Fear extinction- behavioural

- Major laboratory model
    o Fear conditioning CS+US pairing
    o Extinction training CS w/o US pairing
    o Extinction recall CS w/o US pairing; good recall, fear responses low
- New learning perspective
    o Does not erase original CS-US pairing, new safety memory of CS w/o US
    o Extinction it is an active process, not the same as forgetting
    o Return of original CS-US persists after fear extinction
        ▪ Spontaneous recovery- after long interval
        ▪ Renewal- expressed in non-training/ novel environment
        ▪ Reinstatement/ stress precipitated relapse- after mild signalled stressor in same context as test
- Reasons for studying fear extinction
    o Robust phenomenon which can be used to understand psychological and neurological bases of complex context dependent memory
    o Forms basis of exposure therapy
    o Demonstrates valid models of relapse following successful treatment for anxiety in clinical settings

Fear extinction- neural basis

- Fear acquisition and expression are dependent on amygdala and hippocampus
- Neural circuitry hypothesis
    o Prefrontal cortex dictates fear response from amygdala
    o Hippocampus accounts for contextual nature of fear learning

Role of prefrontal cortex

- Two distinct subdivisions
    o Rodents: prelimblic (PL), humans: dorsal anterior cingulate cortex (dACC)
    o Rodents: infralimbic (IL), humans: ventromedial prefrontal cortex (vmPFC)
- Sierra Mercado (2011)
    o Muscimol- GABA agonist to inactivate IL or PL prior to extinction training
    o Day 1- training
    o Day 2- saline or muscimol
    o Day 3- testing
    o IL inactivation
        ▪ Does not impair fear expression
        ▪ Did not impair retrieval but impaired within-session extinction (slowed rate of extinction learning)
        ▪ Impaired extinction recall/ consolidation
    o PL inactivation
        ▪ Impaired fear expression
        ▪ Did not impair extinction
- Milad & Quirk (2004)
    o Microstimulated IL or PL during extinction training
    o Groups
        ▪ Paired stimulation
        ▪ Unpaired stimulation (not timed to match CS)
        ▪ No stimulation
    o IL stimulation- reduced freezing during extinction training and enhanced extinction recall
    o PL stimulation- increased freezing during extinction training and impaired extinction recall