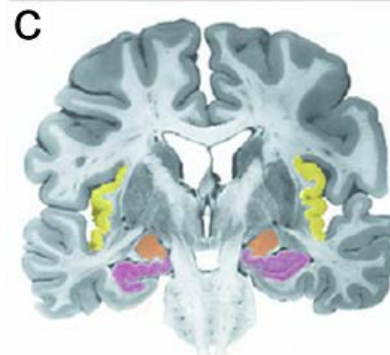
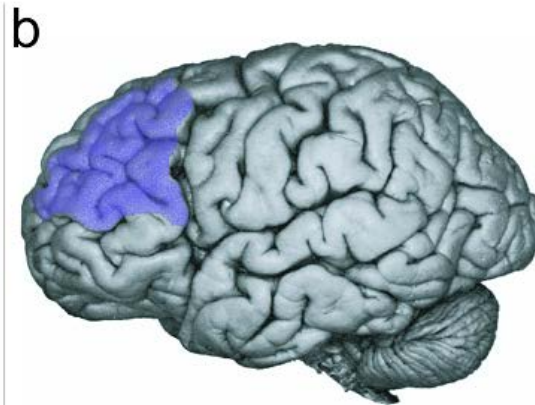
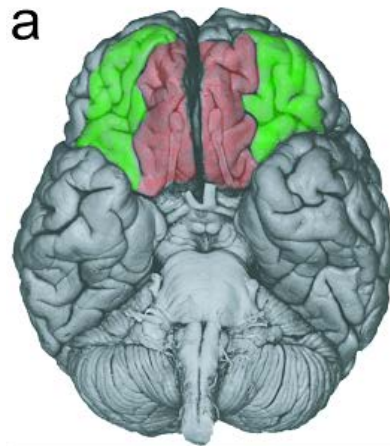


Neural Circuitry, Neuroplasticity, and Treatment of Depression

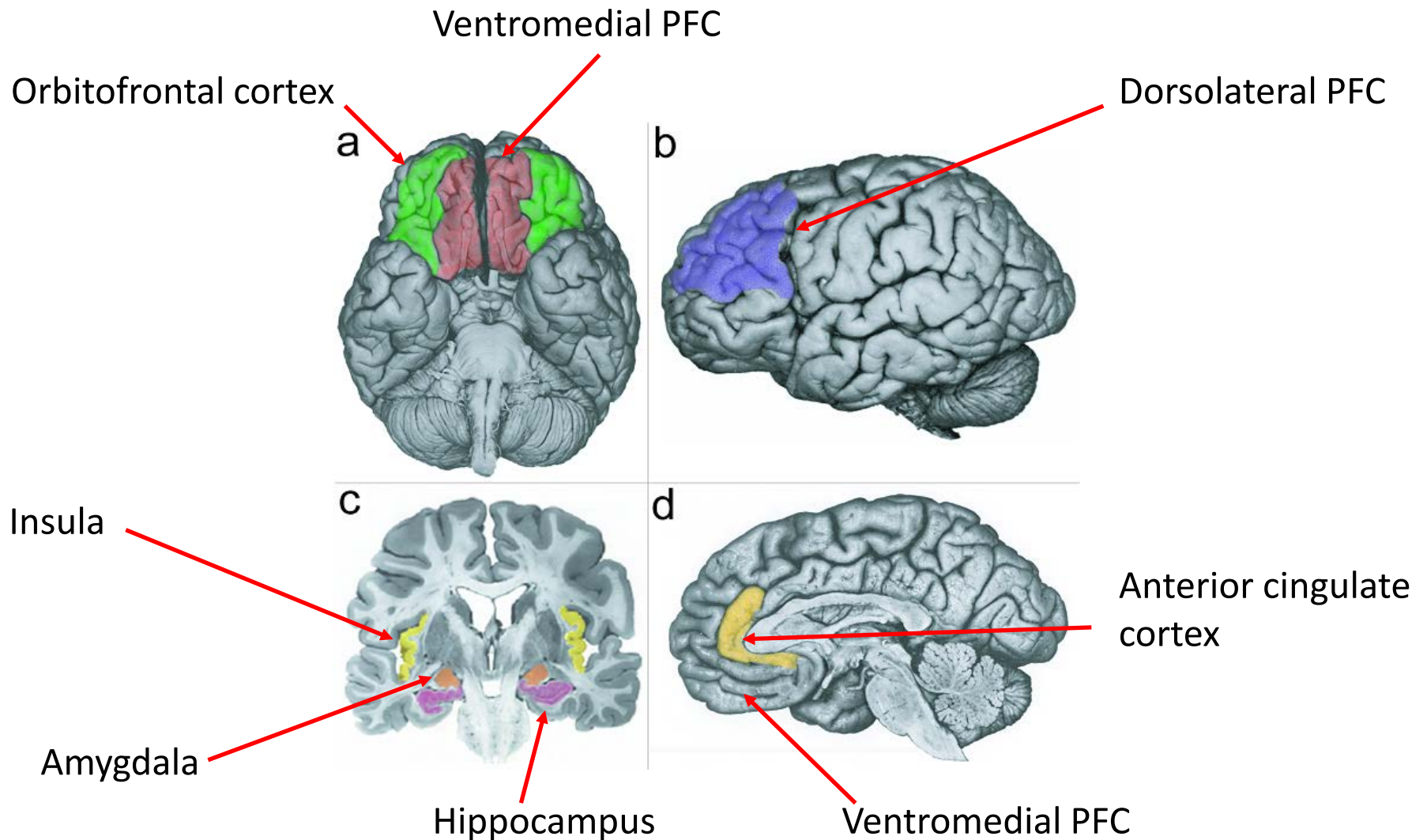
- Neuro-cognitive alterations in depression
- Neural circuitry of emotion & depression
- Example: PFC-amygdala circuit (which is only one of several relevant circuits)
- Biologically-informed behavioral treatment
- How to make this knowledge useful to our patients?

Quiz:

Name that brain region!



Functional Neuroanatomy of Emotion



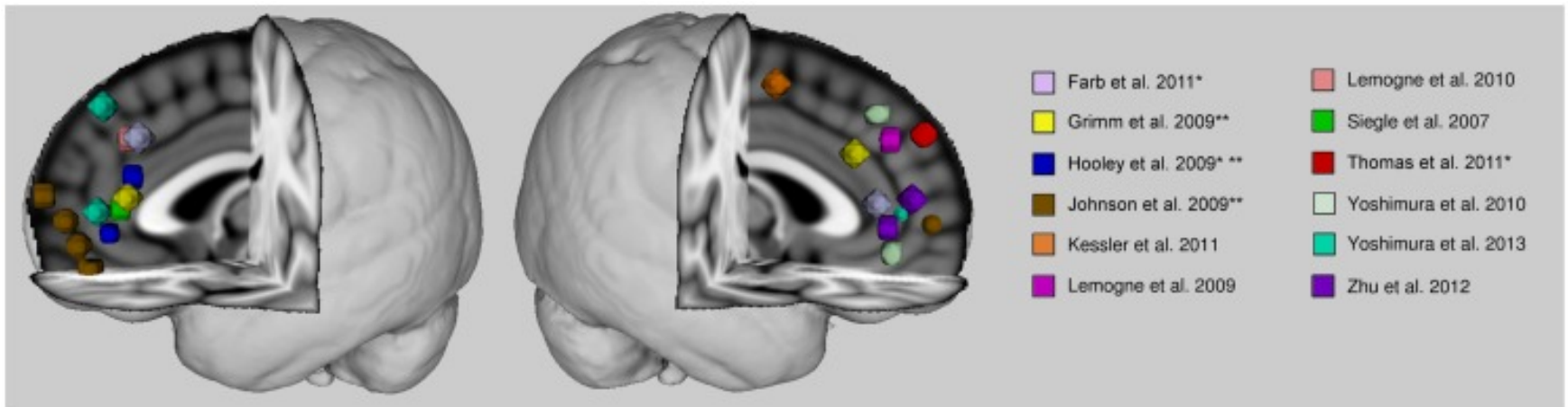
Depressogenic cognition

- Self-focused thoughts
- Rumination
- Negative cognitive bias
 - Interpretation bias
 - Memory bias
- Difficulty with cognitive reappraisal & emotion regulation



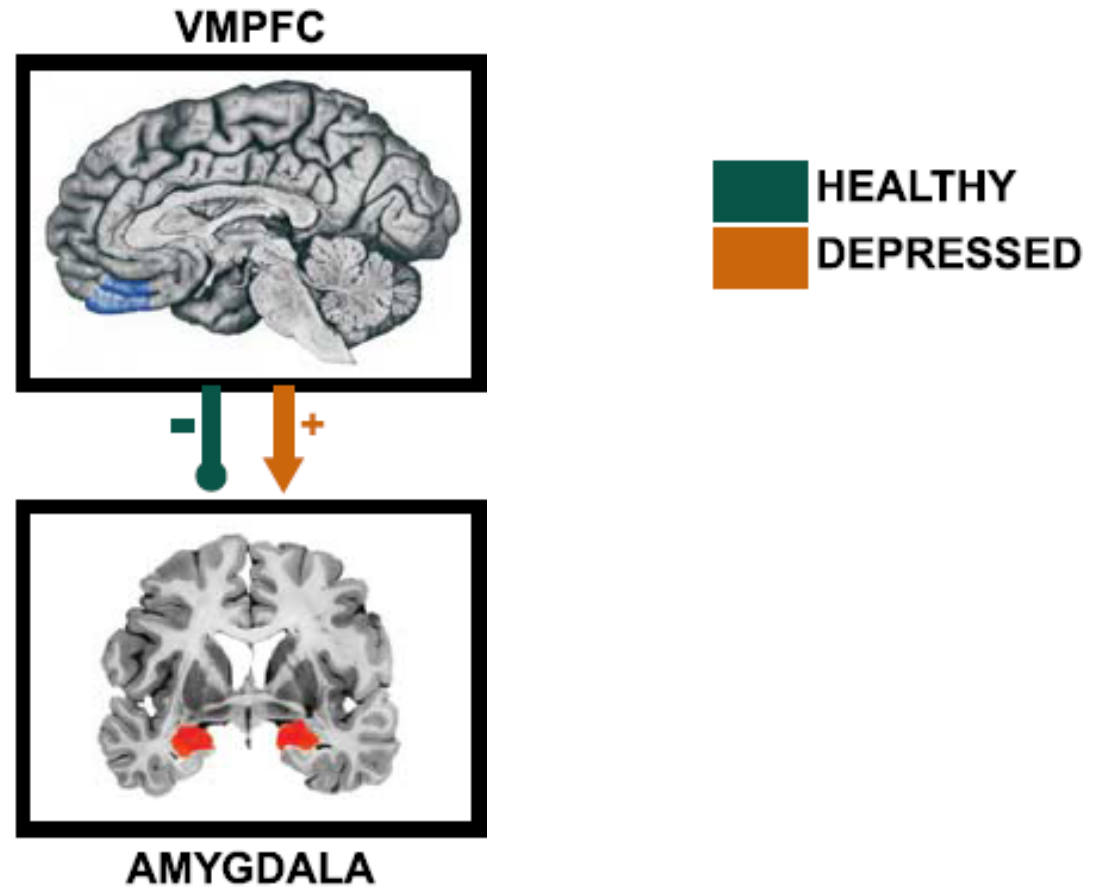


Anterior cortical midline & abnormal self-related processing in depression



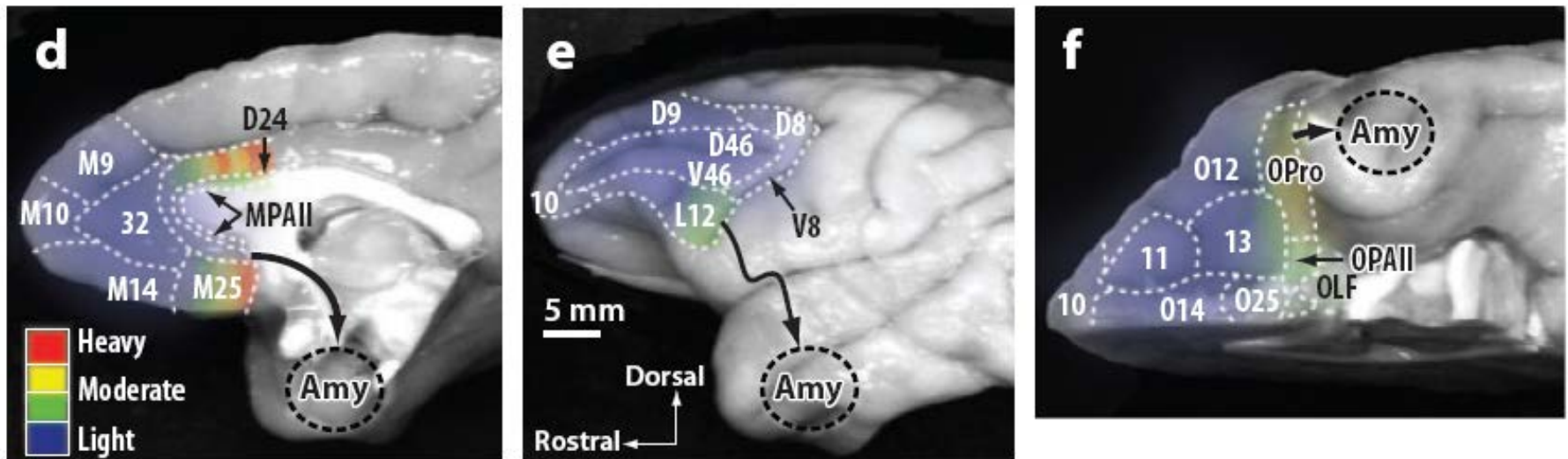
Nejad, Fossati, & Lemogne (2013) Front Hum Neurosci.

Loosening of regulatory control of PFC over amygdala



Johnstone et al. (2007) *J Neuroscience*.

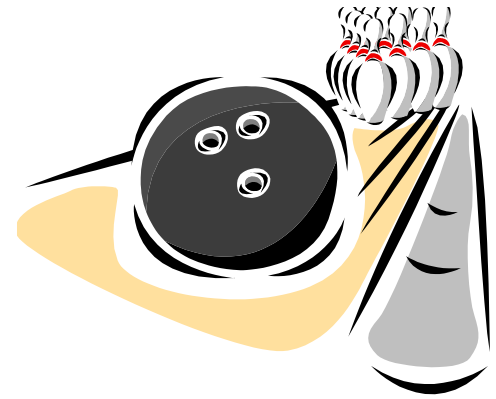
Bidirectional anatomical projections between PFC & amygdala in rhesus monkeys



Ghashghaei, HT (2007) Neuroimage.

Also see Salzman & Fusi (2010) Annual Review Neurosci.

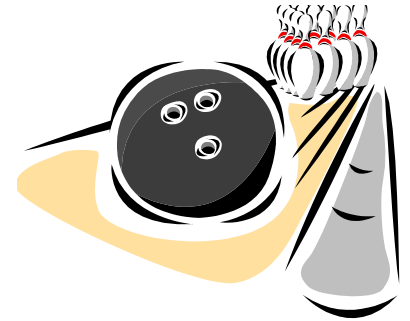
Depressogenic cognitions: The mental gutter



THIS WAS THE SECOND GIRL WHO TURNED ME
DOWN. I WILL NEVER SUCCEED IN FINDING A
GIRL! _____

Cognitive Behavioral Therapy: Practice & Repetition

- *1. Notice automatic thoughts and habits*
- *2. Self-validation for noticing*
- *3. Apply new skill*



**Changing behavioral and *mental* habits requires
PRACTICE**

- Insight re: the automatic thought or habit is not particularly useful unless the new skill is practiced repeatedly



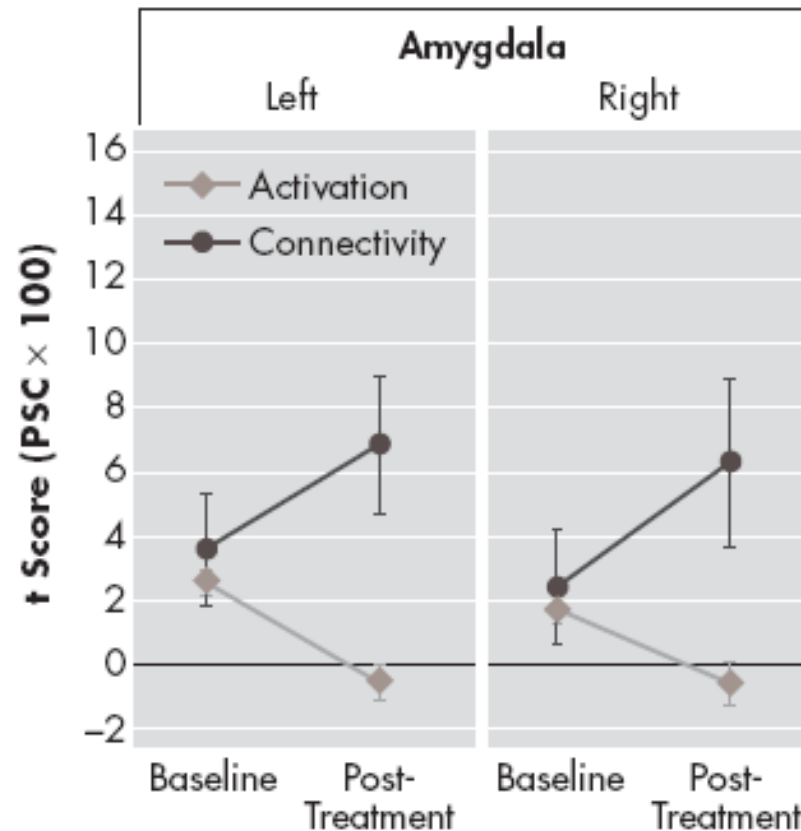
Practice & Repetition

- Behavior-induced structural brain changes occur
- Building new neural circuits requires REPETITION of the new behavior
- “Behavior” refers to thought as well as action
- Does this apply to CBT?

Treatment modalities for depression stimulate neuroplastic mechanisms

- Psychotherapy
- Antidepressant medications
- Somatic & neuromodulatory techniques
 - electroconvulsive therapy
 - deep brain stimulation
- Other
 - physical exercise
 - omega 3 fatty acids

Increase in PFC-amygdala functional connectivity with 6 wks sertraline



Anand, et al. (2007) *J Neuropsychiatry & Clin Neurosci.*

Therapeutic learning in depression

- Effective antidepressants stimulate neuroplastic mechanisms
- Biologically-informed behavioral interventions
 - Promote therapeutic learning
 - “Sculpt” neural circuits
 - Importance of practice and repetition