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 doesn't recognize the faces of people she has met before and so will not dislike (*feel ill will toward*) them, even if they had annoyed her previously. However, her inability to recognize and acknowledge friends and acquaintances sometimes creates the impression that she is superior and unfriendly (*snobby*). What is interesting in this case is that Heather can process incoming sensory information but has trouble organizing and interpreting the sensory input about faces. As Myers notes, she has normal **sensation**, but her **perception** 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 (*knee-deep in motionless flies*), it will die of hunger, completely unaware of the food at its feet.

Basic Principles of Sensation and Perception
Thresholds

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

Even after living two years in Scotland, sheep *baa's* all sound alike to my ears. But not to those of *ewes*, which I have observed *streaking*, after *shearing*, 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 David Myers, who heard this sound many times while living in Scotland, all sheep sound the same. However, to a female sheep (*ewe*) who has been separated from her offspring (*lamb*) while having her wool cut (*sheared*), the *baa* is very distinctive. The *ewe* can easily detect her *lamb* amongst the loud calling of many other upset and alarmed young sheep (*amid the chorus of other distressed lambs*) and she will run fast (*streak*) to her own lamb. 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 **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 fatigue the image disappears.

*Page*s *150*: But much of what we perceive comes not just from what's "out there" but also *from what's behind our eyes and between our ears*. Myers is repeating the point that our mental predispositions, expectations, beliefs, etc. (*what's 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, on the contrary, what we *believe* may actually affect what we *see*. Our assumptions, expectations, and mental predispositions (our ***perceptual sets***) determine, to a large extent, our perceptions.

In 1972, a British newspaper published photos 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 (i.e., a *monster*) because of their *perceptual set*.

Vision
The Eye

. . . ***blind spot*** . . . You can use the suggestion in Figure 5.11 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.

Rods have no such *hotline* [to the brain] . . . **Cones**, which are mostly clustered in the *fovea* and detect color and fine detail, have many more individual connections (*hotlines*) to the brain than **rods**. Rods, which give us our black-and-white vision, have to share *bipolar cells* and so do not have as many individual connections (*hotlines*) to the brain, (but this can be an advantage in dim light, as several rods can focus or funnel their individual faint energy output onto a single bipolar cell).

Visual Organization

There is far more to perception than meets the eye. The saying "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 (Figure 5.16) is a good example of this phenomenon, and Myers paraphrases the saying to make it clear that perception is more complex than the simple visual representations detected by the eye (*there is more to perception than meets the eye*).

Such grouping principles usually help us construct reality. Sometimes, however, they *lead us astray* . . . Although we put together elements of sensation through active organization (*the Gestalt grouping principles*) and end up with a unified experience, we sometimes make mistakes in the process (*we are led astray*).

Their mothers then *coaxed* them to *crawl* out onto the glass. In the experiment with the **visual cliff**, 6- to 14-month-old children 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. Most could not be persuaded to do so, leading to the conclusion that **depth perception** may be innate (*inborn*). The idea for this famous experiment came to 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 5.19) The floating *finger sausage*. Try the demonstration and you will experience the effect of **retinal disparity** and see a tubular shape (a *finger sausage*) made by your brain from the two different images of your fingers.

Take away the distance cues—by looking at the horizon Moon (or each monster) 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 (i.e., 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*); 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 or diffuse 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 (*Ping-Pong*). 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 feel a little strange*) and we may experience vertigo (*dizziness*). However, we quickly 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 (*turn the world upside down, a topsy-turvy world*). Young chicks cannot adapt this way, but kittens and monkeys, like us, can.

The Nonvisual Senses

Hearing

We also 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 predecessors' 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* or *bass guitar* produces low-frequency sound waves and thus has a lower **pitch** than a *violin*, 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 and fuse. The hair cells lining the **cochlea** are very fragile (*delicate*). If subjected to loud sounds such as the noise of a gun being discharged (*blasted by a hunting rifle shot*) or high volume music from earphones (*blaring from iPods*), the hair cells' cilia begin to break down or stick together (*wither and fuse*).

. . . *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.

If a car to the right *honks*, your right ear receives a more *intense* sound, and it receives sound slightly *sooner* than your 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 (*it honks*) to our right, the left ear receives a less intense sound somewhat later than the right ear, and thus we locate the direction of the sound to the right.

That is why, when trying to *pinpoint* a sound, you *cock your head*, so that your two ears will receive slightly different messages. When a sound is equidistant from our two ears (directly ahead, behind, or above) and there is no visual clue, we have trouble locating (*pinpointing*) the source. In this situation it helps to tilt (*cock*) our heads so that each ear receives a slightly different message; the sound will be a little louder and sensed a little sooner by one ear, and the brain uses this information to detect where the sound is coming from.

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 (*we yearn*) to caress, kiss, and closely embrace each other (*snuggle*).

Touch is not only a *bottom-up* property of your senses but also a *top-down* product of your brain and your expectations. The sense of touch is a function of sensation (which works from the *bottom [outside experience] up to the top [the brain]*), but it also involves perceptual processes such as our expectations (which works from the *top [the brain] down to our senses*). This is illustrated in the *rubber hand illusion* (Figure 5.25) in which a participant feels that the fake hand she can see is actually her own hand when both are touched simultaneously.

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 imitating the lyrics from the song "The rain in Spain stays mainly in the plain," which comes from the musical *My Fair Lady*. The point is that injuries, such as those that occur during intense competitive sports games (*the pain in strain*), may not be noticed at the time due to the release of *endorphins* (*by the brain*) combined with the power of distraction.

A well-trained nurse may distract *needle-shy patients* by chatting with them and asking 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 (she *chats with you*) and request that you do not watch the procedure. This type of distraction can reduce the intensity of the pain.

Taste

Essential as taste buds are, *there's more to taste than meets the tongue*. 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*). The flavors we experience are a function of more than just the taste buds in the tongue; they involve **sensory interaction** with the sense of smell (*olfaction*). Thus, the sense of taste involves more than simply responding to the chemicals that stimulate taste receptors in the tongue (*there's more to taste than meets the tongue*).

And after being *given the cold shoulder* by others in an experiment, people judge the room as colder than do *those treated warmly* (Zhong & Leonardelli, 2008). The expression "*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*). Our five senses do not operate independently of each other; rather our brain mixes (*blends*) their inputs. It 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 promotes social warmth*).

Smell

Between those two moments, 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 (flowers, feet, fish, fertilizer, etc.) release molecules, they are carried by the air we breathe (*a stream of scent-laden molecules*) and wash over (*bathe*) receptors in our nasal cavities (*nostrils*).

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.