FOCUS ON VOCABULARY AND LANGUAGE

Not bad for the cabbage-sized three pounds of wet tissue jammed in our skull. With this sentence, Myers is conveying amazed admiration and understanding of the remarkable variety of complex tasks carried out by our brain. The average brain is approximately the size of a leafy vegetable called a *cabbage* and weighs about *three pounds* (which can also be written as "3 lbs."). It is composed of billions of neurons *(wet tissue)*, is tightly packed *(jammed)* in our skull, is responsible for **cognition** *(all the mental activities associated with thinking, knowing, remembering, and communicating)*, and so much more.

Our species is *kin to* the other animals. Myers notes that we are biological creatures related to *(kin to)* other species of animals—we are influenced by the same principles that produce learning in rats and pigeons and even slugs. In many ways, we have exceptional abilities for things such as innovation, learning, memory, and rational thinking, but in other ways we are naïve, unsophisticated *(simple)* and inclined to make mistakes *(error-prone)*. We may also think and act irrationally *(our thinking sometimes fails us),* and we don't always demonstrate good sense or judgment *(we are not-so-wise humans)*.

Thinking
Concepts

For most of us, the robin is *the birdier (more prototypical) bird . . .* We develop our ideas of how things go together *(our **concepts**)* from definitions or by using **prototypes**. The best example *(prototype)* of a bird is a robin *(it's the birdier bird)* rather than a penguin (or a kiwi, or an ostrich)—we easily recognize it as belonging to the concept "bird."

Solving Problems

Thomas Edison tried thousands of light bulb filaments before *stumbling upon one that worked*. Thomas Edison was a famous inventor and he used *trial and error* to develop the metal filament that makes a light bulb glow brightly. Using *trial and error*, he came upon the solution by chance *(he 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, *with no feeling of getting closer to the answer*. Then, *suddenly the pieces fall together in a flash of insight*—an abrupt, *true-seeming*, and often satisfying solution (Knoblich & Oellinger, 2006; Topolinski & Beeman, 2009). **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 *(with no feeling of getting closer to the answer)*. When we solve a problem through *insight*, we feel a sense of accomplishment *(the "I get it!" reaction)*, as the solution often appears to be accurate *(true-seeming)*. This feeling of satisfaction is sometimes accompanied by verbal exclamations such as "Aha!" *(the Aha! moment)*. Research has shown that abrupt and unexpected solutions to a problem *(sudden flashes of insight)* are preceded by frontal lobe activity along with a surge *(burst)* of activity in the right temporal lobe, 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.) Myers is using *basketball* to illustrate that we usually follow our subjective feelings (our ***intuitions***

or *gut feelings*) rather than take the time to use logic and reason. For example, in a game of *basketball*, the player holding the ball must decide whether to throw the ball through the hoop *(shoot the basketball)* or pass it to a player who has scored frequently *(who's hot)*.

. . . they do it [make decisions] mostly by *the seat of their pants* (Janis, 1986). 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 decisions)*.

When we need to act quickly, the *mental shortcuts* we call *heuristics* enable *snap judgments*. We can make very quick decisions *(snap judgments)* using simple thinking strategies *(heuristics)* that are relatively efficient and effective *(mental shortcuts)*. Anything that makes information enter our conscious awareness *(makes information "pop" into mind)* can make it seem routine and ordinary *(commonplace)*, which may impair and alter *(distort)* our judgments. Thus, estimating the likelihood of events based on their accessibility in memory *(the **availability heuristic**)* may cause us to make mistakes *(may lead us astray)*.

We fear swimming in ocean waters because *we replay* Jaws *with ourselves as victims*. *Jaws* is a classic movie about a great white shark attacking people. Vividly remembering this horror film *(replaying it with ourselves as victims)* can create unrealistic fears about swimming in relatively safe ocean waters. Similarly, we may fear flying because of our tendency to mentally visualize old movies about airplane crashes *(we play old air disaster films in our heads)*. Even when the statistical reality of danger is low, one clear, memorable case can exaggerate our fears; so, thanks to the *availability heuristic*, we may become frightened of extremely rare events. As Myers notes, dramatic outcomes startle and shock us *(make us gasp)*, whereas statistical probabilities are not readily understood *(we hardly grasp them)*.

(Thinking Critically About: The Fear Factor—Why We Fear the Wrong Things) Human emotions *were road tested in the Stone Age*. During our evolutionary past, certain traits or characteristics were selected for because they helped our ancestors survive. Those humans who survived because of these attributes passed them on to their descendants. Fearful reactions to snakes, lizards, spiders, confinement, and heights were selected for *(they were road tested)* during earlier times *(in the Stone Age)* and are part of human nature today.

Belief perseverance often fuels social conflict. Our irrationality is on display when we persist *(persevere)* in our views despite evidence that proves those views to be incorrect *(**belief perseverance**)*. This irrational belief can lead to an increase in strong feelings or passions and disagreements over controversial issues *(it fuels social conflict)*. Once beliefs are formed *(take root)*, it takes stronger evidence to change them than it did to create them. Myers suggests one solution *(remedy)* for those who wish to restrain the effect of *belief perseverance*—give serious thought to beliefs that contradict your own *(consider the opposite)*.

Framing—the way we present an issue—*can be a powerful tool of persuasion*. 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 posed *(framed)*. The *framing effect* can have a profound influence on people's decisions and judgments *(can be a powerful tool of persuasion)*. For example, when discussing the risk of surgery, patients who were told that 10 percent of people die said the risk was greater than patients who were told that 90 percent survive. In both cases, the information is the same—but the way the information is *framed* influences how it is perceived as well as how people might act on it.

In each case, what feels like *instant intuition* is an acquired ability to *size up a situation in an eyeblink*. *Intuition* is based on the implicit knowledge we have gained through extensive experience. What may feel like a very quick, automatic response *(instant intuition)* is actually an acquired capacity to assess *(size up)* a situation in a fraction of a second *(in an eyeblink)*. As noted, *intuition* is assessment that has become an automatic and habitual reaction *(it is "frozen into habit")*.

. . . gut feelings . . . 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, assess risks, and make wise decisions. Further, our learned associations can also generate unconscious reactions that arise *(surface)* as immediate emotional responses *(gut feelings)*.

Actually, when making complex decisions, we benefit by *letting a problem "incubate"* while we attend to other things (Sio & Ormerod, 2009; Strick et al., 2010, 2011). Allowing time for the solution to a problem to develop slowly and quietly *(letting it "incubate")* without conscious effort can be beneficial. Our automatic processing capability *(our unconscious mental machinery)* can continue to work to find a solution to a problem when we divert our attention elsewhere—or even when we fall sleep *(when we take time to sleep on it)*.

Our two-track mind makes *sweet harmony* as smart, critical thinking listens to the creative *whispers* of our vast unseen mind and then evaluates evidence, tests conclusions, and plans for the future. Our mind functions on two levels, one conscious and one unconscious *(our two-track mind)*. When we are careful to compare our intuitions (our mostly unconscious thinking) to our rational conscious thinking, the interaction can produce a better combination *(sweet harmony),* as the largely hidden, unseen mind quietly communicates *(whispers)* to the aware, critical, intelligent mind.

Thinking Creatively

. . . out of the blue . . . The solution to a very complex problem can occur to a person unexpectedly and suddenly *(out of the blue)*. This happened to mathematician Andrew Wiles when he eventually solved Fermat's last theorem *(he cracked the puzzle)* after thinking carefully and deeply about the problem for more than 30 years. He was close to an answer *(he had reached the brink of a solution)* when suddenly the explanation appeared surprisingly obvious to him *(an "incredible revelation" struck him)*. This example illustrates **creativity**—the ability to produce new and valuable ideas.

Close-Up: Fostering Your Own Creativity

Viewing life from a different perspective sets the creative juices flowing. For those who wish to increase *(boost)* their creative abilities, Myers offers a few suggestions. One of these is to experience other cultures and ways of thinking. He suggests that spending time in a country different from your own *(traveling abroad)* and seeing things from a another, dissimilar point of view *(a different perspective)* expands the imagination and reveals new ways of thinking *(sets the creative juices flowing)*.

Do Other Species Share Our Cognitive Skills?

Until his death in 2007, Alex, an African Grey parrot, displayed *jaw-dropping numerical skills*. Alex the parrot had an amazing capacity for arithmetic *(a jaw-dropping numerical skill)*. He could name and categorize the objects he was shown and he could understand *(comprehend)* numbers up to 6. He could identify the number of objects displayed to him, add those numbers together, and say

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. Wolfgang Köhler's experiment with the chimpanzee Sultan showed that our closest relatives are capable of cognition *(they display insight)*. When fruit was out of reach, Sultan grabbed *(seized)* a 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!")*.

Language
Language Development

. . . *milestones* . . . A *milestone* is an event of significance or importance. Children's **language** development moves from simplicity to complexity through age-related stages *(milestones)*, each one important and significant in the acquisition of linguistic competence. (Originally, a *milestone* was a large roadside stone inscribed with the distance in miles to nearby towns.)

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 ability *(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)*. As Myers notes, *we rarely form sentences in our minds before we speak them*. Instead, the sentences we utter arrange themselves effortlessly in our minds as we talk *(our sentences organize themselves on the fly as we speak)*. Given the numerous ways that we can make mistakes *(the many ways there are to mess up)*, it is astonishing that we can accurately follow the social and cultural rules of interactive dialogue *(master this social dance)*.

Yet by 4 months of age, babies can recognize 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 (by *lip reading*). Not only can very young children tell the difference *(discriminate)* between sounds, but they 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 *(after the language window closes)*, the language acquisition system tends to work less hard and *mastering* another grammar becomes more difficult. Later-than-usual exposure to language—at age 2 or 3—sets loose *(unleashes)* the unused system for language acquisition in a child's brain *(the brain's idle language capacity)*, producing an onslaught *(rush)* of language. By about age 7, those who have not been exposed to language gradually lose their ability to become proficient in any language.

The Brain and Language

You experience language as a single, unified stream of experience. Though our conscious awareness *(stream of experience)* appears to be without gaps or breaks *(single and unified)*, it arises from subsystems localized in particular brain regions. The brain operates by dividing its mental functions into smaller tasks. For example, when you read a page in the text it seems to be one task, but many different neural networks in your brain are combining *(pooling)* their work to calculate and process *(compute)* each word's form, sound, and meaning.

Do Other Species Have 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.

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 (they *ape*, or copy, *their trainers' signs*). 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—and of our closest relatives'—capacity for communication and language.

It took several hours for the foster mom and infant to warm to each other. But then Washoe *broke the ice* by signing, "Come baby" and cuddling Loulis. At first, the chimpanzee Washoe did not respond affectionately to her adopted son Loulis *(it took several hours for them to warm to each other)*. But when Washoe made a welcoming gesture by signing for Loulis to approach, the gesture 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. Charles Spearman argued that there was a common factor *(**general intelligence**, often shortened to **g**)* underlying particular abilities.

Charles Spearman (1863–1945) believed we have one *general intelligence* (often shortened to *g*) *that is at the heart of our smarts, from sailing the sea to sailing through school*. Spearman believed that we have one *general intelligence (g)* that is central to our intellectual abilities *(that is at the heart of our smarts)*. This *g factor*, or common skill set, applies to all behavior—from navigating the ocean in a sailboat *(sailing the sea)* to progressing easily through school *(sailing through school)*.

Despite their *island of brilliance (their special talent)*, these people [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 limited in almost every aspect of their lives, with the exception of one very specific ability *(an island of brilliance, their special talent)* in which they are extraordinarily gifted. Despite having very poor language skills and other cognitive problems, they may be capable of outstanding performance in areas such as computation, music, art, or drawing *(they have **savant syndrome**)*. Some psychologists argue that this is evidence for the notion of multiple intelligences.

. . . *the street-smart adolescent* who becomes a *crafty* executive . . . Here, 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 *(the street-smart adolescent)* and who later becomes a clever *(crafty)* executive.

But we do well to remember that the recipe for success is not simple. Impressive achievements are not the result of a single ability. Instead, the formula for excellence *(the recipe for success)* combines two attributes *(ingredients)—ability (can do)* and *motivation (will do)*. These qualities often result in *(translate into)* dedicated hard work. Those who become highly successful may be intelligent, but they also tend to be diligent, careful, and thorough *(conscientious)*, have important social relationships *(are well-connected)*, and are persistent, resolute, and vigorous *(are doggedly energetic)*.

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 and responding appropriately (*they are socially aware*, *they can read others' emotions*).

Assessing Intelligence

A *"dull"* child should therefore score much like a typical younger child, and a *"bright"* child like a typical older child. Children develop intellectually at different rates, so Binet and Simon developed the concept of **mental age**. Children who performed below the average level of other children the same age (for example, 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 (for example, a 10-year-old who scored the same as the average 12-year-old) would be considered developmentally advanced or precocious (*"bright"*).

. . . people's scores tend to form *a bell-shaped pattern called the **normal curve***. Many of the variables that we measure (weight, height, intelligence, and so on) approximate an almost symmetrical curve that resembles an inverted U shape *(a bell-shaped pattern called the normal curve)* when plotted on a graph. On intelligence tests, the average score is 100; most scores (68 percent) are between 85 and 115, so they are gathered close together around the average score.

Imagine buying *a tape measure with faulty markings*. If you use an inaccurate ruler *(a tape measure with faulty markings)* to gauge or calculate people's heights, your height report would have high ***reliability*** (consistency) but low ***validity***. For a test to be *reliable*, the instrument should have consistent results over numerous tests. So, if you use a *tape measure* that is not precise *(one with faulty markings)*, it will meet the *reliability* criterion because it will always give you the same result; it will not, however, have *validity*. To be *valid* it should accurately measure what it is supposed to measure.

The Nature and Nurture of Intelligence

Severe deprivation leaves footprints on the brain . . . In this investigation of a destitute orphanage, J. McVicker 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 affects brain development and subsequent cognitive ability *(it leaves 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 educational media claim that it is possible to foster superior intelligence in children 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 vastly outnumber the differences, we pay more attention to the differences *(they excite our interest)*. Also, the differences are more likely to be reported by the media *(most people find differences more newsworthy)*.

The most reliable male *edge* appears in spatial ability tests . . . Men consistently perform better than women on tests of spatial ability (they have an *edge*). But women do better than men (they have an *edge*) on other types of tests. For example, girls are better spellers, more verbally fluent, and better at locating objects. In addition, they are more sensitive to touch, taste, and color and are better at detecting emotions.

(Photo caption) Nature's own morphing: Nature draws no sharp boundaries between races, which blend gradually one into the next around the Earth. There is a debate over whether *"race"* is a social construction or a clearly marked *(neatly defined)* biological category. Myers notes that *nature* does not create clear distinctions *(draws no sharp boundaries)* between *races*. Instead, *races* merge slowly and continuously *(blend gradually, morph)* one into the next around the world *(nature's own morphing)*. However, people tend to classify *(socially define)* themselves as belonging to specific racial categories, which they use for group identification of *(catchall labels for)* physical features, social identity, and nationality.

. . . *feeble-minded* . . . This means to be unintelligent, slow, and intellectually weak. Eastern European immigrants in the early 1900s did not do well on mandatory tests *(many were classified as feeble-minded)*. This was not because they lacked intelligence, but rather because they lacked the cultural experience to answer the questions. In this popular sense, intelligence tests are *biased*. However, the scientific meaning of *bias* rests *(hinges)* on a test's *validity* and whether it accurately predicts future behavior. In this statistical meaning of the term, intelligence and aptitude tests are *not biased*.

Stereotype Threat The self-confirming concern that you will be evaluated based on a negative *stereotype* could impair *(hijack)* your attention and learning and result in a lower test score on exams or intelligence tests. This concern is called ***stereotype threat*** and it has the capacity to affect or harm your intellectual performance. However, if you believe you have the ability to learn *(if you foster a*

growth mind-set), if you understand that intelligence is not fixed but malleable, and if you combine those things with a disciplined effort and sustained practice, you are much more likely to be able to fulfill your potential.