FOCUS ON VOCABULARY AND LANGUAGE

. . . ill will . . . If you feel *ill will* toward someone, you are hostile or unfriendly to that person. Because of her *prosopagnosia* (face blindness), Heather Sellers does not recognize the faces of people she has met before and thus will not dislike them (feel *ill will* toward them)—even if they have annoyed her on previous occasions. In addition, her inability to recognize and acknowledge friends and acquaintances sometimes creates the impression that she feels that she is superior or that she is emotionally distant *(snobby or cold)*. What is interesting about this case is that Sellers can process incoming sensory information but has trouble organizing and interpreting sensory input about faces. As Myers notes, she has normal **sensation (bottom-up processing)** but her **perception (top-down processing)** is not working properly when it comes to faces.

A frog could starve to death *knee-deep in motionless flies*. But let one *zoom by* and the frog's "*bug detector*" cells *snap awake*. The frog's eyes and brain are organized in such a way that only fast moving *(zooming)*, small, dark objects will cause these specialized **feature detector** nerve cells *("bug detectors")* to become active *(snap awake)*. If the frog is surrounded by flies that don't move (is *knee-deep in motionless flies*), it will die of hunger, completely unaware of the food at its feet.

Basic Principles of Sensation and Perception

How do you create meaning from the *blizzard* of sensory stimuli *bombarding* our bodies 24 hours a day? Myers is asking how we make sense of the external world *(how do you create meaning)* from the extremely large array *(blizzard)* of sensory stimuli that assails *(bombards)* our bodies continuously *(how does the world out there get in?)*. This chapter addresses this and other questions.

Thresholds

The *shades* on our senses are open just a *crack*, *giving us only a tiny glimpse* of the energy around us. Just as blinds or curtains *(shades)* let only a little light in through any small opening *(crack)*, our sensory system is able to detect only a very small part *(giving us only a tiny glimpse)* of the large amount *(vast sea)* of the physical energy that exists in the world around us.

Much of our information processing occurs *automatically, out of sight, off the radar screen* of our conscious mind. Many of our cognitive processes, including much of our thinking, memory, and attitudes, are a function of the unconscious, intuitive mind, which operates without awareness *(automatically, out of sight, off the radar screen)*. As the text notes, our conscious minds are like managers who work at the top of a building *(upstairs executives)* and hand over *(delegate)* routine tasks to the staff on the lower floors *(downstairs mental workers)*.

Even after I had lived two years in Scotland, sheep *baa's* all sounded alike to my ears. But not to those of *ewes*, as I observed. After *shearing*, they would streak directly to the *baa* of their lamb *amid the chorus of other distressed lambs*. Sheep make a characteristic calling sound—*baa, baa, baa*. But to Myers, who heard this sound many times while living in Scotland, all sheep sounded the same. However, to a female sheep *(ewe)* that had been separated from her offspring *(lamb)* while having her wool cut *(sheared)*, the *baa* is very distinctive. The *ewe* can easily detect the call of her *lamb* amongst the loud calling of many other upset and alarmed young sheep *(amid the chorus of other distressed lambs)* because she has the capacity to distinguish between very similar *"baaing"* sounds. The minimum difference between two stimuli that can be detected half the time is called the **difference threshold** or the *just noticeable difference (jnd)*.

Sensory Adaptation

So everywhere that Mary looks, the scene is sure to go. To understand this sentence you need to be familiar with the old nursery rhyme: "Mary had a little lamb, its fleece was white as snow, and *everywhere that Mary went the lamb was sure to go."* When a volunteer *(Mary)* is fitted with a special contact lens and miniature projector, she sees the same image no matter where her eyes "look" *(everywhere that Mary looks, the scene is sure to go)*. When an image is projected onto the eye's inner surface ***(retina)*** in this manner, the scene disappears bit by bit and then reappears and disappears again, often in pieces *(fragments)*. This happens because the image, which normally would be moving back and forth rapidly *(flitting from one spot to another)* as a result of tiny eye movements, is now stationary with respect to the retina and its receptors. As the receptors get tired or fatigue the image disappears.

"I cannot for the life of me stop from periodically glancing over to the screen" (Tannenbaum, 2002). To emphasize how difficult it is to do—or not do—something, people use the phrase *"for the life of me"* or "even if my life depended on it." As one researcher notes, it is very difficult to have a conversation when the TV is on, enticing us to watch with its many fast or noisy transitions *(cuts, edits, zooms, pans, and sudden noises)*. He finds he is unable to resist looking at the TV every once in a while, even when attempting to have an interesting conversation *("I cannot for the life of me stop from periodically glancing over at the screen")*.

But much of what we perceive comes not just from *what's "out there"* but also *from the expectations that live behind our eyes and between our ears*. Myers is repeating the point that mental predispositions such as expectations and beliefs *(the expectations that live behind our eyes and between our ears)* influence much more of what we perceive than the sensory stimulation received from the outside world *(what's "out there")*.

Perceptual Set

As everyone knows, *to see is to believe*. As we also know, but less fully appreciate, *to believe is to see*. The expression *"seeing is believing"* means that we rely on visual information when deciding *(believing)* what is true. Myers shows us that, in addition, what we *believe* may actually affect what we *see (to believe is to see)*. Our assumptions, expectations, motivations, emotions, and mental predispositions *(our **perceptual sets**)* determine, to a large extent, our perceptions.

In 1972, a British newspaper published "the most amazing pictures ever taken"—of a *"monster"* in Scotland's Loch Ness. People who had heard about, or believed in, the Loch Ness Monster before seeing a very ambiguous picture of a log were more inclined to see what they expected to see (in this case, a *"monster"*) because of their *perceptual set*.

Context Effects

Most Westerners, for whom *head-carrying* is less common, and boxlike architecture is more common, said the woman was sitting under a window, indoors with her family. Figure 5.6 in the text shows a gathering of people. How we perceive the image depends on our cultural experiences *(cultural context helps form our perceptions)*. For example, in this illustration, some people might see a group sitting under a tree with the woman balancing an object on her head *(head-carrying)*; others might see a group sitting in a room with a window above the woman's head. Note that *"head-carrying"* does not refer to carrying heads; rather, it refers to the custom in some cultures for people—often women—to transport possessions by placing them on their heads *(head-carrying)*.

Vision
The Eye

. . . *blind spot* . . . You can use the suggestion in Figure 5.13 of the text to demonstrate that there are two small parts of your visual field (one in the left and one in the right) where you have no sight. These tiny areas ***(blind spots)*** are where the **optic nerve** exits the eye. As Myers notes, *the optic nerve can send nearly 1 million messages at once through its nearly 1 million ganglion fibers*; the resulting *blind spot* is a small inconvenience for such fast transmission from the eye to the visual cortex *(we pay a small price for this high-speed eye-to-brain highway)*.

Rods have no *hotlines* to the brain. **Cones**, which are mostly clustered in the retina's area of central focus (the *fovea*) and detect color and fine detail, have many more individual connections *(hotlines)* to the brain than **rods**. Because rods, which give us our black-and-white vision, have to share *bipolar cells*, they have fewer connections. However, in dim light this can be an advantage, as several rods can combine or pool their individual faint energy output and focus or funnel it onto a single bipolar cell.

Color Vision

Color, like all aspects of vision, resides not in the object but in the *theater of our brain*. Myers notes that when we view a colored object (for example, a blue balloon), it absorbs all the **wavelengths** except its own (blue) and reflects the wavelengths of blue back to us. The color we perceive is a product of our brain and exists only in our mind *(the theater of our brain)*. This idea is supported by the fact that we dream in color, an internally generated experience *(a mental construction)*.

Visual Organization

(Figure 5.19) There is far more to perception than meets the eye. The common expression *"there is more to this than meets the eye"* makes the point that there is often more going on than appears to be the case—what seems simple is much more complex. The demonstration of the Necker cube is a good example of this phenomenon, and Myers uses the expression to make it clear that perception is more complex than the simple visual representations detected by the eye *(there is far more to perception than meets the eye)*.

. . . Gibson and Walk placed 6- to 14-month-old infants on *the edge of a safe canyon*—a ***visual cliff*** . . . Their mothers then *coaxed* them to *crawl* out onto the glass. In the experiment with the **visual cliff**, 6- to 14-month-old infants were gently encouraged *(coaxed)* by their mothers to move on their hands and knees *(crawl)* onto the invisible glass top on the "deep" side of the apparatus *(the edge of a safe canyon)*. Most could not be persuaded to do so, leading to the conclusion that **depth perception** may be innate *(inborn)* and that experience *(learning)* increases *(amplifies)* the fear of heights. The idea for this famous experiment came to Eleanor Gibson *(it kicked in)* when she was at the Grand Canyon and wondered if a young child *(toddler)* looking *(peering)* over the edge *(rim)* of the canyon would recognize the steep, unsafe incline *(dangerous drop-off)* and retreat *(draw back)*.

(Figure 5.22) The floating *finger sausage*. Try the demonstration and you will experience the effect of **retinal disparity**. You will see a tubular shape *(a finger sausage)* made by your brain from the two different images of your fingers. Movies that use three-dimensional technology *(3-D effects)* imitate *(mimic)* or enhance *(exaggerate)* normal retinal disparity.

(Figure 5.23) Relative motion As we move, *objects* that are actually *stable* may appear to move. Things that are stationary and do not move *(stable objects)* seem to move relative to us when we move.

Take away the distance cues—by looking at the horizon Moon (or each dog) through a *paper tube*—and the object will immediately *shrink*. Observers have argued for centuries about why the Moon near the horizon seems so much larger than the Moon overhead in the sky. One explanation involves the interaction of perceived size and perceived distance. Distance cues at the horizon make the Moon appear farther away than when it is overhead—where there are no distance cues. The Moon casts the same *retinal image* in both situations, so the image that appears to be more distant (that is, the one near the horizon) will therefore seem larger. We can eliminate the distance cues by looking at the Moon through a rolled-up piece of paper *(a paper tube)*; in that case, the Moon will appear much smaller *(it shrinks)*.

Visual Interpretation

Most were born with cataracts—clouded lenses that allowed them to see only light and shadows, rather as someone might see a *foggy image* through a *Ping-Pong ball* sliced in half. People born with cataracts cannot see clearly because the normally transparent lenses in their eyes are opaque *(they see a foggy image)*. To understand what their vision is like, imagine what you would see if you had your eyes covered with half of a small, white, plastic ball that is used in table tennis *(a Ping-Pong ball)*. When cataract patients have their vision restored, after being blind since birth, they can sense colors and distinguish figure from ground (*inborn* abilities), but they cannot visually recognize things that were familiar by touch.

Given a new pair of glasses, we may feel a little strange, even dizzy. When we start wearing ordinary eyeglasses or when we are fitted with a new pair, our initial reaction is often a feeling of unfamiliarity *(we may feel a little strange)* and we may feel unsteady *(dizzy)*. However, we adapt within a few days. We can also adapt to lenses that distort what we are looking at by shifting the apparent location of objects 40 degrees to one side—and even to distortion lenses that invert reality (such lenses turn visual images upside down). Young chickens *(baby chicks)* cannot adapt this way, but kittens and monkeys, like humans, can adapt to an inverted *(topsy-turvy)* world.

The Nonvisual Senses

Hearing

With normal hearing, we are remarkably sensitive to *faint sounds,* such as *a child's whimper*. Humans are very good at detecting very quiet noises *(faint sounds)*, which was clearly beneficial to our ancestors' ability to survive when they were both predator *(hunter)* and prey *(being hunted)*. Likewise, the ability to notice and respond to a youngster's quiet cry of distress *(a child's whimper)* would have had adaptive value. We are also very sensitive to changes in sounds, and we have the ability to differentiate among thousands of human voices *(we have keen hearing)*.

Sound waves produced by a *violin* are much shorter and faster than those produced by a *cello* or a *bass guitar*. Musical instruments produce stimulus energy called *sound waves*—molecules of air that bump and push each other along—and these may be long *(low **frequency**)* or short *(high frequency)*. A *cello* (a large, deep-toned, stringed instrument) or a *bass guitar* produces low-frequency sound waves and thus has a lower **pitch** than a *violin* (a much smaller stringed instrument, also called a "fiddle" when used to play folk music), which produces high-frequency waves and has a higher pitch.

Blast them with hunting rifle shots or blaring iPods (as teen boys more than girls do) and the hair cells' cilia will begin to wither or fuse together. The *hair cells* lining the surface of the *basilar membrane* in the **cochlea** are very fragile *(delicate, like wind bending a wheat field)*. If subjected to loud sounds such as the noise of a gun being discharged *(the blast of a hunting rifle shot)* or high volume music from earphones *(blaring iPods)*, the hair cells' cilia begin to break down or stick together *(wither or fuse together)*.

Occasionally, disease damages hair cell receptors, but more often *the culprits* are biological changes linked with heredity, aging, and prolonged exposure to *ear-splitting* noise or music. **Sensorineural hearing loss** *(damage to the cochlea's receptor cells or to the auditory nerves, also called nerve deafness)* can sometimes be caused by illness. But, more often, the agents responsible *(the culprits)* are likely to be age-related biological factors and extended encounters with extremely loud *(ear-splitting)* music or noise. Nerve deafness cannot be reversed, but **cochlear implants** can restore hearing for children and most adults (by 2009, these devices had been implanted in 188,000 people worldwide).

. . . *our ears ring* . . . We sometimes continue to hear high-pitched sounds even after the noisy machinery or loud music is no longer present. This phenomenon is referred to as *ringing in the ears* and may indicate damage to the hair cells and perhaps eventual hearing loss. Myers notes, *as pain alerts us to possible bodily harm, ringing of the ears alerts us to possible hearing damage. It is hearing's version of bleeding*.

If a car to the right *honks*, the right ear receives a more *intense* sound, and it receives the sound slightly *sooner* than the left ear. We locate sounds because our ears are about 6 inches apart and there is a time, as well as a loudness, difference between auditory reception in each ear. If we hear the sound of a car horn *(its honk)* to our right, the left ear receives a less intense sound somewhat later than the right ear. Thus, we locate the direction of the sound to the right.

Touch

As lovers, we *yearn* to touch—to kiss, to stroke, to *snuggle*. Our sense of touch involves a mixture of at least four distinct senses: *pressure*, *warmth*, *cold*, and *pain*. Intimate relations often involve a desire or longing *(a yearning)* to caress, kiss, and embrace each other *(snuggle)*.

Sports injuries may go unnoticed until the after-game shower *(thus demonstrating that the pain in sprain is mainly in the brain)*. Here, Myers is doing a parody of the lyrics from a song in the musical *My Fair Lady*, "The rain in Spain stays mainly in the plain." The point is that injuries, such as those that occur during intense competitive sports games *(the pain in sprain)*, may not be noticed at the time because of the release of *endorphins* (by the *brain*) combined with the power of distraction.

A well-trained nurse may *chat with needle-shy patients* and ask them to look away when the needle is inserted. One method of pain control is through distraction. If you are nervous or anxious about being injected with a hypodermic needle *(a needle-shy patient)*, the nurse may talk to you about unimportant matters *(chat with you)* and request that you do not watch the procedure. This type of distraction can reduce the intensity of the pain.

Taste

There's more to taste than meets the tongue. As noted earlier in relation to vision, the common expression *"there is more to this than meets the eye"* suggests that there is something extra going on over and above the obvious or apparent. Myers creates a variation of this expression using a

different sense *(taste)*. He is pointing out that the sense of *taste* involves more than simply responding to the chemicals that stimulate *taste* receptors in the tongue—it also involves our expectations *(there's more to taste than meets the tongue)*.

Smell

Between birth and death, you will daily inhale and exhale nearly 20,000 breaths of life-sustaining air, *bathing your nostrils in a stream of scent-laden molecules*. Smell *(olfaction)* is a chemical sense. As substances such as flowers, feet, fish, or fertilizer release molecules, they are carried by the air we breathe *(a stream of scent-laden molecules)* and wash over *(bathe)* the receptors in our nasal cavities *(our nostrils)*.

Sensory Interaction

After being *given the cold shoulder* by others in an experiment, people judge the room as colder than do *those who were treated warmly* (Zhong & Leonardelli, 2008). To be given the *"cold shoulder"* means to be rejected, ignored, or excluded. When participants are ostracized *(given the cold shoulder)* during an experiment, they may experience the room as actually colder than those who are accepted and made to feel part of the social group *(those treated warmly)*. As Myers notes, *social exclusion can literally feel cold*. Our five senses do not operate independently—rather our brain mixes *(blends)* their inputs and can even combine our sensory and social judgments so that, when we feel warm, we may act more friendly than if we are cold *(physical warmth may promote social warmth)*. This phenomenon illustrates **embodied cognition**, or how our bodily sensations influence our cognitions.

Thinking Critically About: ESP—Perception Without Sensation?

. . . *uncanny* . . . People who have dreams that coincide, by pure chance, with later events often have an eerie or strange *(uncanny)* feeling about the accuracy of their apparent precognitions.

And that is how science *sifts crazy-sounding ideas*, leaving most on the historical *waste heap* while occasionally surprising us. The use of scientific inquiry can get rid of, or dispose of, nonsensical concepts *(crazy-sounding ideas)*. Such concepts are added to the long list of other ridiculous claims in much the same way that discarded materials, junk, and other rubbish are disposed of in a garbage dump *(the waste heap)*. As Myers notes, we need a scientific attitude to separate *(sift)* true from false assertions. That means doubting and questioning (being *skeptical*) and at the same time being open to findings that challenge accepted scientific beliefs. However, note that after many, many years of investigation and thousands of experiments, there is no scientific evidence that **extrasensory perception (ESP)** exists. Believers in the paranormal need only produce one person who can demonstrate a single, reproducible ESP phenomenon to refute the claim that there is no ESP—this has not happened.