Testing H.M (left over from last class)
- H.M. no motor learning deficits
- Perceptual learning for **known** objects (memory)
- More decorated picture = more HM mistakes

Memory consolidation: the circuit
Sensory input > perirhinal cortex > entorhinal cortex > hippocampus > cortex

Memory can be genetic phylogenetic memory
Example - baby birds know the shapes of birds of prey, specific shapes, depending on how it moves. THIS CAN ONLY BE GENETIC being that the baby bird hasn’t seen prey birds
Brain continues to develop until at least 10 years old

Memory can be improved
- Chunking or associations
- Procedural learning (creating a story)
- Example Christopher the “idiot savant” IQ

Memory can be lost
- Amnesia
- Forgetting
- Aging
- False memories

Language

Lateralization
- Left hemisphere dominance in speech production in 95% of right handed people & 70% of left handed
- Left → timing/sequence of events
- Right → analysis of simultaneous streams of information. Emotion expression and recognition (face & voice). Involved in geographic perceptions
- LATERALIZATION WADA TEST
  - Recall the split brain patients, using words & pictures
  - Is sign language lateralized? YES (signing deficit, left hemisphere)
  - Do animals have language? Yes to some extent, we know they communicate (can learn language, monkey language 400 symbols)

Speech Production Vs Speech Comprehension

Speech Production
Perceptions Memories → verbal thoughts → broca’s area (inferior frontal lobe, on left)
**Broca's aphasia** - deficit in verbal expression of thoughts, but comprehension is still normal, have trouble producing speech but can understand. People are aware of their deficits (hear themselves)

- **Theory**: Broca’s Area controls “motor programs” for word production. Control of tongue, throat muscles, jaw, lips..
- **Other involved areas**: insular cortex & basal ganglia

**Broca’s Aphasia: 3 independent components**

- Articulation deficits- left insular cortex
- Anomia - deficit in finding words (feeling like it’s on the tip of your tongue)
- Agrammatism - deficit in production/ comprehension of word order

**Speech Comprehension**

**Wernicke’s Aphasia**: deficit in recognizing words (including their own), deficit in comprehending the meaning of words & deficit in converting thoughts into words. Not aware of their deficits, normal at facial expressions and tone recognition

- **Theory**: deficits in the memory of the sounds that make up the words (pattern matching)

Ex- in the video, he couldn’t respond to where he used to work, or where he lives. = Comprehension

**Wernicke’s Aphasia: 3 Components**

- **1-** Deficit in recognition of spoken words. Pure word deafness. Cannot recognize words due to - disconnection of auditory cortex or damage to Wernicke’s area
  - Can read lips, read words, produce speech, recognize meaningful sound
  Does comprehension of words involve internal rehearsal?
  Motor neurons (tongue) activated when hearing speech: Mirror neurons
  Theory: motor neurons feedback to the brain, help with the recognition of words.
  Mumbling = lack of inhibitory feedback control?

- **2-** Deficit in comprehension of word meaning
  - Transcortical sensory aphasia: can repeat words (perception intact) but cannot understand/produce meaningful speech (damage to posterior language area)
  - Direct pathway: Wernicke —> Broca

- **3-** Deficit in converting thoughts into words. Attributing meaning to a word involves memories
  - Indirect pathway: Wernicke → posterior language area (meaning) → Broca → memories
  Example- metaphors, humor or moral of the story, need more than just comprehension; also need memories and meaning
Conduction Aphasia - meaningful speech, good comprehension, repetition is normal except for nonsense/meaningless words or sentences. (need direct meaning to understand)

From Wernicke to Broca Summary
- Indirect pathway: meaning information, no sounds needed, need to access memory
- Direct pathway - speech sounds, no meaning necessary. Foreign languages

Other aphasias
- Anomic Aphasia - fluent and have well-formed speech. Good comprehension. Difficulty in finding words (Problem finding verbs/actions & nouns)
- Aphasia in deaf people - Mirror neurons in Broca’s area respond to the perception of hand gestures. Speech production is influenced by perception of visual/hand info
- Aphasia → may also result in a deficit in the perception/production of hand gestures (left hemisphere)

Prosody
- Use of intonation to convey information, grammatical & emotional information
- Affected in the Broca’s aphasia but not Wernicke’s
- Right hemisphere specialization

Stuttering
- 1% of population, 3x more men than women
- Deficit in planning/initiation of speech
- Theory: Faulty auditory feedback from subjects own speech (hear themselves too early)