

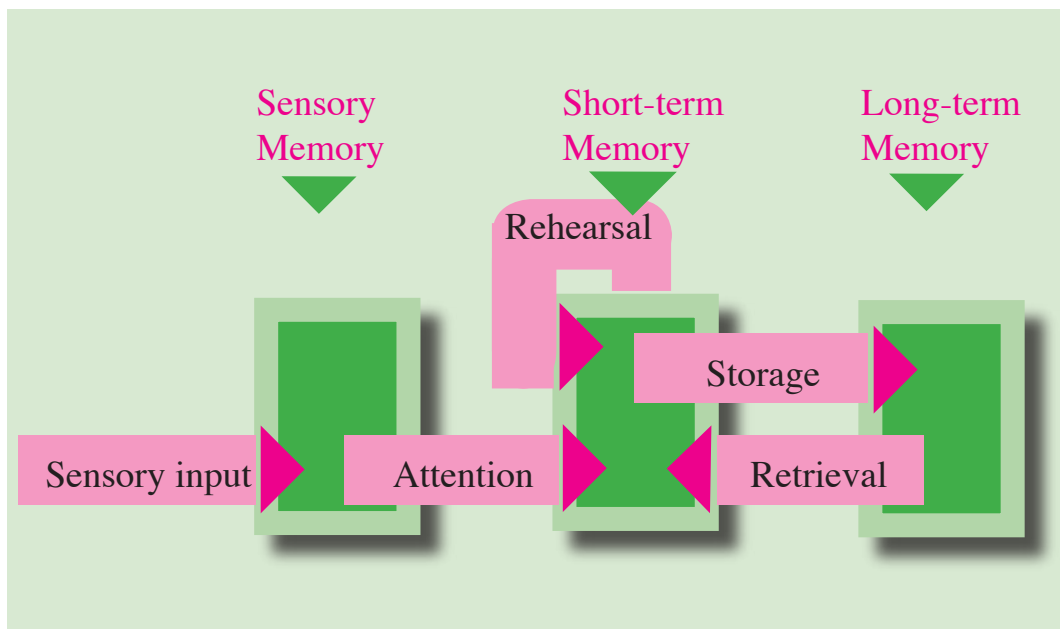
Transformation, an Important Piece of the Learning Process

By Carol M. Santa, Ph.D.

Last summer at our Master Trainers meeting, we decided to focus the spring issue of *Comments* on the specific concepts underlying CRISS Principles and Philosophy. I agreed to write some comments about transformation or organization of ideas. I have had some challenges writing this piece, because it is so difficult for me to tease apart the specific CRISS principles. All of the principles seem to “mush” together, making it difficult to separate one from another. To learn, we need to be metacognitive, which involves learning purposefully based on our background knowledge and being actively involved in writing, talking, and transforming information into our own personal representations.

Even though the principles underlying Project CRISS intermingle, one can tease out the concept of organization from the perspective of cognitive psychology. To see how, let's begin with some “background knowledge” about human memory.

Psychologists have historically proposed a three-process model of memory that includes: sensory or immediate memory, short-term or working memory, and long-term memory (Atkinson and Shiffrin, 1971; Sousa, 2001). The schematic below provides a visual of these processes:



As we listen to a lecture, we are bombarded with an incredible amount of information—other people, the objects in the room, outside noises, the lecturer's appearance, her voice, gestures, and clothes. Much of this information remains in our sensory memory for seconds or less and will be lost forever. Only information one attends to goes into short-term memory.

Our short-term memories have limited capacities. In a classic experiment, George Miller (1956) reported that one's short-term memory can only hold about seven items or bits, plus or minus two. Sometimes we can remember only five items, on good days we might recall nine bits of information! Other researchers have repeatedly confirmed Miller's original finding. (Have you ever wondered why telephone numbers throughout the world are limited to seven digits? Phone companies seem to know about our short-term memory capacities!)

Information remains in short-term memory for several seconds (from 2 to 30 seconds) and disappears unless one imposes structure on it through rehearsal and transformation. By rehearsing information through organizing or transforming strategies (taking notes, underlining, self-questioning), information has the potential to become part of one's long-term memory.

Our long-term memories are organized into a network of associations, both hierarchical and associative. One is more apt to retrieve and subsequently remember specific information when it is embedded into long-term memory with rich associations and within hierarchies of information. Our long-term memory is organized like a giant interconnected filing system.

Included with this linear model of memory (sensory, short-term, and long-term memory) is retrieval or the ability to access information. Information stored in long-term memory is potentially available for retrieval. But, to recall it, we have to retrieve it from the files of our mind. The more we have transformed or structured the information, or the more recently we have used the information, the easier it is to retrieve.

Let's take a moment and think about retrieval on a personal level. What happens when you try to remember something? For me it can be quite frustrating. I know I know something—a face, a book—but I simply can't dredge it up. In fact, the problem of sluggish retrieval seems to plague me more and more. I keep telling myself that my difficulty isn't a symptom of losing my mind. I simply have too much information stuffed into my brain—my brain is so full that I can't latch onto the specifics of what I want to remember. Too often, when trying to recall something, my brain works in low gear or simply grinds away in neutral. (Maybe it's because I have just become a new grandmother!) I flounder around for a hook to pull specific information out of my head. Eventually—sometimes two or three days later, out of the blue—I suddenly remember. Whew! My mind just needed more time to lurk through its murky interconnections before latching onto some cue to pry a memory out of storage.

Memory experts tell us that sluggish retrieval wouldn't be so acute if we had simply done a better initial job of cataloging or transforming information into long-term memory! If I had only said the person's name over and over to myself and perhaps compared her face to another friend, I could have remembered her name. I keep reassuring myself

that my slumbering retrieval has nothing to do with my brain being no longer so young, being no longer so fresh! I just have to work harder at organizing and transforming information so I can better access it.

Have you ever wondered why telephone numbers throughout the world are limited to seven digits?

When thinking about Project CRISS, showing students how to learn is really about teaching them to shift information from short to long-term memory by structuring information and embedding it with retrieval cues. Power Thinking provides students with a way to transform information and with cues (Power 1s, 2s, and 3s) to catalogue and subsequently retrieve ideas. We teach students multiple strategies for organizing and reorganizing information as part of our strategic learning plans. Students

take Main Idea-Detail Notes and then reorganize them into Content Frames and Concept Maps. They build associations with what they already know, rehearse by reading and saying something or converting information into pictures. A picture or a node on a Concept Map becomes a retrieval cue for remembering a vast amount of information.

As I think about organization and its backbone in cognitive psychology, I have decided what I have just talked about would be important for my high school students to know. As Director of Education at Montana Academy, I teach my wayward adolescents most of what we cover in our Level I workshop as part of a "learning how to learn" seminar. Even though I hammer them with CRISS Principles and Philosophy, they still have difficulty seeing *why* our theoretical principles are keys to their own learning. Maybe a crash course in human memory would help create an associative context for CRISS theory and strategies. It's worth a try.

References

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