8.1 Studying Memory

- **Memory** The persistence of learning over time through the storage and retrieval of information
  - Evidence that learning persists takes three forms:
    - **Recall** A measure of memory in which the person must retrieve information learned earlier, as on a fill-in-the-blank test
    - **Recognition** A measure of memory in which the person need only identify items previously learned, as on a multiple choice test
    - **Relearning** A measure of memory that assesses the amount of time saved when learning material for a second time

8.1.1 Memory Models

- Psychologists create memory models to help us think about how our brain forms and retrieves memories
  - **Information-processing models** are analogies that compare human memory to a computer’s operations
- To remember any event:
  - **Encoding** Get information into our brain (processing of information into the memory system)
  - **Storage** Retain that information
  - **Retrieval** Get that information back out
- Our memories are less literal and more fragile than a computer’s
- To focus on parallel processing, one information processing model, connectionism, views memories as products of interconnected neural networks
- Specific memories arise from particular activation patterns within these networks
- **Memory-Forming Process (Atkinson+Shiffrin)**
  1. We first record to-be-remembered information as a fleeting **sensory memory**
     - a. **Sensory memory** The immediate, very brief recording of sensory information in the memory system
  2. We process information into **short-term memory**, where we encode in through **rehearsal**
     - a. **Short-term memory** Activated memory that holds a few items briefly, before the information is stored or forgotten
  3. Information moves into **long-term memory** for later retrieval
     - a. **Long-term memory** The relatively permanent and limitless storehouse of the memory system. Includes knowledge, skills, and experiences
- Psychologists have updated this system to include **working memory** and **automatic processing**
Estimated that, compared w/ learning nonsense material, learning meaningful material required 1/10 the effort (Ebbinghaus)

“The time you spend thinking about material you are reading and relating it to previously stored material is about the most useful thing you can do in learning any new subject matter”

Self-reference effect: Tendency to recall information we can meaningfully relate to ourselves
  ■ Especially strong in members of individualistic Western cultures
  ■ Information deemed “relevant to me” is processed more deeply and remains more accessible

The amount remembered depends both on the time spent learning and on your making it meaningful for deep

8.3 Memory Storage
  ● Our capacity for storing long-term memories is essentially limitless

8.3.1 Retaining Information in the Brain
  ● Despite the brain’s vast storage capacity, we do not store information as libraries store their books, in discrete, precise locations.
    ○ Instead, many parts of the brain interact as we encode, store, and retrieve the information that forms our memories
  ● Explicit-Memory System: The Frontal Lobes and Hippocampus
    ○ Memory requires brain networks
    ○ The network that processes and stores your explicit memories includes your frontal lobes and hippocampus
    ○ When you summon up a mental encore of a past experience, many brain regions send input to your frontal lobes for working memory processing
    ○ Left and right frontal lobes process different types of memories
    ○ Hippocampus is the brain’s equivalent of a “save” button for explicit memories
      ■ New explicit memories of names, images, and events are laid down via the hippocampus
      ■ Damage to this structure disrupts recall of explicit memories
      ■ Left hippocampus: Verbal info
      ■ Right hippocampus: Visual designs and locations
      ■ Subregions of hippocampus serve different functions
        ● Associating names w/ faces
        ● Spatial mnemonics
        ● Spatial memory
          ○ Rear area
          ○ Grows bigger as it learns more
      ■ Memories are not permanently stored in the hippocampus
        ● Hippocampus acts as loading dock where the brain registers and temporarily holds the elements of a remembered episode (smell, feel, sound, location)
        ● Then, memories migrate for storage elsewhere