External Links – Learning, Memory, and Language (Ch 4)

http://www.learner.org/vod/vod_window.html?pid=1574
Language and Speech: Broca's and Wernicke's Areas
The left hemisphere is dominant in this module on language and the brain. Relationships between specific brain areas and verbal processing are shown through the historic example of Dr. Paul Broca's brain-injury patient. The patient's preserved brain is subjected to CAT scan analysis, which shows correspondence between the damaged area and the patient's documented difficulties with language comprehension.

http://www.learner.org/vod/vod_window.html?pid=1584
The Locus of Learning and Memory
In the history of psychology, the question of where learning and memory take place has occupied investigators for years. Recent work at the National Institute of Mental Health has brought scientists closer to resolving the issue. This module shows magnetic resonance imaging (MRI) technology being used to identify specific changes in the motor cortex of human subjects — changes that correspond to training in particular tasks.

http://www.learner.org/vod/vod_window.html?pid=1585
Learning As Synaptic Change
This module presents researchers investigating the structural changes involved in learning. Research conducted at the Pasteur Institute in Paris shows that the learning process involves the formation of new brain connections and the elimination of others. Other researchers dispel the myth of brain loss in aging, present evidence of changes at the cellular level, and review research on associative learning.

http://www.learner.org/vod/vod_window.html?pid=1586
Living With Amnesia: The Hippocampus and Memory
Amnesia appears in many different forms. This module shows how the extent and location of damage can result in varying levels of memory impairment. Footage of Mike, an amnesic individual, demonstrates the result of an injury to the hippocampus. Mike's reaction to his memory deficit and drastic coping measures underscore the importance of memory to everyday functioning.

http://www.learner.org/vod/vod_window.html?pid=1588
A Super-Memorist Advises on Study Strategies
This module explores the brain's potential for storage-as-memory. Rajan Mahadevan, a "super-memorist," demonstrates his phenomenal memory by scanning a 7 by 7 matrix of digits and recalling all forty-nine digits forward, backward, and by columns. He also claims to have memorized 100,000 digits of pi. Mahadevan offers suggestions to help college students improve their study habits when learning new material.

http://thebrain.mcgill.ca/flash/a/a_07/a_07_cr/a_07_cr_tra/a_07_cr_tra.html
Memory and the Brain Module
HM is a subject who had his medial temporal lobe removed when he was young because of epilepsy. After the surgery, he had extreme difficulty storing memories, but was still able to recall all memories that were stored prior to his brain surgery. What was especially striking was that he could talk with researchers (that would visit frequently, one of the reasons there is so much information about this man is that he was very cooperative with working with scientists), they would leave and when they returned he would have to be reintroduced as he didn’t remember their interactions. His story is also interesting in that he had difficulty with declarative memories (events, dates, facts, happenings) but not as much with non-declarative (procedural memory or learning how to do things). What is especially interesting about this is that if he learned how to do something (typing on a keyboard, for example) one could ask him if he knew how and he would say no, but when a keyboard was placed in front of him he would be able to type and show improvement from session to session. HM was an important case study for learning and memory. He died within the last year and donated his brain to science. It was recently sectioned (and you could watch the live feed of it, which they did continuously, a lot of our neuroscience program watched it!). This is a short portion of them sectioning. The first freeze the brain in a block of cryoprotectant (you can see some of the frost on the block) and use a microtome, which is basically a large, sliding blade. They put the section (10s of microns thick!) into a solution to spread it out, then mount it onto a glass slide (they are huge for human brains!).

HM sectioning video

Here is a video of rats undergoing fear conditioning. They first learn to press a lever for a reward after a tone (music note). Then after the tone, a mild shock is introduced (it doesn't hurt them, but you can see their startle), which they then become wary of (the freeze response indicates their unease).

LTP

Winning video for Brain Awareness Week competition on aphasia

Examples of broca’s aphasia (a problem in speed production)
Broca’s aphasia (with guest appearance by Norman Geshwind; describes the language circuit)

Striking examples of Wernicke’s and Broca’s aphasias

Example of Wernicke’s aphasia