

Emotion: Cellular Level



Cellular studies can be divided into physiological recordings (field or single cells), and morphological observations. A large body of data is also available on the synaptic basis of learning, especially as it pertains to aversive conditioning.

- Learning Emotional Responses

Emotions can be defined as 'states elicited by reinforcing stimuli' ([Rolls 1986](#)), whereby the association (innately, through conditioning or learning) of reinforcer stimuli with a behavior is responsible for its emotional coloring.

At the cellular level, learning has been hypothesized to rely on synaptic plasticity of which LTP (long term potentiation) is a strong candidate. LTP is long lasting (hours to days), synapse specific (only the synapses stimulated during 'learning' are strengthened) and associative (the effects of several weak stimulation in different pathways add up).

LTP has been found in most of the [neural systems](#) involved in emotion processing. Specifically, it has been found in the lateral and basal nuclei of the amygdala ([Clugnet & Ledoux 1990](#); [Chapman et al 1990](#))

- Neurophysiology and Emotion

- The Amygdala

- (LeDoux, 1991): Synaptic plasticity and fear conditioning.
 - (Ono & Nishijo, 1992): Neurophysiological basis of the Kluver-Bucy syndrome: Responses of monkey amygdaloid neurons to biologically significant objects.

- Dopamine neurons (VTA-area A8, A9 and A10)

- Dopamine neurons respond phasically to external stimuli having a behavioral significance (such as learned reward value) ([Schultz et al. 1993](#)). Modeling studies propose that these neurons act as temporal predictors of reward ([Montague et al, 1996](#)).

- Neuro-Morphology and Emotion

- The Amygdala

- (Scott et al, 1992): Amygdala Cell Loss and Atrophy in Alzheimer's Disease.
 - (Allman et al 1993a; Allman et al 1993b): Amygdala and life-span in primate species.

Author: Jean-Marc Fellous



Please send us your comments.



[...Navigate The Emotion Site](#)