

Week 15

- Ogden Ch 3 : Patient HM - Global Amnesia

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Ogden Chapter 03 : HM

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Background: HM (Henry Molaison)

- Born 1926
- Childhood “normal, uneventful” (Ogden)
- Age 9: hit by bicycle, CHI, LOC 5 minutes
- Age 10 : began having absence seizures
- Age 16 : first generalized seizure while riding in car
- Education
 - Teased by classmates, left high school
 - Transferred to another school
 - Graduated at 21 - taking “practical” course
- Employment
 - worked on assembly line as a motor winder
 - stopped working due to increasing Seizures

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Seizure Types

- Partial Seizures (aka Focal seizures)
 - Simple Partial - consciousness is not impaired
 - with motor, sensory, autonomic, or psychic symptoms
 - Complex Partial - consciousness is impaired
 - aka “temporal lobe” or “psychomotor seizure”
- Generalized Seizures
 - Absence seizures (aka “petit mal”)
 - consciousness altered but motor behavior normal
 - Myoclonic seizures - <0.1 second muscle contraction
 - Clonic Seizures - repeating 2-3 times per second
 - Tonic-Clonic Seizures (aka “Grand Mal”)
 - initial tonic contraction, followed by clonus
 - Atonic seizures - loss of muscle tone

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Background: HM (Henry Molaison)

- Social life
 - “uninterested in girls” - no known sexual relationships
- Why?
 - anti epileptic therapy (phenytoin, related to but not a barbiturate) - may cause sexual dysfunction
 - normal variation of hyposexuality
 - pathological brain process related to seizures?
 - MTL and adjacent areas related to emotional behavior
- hiding his sexual orientation?

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Phenytoin (Dilantin)

- Antiepileptic / anticonvulsant medication
- Effects:
 - reduces seizure intensity, frequency
- Mechanism :
 - unknown
 - appears to work on sodium ion channels
- Side effects:
 - Symptoms of overdose include coma, difficulty in pronouncing words correctly, involuntary eye movement, lack of muscle coordination, low blood pressure, nausea, sluggishness, slurred speech, tremors, and vomiting.

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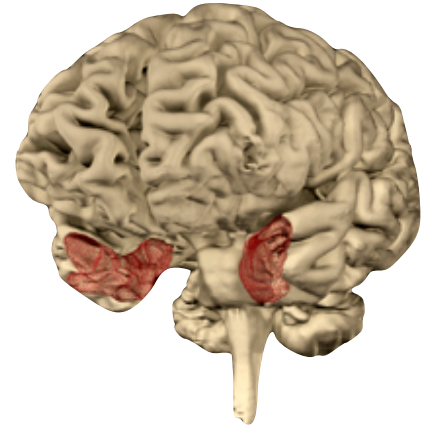
Background: HM (Henry Molaison)

- Symptoms (Premorbid Symptoms Age 16-27):
 - Seizures
 - Absence seizures (about 10/day)
 - Generalized seizures (about 1/week)
 - EEG
 - bilateral general EEG abnormalities during seizure
- Treatments:
 - Drugs:
 - large doses of phenytoin : not effective
 - Surgery:
 - (see next slide)

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HM's Surgery

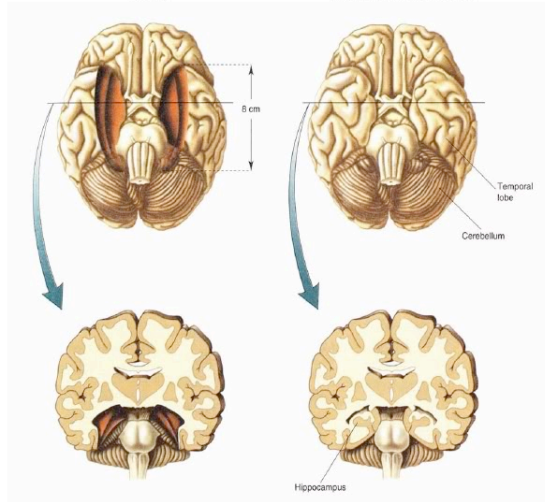
- At age 27, surgery to control seizures
- removed medial tips of temporal lobes, about 5cm



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HM

Normal Brain



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Social status after Surgery

- Timeline
 - 1953 Surgery
 - Lived with parents
 - in 1967 father died
 - till 1977 lived with mother, who died in 1981
 - 1980 till his death, lived in nursing home
- A few times each year, spent 1-2 weeks living at MIT's research center participating in experiments

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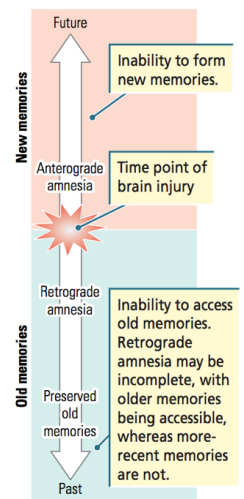
Dr. Jenni Ogden and HM

- Ogden - Neuropsychologist, studied HM at age 60, and again at age 66
 - "He seemed exactly the same as before. His facial expressions, the ways he expressed words, the stories he told, and his mannerisms were uncannily identical to those of 6 years previously. My life had moved on, but HM's hadn't"
- "Where do you live?" - "In a house with my mother"
- "Are your parents alive?" - "I'm not sure"

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HM's Amnesia

- Anterograde Amnesia:
 - complete "Global"
- Retrograde Amnesia:
 - 11 years prior to surgery (age 27) e.g. age 16
- (Note: some confusion in the literature regarding his anterograde amnesia, e.g. in Nova video Kaneda says he could remember "everything...prior to the operation" which is not true.)



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HM's NP Testing : Quantitative

- Pre surgery: given Wechsler-Bellevue IQ test
 - VIQ: 101
 - PIQ: 106
- No memory tests given (why?)
- Post surgery : given WAIS and Wechsler Memory Scales:
 - VIQ: average range (90-110)
 - PIQ: average to superior range (90-129)
 - WMS: 35 or more points below IQ (65 or lower)

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HM : Dissociations and Memory Systems

- Normal vs. Impaired
 - Immediate vs. Long-term learning
 - Remote vs. Anterograde
 - Implicit vs. Explicit
- Both impaired:
 - Verbal Nonverbal learning
 - Semantic and Episodic learning

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HM's NP Testing : Qualitative

- Digit span test (5 or 6)
 - One day, HM given 5 digits, then experimenter leaves room for an hour. Upon return, HM recites 5 digits perfectly.
 - Example of LTM? no...
 - Rehearsal - without LTM sense of passage of time is impaired, so he kept rehearsing
- But some transfer from STM to LTM has been shown:
 - knows that Elvis Presley is a musician (Elvis first played on radio 1954)
 - Immediately after Space Shuttle Challenger disaster (1986) could describe some aspects

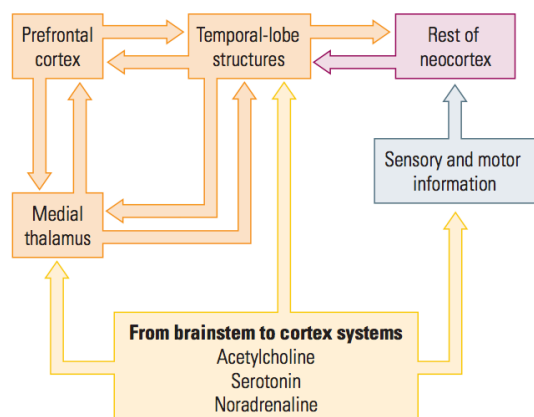
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HM's NP Testing : Qualitative

- Tests show inability to learn either episodic or semantic info since surgery
- Semantic tests are more subtle. Example:
 - words that entered language since 1953
 - lexical decision-making (word or non-word)
 - definition
 - pronunciation
 - HM : severely impaired on all of these

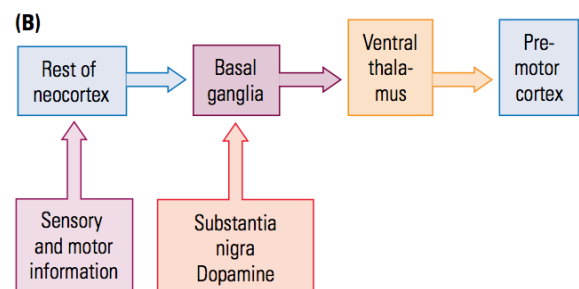
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Neural Substrates of Explicit Memory



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Neural Substrates of Implicit Memory



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HM's emotional processing

- "Happy placid, uncomplaining" (Ogden)
- "Rarely complains about anything." (his mother)
 - caregivers have to carefully assess - he may be ill or injured but not say anything
- Very little spontaneous speech, but can respond normally once conversation is flowing
- Insight : some - "I can't remember"
- Attitude & Emotions : lacks anger or frustration
 - (Other amnesiac, e.g. CW, show frustration)
- Theories:
 - removal of Amygdala -> reduction in emotional behavior?
 - years of anticonvulsant medications?
 - genetic (his Father was "good humored and placid")

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HM's emotional processing : Testing

- Verbal : Spoken words "I am going to the movies"
 - presented with happy, sad, surprised, angry, tearful, and disinterested prosody
 - HM : accurate on all except angry
- When asked to repeat words:
 - he repeated all accurately, including angry tone
- Facial expressions:
 - make facial expressions, name them, ask him to copy them
 - "he found this task difficult, as he could not stop smiling"
- "Greet everyone with warmth"

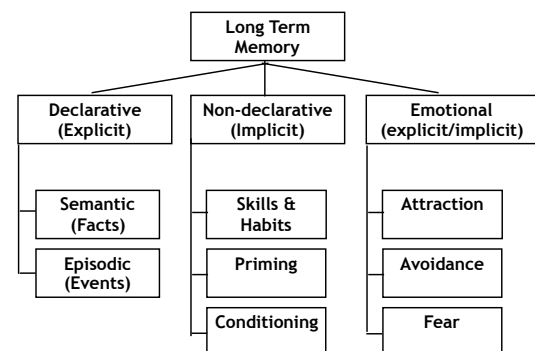
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Day to day life / self Care / ADLs

- HM is negligent about self care, feeding, clothing, grooming
- Spends the day doing crossword puzzles, watching TV, reading the newspaper.
- Compliant to caregiver requests
 - "He will go anywhere with anyone"
 - "if asked to sit in a particular chair, will sit there all day without moving or complaining"

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Review: Taxonomy of Long-Term Memories



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HM - discussion and questions

- Testing shows better semantic memory from age 16-27 than episodic memory (questionable?)
 - semantic memory is frequently "refreshed"
 - episodic memories less so
- What is reason for age 16-27 retrograde amnesia?
 - Theories:
 - first seizure at 16
 - pre-existing MTL dysfunction
 - high doses of anti-epileptic drugs
 - impaired memory formations
 - hippocampus damage
 - memory consolidation theory

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Other patients with amnesia

- CW
- SB

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HSV - Herpes Simplex Virus

- Virus known for over 2000 years
 - “Emperor Tiberius banned kissing in Rome”
- Pathophysiology
 - Virus lives in nerve ganglions between outbreaks
- Epidemiology
 - HSV1 - (mostly) cold sores on mouth/face
 - 57% of adults are infected (USA)
 - HSV2 - (mostly) genital sores
 - 16% of adults are infected (USA)
- Correlations:
 - HSV and Alzheimer’s Disease
 - HSV and Bell’s Palsy

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CW - Clive Wearing

- born 1938, aged 75
- Musician, singer, chorus master
- At age 47 contracted Herpes Encephalitis
 - HSV-1 (57% of american adults are infected)
- Widespread damage:
 - Temporal Lobes (bilateral)
 - Frontal Lobes
- Results:
 - LTM : Profound retrograde & anterograde amnesia
 - remembers his wife, but little else
 - STM also affected - about 7 to 30 seconds of memory
 - emotionally labile
 - keeps feels as if he’s “waking up” for the first time

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Scott Bolzan

- born 1962, aged 51
- former NFL player (for 2 years)
- then worked in Insurance
- At age 46 slipped & fell in bathroom
 - his last memory was “my feet going above my head”
 - severe concussion
- SPECT scan shows no blood flow to
 - Right temporal Lobe
 - Frontal Lobes
- Results:
 - Profound Retrograde Amnesia
 - No Anterograde Amnesia

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Scott Bolzan

- Symptoms
 - no memory of prior life
 - did not recognize wife & children
 - Lost semantic knowledge
 - what is a cellphone
 - what is a TV
 - what is a birthday

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