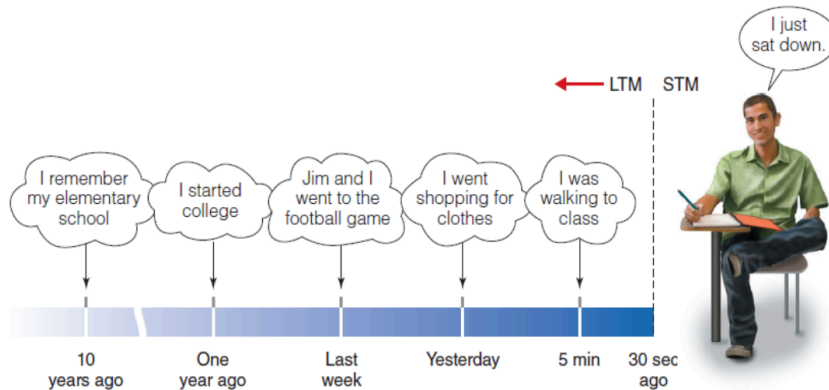


# Week 12 - Long Term Memory

Sunday, 9 June 2019

10:06 pm

## Long term memory VS short term memory



## Definition of long term memory

- Memory is the capacity of the organism to benefit from experience
- Simple and complex
- Specific and general
- Insignificant and very important
- Visual
- Verbal
- Spatial
- Musical
- Active

## Memory and epilepsy

- Temporal lobe epilepsy
- Provided the most singularly important natural laboratory for uncovering the neuroanatomic bases of human memory
- Hippocampus

## Patient H.M

- Parts of temporal lobe removed, including hippocampus and amygdala
- Memory is dissociated from other cognitive and behavioural domains
- The hippocampus is a critical component of the memory system

- Memory is not a single structure
- It represents a range of different learning systems that rely on different parts of the brain

### H.M revisited

- explicit / declarative memory is affected in temporal lobe
- Specifically episodic memory

### The nature of forgetting in temporal lobe epilepsy

- Following H.M., only unilateral resections are performed
- Memory impairment are milder than that of H.M.
- Nature of deficit is dependent on the side of restriction (**material specific model**)
- **Right temporal lobe resection:** spatial memory impairments
- **Left temporal lobe resection:** verbal memory impairments

### Structural and functional correlates of spatial memory in TLE

	HIPP (n = 15)	ATL (n = 15)	IGE (n = 15)	Controls (n = 25)
Gender (M/F)	5/10	6/9	6/9	12/13
Age (mean)	38.1	39.3	27.9	37.8
Side of lesion (R/L)	7/8	6/9	N/A	N/A

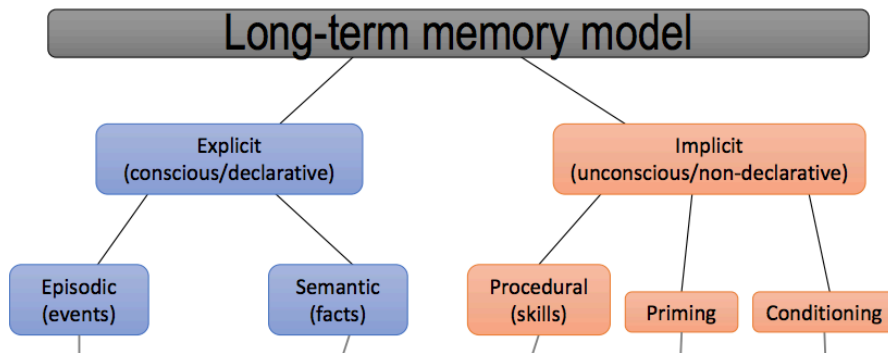
### Study results

- HIPP and ATL groups did not differ on any of the variables
- Side of focus or resection did not influence any aspect of spatial memory
- No differences between IGE and Controls
- HIPP and ATL groups were worse than each comparison group on all measures

### Study conclusions

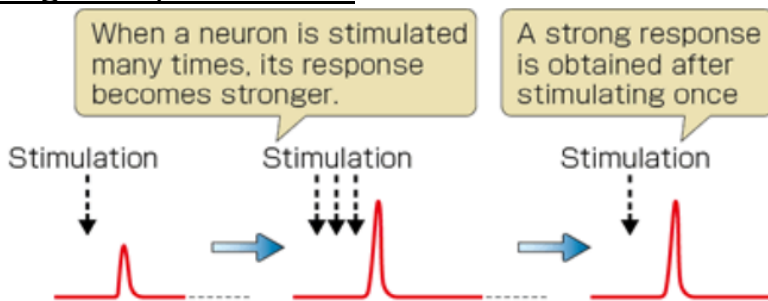
- MTLE impairs spatial memory, irrespective of side of the lesion
- Bilateral hippocampal involvement in spatial memory
- With other studies showing similar results, the material-specificity model does not seem to hold
- The general consensus is that spatial memory and memory in general are mediated by a large brain network in both the right and left hemispheres

## Long term memory model



## Memory at the synapse level

### Long term potentiation



### Jennifer Aniston neuron

- A single unit in human hippocampus activates exclusively by different views of Jennifer Aniston

## Clinical application

- **Clinical objective:** reduce functional morbidity following neurosurgery

### Functional brain surgeries

- Space occupying lesions
- Focal epilepsies
- Parkinson's disease
- Advances brain mapping aims to improve planning and outcome of brain surgery

### Aspects of pre-surgical planning

- **What to take out:** identification of lesion type and spread
- **What not to take out:** evaluation of critical functions / major fibre tracts in vicinity of lesion