

## ***FOCUS ON VOCABULARY AND LANGUAGE***

. . . *gold medal winners in a memory Olympics*. Here, people with exceptional memories are being likened or compared to the top athletes in the Olympic Games. S, for example, would clearly receive the top prize (be a *gold medal winner*) in any competition that tests the ability to remember vast amounts of information (*a memory Olympics*). While most of us can repeat (*parrot back*) a series of about 7 numbers (*a string of 7 or so numbers*), S could accurately **recall** up to 70 if they were presented at three-second intervals in a quiet room.

### **Studying Memory**

Be thankful for memory—your *storehouse of accumulated learning*. Here, Myers is using an analogy to help you understand the general concept of **memory**. *Storehouses* are spaces that are used to keep materials (for example, water or food) until we need them. Likewise, your memory system retains most of the things you have experienced (*your accumulated learning*), and items can be recalled or retrieved as required. Without memory, you would not be able to enjoy (*savor*) such previous happy experiences as past achievements and you would not be able to feel anguish over painful memories; each moment would be new (*fresh*).

How does your brain *pluck* information out of the world around you and *store it for a lifetime of use*? Memory is the retention of learning over time. The question here is how does our brain select and pick (*pluck*) information from our environment and put it away (*store it*) for use throughout your life? We form or build (*construct*) memories through the processes of **encoding**, **storage**, and **retrieval**.

### **Building Memories: Encoding**

#### *Our Two-Track Memory System*

On the second track, other information *skips* the Atkinson-Shiffrin stages and *barges directly into* storage, without our awareness. Our mind works on two levels, the conscious level and the unconscious level (*our two-track mind*). Some material quickly enters (*barges directly into*) **long-term memory** without our conscious awareness; it is on this second level (*track*) that information bypasses (*skips*) the Atkinson-Shiffrin stages of the conscious encoding processes (**explicit memory**) and forms **implicit memories**. As Myers notes, your brain is automatically processing information without conscious effort (it is *your behind-the-scenes mind*). It makes a note of (*jots down*) the sequence of your day's events, stores (*tucks away*) spatial information, and records how often things happen (the *frequency* of events). This occurs so effortlessly that it is difficult to stop it from happening (*to shut it off*).

#### *Effortful Processing and Explicit Memories*

But **sensory memory**, like a lightning flash, is *fleeting*. In his investigation of sensory storage, George Sperling showed people an array of nine letters for a very brief period—one-twentieth of a second (about the length of a *lightning flash*). He demonstrated that this was sufficient time for them to briefly view all nine letters, and that an image remained for a few tenths of a second before fading away. He called this brief (*fleeting*) memory of visual stimuli *iconic memory*.

. . . *boost* . . . There are many **effortful processing** strategies for improving (*boosting*) our ability to form new explicit memories, such as **chunking**, using **mnemonics**, and making material personally

meaningful, to name just a few. One common method for improving and increasing the power of our memory is to use *rehearsal*, or *repetition*. As Myers notes, for effective retention, it is important to space out or distribute rehearsals over time (*the spacing effect*) rather than doing repetitions all at once (*massed practice* or *cramming*). In addition, repeatedly testing yourself improves learning and memory (*the testing effect*).

The *peg-word system harnesses our visual-imagery skill*. To use this strategy, you memorize a *jingle* . . . A *jingle* is an easily remembered succession of words that ring or resound against each other due to alliteration or rhyme. *Jingles* are often used in radio or TV commercials. The memory aid (*mnemonic*) called the *peg-word system* is based on memorizing a 10-item poem (*jingle*) that can be associated with a new list of 10 items that engages and utilizes our visual-imagery ability (*harnesses our visual-imagery skill*). The new items are hung on, or *pegged* to, the familiar items.

In making such mistakes, our minds are like theater directors who, *given a raw script*, imagine a *finished stage production* (Bower & Morrow, 1990). With this statement, Myers suggests that what we remember is not an exact replica of reality. We construct a mental representation or model (*a finished stage production*) from the basic sensory information (*the raw script*) available to us. Thus, when we recall something, it is our own version that comes to mind and not the real thing. For example, we may encode the meaning of a sentence rather than the actual written words.

## Memory Storage

. . . *Sherlock Holmes* . . . Mystery writer Sir Arthur Conan Doyle's most popular character was a very intelligent and logical private detective named *Sherlock Holmes*. *Holmes* believed, as did many others, that our memory capacity was limited, much as a small empty room or attic can hold only so much furniture before it overflows. Contemporary psychologists now believe that our ability to store long-term memories is basically without any limit.

### *Retaining Information in the Brain*

One day, after reaching for his hand, she *yanked* hers back, for the *physician* had *pricked* her with a *tack* in his *palm*. A patient with **amnesia**—a memory loss following brain damage—was unable to recognize her doctor (*physician*) even though he shook her hand and introduced himself every day. On one occasion, he concealed a small sharp pin (*tack*) in the center of his hand (*palm*). It pierced her (*pricked* her) when they shook hands, causing her to quickly pull (*yank*) her hand away. Though she has no memory of this incident, she cannot explain why she will no longer shake hands with the doctor (*having been classically conditioned, she just wouldn't do it*). This type of *implicit memory* involves a part of the brainstem called the *cerebellum*.

Arousal can *sear* certain events into the brain (Birnbaum et al., 2004; Strange & Dolan, 2004). When arousal level rises because of stress, so too do the levels of certain hormones and these hormones in turn signal the brain that something important has happened. They also cause (*provoke*) the *amygdala* to enhance (*boost*) activity in the brain's memory-forming areas. The events that triggered the arousal make an indelible impression on the brain, much as a hot grill burns (*sears*) its shape on the surface of the meat placed on it. Following disturbing and painful events (*horrific* or *traumatic experiences*), very clear recollections (*vivid memories*) may occur repeatedly and spontaneously (*they intrude again and again*).

## *Synaptic Changes*

. . . *London cab drivers*. . . People who drive taxis are called *cab drivers*. Those who work in the city of London, England (*London cab drivers*) face an enormous challenge trying to memorize the complicated layout (*maze*) of city streets; the brain area that specializes in spatial memory becomes larger in the drivers the longer they work there.

## **Retrieval: Getting Information Out**

### *Measuring Retention*

. . . *our mind knows, and knows that it knows*. Our **recognition** ability is both very impressive and very fast. Before we verbally answer recognition questions, our mind is aware of the answers (*the mind knows*) and it is also aware that it has that knowledge (*it knows that it knows*). Though we might have a problem naming all of the Seven Dwarfs in the children's story *Snow White* (our **recall** ability), we would probably not have much difficulty *recognizing* them all.

*Put yourself in Ebbinghaus' shoes*. Here, Myers is asking you to imagine how you might have solved the problem of creating new items to learn if you were Ebbinghaus (*to put yourself in Ebbinghaus' shoes*). To avoid using meaningful words with prior associations, he invented three-letter words that made no sense and had no meaning (*nonsense syllables*). He did this by putting (*sandwiching*) a vowel between two consonants.

### *Retrieval Cues*

If put *in a great mood* . . . people recall the world *through rose-colored glasses* (DeSteno et al., 2000; Forgas et al., 1984; Schwarz et al., 1987). Our memories are affected by our emotional states (*moods*). Thus, if we are happy (*in a great mood*), we are more likely to view the total situation in a more optimistic and hopeful way (*through rose-colored glasses*). Being happy activates (**primes**) pleasant (*sweet*) memories; being angry or depressed activates (**primes**) unpleasant (*sour*) ones. Memory of events and people is influenced by the particular mood we are in, whether it is good or bad, and we tend to remember the events accordingly (**mood-congruent memory**).

When *teens* were *down*, their parents seemed *inhuman*. As moods *brightened*, *those devil parents became angels*. Because our memories tend to be *mood-congruent*, we are likely to explain our present emotional state by remembering events and people as being consistent (*congruent*) with how we now feel. In one study, when adolescents (*teens*) were in a bad mood (*down*), they viewed their parents as cruel and uncaring (*inhuman*); later, when they were in a much better (*brighter*) mood, their parents were described in much nicer terms. It seemed as though their parents experienced an amazing change in character (*those devil parents became angels*), but the change was simply in the teenagers' moods.

Another memory-retrieval quirk, the *serial position effect*, can leave you wondering why you have *large holes in your memory* of a list of recent events. Our tendency to recall best the first and last items in a list (**the serial position effect**) is another example of a peculiar or odd component of memory retrieval (*another memory-retrieval quirk*). We tend to forget the items in the middle of a list (*we have large holes in our memories*); although we might feel confident in our ability to recall the whole list, we cannot rely on that happening (*don't count on it*). In memory retrieval experiments, most people were subject to (*fell prey to*) the *serial position effect*.

## Forgetting

To discard the clutter of useless information . . . is surely a blessing. We tend to focus on the importance of remembering and recalling information. However, to be able to get rid of—or throw away (*discard*)—messy, untidy, irrelevant material (*the clutter of useless information*) is something to be thankful or glad about (*it is a blessing*). If we could not forget, we would be like the Russian memory expert (*memory whiz*) S who was overwhelmed by the amount of useless information he had stored (*his junk heap of memories dominated his conscious mind*).

### *Forgetting and the Two-Track Mind*

. . . they [people with *amnesia*] can learn new skills and can be *classically conditioned* . . . They can *master* mirror-image writing, jigsaw puzzles, and even complicated job skills (Schacter, 1992, 1996; Xu & Corkin, 2001). People who have lost the ability to remember new information (who have *amnesia*) may nevertheless be capable of learning through association (*classical conditioning*). They may also learn to solve problems—for example, to complete jigsaw puzzles and become skilled at (*master*) mirror-image writing even if they are not aware of having done so. They have lost the ability to form new *explicit memories*, but their **automatic processing** of certain skills and *classically conditioned* associations (of implicit memories) remains intact. Myers notes that these findings suggest that *we have two distinct memory systems, controlled by different parts of the brain*.

### *Retrieval Failure*

For example, what causes frustrating “*tip-of-the-tongue*” forgetting? The expression “*it’s on the tip of my tongue*” refers to the feeling you get when you are trying to remember something (for example, a name or a place) but you can’t, even though you feel you know this thing and can *almost* say it (“*tip-of-the-tongue*” forgetting). Given an appropriate **retrieval cue** (such as the first letter of the name or something it rhymes with), you can often remember the item. The problem here is one of *retrieval failure* and not one of a memory that has faded (due to decay) or of *encoding failure*.

As you collect more and more information, your *mental attic* never fills, but it gets *cluttered*. We may have an unlimited amount of space in our memory system or *mental attic* (a room at the top of a house) but, with a constant flow of new information coming in, the storage can become disorganized (*cluttered*). New information may get in the way of recalling old material (**retroactive interference**), or old material may block or disrupt recall of new information (**proactive interference**).

We *sheepishly* accepted responsibility for 89 cookies. Still, we had not come close; there had been 160. The Myers family obviously loves chocolate chip cookies. The story of how all 160 were devoured (*scarfed, wolfed down, eaten, consumed*) within 24 hours (*not a crumb was left*) is not only quite funny—it also makes an important point. Embarrassed, guilty, and feeling a little foolish (*sheepish*), they could only account for and remember eating 89 cookies. Was the memory failure due to an encoding problem or a storage problem, or was the information still intact but not retrievable because it would be embarrassing to remember? Although Freud proposed that we repress memories of painful experiences in the unconscious mind in order to protect our self-concepts and minimize anxiety, Myers notes that increasing numbers of contemporary memory researchers believe **repression** rarely, if ever, occurs.

## Memory Construction Errors

We don't just retrieve memories; we *reweave* them (Gilbert, 2006). Memories are sometimes altered or changed when they are formed. They can also be modified or adjusted when we retrieve them (when we "*replay*" them). Thus, when we recall something, we may inadvertently revise (*reweave*) it, replacing the original with a slightly altered version—a process called *reconsolidation*. In a sense, the more often we recall information, the more likely it is that the meaning has been changed or altered. As Myers notes, *this means that, to some degree, all memory is false* (Bernstein & Loftus, 2009).

### *Misinformation and Imagination Effects*

*The human mind, it seems, comes with built-in Photoshopping software.* Digital images can be altered using appropriate computer software (for example, using *Photoshop*). In a similar manner, the human mind has an inborn ability to change memories (*it has built-in Photoshopping software*). In one experiment, researchers altered family photos to include an event that never happened. After viewing these photos, children "remembered" the faked experience; days later they reported even more vivid (*richer*) details of their false memories.. This is an example of the **misinformation effect** (a memory that has been corrupted by misleading information).

### *Source Amnesia*

*Source amnesia*, along with the misinformation effect, is at the heart of many false memories. **Source amnesia** (faulty memory of how, when, or where information was learned or imagined), in conjunction with the *misinformation effect* (when a memory has been corrupted by misleading information), is a major contributing factor to (*at the heart of*) many false memories.

### *Recognizing False Memories*

"*Hypnotically refreshed*" memories of crimes often contain similar errors. Because of the tendency to manufacture events without being consciously aware of doing so (*memory construction*), people are likely to be influenced by suggestions and biased (*leading*) questions while under hypnosis. Their subsequent "*hypnotically refreshed*" recollections may therefore be a mixture of fact and fiction.

### *Children's Eyewitness Recall*

If memories can be *sincere*, yet *sincerely* wrong, how can jurors decide cases in which children's memories of sexual abuse are the only evidence? Research evidence suggests that, under appropriate conditions, children's memories can be reliable and accurate (*sincere*), but that they are also prone to the *misinformation effect* and can be misled by biased questions and suggestions. Later, the children are not able to reliably separate real from false (*sincerely wrong*) memories.

### *Repressed or Constructed Memories of Abuse?*

. . . even if false, their *memories feel real*. For some people who recover memories in therapy through "*memory work*" *techniques* (for example, "guided imagery," hypnosis, or dream analysis), the memory, even if false, feels very real and is often accompanied by strong and sincere emotions. Professional organizations, such as the American Medical Association, American Psychological Association, and American Psychiatric Association, among others, have issued statements aimed at

finding a solution (*a sensible common ground*) to the controversial issues surrounding recovered memories (*psychology's "memory war"*).

So, does *repression* of threatening memories ever occur? Or is this concept—*the cornerstone of Freud's theory and of so much popular psychology*—misleading? A *cornerstone* is the first stone placed at the corner of a new building during construction; it is the foundation of the structure. In a similar way, the concept of *repression* is a fundamental part of Freud's theory (*its cornerstone*) and the foundation upon which much of his theorizing rests. There continues to be much argument about the concept of *repression*, and other chapters of the text further discuss this controversial (*hotly debated*) issue.