The Process of Memory

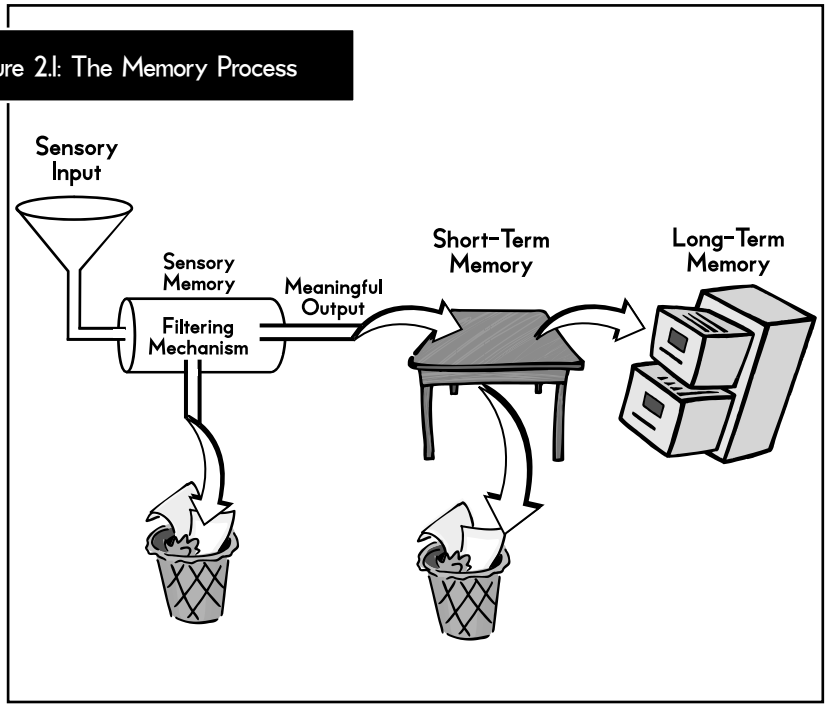
Chapter 2

Memory is both dynamic and active and is under control of the central executive of our brain. This highly complex process involves multiple components simultaneously. Our discussion of this system will describe the functional components of memory. The goal is to explain the process in a more concrete manner. Consequently, categories and analogies will be used to represent the major components by which we encode, store, retrieve, and integrate information. These are *not* intended to represent different structures or distinct stages within the process.

When thinking about our students and learning, several key points are valuable to keep in mind.

- Things can go wrong at any stage of the memory process. If we identify the breakdown point, or the point where the process went wrong, we can develop better tools to help that student create strategies and enhance his memory and learning.
- Learning requires collaboration of the proper memory functions.
- Many components are rapid, integrative, and multidimensional; but consolidation is a slow process.
- "Vastly more extensive and strenuous use of memory is required for school success than is needed in virtually any career you can name." (Levine 2002, p. 91)

Figure 2.1: The Memory Process



In the graphics in Figure 2.1 and Figure 2.6 (page 33), the functional components of memory are identified as:

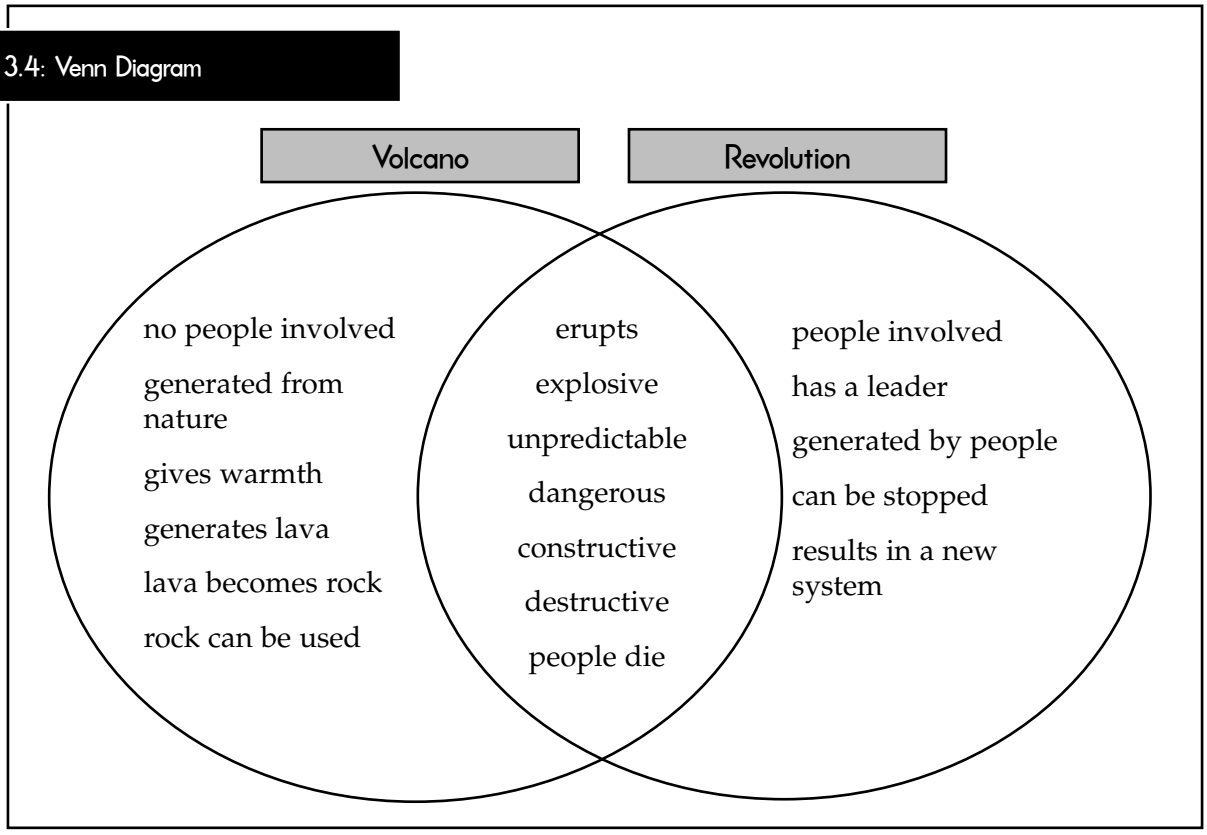
- sensory memory
- short-term memory
- long-term memory
- retrieval

Sensory Memory

Everything begins as sensory input from the environment. Our sensory system takes in information through its receptors: sight, sound, touch, movement, taste, smell, gravity, and position. A great deal of sensory information is simultaneously input. If we were to pay attention to all of this, we would experience sensory overload. For example, most of us

To elaborate on the student's understanding of a volcano, students who have studied an event such as the American Revolution may connect their knowledge about volcanoes with a different sort of eruption, such as a revolution. Ask students to brainstorm and list the similarities and differences between a volcano and a revolution. On the surface these two concepts appear different, but there are actually many similarities, and it is useful for students to discover these patterns and connections. A Venn diagram, as in Figure 3.4, can be created as the students brainstorm their ideas. As they state a characteristic of either a revolution or a volcano, they also determine if it is an aspect that is similar or different compared to the other one. If the characteristic relates to only the volcano or the revolution, it is placed in the appropriate column. If it relates to both concepts, the characteristic is placed in the center, intersecting location.

Figure 3.4: Venn Diagram



A Valuable Teaching Tip

When attempting to facilitate memory,
don't "pack and stack": allow time for elaboration and consolidation.

Organization of Information

To be able to later recall information that was read at an earlier time, and to do so with understanding and accurate retrieval, it is valuable for students to use strategies that encourage them to actively consolidate, integrate, and organize what they have read. This helps provide them with a hook with which they can hang on to the information and concepts. The more efficiently that the students are able to connect with the material, the more efficient will be their total process.

- ▲ We store information by similarities.
- ▲ We retrieve information by differences.

Since the brain likes patterns, it seeks similarities. Visual organizers help integrate information by organizing similarities, as well as differences. We store information by similarity because the brain uses similarity to create neural networks. Differences are also important because we tend to retrieve information by differences.

> Long-term memory most often stores new learning into a network that contains learning with similar characteristics or associations, as perceived by the learner. This network identification is one of the connections made in working memory during rehearsal and closure. To retrieve an item, long-term memory identifies how it is different from all the other items in that network (Sousa, 2001, 143).

This section presents a variety of visual organizers which can be used in many different situations, as illustrated in Figure 5.5. Some advantages of visual organizers are that they are generally easy to use, help students organize their thinking, and can be easily adjusted to individual preferences. They may include pictures and are often nonlinear, in contrast to the more linear or sequential structure of a traditional outline. The visual nature of the graphic makes it possible to see connections between aspects of the information that may not be as obvious in a more linear form. The

Figure 5.5: Uses of Visual Organizers