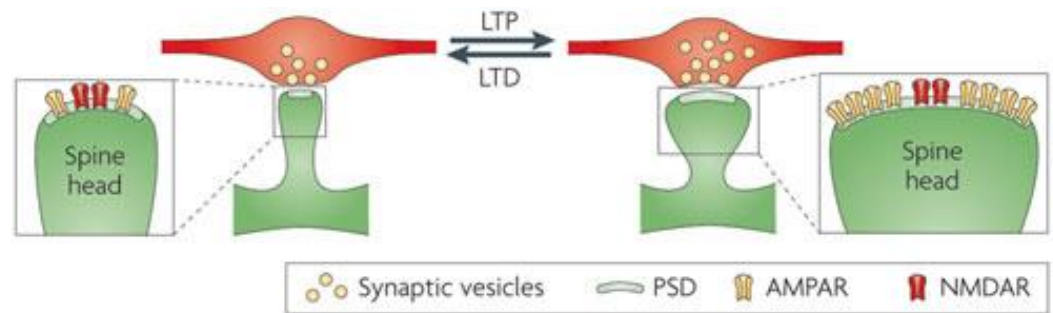
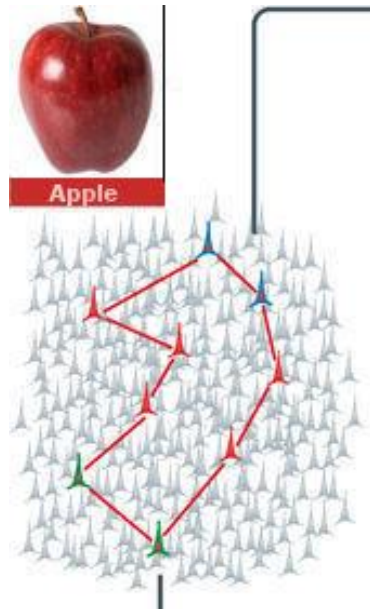


Inläring, Minne & Glömska



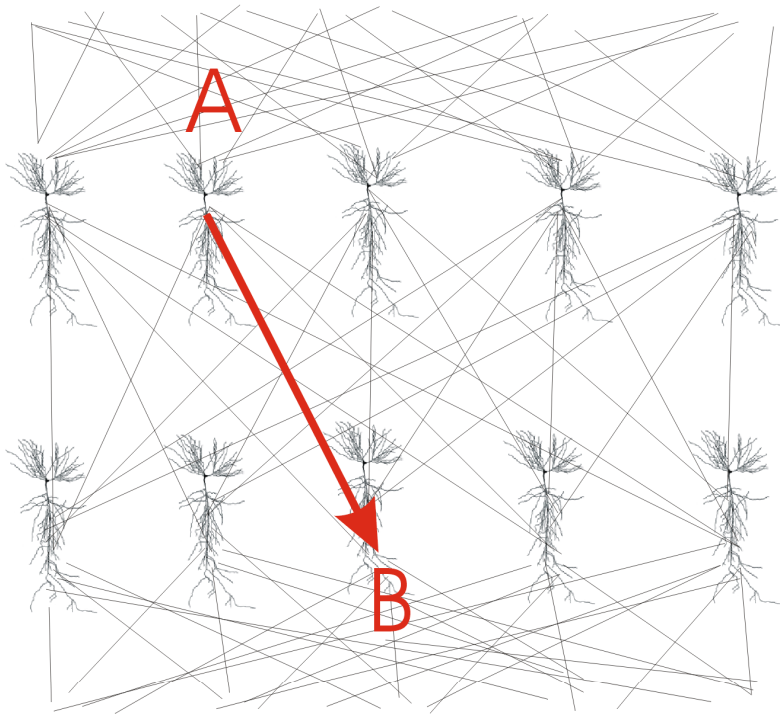
”Information about the past is useful only to the extent that it allows us to anticipate what may happen in the future.”

”The remembered future”

”The remembered present”

”Hebb-synapse”

Cells that fire together wire together

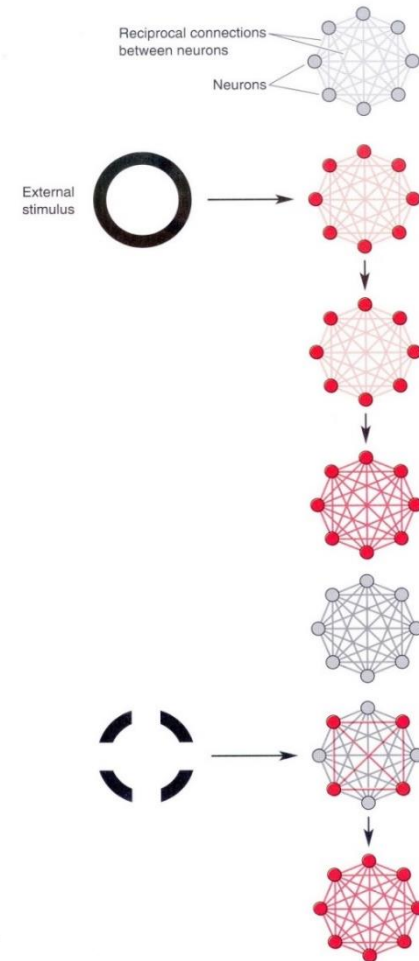
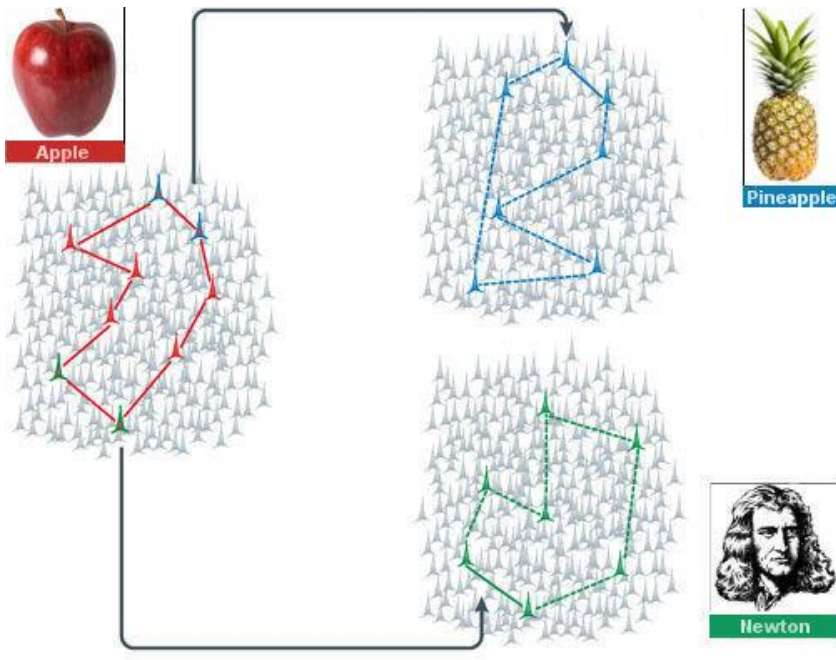


”Hebb-synapse”

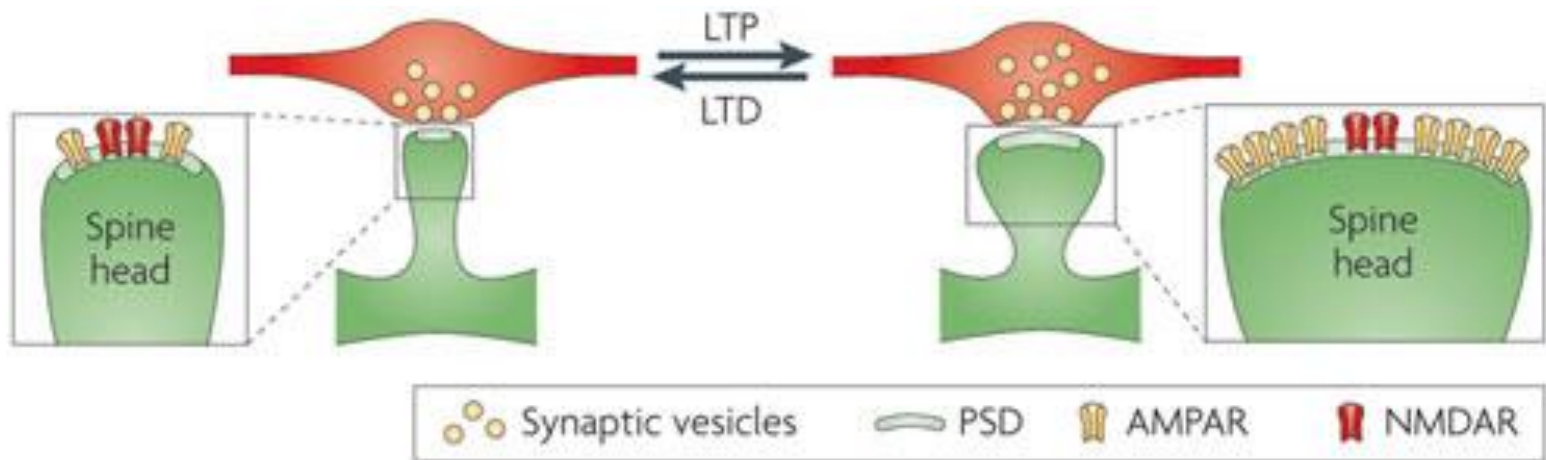
”When an axon of cell A is near enough to excite cell B and repeatedly takes part in firing it, some growth processor metabolic change takes place in one or both cells such that A’s efficiency, as one of the cells firing B, increases.”

Donald Hebb, 1949

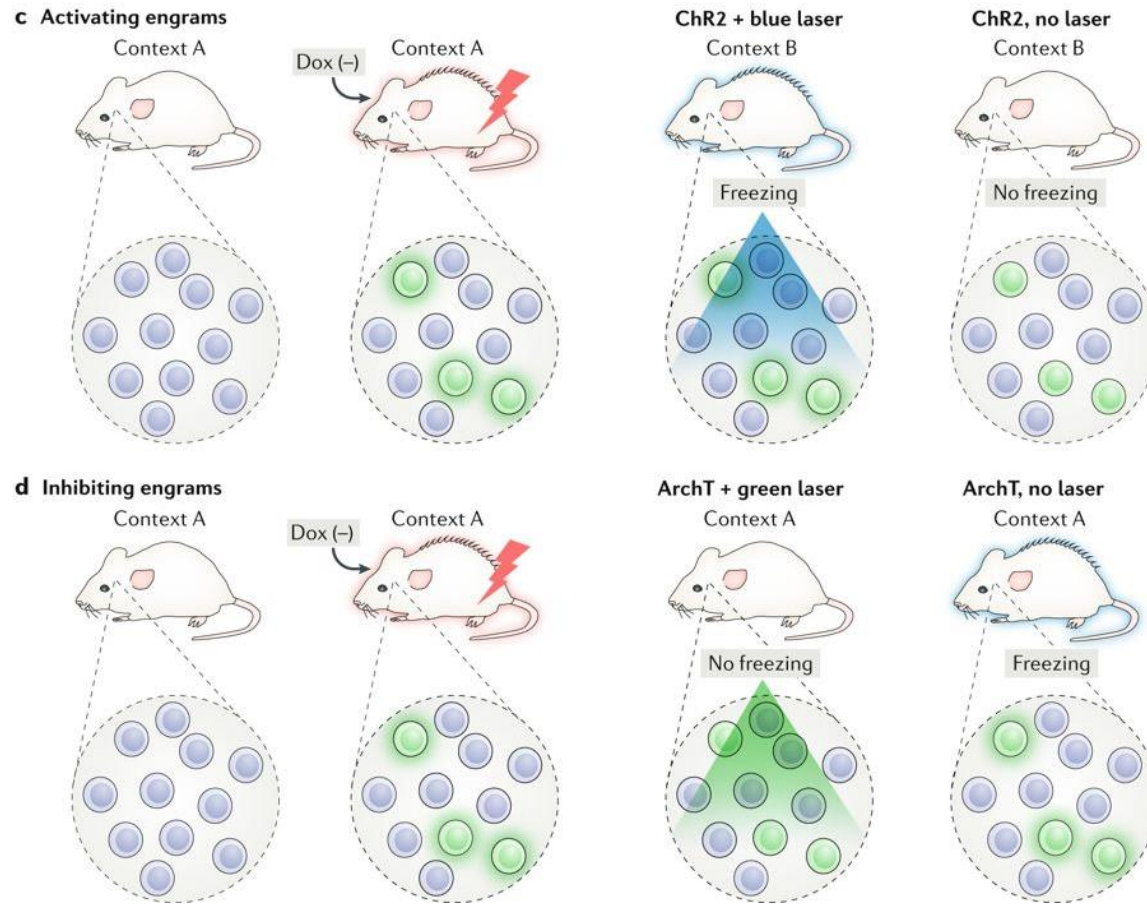
Distributed storage of memories – Hebb's cell assembly, or the engram



Synaptic plasticity: Long-term potentiation (LTP) and Long-term depression (LTD)

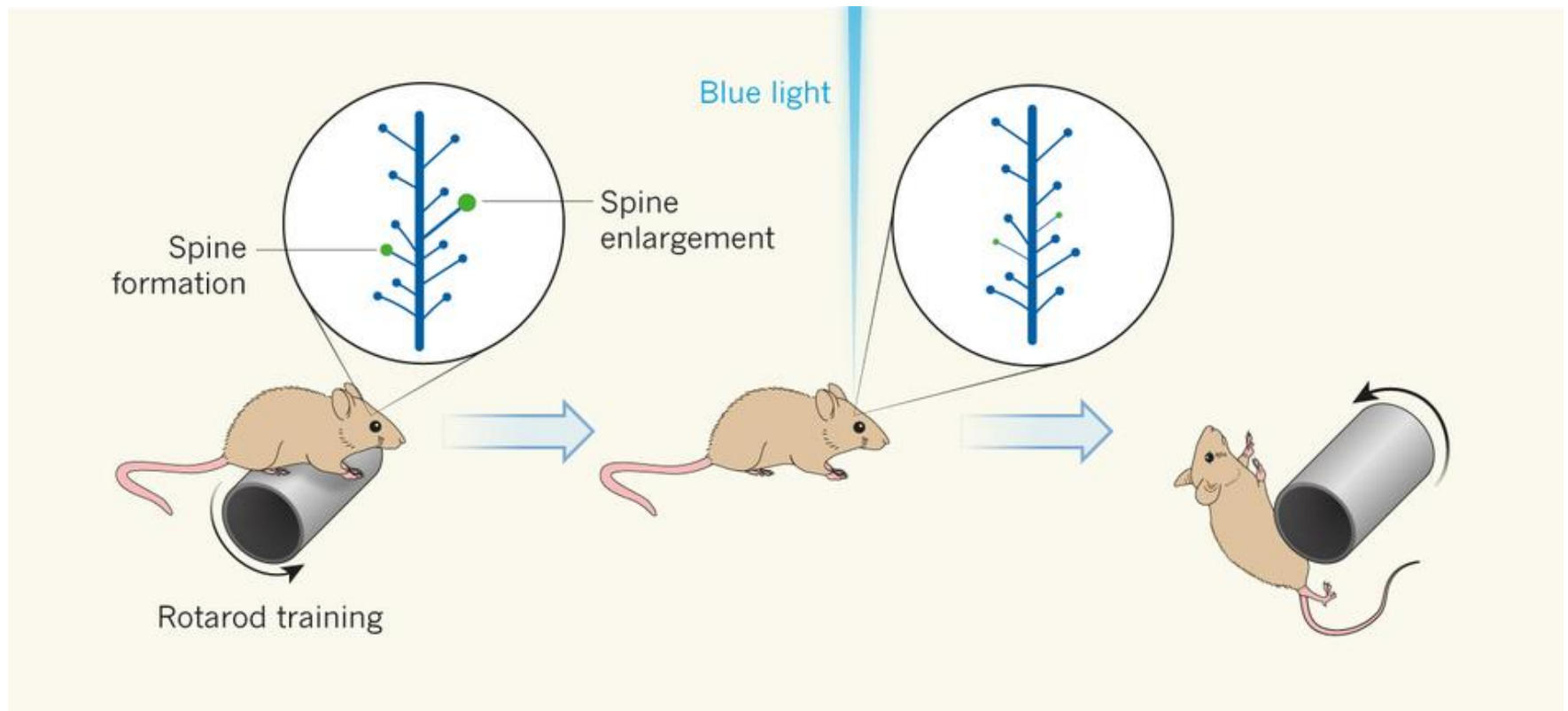


Activity-dependent labelling of engram cells

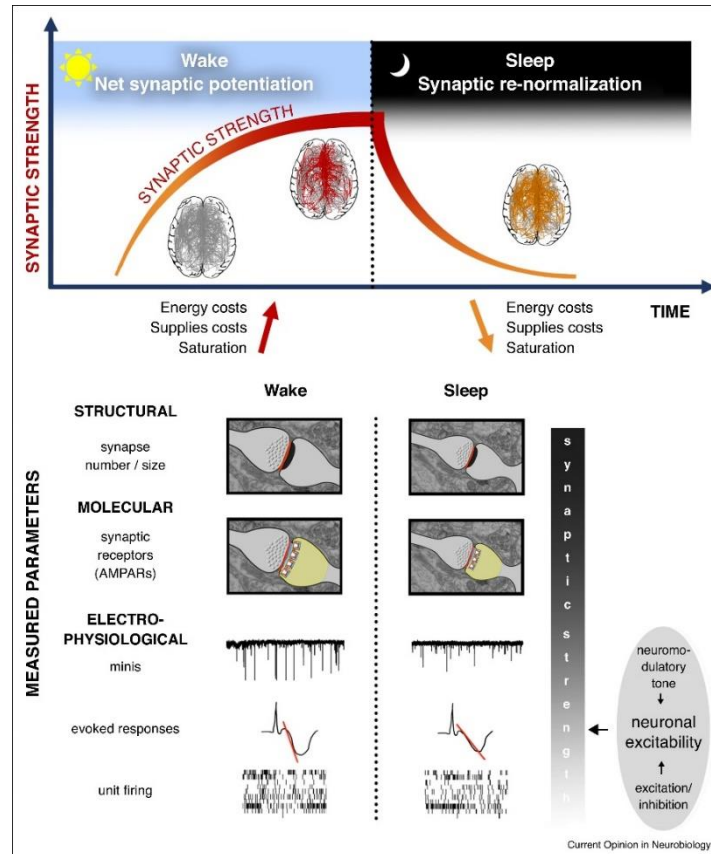


Labelling and optical erasure of synaptic memory traces in the motor cortex

Akiko Hayashi-Takagi^{1,2}, Sho Yagishita^{1,3}, Mayumi Nakamura¹, Fukutoshi Shirai¹, Yi I. Wu⁴, Amanda L. Loshbaugh^{5,6}, Brian Kuhlman^{5,6}, Klaus M. Hahn^{5,7} & Haruo Kasai^{1,3}



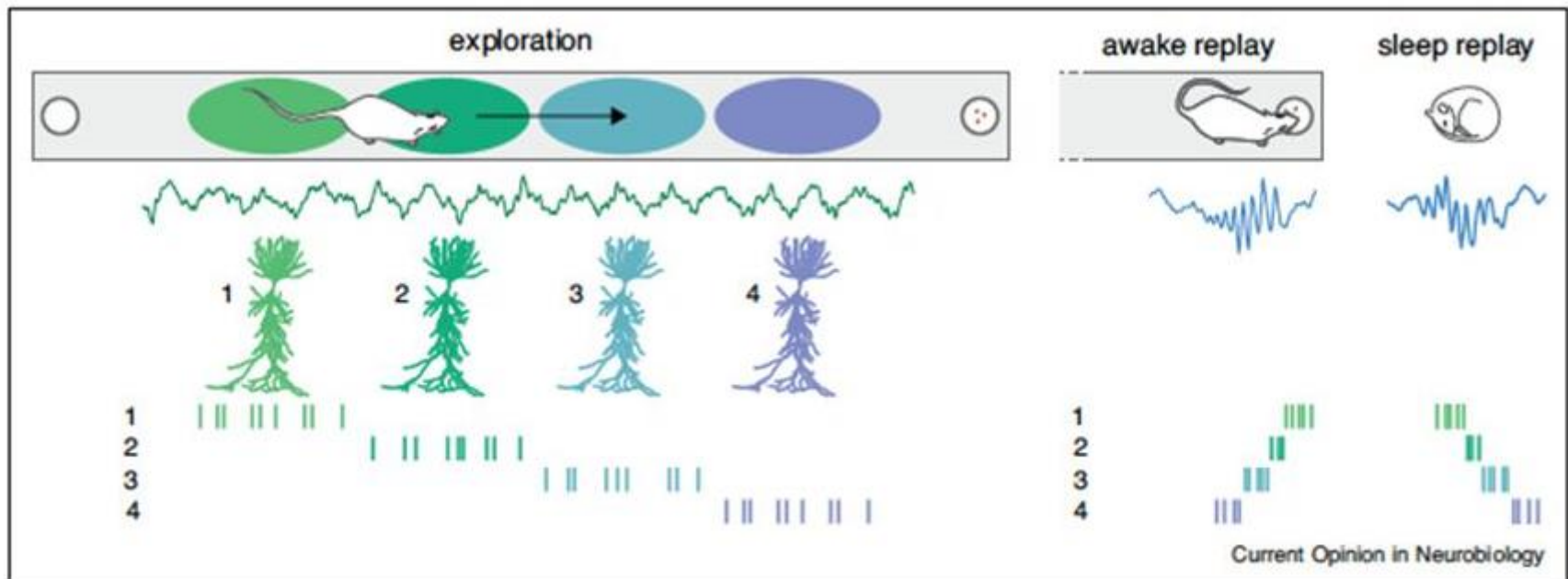
Some synapses grow with LTP and learning... and most synapses shrink during sleep



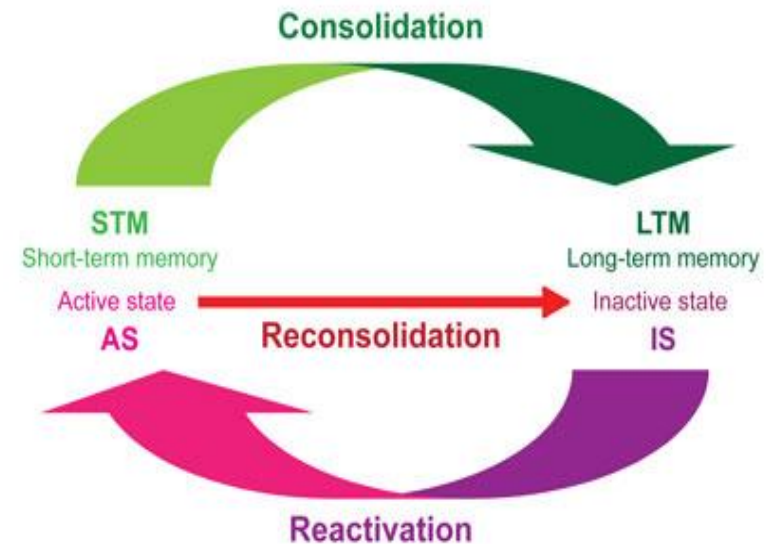
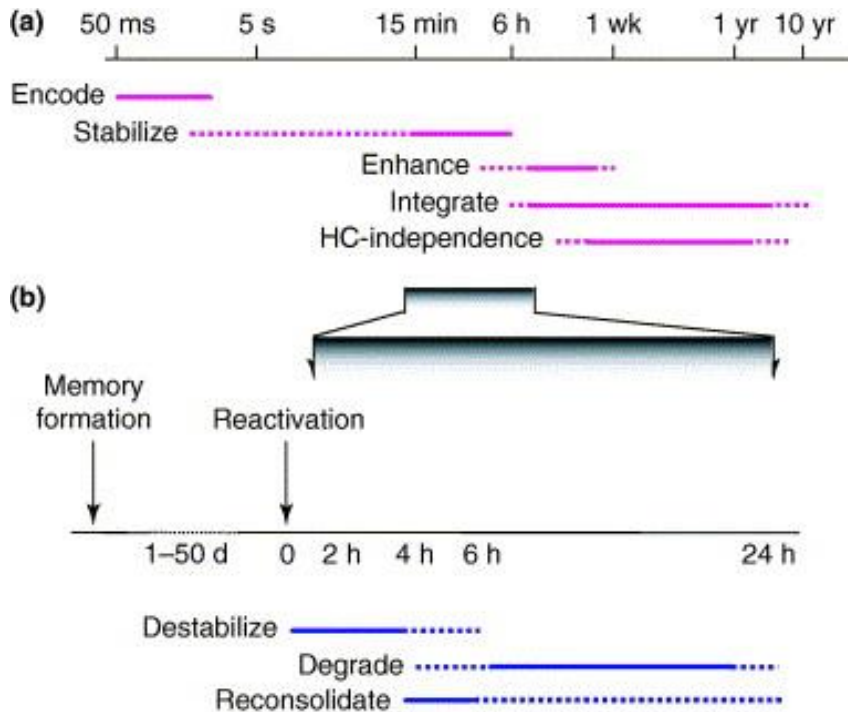
Cirelli (2017) Curr Op Neurobiol 44:72-76
Tononi & Cirelli (2014) Neuron 81:12-34

... creating room for new learning

Memories are consolidated and enhanced during sleep



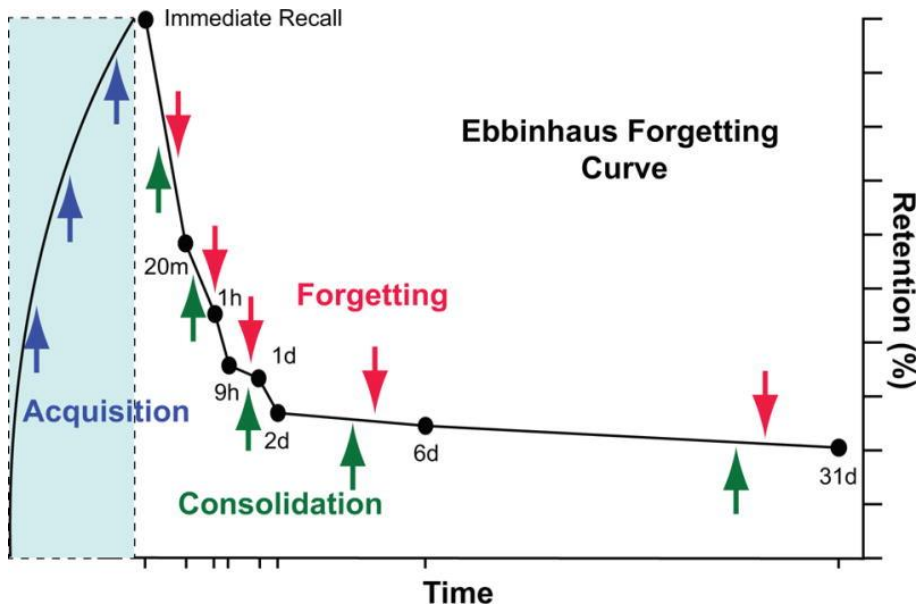
Consolidation and re-consolidation



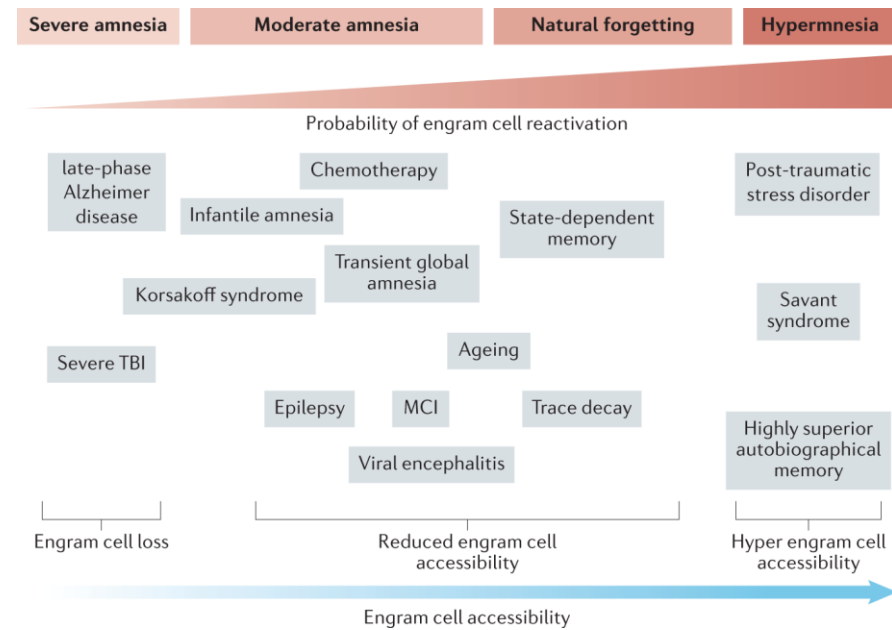
TRENDS in Neurosciences

Stickgold and Walker, 2005

Physiological and pathological forgetting



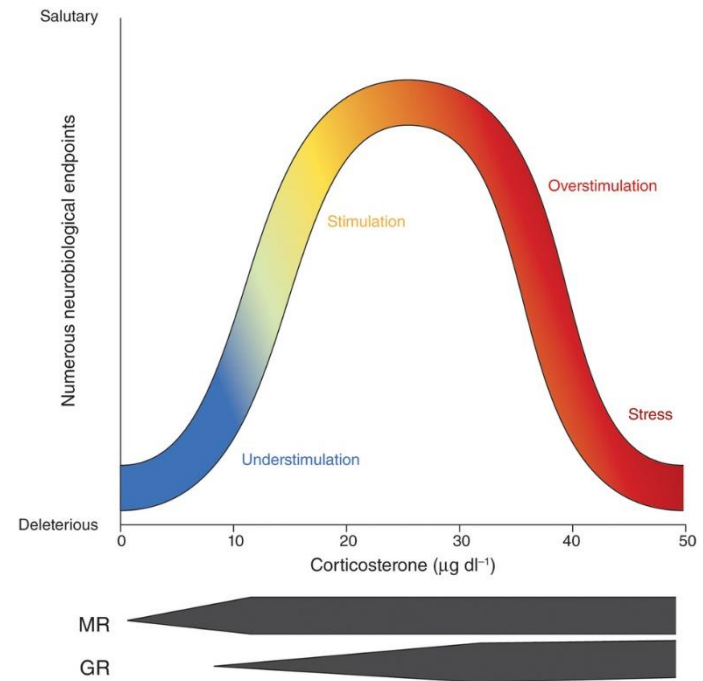
Davis and Zhong 2017 Neuron 95: 490-503



Ryan and Frankland 2022 Nat Rev Neurosci 23:

Factors that influence learning

- Stress
- Sleep
- (Re)Consolidation
- Spaced learning, fasting
- Physical exercise
- Active rehearsal
- Cognitive enhancers?



Sapolsky 2015 Nat Neurosci 18:1344

Subdivision of memories

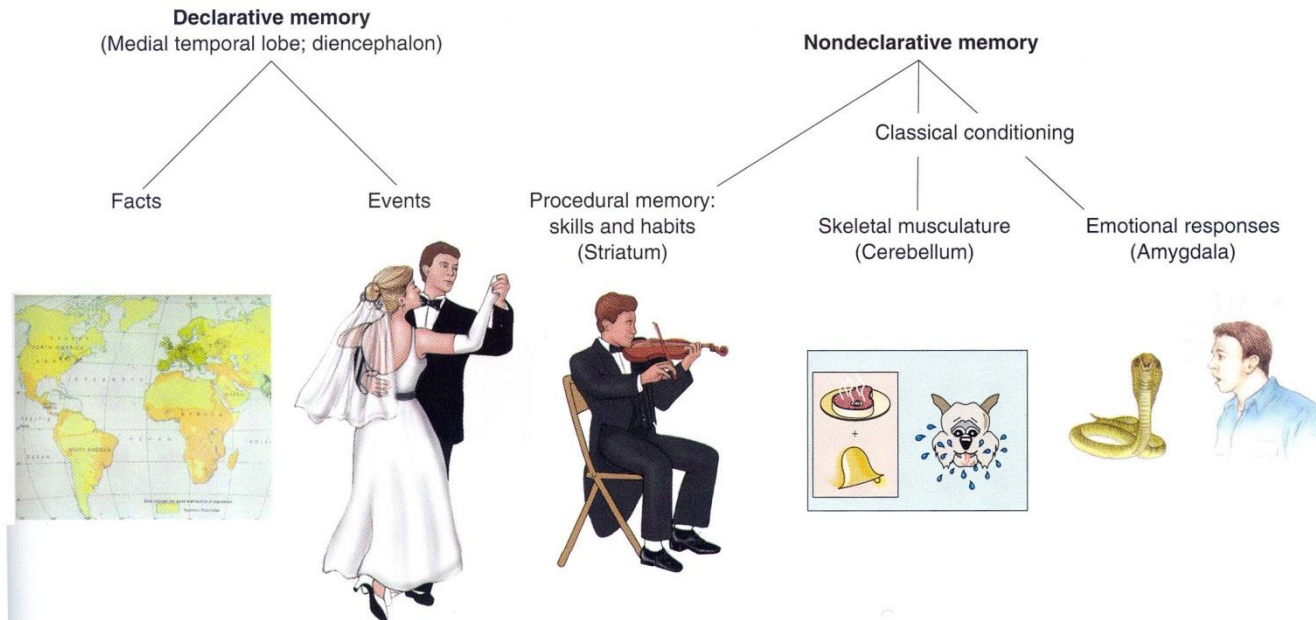
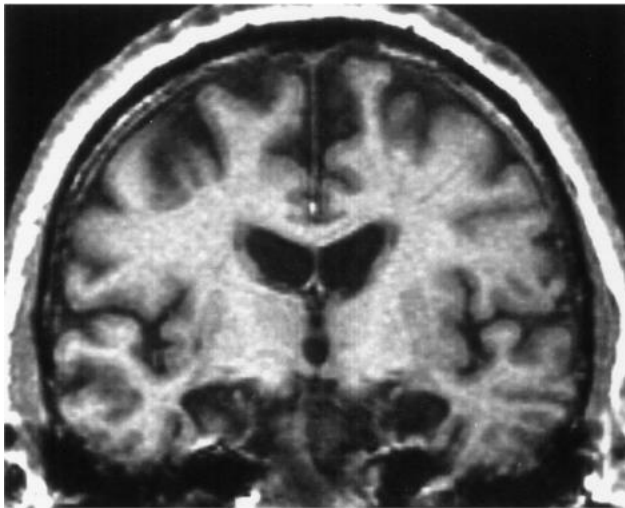


Figure 23.1
Types of declarative and nondeclarative memory. Brain structures thought to be involved in each type of memory are indicated. (This does not represent all types of memory.)

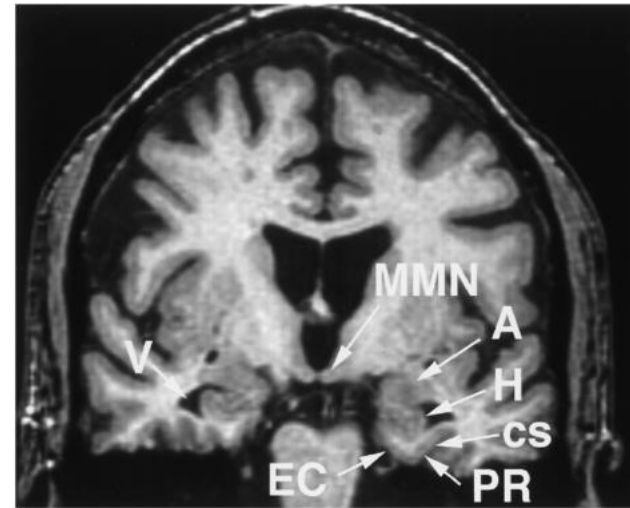
Working memory

H.M. – Hippocampus is necessary for the formation of episodic memories

H.M.'s brain



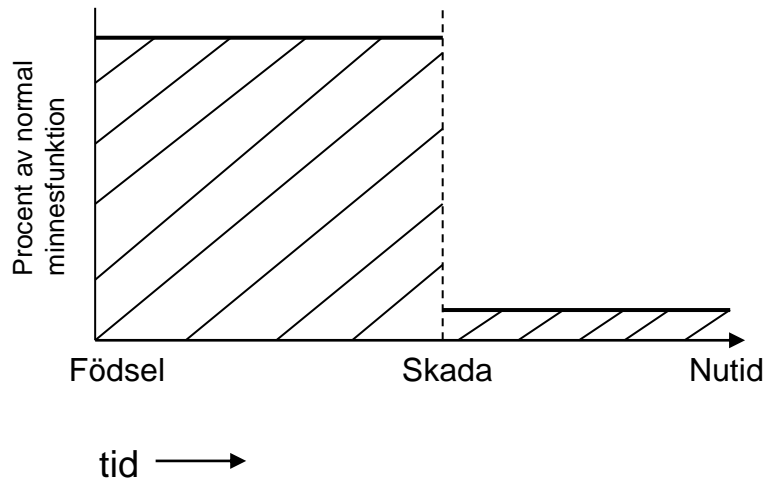
Normal brain



Amnesia

Amnesia = pathological forgetting

Anterograde amnesia



Retrograde amnesia

