FOCUS ON VOCABULARY AND LANGUAGE

. . . to unlock the atom and crack the genetic code . . . Humans have created many wonderful and amazing devices and investigated and solved numerous questions about the physical world, such as the nature of the atom (we have *unlocked the atom*) and the structure of genes (we have *cracked the genetic code*). These examples illustrate how our shared intelligence (*collective genius*) has been utilized for innovative and creative endeavors.

. . . our species is *kin to* . . . Myers notes that we are biological creatures related to (*kin to*) other species of animals and influenced by the same principles that produce learning in rats and pigeons. We also have exceptional abilities for innovation, learning, memory, and rational thinking; yet, at the same time we also might make mistakes and think and act irrationally (we are *error-prone humans*).

Thinking

Solving Problems

Thomas Edison tried thousands of light bulb filaments before *stumbling upon one that worked*. Edison was a famous inventor who used a trial-and-error method in developing the metal filament that makes the light bulb glow brightly. Using trial and error, he came upon the solution by chance (*stumbled upon one that worked*). Myers contrasts this method with following an **algorithm** (a step-by-step method that always ends with the answer and is typical of computer programs).

Sometimes we puzzle over a problem, and suddenly the pieces fall together in a flash of insight. **Insight** is the sudden and often novel realization of the solution to a problem. The answer typically arrives in conscious awareness quickly and unexpectedly (*suddenly the pieces fall together*) without any forewarning that the solution is imminent (*flashes of insight*). When we solve a problem through insight (*the "I get it!" reaction*), we feel a sense of accomplishment and sometimes use verbal exclamations—such as "Aha!"—because the feeling is very satisfying. Research has shown that when people experience abrupt and unexpected (*flashes*) of insight their frontal lobes (which are involved in focusing attention) are active and there is also a surge (*burst*) of activity in their right temporal lobes, just above the ear.

Making Good (and Bad) Decisions and Judgments

Should I *shoot* the basketball or pass to *the player who's hot*. (Don't take this sentence literally.) In a game of basketball, the player holding the ball has to decide to throw it through the hoop (*shoot the basketball*) or pass it to a player who has scored frequently (*the player who's hot*). We usually follow our subjective feelings (*intuitions* or *gut feelings*) rather than taking the time to use logic and reason.

. . . they do it [make decisions] mostly by *the seat of their pants*. When we make decisions based on subjective or intuitive reasons, rather than using logical, reflective problem-solving strategies, we are using *seat-of-the-pants* judgments. Thus, when we employ **heuristics** (simple thinking strategies), we may make decisions that are incorrect and not very smart (*dumb judgments*). However, when we need to act quickly, the use of heuristics (*mental shortcuts*) can eliminate the tendency to procrastinate (can *overcome analysis paralysis*).

The faster we can remember an instance of some event (*a broken promise*, for example), the more we expect it to happen again. We tend to use whatever information is accessible in our memories

when making decisions and forming judgments; similarly, events or mistakes that are easiest to access (i.e., those that most readily come to mind—*they "pop" into mind*) will most likely be used. This is called the **availability heuristic**. So, if on one occasion, someone did not keep his or her word (*broke a promise*) about doing something, we tend to remember that event and use it in predicting future behavior. Sometimes the availability heuristic can cause errors in judgment (*it can lead us astray*).

Numbers can be numbing. At times we ignore the statistical probability of events happening. The numbers involved can get in the way of our ability to rationally analyze the problem (*the numbers can be numbing*). We remember vivid images that may distort our assessment of risks and probable outcomes. As Myers notes, *dramatic outcomes capture our attention; probabilities don't*.

(Thinking Critically About: Assessing Risk) Human emotions *were road-tested in the Stone Age*. During our evolutionary past, certain traits or characteristics were selected because they helped our ancestors survive, and those who survived because of these attributes passed them on to their descendants. Fearful reactions to snakes, lizards, spiders, confinement, and heights were selected (*they were road-tested*) during earlier times (*in the Stone Age*) and are part of human nature today.

Framing is the way we present an issue, and *its effects can be striking*. Presenting the same information in two different ways can cause people to react more negatively or positively, depending on how the (logically equivalent) information was framed (*posed*). The framing effect can have a profound influence on people's decisions and judgments (the *effect can be striking*). For example, a product priced at $100, reduced (*marked down*) from $150, will appear to be a better deal than the same product priced at $100 in another store.

That our judgments can *flip-flop* dramatically is startling. Presenting the same information in two different ways can cause people to react more negatively or positively depending on how the (logically equivalent) information was framed. The framing effect can cause alarming and dramatic reversals (*flip-flops*) in people's decisions and judgments. For example, a very fatty food product made by grinding meat (a *hamburger*) will be seen more positively if described as "75 percent lean" as opposed to "25 percent fat," despite the fact that exactly the same information is conveyed in each case.

Belief perseverance often fuels social conflict . . . Our unreasoned thinking shows when we persist (*persevere*) in our views despite evidence to the contrary (***belief perseverance***). This can lead to an increase in strong feelings or passions over controversial issues (it *fuels social conflict*). Myers suggests that one solution for those who wish to restrain the effect of *belief perseverance* is to give serious consideration to beliefs *opposite* to their own.

The Perils and Powers of Intuition

More than we realize, thinking occurs off-screen, with the results occasionally displayed on-screen. Humans process a great deal of information without any conscious awareness of doing so. This is similar to a computer's hidden processing, which is not displayed on the monitor (*it occurs off-screen*). Once in a while the results of our unconscious processing enter consciousness (*the results are occasionally displayed on-screen*).

. . . gut feeling . . . Gut feelings are emotional reactions that often occur unconsciously and immediately without rational thought or reflection. Our irrational thinking can seriously affect (*plague*) our attempts to solve problems, and our intuitions may also encourage anxiety and fear as

well as intolerance (*prejudice*). Our learned associations can also generate unconscious reactions that arise (*surface*) as immediate emotional responses (*gut feelings*).

Our two-track mind makes *sweet harmony* as smart, critical thinking listens to the creative *whispers* of our vast unseen mind. Our mind functions on two levels, one conscious and one unconscious (*our two-track mind*). When we are careful to check our intuitions (the mostly unconscious level) against our rational, conscious thinking (reality), the interaction can produce a better combination (a *sweet harmony*) as the large, hidden, unseen mind quietly communicates (*whispers*) to the aware, critical, intelligent mind.

Language

When our capacity for **language** evolved, *our species took a giant step forward* (Diamond, 1989). When the physiological ability for complex vocalization evolved, the ability to communicate orally expanded exponentially. This new linguistic capacity helped our species achieve new levels of accomplishments (*our species took a giant step forward*), enabling us to communicate from person to person and to transmit civilization's accumulated knowledge from generation to generation.

Language Development

Without blinking, we sample tens of thousands of words in our memory, effortlessly *combine them with near-perfect syntax*, and *spew them out three words a second* (Vigliocco & Hartsuiker, 2002). Humans have an amazing facility (an astonishing knack) for language. With little or no effort (*without blinking*), we can select the appropriate words from the tens of thousands in memory, put them together in a grammatically correct form (*combine them with near-perfect syntax*), and verbally produce them in rapid succession (*spew them out three words a second*). The sentences we utter arrange themselves effortlessly in our minds as we talk (*they organize themselves on the fly as we speak*).

Yet by 4 months of age, babies can recognized differences in speech sounds (Stager & Werker, 1997). *They can also read lips*. When people speak, their lips move in ways that correspond to the sounds they utter. Many deaf people can understand what is being said by watching how the lips move (*lip reading*). Very young children can not only tell the difference (*discriminate*) between sounds, but also can recognize lip movements that correspond with certain sounds (*they can also read lips*). This capacity to understand what is said to and about them (*receptive language ability*) matures before the ability to produce language (*productive language ability*).

After the language window closes, even learning a second language becomes more difficult. During the early years of language development, we easily and accurately acquire (*master*) grammar and accent; after that critical period has passed, the language acquisition system tends to work less hard, and mastering another grammar becomes more difficult (*the window for learning language closes*).

Animal Thinking and Language

If in our use of language we humans are, as an *ancient psalm* says, *"little lower than God,"* where do other animals fit in the scheme of things? An *ancient psalm* (a very old religious or sacred text) suggests that our capacity for, and use of, language makes us almost like supreme beings (*"little lower than God"*). Myers notes that it is this use of language that elevates us above nonhuman animals. Nevertheless, we do share a capacity for language with other animals.

Until his death in 2007, Alex, an African Grey parrot, displayed *jaw-dropping numerical skills* (Pepperberg, 2006). Alex the parrot could name and categorize the objects he was shown. He had an amazing arithmetic capacity (*a jaw-dropping numerical skill*) and could identify the number of objects displayed and add the numbers together, saying which of two sets of numbers was larger. Alex's ability shows that humans are not the only species with numerical ability.

Then suddenly, *as if thinking "Aha!"* Sultan [the chimpanzee] jumped up and *seized* the short stick again. Kohler's experiment with the chimpanzee Sultan showed that our closest relatives are capable of cognition (*they display insight*). When the fruit was out of reach, Sultan grabbed (*seized*) the short stick and used it to pull a longer stick into the cage, which he then used to get the fruit. It appeared as if Sultan had abruptly arrived at a solution to the problem; it was as if he had a sudden insight (*as if thinking "Aha!"*).

Were the chimps *language champs* or were the researchers *chumps*? Critics of "ape language" argue that, for animals, language acquisition is painfully slow, resembles conditioned responses, does not follow syntax, and is little more than imitation. In addition, demonstrations of animal language are always subjectively interpreted by their trainers. Myers asks: Were the chimps exceptionally talented (*language champs*) or were the researchers just easily fooled or duped (*were they chumps*)? The answer is that the controversy has led to further research and progress along with a renewed appreciation of our own, as well as our closest relatives,' capacity for communication and language.

It took several hours for Washoe and the foster infant, Loulis, to warm to each other. But then she *broke the ice* by signing, "Come baby" and cuddling Loulis. When the chimpanzees were first introduced, Washoe did not respond affectionately to Loulis for a period of time (*it took several hours for them to warm to each other*). When Washoe made a welcoming gesture by signing for Loulis to approach, it initiated an interaction (*it broke the ice*) and helped establish their relationship.

Intelligence

What Is Intelligence?

You may also know a terrific artist who is *stumped by* the simplest math problem . . . Researchers have used a statistical approach (*factor analysis*) to identify groups of test items that measure a common ability. So, someone who has a group, or cluster, of abilities in one area may be very puzzled by and completely unable to solve (*stumped by*) a relatively simple problem in a different area. Spearman argued that there was a common factor (***general intelligence*** or ***g***) underlying particular abilities.

One General Intelligence or Multiple Intelligences?

Despite their *island of brilliance*, people with *savant syndrome* often score low on **intelligence tests**, and may have limited or no language ability (Treffert & Wallace, 2002). Some people are developmentally disabled in almost every aspect of their lives except for one very specific ability (they have an *island of brilliance*) in which they are exceptionally gifted (***savant syndrome***). Despite having very poor language skills and other cognitive dysfunctions, they may be capable of outstanding performance in areas such as computation, memory for music heard only once, or drawing. Some psychologists argue that this is evidence for the notion of multiple intelligences.

. . . *the street-smart* adolescent who becomes a *crafty* executive . . . Myers is attempting to simplify Howard Gardner's eight intelligences. As an example of one of these intelligences, he describes the

adolescent who has the ability to survive in urban environments (he is *street-smart*) and later becomes a clever (*crafty*) executive.

. . . *out of the blue* . . . The solution to a very complex problem can occur unexpectedly and suddenly (*out of the blue*). This happened to Andrew Wiles when he eventually solved (*cracked the puzzle* of) Fermat's last theorem after thinking long and hard about the problem for over 30 years. This example illustrates the creative process, the ability to produce novel and valuable ideas.

They can read others' emotions . . . **Emotionally intelligent** people not only have insight into their own motivations (*they are self-aware*) but they are also very good at knowing and understanding what others are feeling (*they can read others' emotions*).

Assessing Intelligence

A *"dull"* child's test results should therefore be the same as a typical younger child's, and a *"bright"* child's results the same as a typical older child's. Children develop intellectually at different rates, leading Binet and Simon to develop the concept of **mental age**. Children who performed below the average level of other children the same age (e.g., a 10-year-old who performed the same as the average 8-year-old) would be considered slow in development (*"dull"* or *"backward"*). Those who performed above the average (e.g., a 10-year-old who scored the same as the average 12-year-old) would be considered developmentally advanced or precocious (*"bright"*).

If we make a graph of test-takers' scores, they typically form a bell-shaped pattern called the *normal curve*. Many of the variables that we measure (e.g., weight, height, mental aptitude) follow a symmetrical inverted U shape (a *bell-shaped* curve or ***normal curve***) when plotted on a frequency distribution. On intelligence tests, the average is 100; most scores (68 percent) are between 85 and 115, so they are gathered close together near the average score.

The Nature and Nurture of Intelligence

Severe deprivation can leave footprints on the brain . . . In this investigation of a destitute orphanage, Hunt (1982) found that the effect of extreme neglect was severe depression and a general mental and physical timidness (*the children became passive "glum lumps"*). Their inborn (*native*) intellectual capacity was being severely suppressed (it was being *crushed*) due to the *physical and emotional neglect*. As Myers notes, severe deprivation can affect brain development and subsequent cognitive ability (*they can leave footprints on the brain*). Hunt's intervention program had dramatic results. This points to the strong influence of environment.

There is no *environmental recipe* for *fast-forwarding* a normal infant into a *genius*. Some popular books claim that it is possible to give children a superior intelligence by providing them with an "enriched" environment. Most experts support the idea that all children should have normal exposure to sights, sounds, and speech. But beyond that, there is no set formula (*environmental recipe*) for quickly accelerating (*fast-forwarding*) a normal infant into an exceptionally brilliant and talented individual (a *genius*).

Group Differences in Intelligence Test Scores

In science, as in everyday life, *differences, not similarities, excite interest*. Males and females are alike in many more ways than they are different. While the *similarities* overwhelm (*vastly outnumber*) the *dissimilarities*, we pay more attention to the differences (*they excite our interest*). Also, the *differences* are more likely to be reported by the media (*we find them more newsworthy*).

Females *have an edge* in locating objects. Females do better than males on certain tests (they *have an edge*). For example, they are better at spelling, verbal fluency, and remembering words and picture associations. They are also more sensitive to touch, taste, and odor, and they are better at detecting emotions. Males do better on tests of spatial ability (*they have an edge*) compared to females.