

# Fellous & Arbib

## Ch. 4 - Fellous & Ledoux - fear circuits, etc.

### • Historical neglect of emotions

- "cloud of subjectivist suspicion" (many decades)
- false sense of understanding emotions in terms of neuroanatomy: the "limbic system" (hippocampus, amygdala, certain thalamic nuclei, cingulate gyrus, etc., etc.)
- early AI & cognitive science focused on thinking, exclusive of emotions

### • Recommended methodology

- study processes/circuits
- focus on specific emotions (divide & conquer)
- formulate conjectures abt. other circuits by analogy

### • Fear circuits

- two paths to fear reactions (cf. Rolls) to "tone":



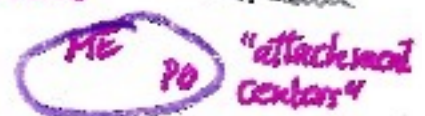
- contextual stimuli: cage in which "tone" & foot shock occur involves 3rd pathway



- role of medial prefrontal cortex (shut down to enable fear)
- working memory (with sensory storage buffers) → blackboard architecture
- certain representations ↔ consciousness

### • Love

prairie vole vs. mountain vole  
role of oxytocin & vasopressin



Further details (voles & humans): see

<https://www.smithsonianmag.com/science-nature/what-can-rodents-tell-us-about-why-humans-love-180949441/>

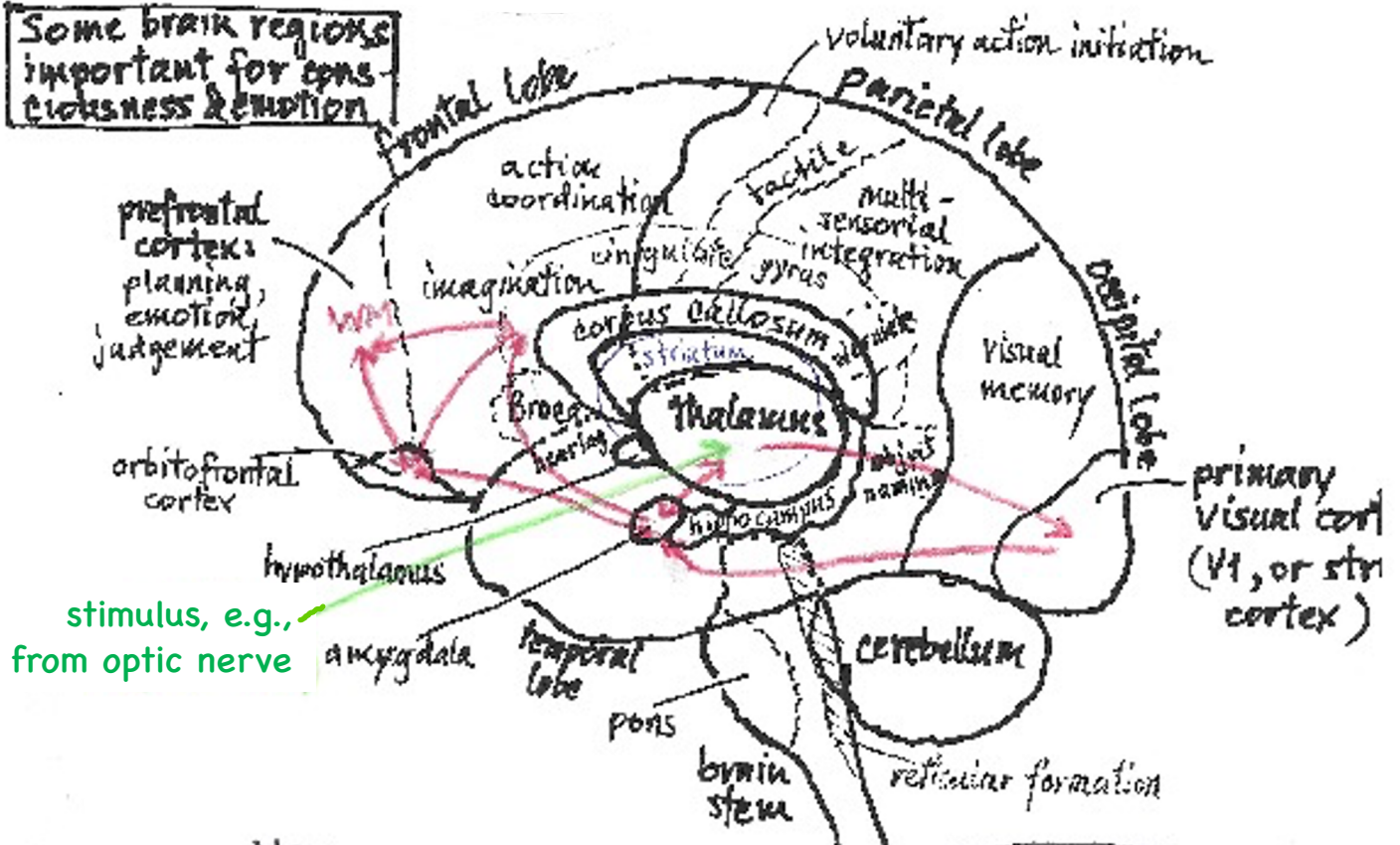
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Re: Fellous & Ledoux - emotion circuits & the amygdala

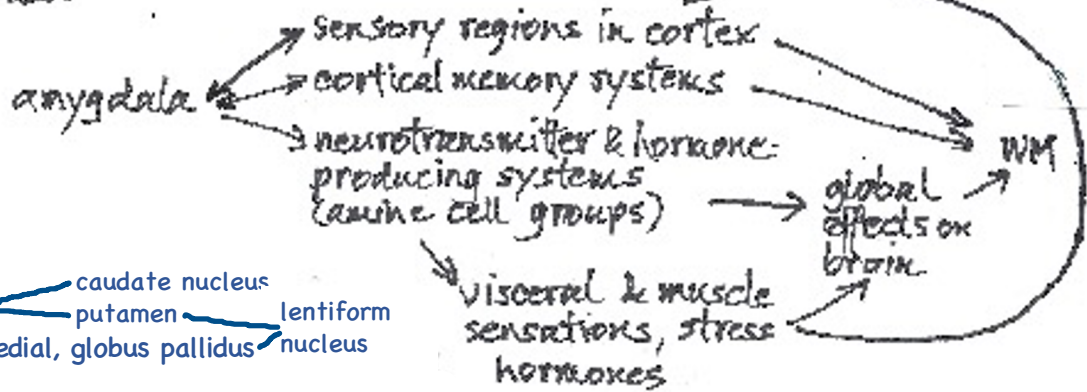
Processing an emotionally significant "stimulus"

(input pathways not shown; outputs to hypothalamus, brain stem, striatum, etc., not shown, but see amygdala interactions/outputs below)

**Some brain regions important for consciousness & emotion**



Also:



Basal ganglia:

"outer": striatum — caudate nucleus  
 — putamen — lentiform nucleus  
 "inner": lateral medial, globus pallidus — nucleus

(part of reward system, decision making, planning)



# Basal ganglia, brain stem, and cerebellum

