala responds:

- To faces of untrustworthy people (*Winston*)

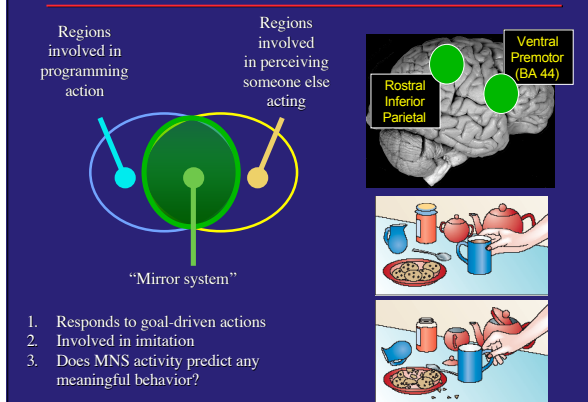
Nucleus Accumbens/Ventral medial PFC respond to:

- Faces of attractive people (*O'Doherty*)
- Things you would buy (*Knutson*)

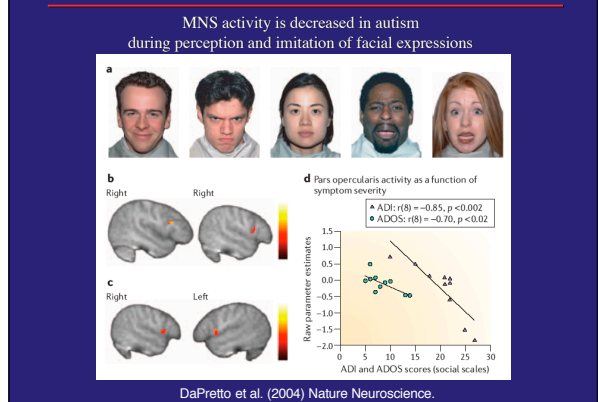
## 3. Common systems for direct experience & social perception



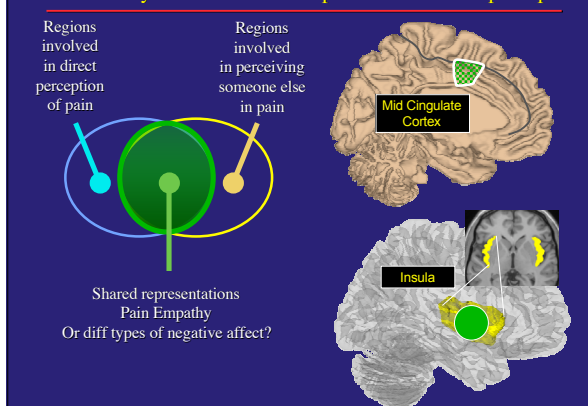
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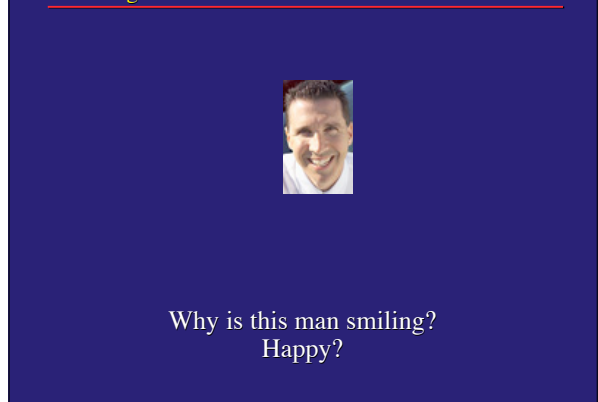
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### 4. Draw high-level inference about social/emotional stimuli





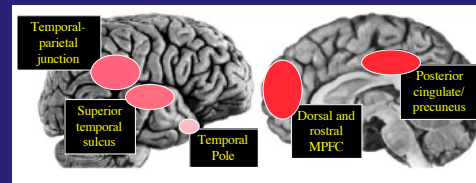
#### 4. Draw high-level inference about social/emotional stimuli



Why is this man smiling?  
Happy?  
Or manipulative?

#### 4. Draw high-level inference about social/emotional stimuli

- False belief task (*Gallagher, Sage*)
- Interactive games with human vs. computer opponent (*Gallagher*)
- Viewing shapes that depict intentional movements (*Castelli*)
- Form an impression from face or see face later (*Mitchell, Todorov*)
- Judge your own emotion, or someone else's (*Lane, Ochsner*)
- Judge whether trait words describe you (or someone else) (*Kelley, Ochsner*)
- Retrieve exemplars of affective categories (*Cato, Crosson*)



\* Color saturation reflects commonality of activation across tasks

#### 5. Regulate evaluation/response in context-appropriate manner

##### Description-Based Regulation

Use language, memory, attention to  
reinterpret stimulus meaning  
[*Reappraisal*].

Depends on:  
Dorsal and lateral PFC  
modulating amygdala

Ochsner et al. 2002, *JocN*; 2004, *Neuroimage*.



Think about image in a way that  
makes you feel more neg....

**Increase Negative Affect**

“He’s in pain, is weak of heart,  
may die soon....”



Think about image in way that  
makes you feel less negative....

**Decrease Negative Affect**

“He’s just tired/annoyed, is  
hearty, will be right as rain....”

## 5. Regulate evaluation/response in context-appropriate manner

### Description-Based Regulation

Use language, memory, attention to reinterpret stimulus meaning  
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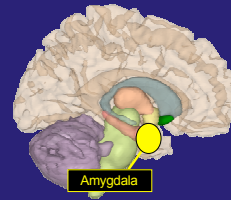
### Outcome-Based Regulation

Re-map/alter learned contingencies via direct experience with outcomes  
[*Extinction, Reversal learning*].

Depends on:  
Ventral and medial PFC

## Acquisition of fear conditioning

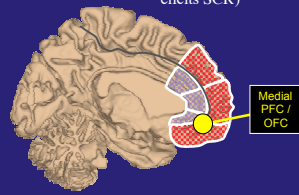
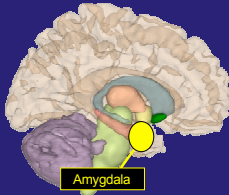
Initially Neutral Stimulus (blue triangle) + Intrinsically Aversive Stimulus (shock elicits SCR) → Conditioned Stimulus (triangle elicits SCR)



Phelps et al. 2004, *Neuron*

## Extinction of fear conditioning

Conditioned Stimulus (triangle elicits SCR) + Nothing → Extinguished Conditioned Response (triangle no longer elicits SCR)



Phelps et al. 2004, *Neuron*

## 5. Regulate evaluation/response in context-appropriate manner

### Description-Based Regulation

Use language, memory, attention to reinterpret stimulus meaning  
[e.g. *Reappraisal*].

Depends on:  
Dorsal and lateral PFC

### Choice-Based Regulation

Balance pros/cons of choice options  
[e.g. *Delaying gratification*].

Depends on:  
Combo of the other two

### Outcome-Based Regulation

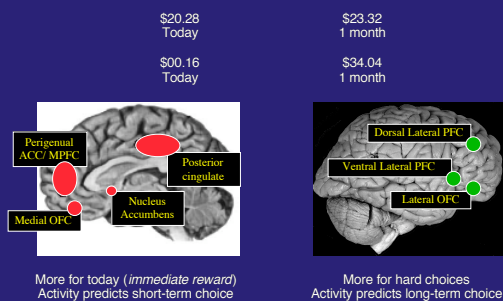
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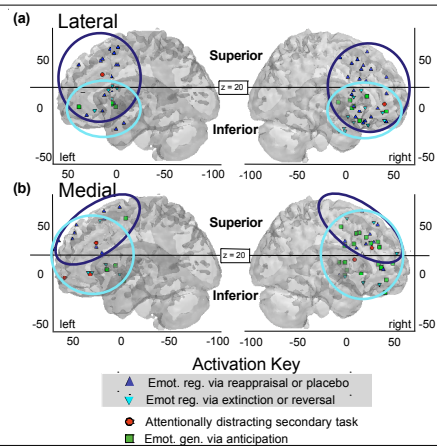
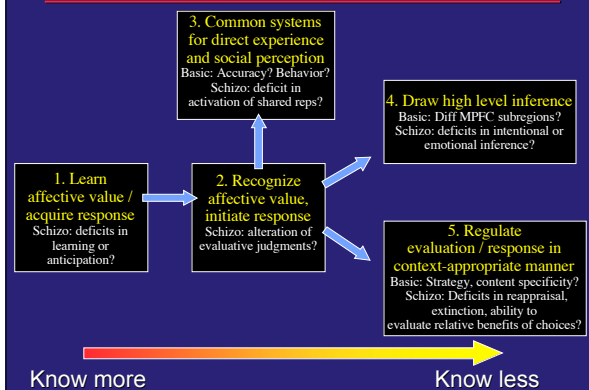
### Choice

- Trade-off short-term vs. long-term gains (*McClure*)

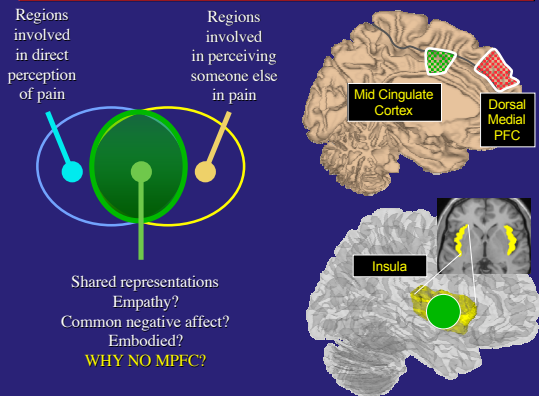


McClure et al. (2004) Science.

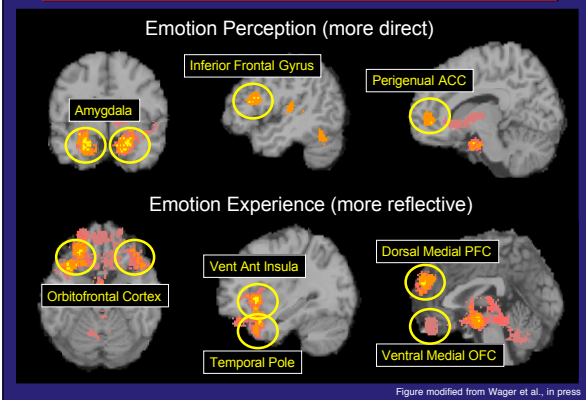
## Socioemotional processing stream



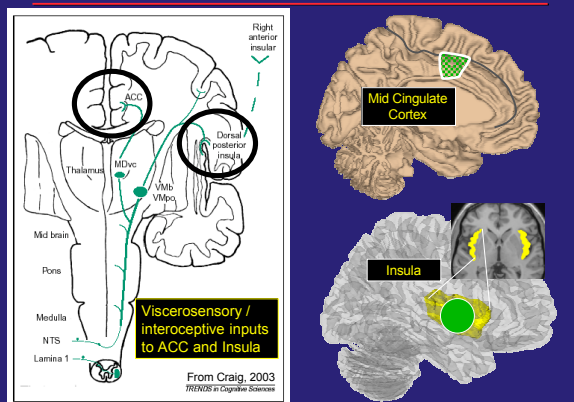
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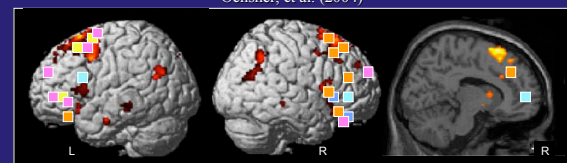
### Direct vs. Reflective modes of processing



### 3. Common systems for direct experience & social perception



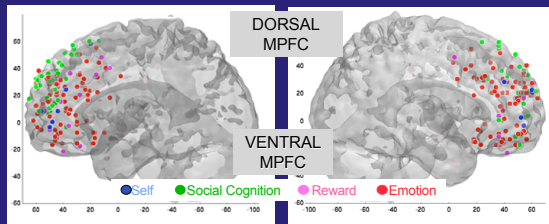
Ochsner, et al. (2004)



- Ochsner et al (2002)
- Beauregard et al (2001)
- Levesque et al (2003)
- Kalisch et al (2005)
- Phan et al (2005)
- Harenski & Hamann (2005)

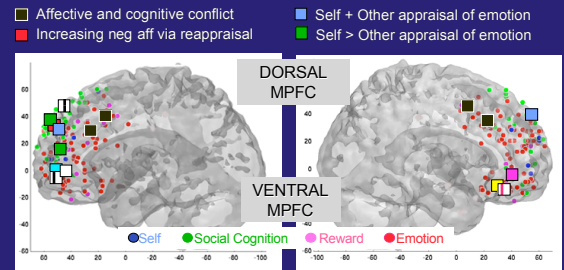
Reinterpret individual aversive images in neutral/positive terms  
 Detached when watching sexually arousing films  
 Detached when watching from sad films  
 Detached when anticipating shock  
 Reinterpret blocks of aversive images in neutral/positive terms  
 Reinterpret blocks of aversive moral or non-moral images in neutral/positive terms

## 2. The Broader Context



Ochsner & Gross (in press) *Trends in Cognitive Sciences*; Kober, Ochsner & Wager (in prep)

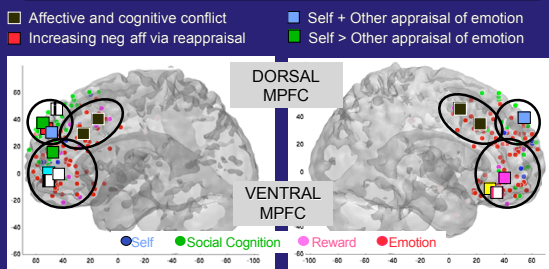
## 2. The Broader Context



- Ability to identify feelings predicts activation during affective conflict
- Trait Anxiety → decr during affective conflict
- Self-focused anxiety predicts activity during pain
- Self + Other appraisal of emotion
- Self > Other appraisal of emotion
- Self > Situation focused reappraisal
- Resolution of response conflict
- Ruminators deactivate when reappraising

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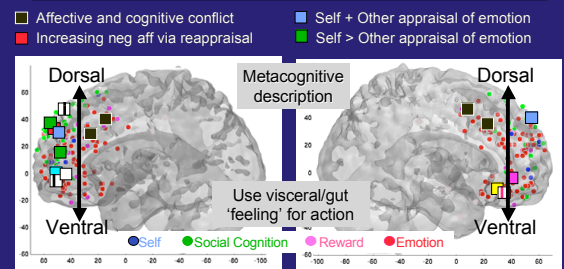
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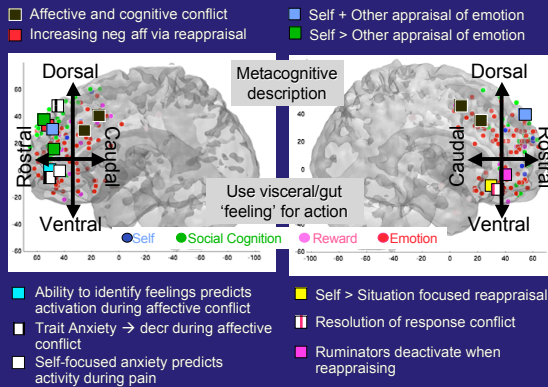
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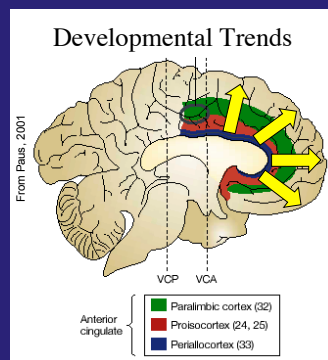
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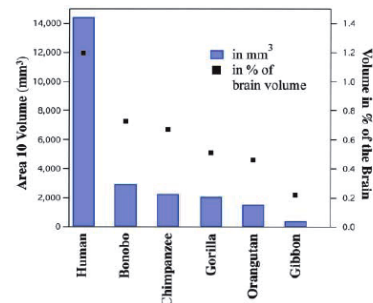
## MPFC Structure

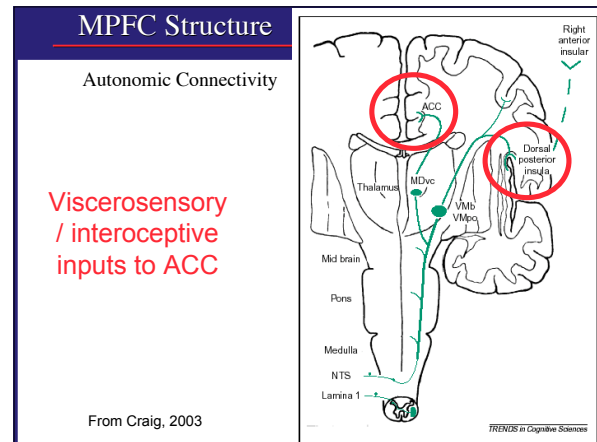
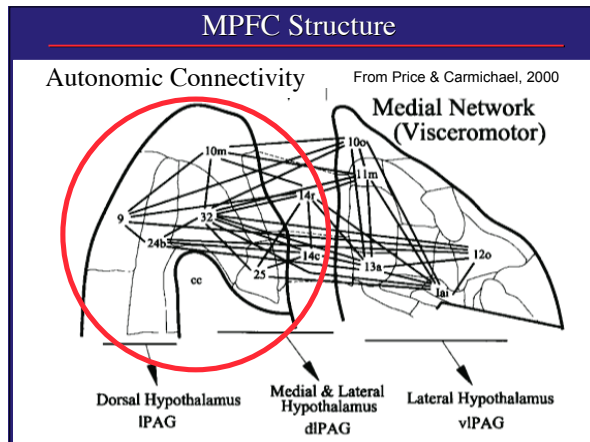


## MPFC Structure: 4 Facets

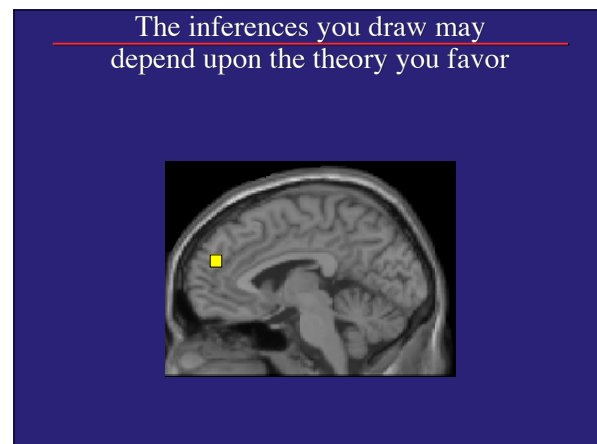
### Phylogenetic specializations

Adapted from Semendeferi et al, 2001





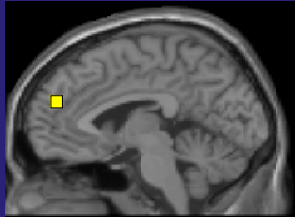
- ### Drawing psychological inferences from patterns of brain activation
- Example: A study of affective forecasting
    - Judge how you'd feel:
      1. If you won the lottery tomorrow
      2. If you won the lottery in a year
  - You observe greater MPFC activity when thinking about the near than the far future
  - What can you infer about psychological process?





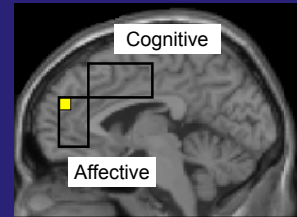
The inferences you draw may  
depend upon the theory you favor

Emotion/Cognition: When forecasting the near future,  
you should feel more emotion



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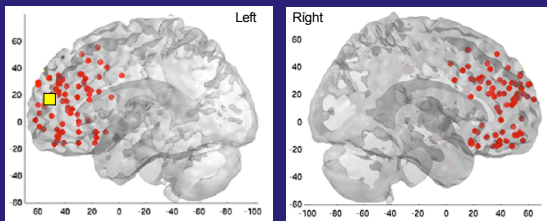
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Look at a Review Paper, e.g. Bush, Luu & Posner (2000)

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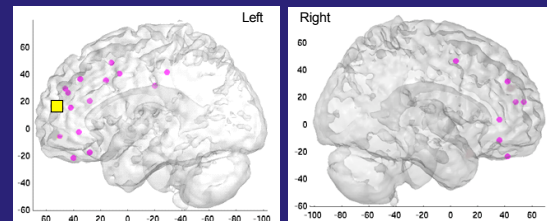
Emotion/Cognition: When forecasting the near future,  
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48 Emotion Studies

The inferences you draw may  
depend upon the theory you favor

Reward: Forecasting the near future should  
be more rewarding

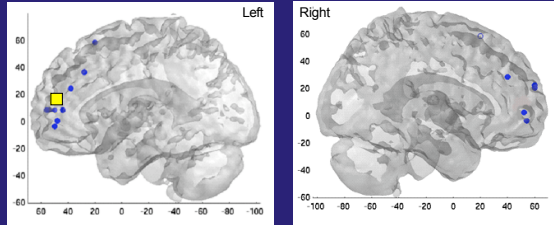


7 Reward Studies

The inferences you draw may depend upon the theory you favor

### Self-referential:

When thinking about the near future, you could think more about personal implications (would it change me? would I become jaded, etc.)

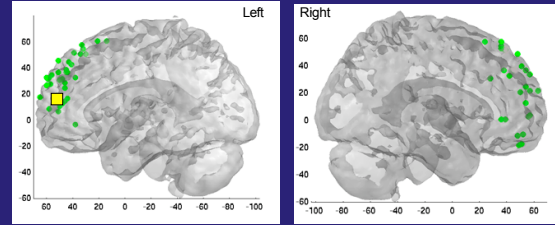


10 Self Studies

The inferences you draw may depend upon the theory you favor

### Social Cognitive:

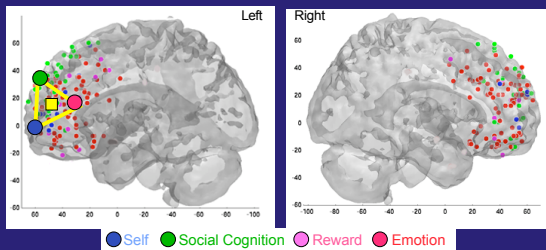
When thinking about the near future, you could think more about how your loved ones would feel (happy, jealous, excited, etc.)



15 Theory of mind/Social Cognition Studies

The inferences you draw may depend upon the theory you favor

### The Bermuda Imaging Triangle



What to infer?

Social Cog/TOM

Self-reflection

Attitudes

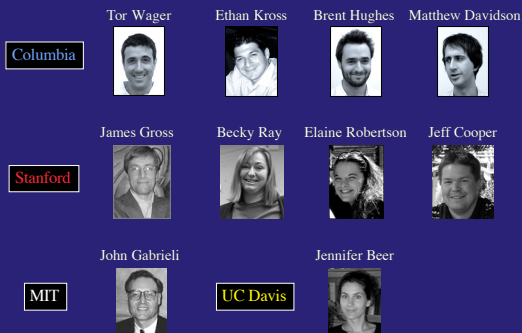
Emotion

Reward

Medial PFC

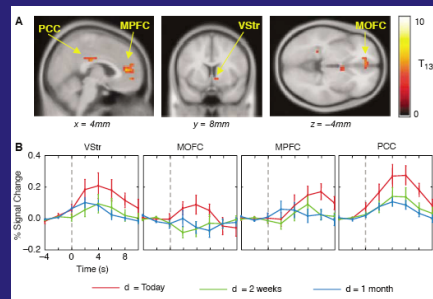
One common, or many distinct mechanisms?

## Collaborators



## 5. Regulate evaluation/response in context-appropriate manner

### Choice



McClure et al. (2004) Science 306: 503-507

## 5. Regulate evaluation/response in context-appropriate manner

### Choice

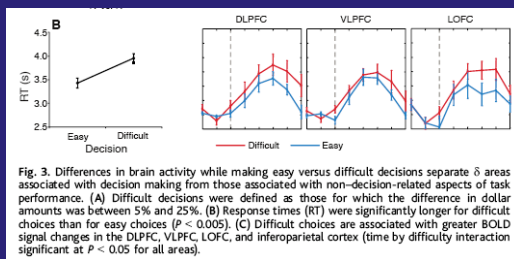


Fig. 3. Differences in brain activity while making easy versus difficult decisions separate  $\delta$  areas associated with decision making from those associated with non-decision-related aspects of task performance. (A) Difficult decisions were defined as those for which the difference in dollar amounts was between 5% and 25%. (B) Response times (RT) were significantly longer for difficult choices than for easy choices ( $P < 0.005$ ). (C) Difficult choices are associated with greater BOLD signal changes in the DLPFC, VLPFC, LOFC, and inferior parietal cortex (time by difficulty interaction significant at  $P < 0.05$  for all areas).

McClure SM, Laibson DI, Loewenstein G, Cohen JD (2004) Separate neural systems value immediate and delayed monetary rewards. Science 306: 503-507