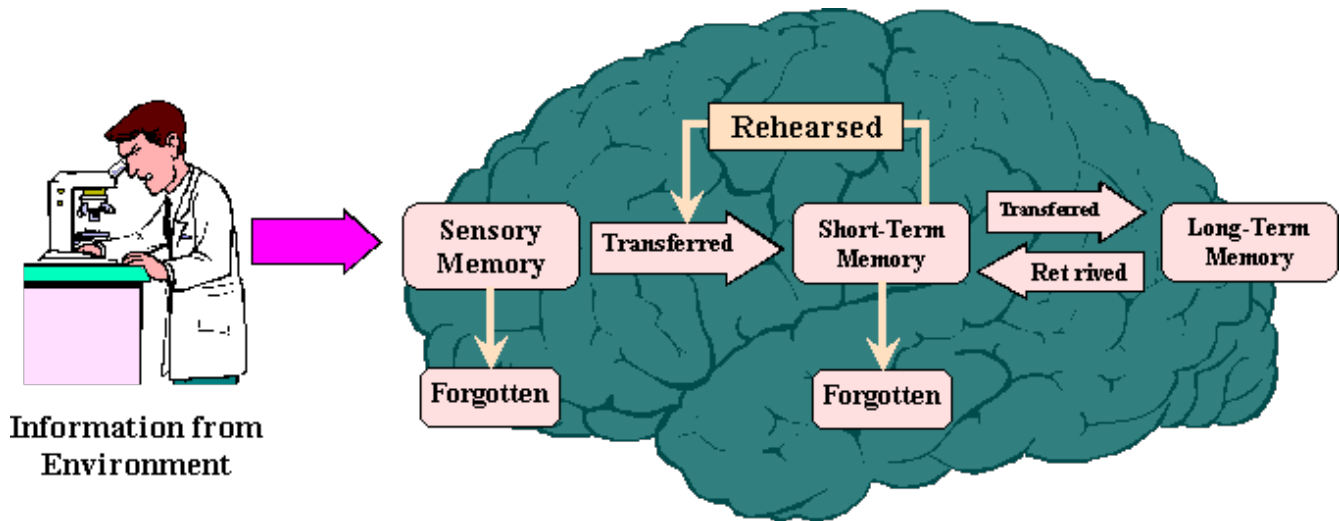


Information Processing Model

The progress of information through these storage systems is often referred to as the **Information Processing Model** (Marzano, 1998), which can be mapped as:



Short-Term Memory (STM)

STM is characterized by:

- A limited capacity of up to seven pieces of independent information.
- The brief duration of these items last from 3 to 20 seconds.
- Decay appears to be the primary mechanism of memory loss.

After entering sensory memory, a limited amount of information is transferred into short-term memory. Within STM, there are three basic operations:

- **Iconic memory** - The ability to hold visual images.
- **Acoustic memory** - The ability to hold sounds. Acoustic memory can be held longer than iconic memory.
- **Working memory** - An active process to keep it until it is put to use (think of a phone number you'll repeat to yourself until you can dial it on the phone). Note that the goal is not really to move the information from STM to LTM, but merely put the information to immediate use.

The process of transferring information from STM to LTM involves the encoding or consolidation of information. This is not a function of time, that is, the longer a memory stayed in STM, the more likely it was to be placed into LTM; but on organizing complex information in STM before it can be encoded into LTM. In this process of organization, the meaningfulness or emotional content of an item may play a greater role in its retention into LTM. As instructional designers, we must find ways to make learning relevant and meaningful enough for the learner to make the important transfer of information to long-term memory.

Also, on a more concrete level, the use of [chunking](#) has been proven to be a significant aid for enhancing the STM transfer to LTM. Remember, STM's capacity is limited to about seven items, regardless of the complexity of those items. Chunking allows the brain to automatically group certain items together, hence the ability to remember and learn better.

Our prior knowledge of pictures and faces allow us to see a “face” in the word “Liar”:



Long-Term Memory (LTM)

The knowledge we store in LTM affects our perceptions of the world, and influences what information in the environment we attend to. LTM provides the framework to which we attach new knowledge. It contrasts with short-term and perceptual memory in that information can be stored for extended periods of time and the limits of its capacity are not known.

Schemas are mental models of the world. Information in LTM is stored in interrelated networks of these schemas. These, in turn, form intricate knowledge structures. Related schemas are linked together, and information that activates one schema also activates others that are closely linked. This is how we recall relevant knowledge when similar information is presented. These schemas guide us by diverting our attention to relevant information and allow us to disregard what is not important.

Since LTM storage is organized into schemas, instructional designers should activate existing schemas before presenting new information. This can be done in a variety of ways, including graphic organizers, curiosity-arousing questions, movies, etc.

LTM also has a strong influence on perception through *top-down processing* - our prior knowledge affects how we perceive sensory information. Our expectations regarding a particular sensory experience influence how we interpret it. This is how we develop bias. Also, most optical illusions take advantage of this fact.

An important factor for retention of learned information in LTM is rehearsal that provides [transfer of learning](#).