Intelligence and General Ability Assessment

LEARNING OBJECTIVES

After reading this chapter, you will be able to

- Define intelligence
- Describe various models of intelligence
- Identify and describe various individual and group intelligence assessments
- Discuss issues in assessing intelligence
- Apply intelligence assessments to case examples

As a construct, intelligence has received a great deal of scrutiny. Since Francis Galton's first attempt in the 1800s, researchers have made efforts to define intelligence in a manner that would allow for it to be readily assessed. As a result of various researchers and the theoretical foundations of their research, numerous conceptualizations of intelligence have been developed with coinciding strategies to assess and measure the mental aptitudes related to intelligence definitions. From the publication of the first official intelligence test, the Binet-Simon Intelligence Test, in 1905 to the adaptations of tests used today, the history of intelligence tests has been marked by concerns regarding inequality.

Developed as a means to assess mental retardation from behavioral problems in children, the Binet-Simon consisted of 30 short tasks requiring basic reasoning or what was categorized as memory, attention, and verbal skills (Baron & Leonberger, 2012). This test was revised in 1916 and continued to be revised into what it has become known as today, the Stanford-Binet. We will focus more on this assessment later in the chapter. Following the establishment of the Stanford-Binet, intelligence tests were integrated in a variety of settings and were even utilized during World War I to assess what individuals were suited

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for roles in the war. Dissatisfied with the limitations of the Stanford-Binet, David Wechsler began developing intelligence tests of his own (Baron & Leonberger, 2012). Although Wechsler agreed with the general principles of the Stanford-Binet, he felt that various scales needed to be developed for use with various age groups and noted the need to incorporate nonverbal components of testing. Several of these scales developed by Wechsler will also be discussed in more depth throughout this chapter.

Despite the relative popularity of measures such as the Stanford-Binet and those scales developed by Wechsler, these approaches were questioned for their relative establishment of a single, general type of intelligence. Breaking away from a focus on singular, measurable measures of intelligence, Raymond Cattell proposed two distinct intelligences. Fluid intelligence, Cattell noted, was the type of intelligence needed for problem solving, while crystallized intelligence was identified as that which a person learns. Additional information regarding Cattell's theory is discussed later in the chapter.

The broadening of focus by Cattell was further widened in 1983 by Howard Gardner, who proposed seven independent intelligences. Although the evolvement of Gardner's theory of Multiple Intelligences will be discussed in detail later, it is relevant to note here that Gardner's model became the first to bring into question the accurate depiction of the widely used intelligence quotient (IQ). Questions regarding the use of this single quotient have surfaced quite a bit over the past decades, with various studies (e.g., Edwards, 2006; Furnham, Boo, & McClelland, 2012; Wicherts & Dolan, 2010) demonstrating bias against specific populations including minorities, resulting in the single IQ quotient being used to label individuals as intellectually deficient. These concerns eventually led the American Psychiatric Association (2013) to mandate the use of a functioning score in addition to the IQ score in diagnosing levels of cognitive functioning. Still, intelligence testing has continued to play an important role in society by shaping the way intelligence is viewed and directly impacting the lives of countless children and adults around the world (Anastasi & Urbina, 1997).

In this chapter, we will examine historical intelligence theories that have helped shape our current understanding of intelligence. In addition, we will introduce the intelligence assessment instruments you will most likely encounter in your work as a professional counselor. Although these instruments are of high quality and are supported by a substantial amount of research (see J. R. Graham & Naglieri, 2002), they also are the subject of considerable criticism from both the professional community and the general public. By the end of this chapter you should be able to identify the advantages and disadvantages of the various assessment instruments discussed and know how to effectively integrate them into your work with the clients you serve.

INTELLIGENCE DEFINED

When you hear the term *intelligence*, what comes to mind? A basic definition of **intelligence** is that it is a measure of your ability to acquire and apply knowledge. But what type of knowledge, and by what methods of acquisition? Is it an account of how much you have learned through your many years of schooling? Does it refer to your ability to function as

a productive member of society? Or is it really an example of your ability to think abstractly? Depending on who you talk to, intelligence can be a measure of all of these characteristics. The construct of intelligence has been studied by researchers for over a hundred years. To date, there still is not a consensus understanding of what exactly is intelligence. A review of the professional literature reveals that there are numerous ways to describe intelligence. The volume of unique definitions of intelligence have led some to believe that the construct of intelligence is one that cannot be fully defined, and at best can only be approximated (Legg & Hutter, 2006).

This lack of consensus certainly proves challenging to those seeking to measure and assess this construct. Consequently, attempts to quantify and assess intelligence have resulted in a history of misunderstanding, controversy, and occasional misuse (Bartholomew, 2006; Groth-Marnat, 2009; Weinberg, 1989). Although there is no single definition of intelligence that is universally accepted, there are strong similarities among the many existing definitions (Legg & Hutter, 2006). According to Sax (1997), each of the various definitions of intelligence found in the professional literature include reference to at least one of three primary components: *origin*, whether intelligence is a trait that is inherited or learned; *structure*, whether intelligence is conceptualized as a singular or multidimensional construct; and *function*, how intelligence is used by an individual and the purpose it serves. Collectively, then, intelligence seems to be an inferred process that researchers use to explain the different degrees of adaptive success observed in an individual's behavior. As you begin learning about the different models of intelligence discussed in the following section, make note of how each theorist attended to these three components in building his theory of intelligence. Before we review the different theories of intelligence, see Case Illustration 7.1, and keep in mind the three friends that it describes.

CASE ILLUSTRATION 7.1

Think about the people in your life. Who would you classify as intelligent? When you think about the term *intelligence*, what comes to mind? Do you immediately think about people like Albert Einstein? Do you instantly think of someone who is categorized as a "genius"? What exactly is intelligence, and how do we define it?

Let's look at the case of three friends, all age 22, named Travis, Richard, and Xavier. All three boys have grown up together and have been friends since the third grade. Travis is socially shy. It is difficult for him to make friends or speak in public, and he always feels socially awkward. His only friends are Richard and Xavier, and he has only had three girlfriends thus far in his life. All three girls approached him. Travis graduated from high school with a 2.50 grade point average (GPA). However, Travis is very mechanically inclined. At age 15 he was able to take apart the entire engine of his car and rebuild it himself, with just the knowledge of one high school class in small engine repair and the Chilton's manual for his car. Travis can easily remember the order in which car parts go back on a car, without having to take pictures or write himself notes. He seems to have a great memory for visual

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or mechanical information. Currently, Travis makes his living buying broken-down cars, repairing them, and then reselling them at a substantial profit.

Richard has no mechanical skills at all and cannot even do the simplest of repairs on his own car, despite how many times Travis has shown him what to do. Like Travis, Richard was also not very good at school. However, Richard has lots of friends and girlfriends. Richard has always been able to make friends easily. He is very charismatic and comfortable in social situations. Richard can easily connect with other people who seem drawn to him. People instantly trust Richard, and all of his friends' parents think of Richard as another son. Over time, Richard has come to know many influential people in the city where he grew up. Richard is always inviting Travis and Xavier to go to social events, but Travis nearly always declines. Xavier will sometimes go as long as it does not interfere with his academic life. Richard currently works at a local car dealership as a sales representative. He has many repeat customers, due to his ability to make others feel comfortable and respected. Richard has been contemplating running for public office in his city at the urging of a local politician who sees potential in Richard's ability to connect easily with others.

Last, we have Xavier. Xavier is also not very mechanically inclined and always pays Travis to do the routine maintenance on the car he bought from Richard. Xavier considers himself moderately social, and while he does not make friends as easily as Richard, he doesn't have as much difficulty making friends as Travis. Unlike Travis and Richard, Xavier did well in school. He graduated from high school with a 4.0 GPA and was the class valedictorian. Xavier is currently in college pursuing a degree in law. He still maintains a 4.0 GPA in college. Xavier has a large fund of knowledge and seems to easily apply what he has learned to many different situations. Richard and Travis call Xavier a "walking Wikipedia." Xavier always seems to remember facts, no matter how obscure. One of Xavier's favorite things to do is watch shows like "Who Wants to Be a Millionaire" or "Jeopardy." Richard and Travis are always encouraging Xavier to apply to be on one of those shows.

After having met these three friends, if you were asked to pick which of them best demonstrates the concept of intelligence, who would you pick? Many people would pick Xavier, because of his GPA, his ability to remember information, and the fact that he is doing well in college while working on a law degree. However, both Richard and Travis also demonstrate aspects of intelligence. At the end of this chapter, return to this case and revisit these three friends. After having read the chapter, what are your thoughts about how you would define these three friends in terms of their demonstrated intelligence?

OVERVIEW OF INTELLIGENCE MODELS

There is an enormous amount of literature on various ways that intelligence has been conceptualized. These definitions have led to the formation of theories, followed by the development of intelligence tests. Today, many of these assessments are used in schools but may also be applied in counseling settings to build a more comprehensive understanding of functioning processes, establish strengths that are important for treatment planning, and highlight the individuality of people in the therapeutic relationship. You will discover that

some theories (e.g., Binet's, Wechsler's, Piaget's) are based on **interactionism**, which is a concept used to describe the interaction between one's heredity and environment and the influence this has on one's intelligence. Other theories are considered **factor-analytic theories,** in which factor analysis is used to determine the underlying relationship between a set of variables such as test scores. Finally, we briefly discuss **information-processing theories** that focus on how information is processed and the mental processes that make up intelligence. In the upcoming section, we provide a brief overview of the major theories of intelligence, including Spearman's *g* Factor Approach, Cattell's Fluid and Crystallized Intelligences, Thurstone's Primary Mental Abilities, Vernon's Hierarchical Model of Intelligence, Sternberg's Triarchic Theory, Piaget's Cognitive Development Model, Gardner's Multiple Intelligences, Emotional Intelligence, and the Information-Processing View. Before we get too far along in this chapter, take a moment to reflect on your own definition of intelligence with Guided Practice Exercise 7.1, and keep in mind the examples of the individuals from history with above-average intelligence by reading Case Illustration 7.2.

GUIDED PRACTICE EXERCISE 7.1

What is intelligence? In small groups or pairs, discuss and debate your own perceptions and understanding of intelligence. Take notes of your own and the group's ideas. We will refer back to them at the end of the chapter.

CASE ILLUSTRATION   7.2

When people are asked who has the highest IQ in the world, they often name Stephen Hawking. His IQ is 228. As you will learn in this chapter, an average intelligence quotient (IQ) is considered to be 100, with a range of 85−115. So Stephen Hawking is clearly at the far range of human intelligence. In comparison, Albert Einstein's IQ was said to be only 160 and Leonardo Da Vinci's was estimated at 190. All of these men did great things with their brain power. While Albert Einstein and Leonardo Da Vinci are no longer living, Stephen Hawking is still with us and is a theoretical physicist. He is a former professor at the University of Cambridge in England and is the current director of research at the Centre for Theoretical Cosmology at the same institution. Stephen Hawking is considered one of the most famous scientists of all time.

Sources: Most Extreme.Org (2012); *Stephen Hawking* (n.d.).

Spearman's *g* Theory

In 1904, Charles Spearman, a British psychologist, produced a manuscript applying factor analysis to study the construct of intelligence and found an individual's performance on a variety of tests was highly correlated. Spearman postulated that performance

on intelligence tests is based on a **general ability factor** (*g*) and one or more specific factors (*s*). The *g* **factor** represented a measure of general intelligence that underlies performance on a wide variety of tasks, while *s* factors were specific learned skills which can influence intelligence performance. Thus, Spearman's model is sometimes referred to as a two-factor theory of intelligence. Spearman's theory served as an original theory of intelligence, and although theories of intelligence have evolved significantly in the past century, his works (including his statistical approach) have been a valuable tool for continued research into intelligence and its application in practice.

Cattell's Fluid and Crystallized Intelligence

Raymond Cattell (1963) suggested that Spearman's single unitary factor (*g*) could be divided into two components: **fluid intelligence** (known as *gf*) and **crystallized intelligence** (known as *gc*). Cattell viewed fluid intelligence as an inherited (innate) quality that refers to problem-solving and information-processing ability, uninfluenced by culture or education. According to Cattell, fluid intelligence increases from birth through adolescence, when it reaches its peak and then begins a slow decline during the adult lifespan. The use of abstract reasoning, memory span, and analogies are tasks used on standardized intelligence tests to measure fluid intelligence.

Crystallized intelligence refers to the skills and knowledge acquired over the course of one's lifetime based on formal learning and experiences, and therefore it does not decline. Cattell viewed crystallized intelligence as largely environmental. Crystallized abilities measured by standardized instruments include general knowledge and verbal comprehension.

Drawing on factor analytic studies, John Horn, a student of Cattell's, helped expand the *Gf-Gc* model of intelligence. By 1994, the **Cattell-Horn *Gf-Gc* model** included nine broad abilities: Crystallized Intelligence (Gc), Quantitative Knowledge (Gq), Reading/Writing (Grw), Fluid Intelligence (Gf), Visual-Spatial Thinking (Gv), Auditory Processing (Ga), Long-Term Retrieval (Glr), Short-Term Retrieval (Gsm), and Processing Speed (Gs).

Combining the elements of the *g* and *Gf-Gc* model, John Carroll developed the hierarchical **Three Stratum theory**. The top of the model is stratum III (general level), which consists of a single general ability, *g*. This is followed by stratum II (broad level), which includes eight factors similar to Horn's (Fluid Intelligence, Crystallized Intelligence, General Memory and Learning, Broad Visual Perception, Broad Auditory Perception, Broad Retrieval Ability, Broad Cognitive Speediness, and Processing Speed). This is followed by stratum I (specific level), which includes numerous skills and abilities depending on the second-level stratum to which they are linked (Carroll, 1997).

The **Cattell-Horn-Carroll (CHC) model** integrates the *Gf-Gc* theories of Cattell and Horn with Carroll's three-stratum theory. At the top of the model, Stratum III is general ability (*g*). Stratum II includes nine broad factors: Fluid Reasoning (Gf), Comprehensive-Knowledge (Gc), Short-Term Memory (Gsm), **Visual Processing (Gv)**, Auditory Processing (Ga), Long-Term Retrieval (Glr), Processing Speed (Gs), Decision/Reaction Time Speed (Gt), Reading and Writing (Grw), and Quantitative Knowledge (gq). The bottom Stratum I includes over 70 primary cognitive abilities (e.g., reading speed, memory span, mechanical knowledge).

Contributions by Cattell, Horn, and Carroll served not only to increase an understanding of the complexities of intelligence but also to enhance the use of research practice in order to

investigate other aspects of human behaviors. When applied to the counseling relationship, these models provide an increased understanding of the client's ability to function, including an establishment of strengths and areas in which the client can be further educated.

Thurstone's Primary Mental Abilities

Louis L. Thurstone, a British psychologist who lived from 1887 to 1955, did not believe that *g* was the only factor that constitutes intelligence, nor did he support the idea that a single IQ fully and comprehensively assessed intelligence. In fact, his theory is often viewed as the opposite of Spearman's. Thurstone used factor analytic techniques to demonstrate that intelligence consisted of seven primary mental abilities, which are the skills that enable one to learn, think, and reason. The seven primary abilities are verbal comprehension (e.g., interpreting quotes or proverbs, generating antonyms, synonyms, analogies), numerical ability (e.g., mental manipulation of numbers, speed and accuracy of ability), memory (e.g., paired-association tasks), inductive reasoning (e.g., inference, extrapolation, interpolation), perceptual speed (e.g., grouping objects, rearranging disordered words into sentences), word fluency (e.g., anagrams), and spatial relations (e.g., spatial manipulation, imagining how visuals maybe rotated in other orientations; Thurstone & Thurstone, 1941). Thurstone believed it was more important to assess a person's pattern of mental abilities than to rely on an overall average score. Along with his wife, Thelma Thurstone, he developed the **Primary Mental Abilities Test (PMA)** to measure the seven primary mental abilities. As we discuss individual assessments, you will read about David Wechsler. You will find that his approach was similar to Thurstone's as he, too, defined and measured intelligence as a pattern of different abilities.

Thurstone's model recognizes differences in abilities as a result of experience. By evaluating an individual's patterns of mental abilities as opposed to a single identified factor, Thurstone demonstrated the potential for individuals to have differing areas of strength. Knowledge of these areas may be beneficial in the counseling relationship, including the impact that knowledge of strength areas may have on career decisions (as will be discussed in Chapter 12). Now that you have read a few theories of intelligence, consider Case Illustration 7.3.

CASE ILLUSTRATION 7.3

David is a 45-year-old Caucasian male with an intellectual disability. He was born with Down syndrome. When tested, David's IQ was assessed at 49. David also has some problems with adaptive functioning in his environment. For example, he has had difficulty learning social rules and has problems with some self-care practices such as shaving, fixing himself a meal, and doing some household chores. David lives in a group home, and his parents and siblings come to visit him regularly. David's intellectual disability is common for those who suffer from Down syndrome, and Down syndrome is an example of a genetic cause for having a low IQ. In his group home, David receives support in the manner of increased educational experiences, help with his self-care routine, and socialization with others in the home as well as outside volunteers. Counselors also work with David to help improve his social and living skills. These supports have substantially improved David's quality of life.

## Vernon's Hierarchical Model of Intelligence

Phillip **Vernon's theory of intelligence** takes an intermediate position between Spearman's unitary *g* factor and Thurstone's multiple-factor theory. He believed intelligence was unitary, integrated, and comprising small and large abilities. Vernon is often credited with designing the first hierarchical model of intelligence. In hierarchical theories, abilities can be ordered in terms of levels from general to specific. Vernon, a colleague of Spearman, expanded on Spearman's model by further dividing *g* into two minor group factors primarily based on his review of many factor analytic studies. Vernon's (1984) model consists of four levels. At the top level of the model is a general cognitive factor (*g*) similar to Spearman's *g*. The next level includes two major group factors: verbal-educational (v:ed) and practical-mechanical (k:m). These two factors are further broken down into a number of minor group factors (verbal ability, numerical ability, mechanical ability, spatial ability, and practical ability), which are then broken down even further into a fourth level. This bottom level is composed of several specific factors of intelligence related to particular tests. Figure 7.1 represents Vernon's hierarchical model of intellectual abilities. Notice how the top of the model is broader and encompasses a wider range of factors. As you move down, the range becomes smaller and the abilities become more specific. The WISC-IV ability arrangement, which you will read about later in this chapter, can be categorized by Vernon's model.

Sternberg's Triarchic Theory of Intelligence

Robert Sternberg, a psychologist born in 1949, also believed that intelligence was made up of more than a single general factor. However, rather than focusing on different types of intelligence as Gardner did, Sternberg was interested in how different aspects of intelligence come together and interact with one another. In other words, he was interested in how intelligence operates as a system (Sternberg, 1988). Sternberg developed the **triarchic theory of intelligence**, which includes three types of reasoning processes that people use to solve problems: analytic (also referred to as componential), creative (also referred to as experiential), and practical (also referred to as contextual). **Analytic intelligence** includes executive processes such as analyzing, comparing, and evaluating. **Creative intelligence** involves creating, inventing, or designing new ways of solving problems when we are faced with an unfamiliar situation. **Practical intelligence** is applying and using what we know to everyday life, similar to common sense. According to the triarchic theory of intelligence, individuals can have strengths in one or all of the aspects of intelligence, and individuals with higher cognitive ability integrate all three of the aspects of intelligence daily.

Sternberg believed that the traditional definition of intelligence relies too heavily on cognitive ability and that intelligence cannot be assessed using a single measure. He was a proponent for intelligence testing to include more creative and practical measures. Sternberg created the **Sternberg Triarchic Abilities Test** (STAT)—a multiple-choice test which uses verbal, quantitative, and figural items—which measures the three aspects of intelligence on different scales (Sternberg & Grigorenko, 2000–2001). Unlike the models we previously discussed, which used factor analysis to develop intelligence theories, Sternberg developed a measure based on a theory. Thus, one of the limitations to Sternberg's theory is the lack of empirical evidence. Furthermore, because the STAT measures aspects of intelligence that differ from those

Figure 7.1 Vernon's Hierarchical Model

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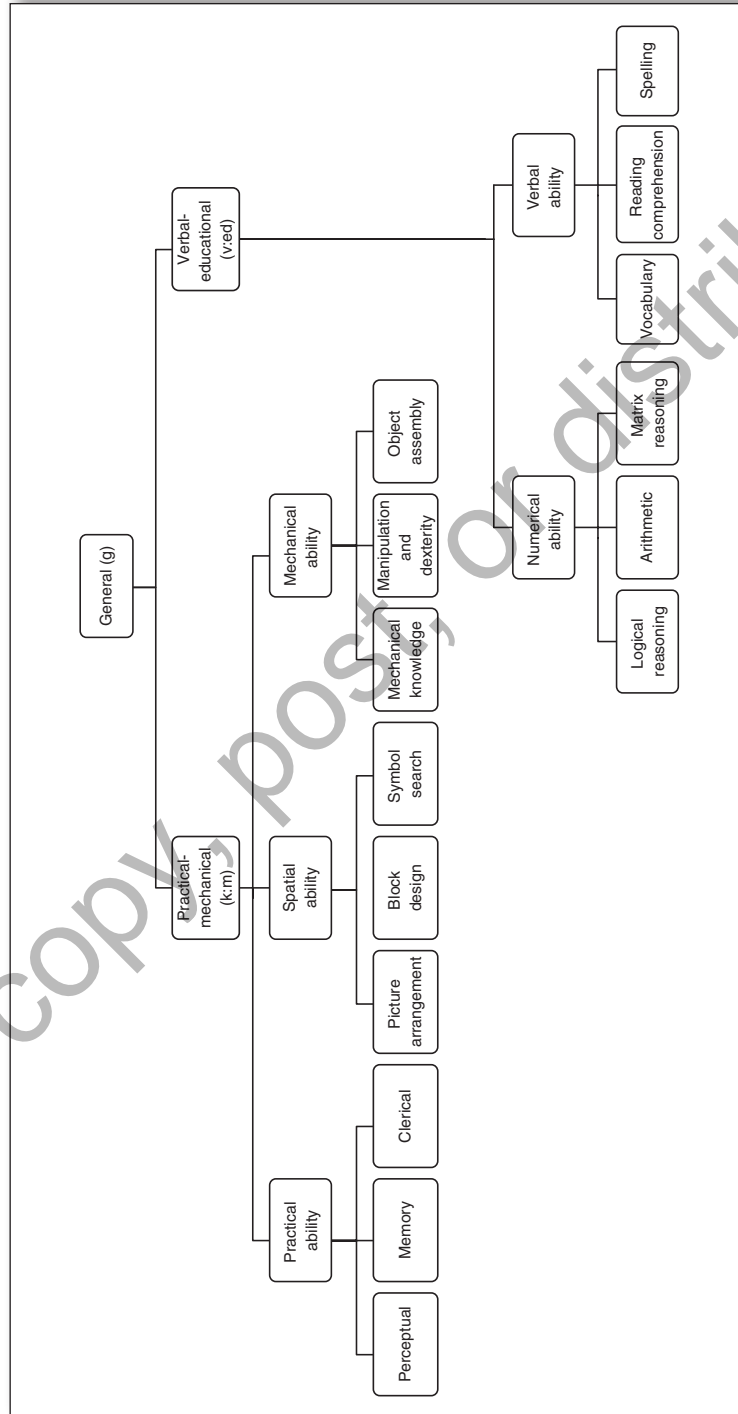
measured by traditional intelligence tests, there is limited information on the STAT's ability to predict academic achievement (see Chapter 8). Nonetheless, Sternberg's shift from previous theory to better understand the cognitive processes of intelligence has had a wide impact on curriculum as many schools are now striving to include instruction that reflects analytical, practical, and creative abilities.

Sternberg's theory of processing is important in developing person-centered treatment plans. For example, an individual who possesses high levels of creative abilities and low levels of analytic abilities may benefit more from a creative approach as opposed to an approach which requires the client to analyze his or her behaviors. Understanding the ways that individuals process information is important in assessing the most appropriate approaches.

Piaget's Cognitive Development Theory

Jean Piaget, a Swiss developmental psychologist, studied cognitive development (intelligence) in children from a constructivist approach. He was interested in discovering how children think, understand the world around them, and solve problems. Piaget (1954) used the term **schema** to describe a cognitive structure that grows with life experiences, helps people understand, and leads to knowledge. As children adapt to new challenges and demands, schemas change. Piaget believed we inherit two tendencies: **organization** (how we organize mental processes) and **adaptation** (how we adjust to the environment). Two processes within adaptation are assimilation and accommodation. Piaget believed learning occurred through assimilation (the process of incorporating new objects into present schema) and accommodation (the processes of modifying existing schemas or creating new ones to deal with new information). I'll never forget the day my daughter and I were swimming and she shouted, "Whale! Whale!" I think that is the fastest I ran out of the water! As it turns out, my daughter was referring to a baby minnow. What does this have to do with Piaget? Well, my daughter seeing a fish and calling it a whale means she had processed her new experience using an already existing structure (e.g., assimilation). Once she was able to separate the concept of fish from whale, accommodation took place, and she was able to understand a new idea.

Piaget identified four stages of cognitive development that children move through as a result of the interaction of biological factors and learning. Although age ranges at which children move through the stages are associated with each stage, Piaget noted that children pass through the stages at varying rates but in an invariant sequence (i.e., in the same order). Table 7.1 highlights Piaget's stages of development.

Piaget's stage theory has greatly influenced teaching pedagogy, cognitive assessment, and even therapeutic approaches. He was an advocate of **activity-based learning** and claimed children gain knowledge through their experiences and the process of constructing and reconstructing knowledge. Teachers have used his theory to design age-appropriate curriculum. In addition, Piaget's ground-breaking work significantly impacted the intelligence assessment field. He pioneered concepts of **constructivist learning** and **contextual perception**, which provided the foundation for more accurate testing instruments. Finally, Piaget's establishment of age-appropriateness provides a foundation for working with various generations of populations. After all, you would not approach a toddler client in the same way you would approach an adult client.

Table 7.1   Piaget's Stages of Cognitive Development

Stage	Age	Characteristics of Thought
Sensorimotor period	Birth–2 years of age	Differentiates self from objects, object permanence, centered on immediate physical environment (grabbing, touching, smelling, eating); reflexes important
Preoperational period	2–6 years of age	Language development, egocentric thought (difficulty taking other's point of view, e.g., "The rain is following me"), animism in play (nonliving objects have lifelike capabilities); centration (focusing on key feature of object and not noticing the rest)
Concrete operation period	7–12 years of age	Performs logical operations (adding, subtracting, ordering); can order objects (e.g., small to large), can count mentally, understands reversibility and conservation (e.g., substance's weight, mass, volume remain the same even when shape changes)
Formal operations period	12 years+	Increased ability for abstract thinking; can generate hypotheses and test them; evaluates own thought

Gardner's Multiple Intelligences

Howard Gardner, a psychologist at Harvard, was dissatisfied with the concept of IQ, and like Spearman he did not view intelligence as unitary. In the early 1970s, Gardner conducted research in developmental psychology and neuropsychology with veterans at the Boston VA Medical Center and with Project Zero at Harvard's Graduate School of Education. His work led him to develop his **theory of Multiple Intelligences** (MI; Gardner, 2011), in which he hypothesized that there are seven intelligences: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal. Although his theory included traditional and accepted competencies assessed by IQ tests at the time (verbal and mathematical), Gardner's theory was unique in that he believed intelligence encompassed musical, kinesthetic, and interpersonal intelligence. Case Illustration 7.4 highlights Gardner's intelligences (or competencies) which relate to a client's unique aptitude set of capabilities. Gardner (1999) defined intelligence as "a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture" (pp. 33–34). Gardner also valued naturalistic inquiry and questioned the validity of determining intelligence when individuals are removed from their naturalistic environment. This led Gardner to add an eighth intelligence (naturalistic) to his theory. Today, as Gardner's (2011) theory of Multiple Intelligences has evolved, a range of abilities are grouped into nine comprehensive categories, with existential intelligence being the most recently added. Gardner also proposed that spiritual intelligence be added. Table 7.2 briefly summarizes the current nine intelligences.

Table 7.2 Gardner's Multiple Intelligences

Identified Intelligences	Description
Spatial-visual	Ability to think in images and pictures, create and manipulate mental images, and visualize abstractly and accurately
Linguistic-verbal	Ability to use words effectively both orally and in writing (e.g., use of rhetoric, mnemonics, explanation, metalanguage)
Logical-mathematical	Ability to use numbers effectively, think abstractly, and apply logic, including recognizing numerical patterns and relationships and propositions (e.g., cause-effect)
Musical	Ability to perceive, comprehend, and produce musical forms; includes sensitivity to and appreciation of rhythm, pitch or melody, and timbre
Bodily-kinesthetic	Ability to control and use one's bodily movements, including balance, flexibility, speed, coordination, and dexterity
Intrapersonal	Self-awareness of one's strengths, limitations, moods, motivations, values, and beliefs as well as capacity for self-esteem and self-discipline
Interpersonal	Ability to perceive and respond appropriately to the moods, intentions, motivations, feelings, desires, and goals of others
Naturalistic	Ability to recognize and categorize species, including plants, animals, and other inanimate objects in nature
Existential	Concern with life issues and ability to answer deep questions (e.g., What is the meaning of life?)

Source: Gardner (2011).

CASE ILLUSTRATION 7.4

News reports have recently told a story about Carson Huey-You, an 11-year-old boy from Texas who is starting his freshman year of college at Texas Christian University (TCU). Carson is 4'7″ and weighs only 75 pounds. He is the youngest student ever on record at TCU. Carson is majoring in quantum physics and is currently enrolled in calculus, physics, history, and religion.

Carson was homeschooled by his mother until he was 5. He was reading chapter books and could add, subtract, multiply, and divide at the age of 2. Carson was also writing with good penmanship by the age of 3. At age 5 he could do algebra and he was placed into the eighth grade at a private school. At age 10, Carson graduated from high school and was the co-valedictorian. He scored 1770 on his SATs. Carson also is an excellent pianist and speaks multiple languages.

Carson reported that he is a little awed and overwhelmed to be going to college at age 11, but he is also excited and the other students have been kind to him. Carson's mother reported that aside

from Carson's intellectual abilities, he is just a normal 11-year-old kid who likes to do things any other kid his age would, such as playing video games, hanging out, and wrestling. Being so gifted at a young age, perhaps young Carson will give Stephen Hawking a run for his money in the field of physics! Keep young Carson in mind as you read about Gardner's Multiple Intelligences.

Source: Dechant (2013).

Gardner's theory recognizes individual strengths. For example, a client who may achieve a low score on an IQ test but is a successful college swimmer may still be considered intelligent according to Gardner's theory. Gardner (2006) notes,

It is of utmost importance that we recognize and nurture all of the varied human intelligences and all of the combinations of intelligences. We are all so different largely because we have different combinations of intelligences. If we recognize this, I think we will have at least a better chance of dealing appropriately with the many problems we face in the world. (p. 36)

Guided Practice Exercise 7.2 asks you to consider your views on Howard Gardner's theory of Multiple Intelligences.

GUIDED PRACTICE EXERCISE 7.2

With a partner or in small groups, discuss Howard Gardner's theory of Multiple Intelligences. What are your views on this theory? Of the seven original intelligences (linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal), in which areas do you feel strong? Why? In which areas do you feel not as apt? Why? How do you differ from the people with whom you are discussing this theory? Think back to young Carson Huey-You, the 11-year-old boy from Texas who is starting his freshman year of college at Texas Christian University. Carson seems to excel in many different areas. In which areas of Gardner's Multiple Intelligences does Carson seem to have strengths?

Gardner's establishment of appreciation for unique strengths and abilities may actually serve as a predecessor of multicultural theory, largely in part due to his emphasis on diversity. Furthermore, Gardner's emphasis on strengths as opposed to limitations shares a foundation with strength-focused therapy. Although Gardner focused on issues of intelligence, his contributions can still be felt today in other areas of counseling.

Emotional Intelligence

Gardner's shift away from traditional theories that viewed intelligence as a single general factor to a theory that focused on a broad array of mental abilities, including both

interpersonal and intrapersonal intelligences, helped lead to the outgrowth of emotional intelligence. Salovey and Mayer (1990) first defined emotional intelligence (EI) as "the ability to monitor one's own and other's feeling and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (p. 189). However, after additional research, they came to realize that their original definition for EI was vague and omitted thinking about feelings. As a result, Mayer and Salovey (1997) revised their original definition of EI and concluded that

> emotional intelligence involves the ability to perceive accurately, appraise, and express emotion; the ability to access and generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth. (p. 10)

Based on their definition that EI is an intelligence defined and measured by the aforementioned abilities, the four-branch model emerged. Today the four-branch model is known as the **mental ability model** and includes perceiving emotions, using emotions to facilitate thought, understanding emotions, and managing emotions.

However, it was not until Daniel Goleman (1995) published his book *Emotional Intelligence: Why It Can Matter More Than IQ* that EI gained research and media attention. Goleman's model included five dimensions of emotional intelligence and 25 emotional competencies. According to Goleman (1998),

> our emotional intelligence determines our potential for learning the practical skills that are based on its five elements: self-awareness, motivation, self-regulation, empathy, and adeptness in relationships. Our emotional competence shows how much of that potential we have translated into on-the-job capabilities. (pp. 24–25)

Goleman's five main EI constructs led to the development of the **mixed ability model,** which focuses on the competencies and skills that influence leadership performance. In addition to the mental ability model and mixed ability model, several additional EI models exist, including the **trait model of emotional social intelligence** and the **bar-on model of emotional social intelligence**. Today there are a number of published instruments that assess EI based on specific models of EI: the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), which is based on the four branch model; the Emotional Competence Inventory (ECI) and the Emotional Intelligence Appraisal, based on the mixed ability model; and the Emotional Quotient Inventory (EQ-i), a self-report measure based on trait emotional intelligence.

The concept of emotional intelligence is fairly new and as a result has only limited empirical support. Relatively few studies have been conducted that examine the impact of emotional intelligence on learning, decision making, or relationships, and even fewer that consider the relevance of these impacts. Critics of this model assert that EI expands concepts of intelligence too far and is little more than an integration of individual personality influences and cognitive assessment (Schulte, Ree, & Carretta, 2004; Waterhouse, 2006). However, interest in this model and its place in education, occupational, and

medical environments continues to grow (Van Rooy & Viswesvaran, 2004). Contemporary research has found correlations between EI and constructs of decision making, learning, and identity development (Fernandez-Berrocal & Ruiz, 2008; Martínez Pons, 1997; Trinidad, Unger, Chou, & Johnson, 2004). Still, a significant challenge to identifying the validity of EI instruments lies in the variations of culture, experiences, and interpretations—noteworthy criticisms of this model.

INFORMATION-PROCESSING VIEW

Aleksandr Luria (born in 1902), a Russian neuropsychologist, is considered to have founded the field of **neuropsychology**. Luria's (1966) conception of intelligence focused on how information is processed in two ways: **simultaneous processing** (simultaneous integration of information all at one time) and **successive processing** (information is processed in sequential or serial order). Simultaneous processing is often referred to as parallel processing, and successive processing is also known as sequential processing. An example of successive processing would be arranging stimuli in sequential order or memorizing a telephone number. An example of simultaneous processing is solving abstract analogies or recognizing figures such as a square placed inside a circle.

Later in the chapter, you will read about the Kaufman Assessment Battery for Children, Second Edition (KABC-II), which relies on successive and simultaneous information processing.

Luria's clinical procedures and writings also inspired the development of a comprehensive standardized assessment that measures neuropsychological functioning called the **Luria-Nebraska Neuropsychological Battery** (LNNM). The LNNM is used by clinicians as a screening tool to determine if significant brain injury or psychological impairments are present and to distinguish between brain damage and mental health disorders such as schizophrenia.

Guided Practice Exercise 7.3 is meant to help you consider which intelligence theory best fits your own ideas and perceptions. Now that we have discussed various models of intelligence, let's look at popular individual and group assessments used to measure intelligence.

GUIDED PRACTICE EXERCISE 7.3

By now you have been exposed to many different theories related to intelligence. Take a moment to reflect on what you've learned. Which theorist best captured your own ideas or perceptions of intelligence from your discussion earlier in this chapter in Guided Practice Exercise 7.1? Discuss your thoughts with a partner. Which theory best captured your partner's perception of intelligence? How has your perception changed or stayed the same from when you discussed this earlier in Guided Practice Exercise 7.1?

Individual Assessment

There are a number of individual intelligence tests available today. Three of the most common and widely used tests are the Stanford-Binet Intelligence Scales, 5th edition, the Wechsler Scales, and the Kaufman Brief Intelligence Test, Second Edition (KBIT-2). Before we dive into discussing each of these instruments, it is important to reflect on what we learned in the previous chapters (e.g., standard scores, percentiles, standard error of measurement). Although intelligence testing is useful and helpful, many intelligence assessments require advanced training and supervision beyond a master's level education. However, even if you do not plan to administer these tests in the future, you must still understand the fundamental principles of assessment to avoid misinterpretation of intelligence scores and/or mislabeling individuals with learning disabilities. Furthermore, how one communicates the results to the client is vital.

As you read about the different intelligence assessments, you will find that each assessment is divided into sections containing a number of subtests. Once these subtests are complete, a composite score, which takes into account all the sections, is computed to identify a full (overall) scale IQ (FSIQ). If you recall from Chapter 2, raw scores can be converted into standard scores. For intelligence tests, converted scores typically have a floor of 40 and a ceiling of 160 using a mean of 100 and standard deviation of 15. You might be asking yourself, why is the author talking about floors and ceilings in an assessment chapter. The **intelligence floor** of a test simply means the lowest level of intelligence the instrument measures, while the **intelligence ceiling** of a test refers to the highest level of intelligence the instrument reportedly measures. For example, the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV) has a full scale IQ floor of 40 and a full scale IQ ceiling of 160. The below assessments have a 4–5 standard error of measurement (SEM). In Chapter 3, you learned that the SEM provides an estimation of the range of scores that would be obtained if someone were to take the instrument over again. Why might the role of SEM be important in this chapter? Take a look at Table 7.3, which shows the classification of intelligence scores used in score interpretation. Please note that other assessments may have different ranges, and thus you should always consult the manual to ensure your accurate interpretation of results. For example, the previous version of the WAIS-IV, the WAIS-III, has a full scale IQ floor of 45 and a full scale IQ ceiling of 155.

Imagine you have a client whose obtained FSIQ score on a **norm-referenced test** is 70. The test manual reports that the SEM is 5. Given the client's obtained score of 70, you are 68 % confident that his or her "true" score is somewhere between 65 and 75. Given the client's obtained score of 70, you are also 95 % confident that his or her true score is somewhere between 60 and 80. If a counselor simply looked at the score of 70, he or she might believe that the client is only 1 point off from being diagnosed with a developmental disorder; however, knowing the standard score along with the SEM demonstrates the need for further assessment before making this conclusion.

In addition to looking at the full scale IQ, one can make comparisons between the different subtests. For example, the test scores for the Wechsler Intelligence Scale for Children are reported in terms of verbal scale IQ, performance scale IQ, and full scale IQ. Thus, as you read about each intelligence assessment, it is important to understand the different

Table 7.3 Nominal Categories for SB5 IQ Scores

Range of Measured IQ	Category
145–160	Very gifted or highly advanced
130–144	Gifted or very advanced
120–129	Superior
110–119	High average
90–109	Average
80–89	Low average
70–79	Borderline impaired or delayed
55–69	Mildly impaired or delayed
40–54	Moderately impaired or delayed

domains that each test measures. Guided Practice Exercise 7.4 asks you to consider the reliability and validity of the results of an IQ test. As noted in Chapter 5, a comprehensive assessment is essential to provide a diagnosis. Furthermore, a score is simply a snapshot of how a client thinks, feels, acts, or performs in a given moment in time. It is by no means a definitive statement of who a client is as a person. As a result, it is important to give context when sharing test scores with a client. Let's take a look at some of the more popular intelligence tests.

GUIDED PRACTICE EXERCISE 7.4

Before class, and prior to reading about the various intelligence assessments, go to the website www.free-iqtest.net. Take the IQ test. There are only 20 questions. After you complete the test, click on the icon to get your results. What were your perceptions of this IQ test? Do you think your results are accurate? Why or why not? Remember what you learned about reliability and validity. Do you have any concerns about the validity or reliability of your results? Why or why not? Did your results surprise you?

Some IQ tests have components similar to the one you just took. Do you think answering these types of questions can accurately assess your intelligence? Why or why not? What aspects of intelligence do you think this type of assessment evaluates (e.g., crystallized or fluid, verbal comprehension, numerical ability, memory, inductive reasoning, perceptual speed, word fluency, spatial relations, linguistic, musical, logical-mathematical, spatial, bodily kinesthetic, interpersonal, intrapersonal). Why? Hint: Remember or review the theories you just read.

STANFORD-BINET

In 1904, Alfred Binet was appointed by the French government to develop a test that would screen for developmentally disabled children in Paris schools. In 1905, Binet collaborated with Theodore Simon and created the first formal intelligence test, consisting of 30 questions pertaining to school-related items, each with increasing difficulty. In 1908, the original Binet-Simon Scale started to be used in the United States. By 1916, Lewis Madison Terman at Stanford University tested over 3,000 children in the United States. After years of research that included a normative sample, Terman published an American version of the Binet, which included new items; today we know this as the **Stanford-Binet Intelligence Scale**. So the current name for this test comes from Lewis Terman's affiliation with Stanford and from Alfred Binet, the original developer. Terman continued to work on the instrument and published several editions.

Wilhelm Stern produced a **ratio IQ** based on mental age, which is the age at which the individual appears to be functioning intellectually. Taking the mental age divided by the chronological age and multiplying by 100 computes the ratio IQ.

Ratio IQ = mental age/chronological age × 100

One of the major revisions of the third edition of the Stanford-Binet was the use of the deviation IQ instead of the ratio IQ. For the **deviation IQ**, an individual's performance is compared to other individuals in his or her age group in the standardized sample. The deviation IQ represents deviation from the norm. An individual's raw score is converted into a standard score, with a mean of 100 and standard deviation of 16. Thus, if an individual obtained a 100, he or she is considered to be performing at a level equal to the average person in his or her same age group.
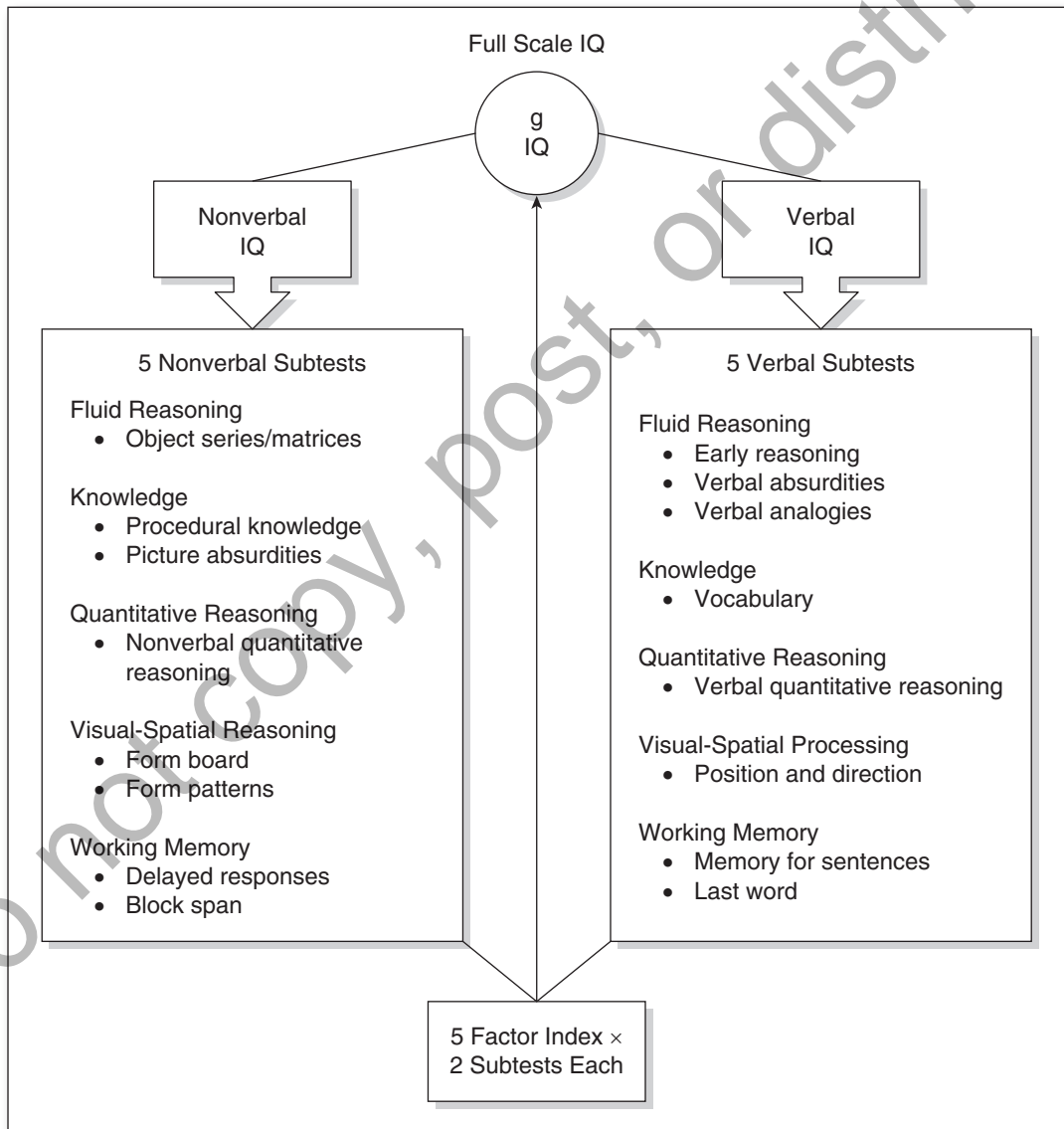
The current version, the Stanford-Binet Intelligence Scale-Fifth Edition (SB5), assesses verbal and nonverbal intelligence across five domains among individuals as young as 2, through 85 years and older, with a comprehensive set of 10 subtests. The current version yields a **full scale IQ, a verbal IQ,** and a **nonverbal IQ**, with a mean of 100 and standard deviation of 15. The SB5 continues to be one of the most popular and widely used intelligence tests to identify students with intellectual giftedness and students who quality for special education or have a learning disability, assess intellectual disability, and provide considerations for worker's compensation. The nonverbal sections are useful for professionals who evaluate clients with communication disorders, deafness or hard of hearing, a non-English background, and preschool learning difficulties.

The SB5 is based on the Cattell-Horn-Carroll (CHC) theoretical model. If you recall from our earlier discussion, this model views intelligence as a multifaceted array of cognitive abilities. There is a general (*g*) overarching ability, which consists of several dimensions: fluid intelligence, crystallized knowledge, quantitative knowledge, visual processing, and short-term memory. Through the use of different types of tasks and subtests at different levels, the SB5 measures the five CHC factors. However, the SB5 factors are referred to as fluid reasoning, knowledge, quantitative reasoning, visual-spatial processing, and working memory. The SB5 is unique in that it is the first intelligence assessment to measure the five cognitive factors in both the nonverbal and verbal domains. The five cognitive factors are

assessed by one verbal and one nonverbal subtest each. Thus, 2 domains × 5 factors = 10 subtests. Figure 7.2 illustrates the hierarchical structure of the SB5 scoring system. Examples of the type of tests given under each domain are listed as well.

Another distinctive feature of the assessment is the use of a **routing test** to save test administrator time, as well as the use of **basal levels** and ceiling levels to help the test

Figure 7.2 Hierarchical Structure of SB5 Scoring System

Full Scale IQ

g IQ

Nonverbal IQ

Verbal IQ

5 Nonverbal Subtests

Fluid Reasoning
• Object series/matrices

Knowledge
• Procedural knowledge
• Picture absurdities

Quantitative Reasoning
• Nonverbal quantitative reasoning

Visual-Spatial Reasoning
• Form board
• Form patterns

Working Memory
• Delayed responses
• Block span

5 Verbal Subtests

Fluid Reasoning
• Early reasoning
• Verbal absurdities
• Verbal analogies

Knowledge
• Vocabulary

Quantitative Reasoning
• Verbal quantitative reasoning

Visual-Spatial Processing
• Position and direction

Working Memory
• Memory for sentences
• Last word

5 Factor Index × 2 Subtests Each

administrator determine starting and stopping points. You can think of the routing test as a pretest, a basal score as the entry level, and the ceiling score as the test terminating score. For example, in the Nonverbal domain an Objects Series/Matrices routing subtest is given to the examiner to determine the age level at which the test should begin. Then the examiner determines the basal level, which is where the examinee answers all the questions correctly on two consecutive age levels. Once the basal level is established, the prior items are considered correct and the examiner moves forward until reaching the ceiling level. The ceiling level on the SB5 is the highest level of test items administered and the point at which the examinee answered 75% of the items incorrectly on two consecutive age levels.

The five subtests under the verbal domain and the nonverbal domain yield a nonverbal IQ and a verbal IQ. The five factor indexes yield an FSIQ. The raw scores on the nonverbal IQ, verbal IQ, and FSIQ are converted to standard scores with a mean of 100 and standard deviation of 15. Table 7.4 lists the nominal categories that have been created as a quick reference to certain cutoff scores.

The SB5 record form includes a checklist, which gives the examiner the opportunity to observe the examinee's behavior and note the examinee's physical appearance, mood, activity level, and medications. All of these factors provide useful information that will be considered in reporting formal scores. As discussed in Chapter 6, when reporting results, you want to stay away from labeling your client. Rather than labeling your client as "superior," you would highlight his or her skills and abilities. Remember, the SB5 is regarded as a Class C instrument and requires extensive training.

The SB5 reports high reliability and strong validity. Average internal consistency composite reliability for the FSIQ, nonverbal IQ, and verbal IQ are reported to range from .95

Table 7.4 Nominal Categories for SB5 IQ Scores

Range of Measured IQ	Category
145–160	Very gifted or highly advanced
130–144	Gifted or very advanced
120–129	Superior
110–119	High average
90–109	Average
80–89	Low average
70–79	Borderline impaired or delayed
55–69	Mildly impaired or delayed
40–54	Moderately impaired or delayed

to .98. The FSIQ SEM = 2.30, nonverbal IQ SEM = 3.26, and verbal IQ SEM = 3.05. Normative data is based on 4,800 individuals between the ages of 2 and 85 years and older stratified by age, gender, race, ethnicity, geographical region, and educational attainment. Content, criterion-related, and predictive validity are thoroughly discussed in the manual.

WECHSLER SCALES

During the 1930s, David Wechsler was working at Bellevue Hospital in New York City. Many of his clients were multilingual and multicultural. He did not believe that the most popular individually administered intelligence test at that time, the Stanford-Binet, met his clients' testing needs. Dissatisfied with the Stanford-Binet and the emphasis that it placed on language and verbal skills, Wechsler wanted to develop an intelligence test that included nonverbal intelligence. Thus, in 1939, the **Wechsler Bellevue Intelligence Scale** (WB-I) was developed. Unlike the Stanford-Binet, which was a chronological scale and classified items by age, the WB-I was a point scale, which classified items by subtests. The test included six verbal subtests and five performance subtests with items becoming progressively more difficult.

Over the years, David Wechsler designed a series of individually administered intelligence tests to measure intellectual abilities from preschool to adulthood, with the most common and currently used being Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV) for ages 16 to 90 years and 11 months; the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) for ages 6 years through 16 years and 11 months; and the Wechsler Preschool and Primary Scale of Intelligence-Fourth Edition (WPPSI-IV) for ages 2 years and 6 months to 7 years and 7 months. The Wechsler tests are based on the *g* factor of intelligence and consist of subtests representing fluid and crystallized intelligence. As you read about these assessments, you will notice several commonalities. All the Wechsler assessments yield IQs with a mean of 100 and standard deviation of 15, and the examinees' scores are compared to others in the same age group. The assessments include a full scale IQ used to measure general intelligence, a verbal IQ calculated from scores on subtest categorized as verbal, and a performance IQ calculated from scores on subtest categorized as nonverbal. However, the exception is the WISC-IV, which does not yield separate verbal and performance IQs, discussed below.

Other terms you will want to be familiar with include core and supplemental subtests. **Core subtests** are used to obtain a composite score, while **supplemental subtests** are optional tests. Supplemental subtests are used to help gather and provide additional clinical information and sometimes are used in place of core subtests. Why might supplemental subtests be used in place of core subtests? A supplemental subtest is often substituted for a core subtest when the examinee's physical limitation may prevent him or her from completing a certain subtest or when the examinee may have been exposed to previous items. Supplemental subtests can also be substituted for core subtests when the examiner administers core subtests incorrectly. As we now turn our attention to discussing the three common Wechsler tests, please keep in mind that these instruments are regarded as C qualification level. The use of the WISC-IV in a counseling situation is described in Case Illustration 7.5.

CASE ILLUSTRATION   7.5

Jesus is a 10-year-old fifth grader. He has been an excellent student and has received scores of 90%–100% on all of his assignments up until this year. However, this year things have changed. Jesus now rarely turns in his work and he has started having behavioral problems, such as talking in class or reading outside materials during instruction time. Jesus has also started skipping school.

A hypothesis of Jesus's parents is that Jesus is bored, because the work he is doing is too simple for him. His parents believe that he is very smart. They state that Jesus has always complained that his schoolwork was too easy for him. However, Jesus's teacher and the school disagree. While they agree that Jesus is smart, they maintain that he is sufficiently challenged academically in the classroom. The school maintains that the issues with Jesus are related to a behavioral issue and lack of respect for his teacher.

Jesus's parents decide to take him to counseling. Through the counseling process, the counselor suggests that his parents have his intelligence tested. The counselor states that if Jesus tests high enough, this could support their argument with the school that Jesus's learning capacity is greater than his current grade level.

Jesus is referred to a psychologist who administers the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV). Jesus was given the WISC-IV because it can provide information to help in diagnoses and treatment planning. Besides giving information about intellectual capability, the WISC-IV can also help distinguish learning and intellectual disabilities.

Jesus's scores clearly demonstrate he has a higher IQ than peers in his age group. Whereas average intelligence scores on the WISC-IV range from 85 to 115, Jesus's full scale IQ measured at 125. However, it is determined through the administration of the WISC-IV that Jesus has some problems with processing information, which would lead to frustration for him. When frustrated, Jesus tries to disengage from the task. When challenged to return to the task, his frustration causes him to act out behaviorally.

During the clinical interview conducted by the psychologist prior to administering the exam, it was noted that Jesus had been in a car accident during the summer prior to the current academic year and had sustained a concussion for which he was treated. Given that Jesus had not previously sustained the level of difficulty in his schoolwork, nor had acted out behaviorally prior to the accident, the psychologist recommends that Jesus undergo further cognitive testing to evaluate whether he sustained a brain injury that has caused him problems with information processing.

Source: Callahan & Eichner (2008).

Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV)

The **Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV)**, published in 2008, is the most recent Wechsler instrument used to measure intelligence in people from 16 to 90 years and 11 months. The assessment is composed of the following 10 core subtests, which take approximately 60–90 minutes to complete: Block Design, Similarities, Digit Span, Matrix Reasoning, Vocabulary, Arithmetic, Symbol Search, Visual Puzzles, Information, and Coding. There are also five supplemental subtests available: Letter-Number Sequencing,

Figure Weights, Comprehension, Cancellation, and Picture Completion. These subtests yield four index scores: Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed. Each of these index scores has a mean of 100 and standard deviation of 15. The four indices compose the FSIQ. If you recall from earlier, we stated that the WAIS-IV has a floor of 40 (very low) and ceiling of 160 (very high). Table 7.5 lists the WAIS-IV subtests grouped according to indices and provides a brief description of the core and supplemental subtests. Although not listed, there is a fifth index score, **General Ability Index** (GAI), that is calculated using the verbal comprehension and perceptual reasoning indexes.

Table 7.5   Brief Description of WAIS-IV Subtests Grouped According to Indexes

Verbal Comprehension Scale	
Similarities	Pair of words are presented and the examinee explains how two objects are alike; assesses examinee's ability to analyze relationships and abstract thinking
Vocabulary	The task is to define words that increase in difficulty; correlates highly with FSIQ; thought to be a good measure of intelligence
Information	Includes wide-ranging questions that one would be expected to know in formal education, everyday living, and cultural interactions
Comprehension*	Assesses the examinee's ability to organize and apply knowledge by asking open-ended questions that require an explanation of why certain procedures are followed, understanding of verbal abstraction, often referred to as common sense
Perceptual Reasoning Scale	
Block Design	Requires visual motor coordination; examinee is presented with a design consisting of colored blocks; the examinee assembles up to nine blocks to match the design on a card
Matrix Reasoning	Nonverbal analogy tasks that measure visual information-processing and abstract-reasoning skills with which the examinee identifies patterns and uses spatial reasoning
Visual Puzzles	A puzzle picture is presented and examinee chooses from a list the correct pieces of a puzzle that, when placed together, would reconstruct the puzzle in the picture
Picture Completion*	Colored cards with a picture are shown to the examinee, the picture is missing a colored piece and the examinee identifies the missing part
Figure Weights*	Examinee looks at a scale with missing weights and then chooses the weights needed to balance the scale (ages 16–69)
Working Memory Scale	
Digit Span	Measures concentration, attention, and short-term memory; three sets of digits are read by the administrator, and the examinee repeats the numbers back to the administrator in order, backward, or in ascending order

(Continued)

Table 7.5 (Continued)

Working Memory Scale (continued)	
Arithmetic	Measures learning of arithmetic, concentration, and short-term auditory memory; must be solved verbally with no pencil or paper
Letter-Number Sequencing *	Examiner reads a combination of numbers and letters in a mixed-up order and the examinee has to recall the numbers in ascending order and the letters in alphabetical order (ages 16–69)
Processing Speed Scale	
Symbol Search	Measures cognitive processing speed, motor speed, and visual perception; examinee scans two groups of symbols (search group and target group) and indicates whether a stimulus/target symbol appears in the search group
Coding	Examinee receives a code from a printed key and a piece of paper with blanks under a series of numbers, then fills in the blanks using the key
Cancellation*	Examinee scans a list of structured or unstructured colored shapes and marks targeted shapes within a specified time limit (ages 16–69)

Note: * indicates supplemental subtests.

The WAIS-IV has strong psychometric soundness. The normative sample consisted of 2,200 individuals between the ages of 16 and 90 years stratified by age, gender, race, ethnicity, geographical region, and educational level. High internal consistency reliability estimates on all subtests and composite scores as well as strong content, construct, and criterion-related validity were reported in the manual. The numerous validity studies also include clinical samples. Although the WAIS-IV is regarded as a highly valuable instrument, there are a couple items worth mentioning. If you recall, the Processing Speed Index is composed of subtests that require motor control. Some clients may not have the motor ability to complete these tests; therefore, one must consider how this might impact scoring. For example, an individual's color vision as well as frustration level could influence performance on the Block Design subtest. Using the FSIQ can be misleading and even invalid if a client has large discrepancies between index scores. Instead, the strengths and weaknesses in the client's profile should be discussed, and the FSIQ should be de-emphasized. Scoring of items on Comprehension, Similarities, and Vocabulary subtests appears less clear compared to the other subtests and is subjective. An examinee might have a lower score on these sections depending on the administrator's interpretations. Now that we have discussed one of the most popular intelligence assessments for adults, let's review an intelligence assessment for children.

Wechsler Intelligence Scale for Children (WISC-IV)

The Wechsler Intelligence Scale for Children (WISC) was first published in 1949 as an extension of the Wechsler Bellevue Intelligence Scale to be used with children. Today, the recent version published in 2003 is known as the **Wechsler Intelligence Scale for**

Children-Fourth Edition (WISC-IV) and is used to assess children's intellectual ability in children ages 6 years to 16 years and 11 months. The instrument yields an FSIQ and four index scores: Verbal Comprehension Index, Perceptual Reasoning Index, Working Memory Index, and Processing Speed Index. Sound confusing? The index scores are calculated based on the scores the examinee obtains on the three to five subtests. The scores on the index combine to yield the FSIQ. It is important to note that there are 10 core subtests and 5 supplemental subtests on the WISC-IV, and only the core subtests for each of the indexes are used to yield the FSIQ.

The WISC-IV and the SB5 are similar in many respects, including that they (a) were published in 2003, (b) are individually administered assessments with a test time of approximately an hour, (c) yield FSIQ cores, and (d) were normed on 2,200 test takers between the ages of 6 and 16. There are differences based on exclusionary criteria, cognitive and nonverbal factors measured, and populations used for validity studies. For example, the WISC-IV contains five supplemental tests and the SB5 does not. The cognitive factors included on the WISC-IV are Working Memory, Processing Speed, Verbal Comprehension, and Perceptual Reasoning, while the cognitive factors on the SB5 are Working Memory, Visual-Spatial Processing, Knowledge, Fluid Reasoning, and Quantitative Reasoning. The nonverbal factors on the WISC-IV are Working Memory, Processing Speed, and Perceptual Reasoning, while the nonverbal factors on the SB5 consist of Working Memory, Visual Spatial Processing, Fluid Reasoning, Quantitative Reasoning, and Knowledge. Unlike the SB5, which has an Abbreviated Battery IQ, there is no current short form for the WISC-IV.

Today the WISC-IV is used for more than measuring a child's intellectual ability. It is often used to aid in diagnosing learning and intellectual disabilities. If the examinee's processing problems are affecting the results on the WISC-IV, 16 of the optional subtests can be given. These 16 optional subtests are available on the WISC-IV Integrated. The WISC-IV Integrated helps obtain a more comprehensive measure of cognitive ability to assist in intervention planning. Many validity studies are available in the manual that describe the use of the WISC-IV with people diagnosed with ADHD, learning disabilities, traumatic brain injury, and Autism Spectrum Disorders.

Wechsler Preschool and Primary Scale of Intelligence (WPPSI-IV)

Prior to 1967, the Stanford-Binet was the test of choice to be used to measure intelligence in preschool children. Wechsler (1967) believed a test should be developed and re-standardized for children under 6 years of age, thus the original Wechsler Preschool and Primary Scale of Intelligence (WPPSI) was developed. According to Zimmerman and Woo-Sam (1978), the WPPSI was the first intelligence test that "adequately sampled the total population in the United States, including racial minorities" (p. 10). The original WPPSI has undergone several revisions, with the addition of some subtests and the deletion of others. The most current version was published in 2012 and is the **Wechsler Preschool and Primary Scale of Intelligence (WPPSI-IV)**.

The WPPSI-IV is a comprehensive, standardized intelligence test for ages 2 years and 6 months to 7 years and 7 months. The newest version includes new processing speed tasks, working memory subtests, and visual spatial and fluid reasoning composites for children ages 4 years to 7 years and 7 months. The WPPSI-IV is divided into two age bands. The first

age band is for 2 years and 6 month to 3 years and 11 months. The second age band is for 4 years to 7 years and 7 months. Each age band yields an FSIQ, a Primary Index Scale, and Ancillary Index Skill levels. In order to obtain an FSIQ for the youngest age band, five core subtests are administered: Receptive Vocabulary, Information, Block Design, Object Assembly, and Picture Memory. You can see in Figure 7.3, which shows the test framework for each age band, that Picture Naming is under Verbal Comprehension and Zoo Locations is under Working Memory. These tests are not required to obtain an FSIQ but are available and used to detect emerging working memory difficulties. To obtain an FSIQ for ages 4 years to 7 years and 7 months, six subtests are administered: Information, Similarities, Block Design, Matrix Reasoning, Picture Memory, and Bug Search.

The WPPSI-IV is useful to clinical and school psychologists in identifying students who may be eligible for gifted classes as well as those who may have cognitive delays and intellectual disabilities, and may qualify for special services. The WPPSI-IV is often used by neuropsychologists to determine the impact of traumatic brain injury on cognitive ability and functioning among children.

Wechsler Abbreviated Scale of Intelligence (WASI)

The **Wechsler Abbreviated Scale of Intelligence** is a standardized, brief measure of intelligence for ages 6 to 89 years of age. The instrument is administered by paper-and-pencil and is hand-scored. The assessment is regarded as a Class C instrument. The WASI comes in two forms: the four-subtest form which takes approximately 30 minutes or the two-subtest form which takes approximately 15 minutes. The four-subtest form consists of Vocabulary, Similarities, Block Design, and Matrix Reasoning and yields a verbal IQ score, a performance IQ score, and an FSIQ. The two-subtest form includes Vocabulary and Matrix Reasoning and yields only an FSIQ. Although the WASI has multiple uses (such as measuring a person's verbal, nonverbal, and general cognitive functioning quickly and screening for gifted programs or intellectual disability), one should note that the WASI is not meant to be a substitute for the WISC-IV and the WAIS-IV. Let's now discuss a Class B instrument.
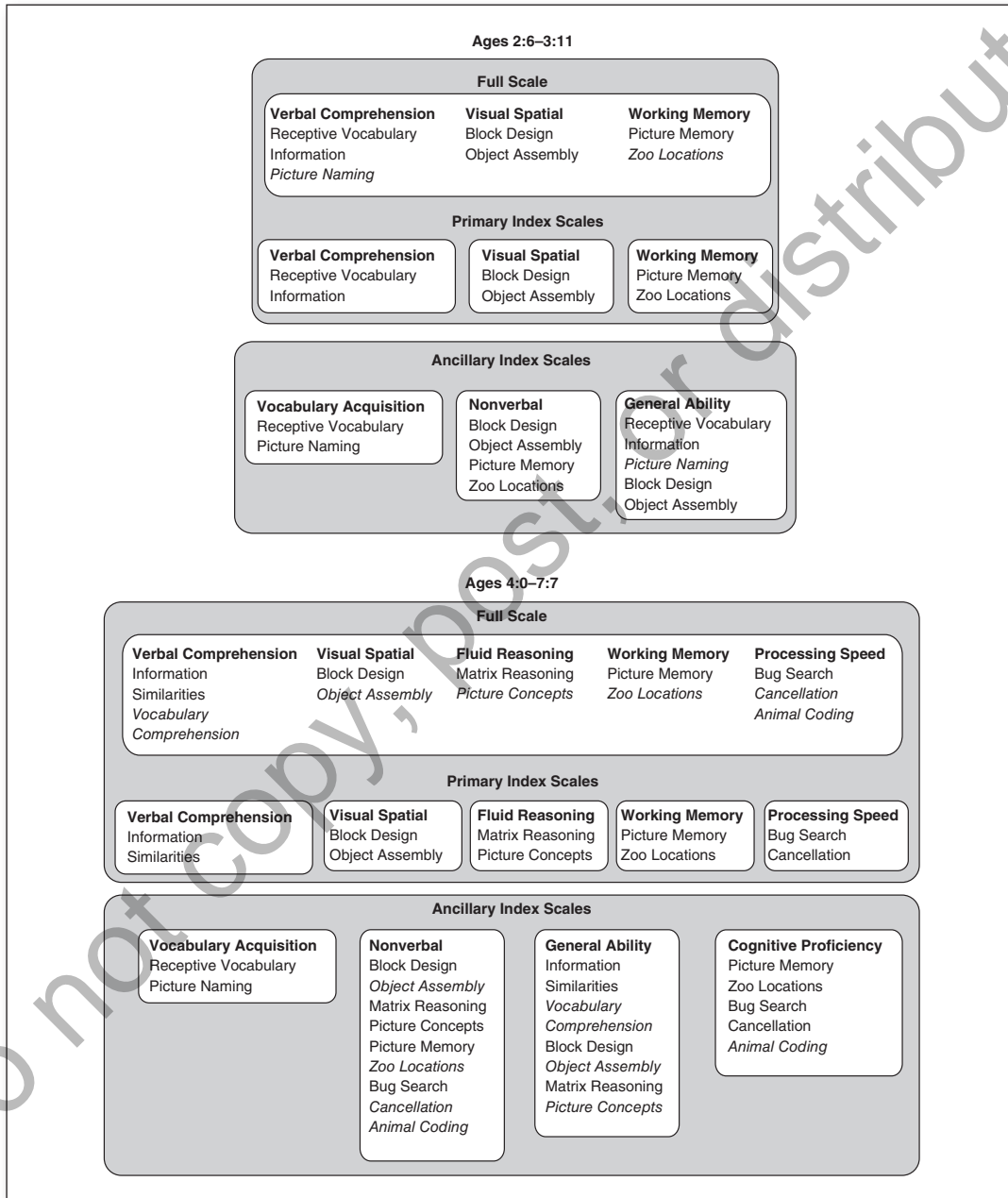
KAUFMAN BATTERIES

Kaufman Brief Intelligence Test, Second Edition (KBIT-2)

Alan S. Kaufman and Nadeen L. Kaufman have developed a variety of intellectual and educational assessments. Alan Kaufman was a student of Robert Thorndike and completed a clinical apprenticeship with David Wechsler. We will highlight a few of their intelligence tests, beginning with the **Kaufman Brief Intelligence Test, Second Edition (KBIT-2).** If you recall, the previous complex intelligence tests we discussed are Class C instruments. Unlike the SB5 and the Wechsler scales, the KBIT-2 is regarded as a Class B instrument and has a shorter administration time (approximately 20 minutes). The KBIT-2 provides a verbal score, nonverbal score, and composite IQ.

Counselors may find the KBIT-2 helpful in obtaining a quick estimate of intelligence in people from 4 to 90 years of age. For example, a counselor may need to reevaluate children

Figure 7.3   WPSSI Framework

Ages 2:6–3:11

Full Scale

Verbal Comprehension	**Visual Spatial**	**Working Memory**
Receptive Vocabulary	Block Design	Picture Memory
Information	Object Assembly	*Zoo Locations*
Picture Naming		

Primary Index Scales

Verbal Comprehension	**Visual Spatial**	**Working Memory**
Receptive Vocabulary	Block Design	Picture Memory
Information	Object Assembly	Zoo Locations

Ancillary Index Scales

Vocabulary Acquisition	**Nonverbal**	**General Ability**
Receptive Vocabulary	Block Design	Receptive Vocabulary
Picture Naming	Object Assembly	Information
	Picture Memory	*Picture Naming*
	Zoo Locations	Block Design
		Object Assembly

Ages 4:0–7:7

Full Scale

Verbal Comprehension	**Visual Spatial**	**Fluid Reasoning**	**Working Memory**	**Processing Speed**
Information	Block Design	Matrix Reasoning	Picture Memory	Bug Search
Similarities	*Object Assembly*	*Picture Concepts*	*Zoo Locations*	*Cancellation*
Vocabulary				*Animal Coding*
Comprehension				

Primary Index Scales

Verbal Comprehension	**Visual Spatial**	**Fluid Reasoning**	**Working Memory**	**Processing Speed**
Information	Block Design	Matrix Reasoning	Picture Memory	Bug Search
Similarities	Object Assembly	Picture Concepts	Zoo Locations	Cancellation

Ancillary Index Scales

Vocabulary Acquisition	**Nonverbal**	**General Ability**	**Cognitive Proficiency**
Receptive Vocabulary	Block Design	Information	Picture Memory
Picture Naming	*Object Assembly*	Similarities	Zoo Locations
	Matrix Reasoning	*Vocabulary*	Bug Search
	Picture Concepts	*Comprehension*	Cancellation
	Picture Memory	Block Design	*Animal Coding*
	Zoo Locations	*Object Assembly*	
	Bug Search	Matrix Reasoning	
	Cancellation	*Picture Concepts*	
	Animal Coding		

Source: WPPSI-IV Framework.

and adults who received cognitive assessments in the past in order to obtain a more current assessment. The KBIT-2 is also used to screen students who may be eligible for gifted programs. Some schools administer the KBIT-2 for entrance into a gifted program, while other schools require students to score well on the KBIT-2 before receiving further testing to gain entrance into gifted programs. In addition, to screen children for gifted programs, the KBIT-2 is often used to identify students who may be at risk and require more formal testing. For example, you might have concerns about your client's intellectual functioning. The KBIT-2 allows you to obtain a quick estimate, identify any cognitive deficits, and discover if a more comprehensive evaluation is warranted. Although the KBIT-2 has many benefits, counselors should be aware that this instrument is not a comprehensive intelligence test compared to the previously discussed intelligence tests. Let's take a look at the instrument.

The KBIT-2 measures crystallized and fluid ability through two domains: verbal and nonverbal. If you recall, crystallized ability is measured through verbal subtests while nonverbal subtests measure fluid ability. The Crystallized (Verbal) Scale includes two types of items: Verbal Knowledge and Riddles. These items are designed to measure vocabulary, general information, and reasoning ability. Sound familiar? Remember in the Cattell-Horn-Carroll theory that general information and vocabulary were the two ways to measure crystallized ability (gc; Kaufman & Kaufman, 2004). In Verbal Knowledge, the administrator shows the examinee several pictures and the examinee is then asked to point to the picture that best represents the word mentioned. For example, the examinee may be shown six pictures on one sheet of paper and the examiner says "molding." The child would then point to the picture that contains molding. Figure 7.4 is an example of pictures that would accompany a Verbal Knowledge item. The Riddles subtest evaluates knowledge of information

Figure 7.4 Verbal Knowledge Test Picture
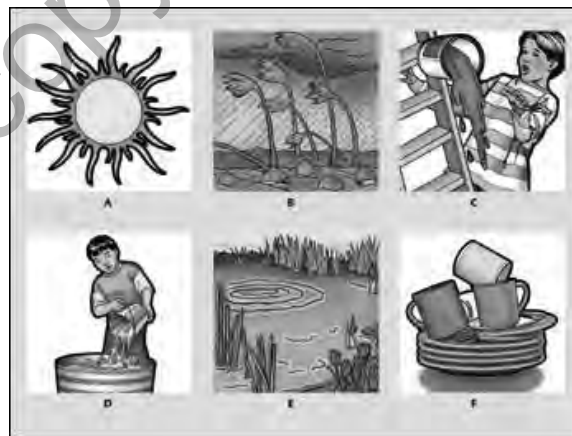
Source: Kaufman & Kaufman (2004).

and vocabulary, but also measures logic. During the Riddles subtest, the examiner asks a question and the examinee responds by giving a one-word answer that solves the riddle. With children ages 4 to 6 years of age, pictures are used instead and the child would point to the picture that shows the answer.

The Fluid (Nonverbal) Scale includes only one subtest, Matrices, which assesses fluid thinking skills or ability to solve new problems by perceiving relationships between shapes and figures and completing analogies without testing vocabulary or language skills. The Matrices subtest measures Fluid Reasoning (Gf) and Visual Processing (Gv). For example, the examinee is shown designs that follow a pattern but are missing an element. The examinee is asked to point to the picture that would complete the pattern. The examinee decides which figure will go into the empty box that will create the same relationship between the two figures on the bottom. An example of the use of the KBIT-2 in counseling is presented in Case Illustration 7.6.

CASE ILLUSTRATION 7.6

Ronald McNair is a combat Marine who was stationed in Afghanistan. In 2012, he became a victim of an improvised explosive device (IED), or a homemade bomb, which are popular among terrorist and guerilla groups in various countries around the world. The Humvee vehicle in which Ronald's team was traveling while on patrol ran over the device. As a result of the explosion, everyone in the vehicle except for Ronald was killed; he suffered extensive head injuries. After months of surgeries, treatment, and rehabilitation, it is suspected that Ronald sustained permanent brain damage that has impacted his intellectual and cognitive functioning. Therefore, his doctors requested that Ronald be tested to determine his current level of functioning.

In order to facilitate that goal, Ronald was given the Kaufman Brief Intelligence Test (KBIT-2). The KBIT-2 was chosen for Ronald because it has a brief administration time. As a result of Ronald's head injury, he quickly gets frustrated and agitated if a task takes too long to complete. The KBIT-2 takes only about 15–30 minutes to administer and therefore fits inside Ronald's window of sustained mental activity. In addition, with the KBIT-2, Ronald can give his responses to the prompts simply by pointing at the test booklet or giving one-word answers. This will also help minimize Ronald's frustration during the assessment period. The KBIT-2 was chosen also because it provides a verbal and a nonverbal score in addition to a composite IQ score and it measures both crystallized and fluid ability.

The results from this assessment will allow Ronald's doctors to evaluate his scores to determine where Ronald might be having difficulties. They will also be able to gain a clearer understanding of what other testing may be required. The results will help his treatment team further refine his treatment plan.

Kaufman Assessment Battery for Children, Second Edition (KABC-II)

Additional assessments developed by the Kaufmans include the **Kaufman Assessment Battery for Children, Second Edition (KABC-II)** and the **Kaufman Adolescent and Adult Intelligence Test (KAIT)**. The KABC-II assesses cognitive ability in children 3 to 18 years of

age. A unique aspect of this assessment is that it is based on a dual theoretical foundation and uses the Luria neuropsychological model or the Cattell-Horn-Carroll (CHC) approach, providing the administrator with options for children who may not be mainstreamed in the culture or language (Kaufman & Kaufman, 2004). The test administrator chooses between using the CHC or Luria model. If you recall, the CHC model is based on fluid and crystallized intelligence. When selecting the CHC model on the KBIT-2, five scales are produced: Short-Term Memory, Visual Processing, Long-Term Storage and Retrieval, Fluid Reasoning, and Crystallized Abilities, yielding a Fluid-Crystallized Index. This model would be appropriate for children who are mainstreamed with the societal culture and language. If it would be unfair to measure the examinee's crystallized ability due to deficiencies, the Luria model can be chosen. The Luria model scales are Sequential Processing, Simultaneous Processing, Learning Ability, and Planning Ability, yielding a Mental Processing Index. In addition, the test items contain minimal cultural content, reduced verbal instructions, and shortened responses, allowing children of diverse backgrounds to be assessed more accurately and decreasing the impact of ethnic differences on scores. The KABC-II includes 18 subtests. The examinee's age range and the model chosen determine how many subtests are given. The maximum number of subtests given is 10, with the total test time ranging from 25 to 70 minutes. One should note that unlike the KBIT, the KABC-II is considered a Class C instrument.

Kaufman Adolescent and Adult Intelligence Test (KAIT)

The KAIT is an individually administered test that measures both fluid and crystallized intelligence for individuals from 11 to 85 years of age. The KAIT includes a Core Battery and an Expanded Battery. The Core Battery takes 65 minutes to complete and is made up of six subtests (three crystallized and three fluid) yielding three intelligence scales: Fluid (Gf), Crystallized (Gc), and Composite Intelligence. Some items on the battery measuring fluid intelligence include logical steps, mystery codes, and a test of long-term memory. Some items measuring crystallized intelligence are definitions, double meanings, auditory comprehension, and test of listening ability. The three IQ scores have a mean of 100 and standard deviation of 15. The Expanded Battery includes the same core battery elements as well as four additional subtests and takes 90 minutes to complete. A distinctive aspect of the KAIT is that the subtests are presented in both visual and auditory formats, allowing for a broader measurement of intelligence.

OTHER INTELLIGENCE TESTS

Universal Nonverbal Intelligence Test (UNIT)

The **Universal Nonverbal Intelligence Test (UNIT)** is a standardized and norm-referenced assessment that assesses general intelligence in people 5 to 17 years of age using nonverbal test administration and item response. The test administrator uses eight universal hand/body gestures to explain the task to the test taker. Multiple response modes are used on the UNIT subtests, including manipulative, paper-and-pencil completion, and pointing. The

instrument requires a qualification level B and comes in three testing options: Abbreviated (10–15 minutes), Standard (30 minutes), and Extended batteries (45 minutes). The extended version is composed of six subtests: Symbolic Memory, Cube Design, Spatial Memory, Analogic Reasoning, Object Memory, and Mazes (Bracken & McCallum, 1998).

The instrument is ideal for children and adolescents who are verbally uncommunicative; have speech, language, or hearing impairments; and/or have different language backgrounds. The instrument is culturally and ethnically sensitive and was normed on a comprehensive national sample of 2,100 children and adolescents with respect to gender, race, Hispanic origin, region, community setting, level of parental educational attainment, classroom placement (full-time regular classroom, full-time self-contained classroom, part-time special education resource), and special educational services. The manual contains detailed information about use of the UNIT across ethnicities including African Americans, Asians, Hispanic, Native Americans as well as those who may be hearing impaired and have limited English ability.

Reliability coefficients for the UNIT are high and demonstrate strong concurrent and discriminate validity.

Comprehensive Test of Nonverbal Intelligence (CTONI-2)

The **Comprehensive Test of Nonverbal Intelligence, Second Edition (CTONI-2)** is another popular nonverbal, norm-referenced intelligence instrument that is ideal for those with language or motor ability impairments. Unlike the UNIT, which is appropriate for children and adolescents, the CTONI-2 is designed for both children and adults and assesses intellectual ability for ages 6 to 89 years old. The CTONI-2 measures analogical reasoning, categorical classification, and sequential reasoning. Two types of stimuli are used: pictures of familiar objects (e.g., animals, people, toys) followed by geometric designs (e.g., unfamiliar sketches, drawings). The CTONI-2 includes six subtests: Pictorial Analogies, Geometric Analogies, Pictorial Categories, Geometric Categories, Pictorial Sequences, and Geometric Sequences. The CTONI-2 does not require oral responses, reading, writing, or object manipulation; the test taker simply points to the selected responses. There are six subtest scores and three composite scores: Global Nonverbal IQ, Pictorial Nonverbal IQ, and Geometric Nonverbal IQ (Hammill, Pearson, & Wiederholt, 2009). A shorter nonverbal intelligence test is the **Test of Nonverbal Intelligence, Fourth Edition (TONI-4).** The TONI-4 is appropriate for ages 6 through 89 years old and measures intelligence, aptitude, abstract reasoning, and problem solving in approximately 15–20 minutes. The TONI-4 was standardized on a national sample of 2,272 people stratified against age, gender, race, ethnicity, geographic location, community size, language spoken in the home, family income, and educational attainment (Brown, Sherbenou, & Johnsen, 2010).

Slosson Intelligence Test-Revised Third Edition (SIT-R3)

The **Slosson Intelligence Test-Revised Third Edition (SIT-R3)** is often used in schools and clinics to assess verbal intellectual ability in children and adults from 4 to 65 years of age. The SIT-R3 includes six verbal cognitive subtests: General Information, Comprehension, Quantitative, Similarities and Differences, Vocabulary, and Auditory Memory. These

subtests include items similar to those found on the Wechsler verbal subtests. A distinctive aspect of this instrument is that the subtests are simultaneously administered and scored, thus allowing the instrument to be given in approximately 10–20 minutes. One should note that, according to the manual, the test cannot be administered to groups. The SIT-R3 overall score yields a Totals Standard Score (TSS) with a mean of 100 and standard deviation of 16. Percentile ranks, mean age equivalents, T-scores, normal curve equivalents (NCEs), and stanines can be used to interpret results and make comparisons to other tests that have standard scores on the verbal side. The **Slosson Intelligence Test-Primary (SIT-P)** is an additional brief, standardized instrument available to screen and provide quick estimates of a child's intelligence and identify children who may need further testing. The instrument includes both verbal items of the crystallized ability (vocabulary, similarities and differences, digit sequence, sentence memory, and quantitative skills) and fluid performance items of nonverbal abilities (e.g., block design, visual-motor integration, fine motor, gross motor). The SIT-P yields Verbal and Performance subscales, a TSS, and a deviation IQ with a mean of 100 and standard deviation of 15. The instrument was normed on 825 children, reports high reliabilities (.90+ on full scale scores), and shows concurrent validity with other instruments such as the WISC III and SIT-R (Erford, Vitali, & Slosson, 1999).

Group Assessment

As you learned in Chapter 1, the group intelligence movement began during World War I with over 2 million men being tested using the Army Alpha and Army Beta. The Otis Mental Ability test, today called the Otis-Lennon School Ability Test, Eighth Edition (OLSAT 8), was the first group intelligence test to be used in schools.

Today, popular **group intelligence tests**—also known as **school ability tests**—include the Cognitive Abilities Test, Form 7 (CogAT-7), InView, California Test of Mental Maturity, and Henmon-Nelson Tests of Mental Ability. In addition to schools, group intelligence tests such as the Wonderlic Personnel Test, Shipley Institute of Living Scale, and Multidimensional Aptitude Battery are used in a wide range of other settings.

Group intelligence tests can be useful when having to evaluate a large number of test takers at one time or within a limited amount time. In addition to offering efficient use of time, group testing is often less expensive than individual testing. Typically, the test administrators do not need to be as highly trained as those who give individual tests, and items are easily scored on a computer. Furthermore, the administrator of the group test may have less influence or effect on the examinee's score compared to an individually administered test. For the purposes of this chapter, we will further discuss the CogAT-7, Test of Cognitive Skills, InView, and Wonderlic Personnel Test.

Cognitive Abilities Test, Form 7 (CogAT-7)

The **Cognitive Abilities Test, Form 7 (CogAT-7)**, previously known as the CogAT-6, has recently been renormed (Lohman, 2011). The CogAT-7 is a group-administered ability test for students in kindergarten through Grade 12 that is used to assess students' general and specific abilities in reasoning and problem solving through verbal, nonverbal, and quantitative batteries. Each battery includes subtest that use three different tests. The CogAT-7

includes a Primary Battery containing Levels K, 1, and 2 used from kindergarten to Grade 2 and a Multilevel Battery containing Levels A through H to be administered to students in Grades 3 through 12. In other words, test levels are designated by age and all levels have three independent batteries (verbal, quantitative, and nonverbal). A score is provided for each battery along with a **standard age score**, percentile ranks by age and grade, and stanines by age and by grade. Age norms can be used to compare a student to other students in the same age group, while grade norms allow a student's performance to be compared to other students in the same grade. In addition, a composite or total score for all three batteries is provided. Figure 7.5 shows the three batteries and the items under each battery based on the level of the instrument.

According to the test creators, the primary uses of the CogAT scores are to develop instruction based on the abilities of students, provide an alternative measure of cognitive development, and aid in identifying students whose levels of achievement are vastly different from predicted levels of achievement (Riverside, 2002). The CogAT is normed with the **Iowa Test**. When given with one of the Iowa Tests, the CogAT can be used to determine predictive achievement as well as whether there are any discrepancies between achievement (see Chapter 8) and ability. Discrepancies may warrant further testing to rule out a learning disability. The CogAT is widely used to identify academically talented students because the instrument assesses student cognitive development, which may not be captured by grades or academic achievement alone. A short **Cognitive Abilities Test (CogAT-7) Screening Form** is also available to screen for students being considered for academically talented programs when schools cannot administer the complete CogAT. The CogAT-7 Screening Form includes one subtest from each of the three batteries.
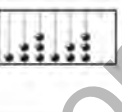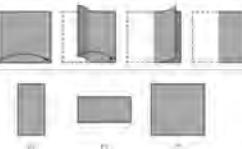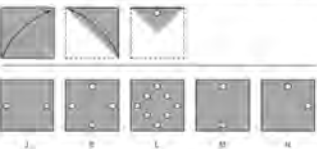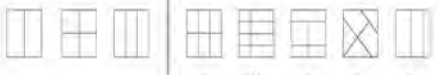
Test of Cognitive Skills (TCS/2)

The **Test of Cognitive Skills, Second Edition (TCS/2)** is a group-administered test of cognitive abilities that was originally designed to be an equivalent to the Stanford-Binet. The instrument is standardized with the **California Achievement Tests** (CAT/5) and the Terra Nova (a group grade-level achievement test). The concept of achievement, as well as the TerraNova, is discussed in more detail in Chapter 8. This instrument can be used with students in Grades 2 through 12 to measure skills and abilities that are important to academic success. A distinctive aspect of this assessment is that it is one of the few academic ability tests that measures **short-term memory**. In addition, the instrument has six test levels, and each level includes four subtests: sequences, analogies, memory, and verbal reasoning. The instrument yields scores for three cognitive factors—verbal, nonverbal, and memory—and a Cognitive Skills Index (CSI), which provides a deviation IQ score. Although this test alone does not typically meet state achievement test requirements, the TCS/2 is often used with a group test to identify children for gifted and talented programs.

InView

InView is another group intelligence test that assesses cognitive abilities in students in Grades 2 through 12. The instrument includes verbal reasoning (words and context), sequences, analogies, and quantitative reasoning. InView is standardized with the TerraNova

Figure 7.5 Three Batteries on CogAT-7

Source: Riverside (n.d.).

Third Edition to provide anticipated-achievement scores. When used with the TerraNova, one can evaluate whether students are achieving their full potential. The results from InView can help guide instruction, plan activities, highlight students' needs and strengths, and provide teachers with valuable and helpful information for parent-teacher conferences.

Wonderlic Personnel Test

The **Wonderlic Personnel Test** is often given by human resources professionals, especially in business during the hiring process to measure a potential employee's cognitive ability. The U.S. Department of Labor collaborated with the inventors of the Wonderlic to determine the cognitive ability that is needed for each occupation. A key goal of this effort was to match a potential employee with an occupation that suits his or her abilities. Thus, this instrument is not used to measure one's definitive intelligence, but instead to match the examinee with jobs that are consistent with his or her ability. The instrument is a 12-minute speed test of mental ability that includes 50 items on vocabulary, visual identification, math word problems, and brief logic statements. While the Wonderlic Personnel Test may still be given in many industrial settings, the most current version is the **Wonderlic Cognitive Ability Test**. The instrument is available in three versions: Wonderlic Cognitive Ability Pretest, Wonderlic Contemporary Cognitive Ability Test, and Wonderlic Classic Cognitive Ability Test. Guided Practice Exercise 7.5 is meant to help you further conceptualize your thoughts and perceptions of intelligence.

GUIDED PRACTICE EXERCISE 7.5

Now that we are at the end of the chapter, get out your notes that you made earlier regarding your thoughts and perceptions regarding intelligence. Get into the same small group or pair in which you had your original discussion. Now discuss your perception of intelligence once again. Did your perception of intelligence change after reading this chapter? If so, how did it change?

Current Issues and Trends in Intelligence Assessment

Since the development of the Stanford-Binet test in 1905, the assessment of intelligence has been a controversial practice. The variety of models and overall lack of consistency in describing the factors that make up the construct have complicated attempts to accurately assess intelligence. Despite these controversies, the practice of assessing intelligence remains quite popular. In this section we briefly highlight some of the current issues and trends in intelligence assessment and discuss how they may impact your future work with clients.

Defining the Target Construct

Recent researchers of intelligence assessment have noted that the contemporary methods of assessing intelligence have been found to overlap considerably with **achievement tests** (Naglieri & Goldstein, 2009). In fact, the strong correlations found between the scores

on both intelligence and achievement tests appear to suggest that the two test types may in fact be measuring the same latent ability (Rindermann, 2007). This overlap, coupled with the negative perceptions of the term *intelligence* that many people have, has led to a paradigm shift in which the construct of intelligence is being redefined. In the place of the term *intelligence* you may often see the term **cognitive ability** used. This term refers to the brain-based skills and mental processes needed to carry out any task and has more to do with the mechanisms of how you learn, remember, and pay attention rather than any actual knowledge you have learned (Latham, 2006).

Theory-Based Assessment

Unlike the industry standard instruments like the Stanford-Binet and the Wechsler scales, which are **empirically based assessments,** the new generation of assessments designed to measure intelligence and cognition are based on psychological theory (Sparrow & Davis, 2000). Examples of **theory-based assessments** include the Kaufman Assessment Battery for Children (K-ABC), the KAIT, and Naglieri's Cognitive Assessment System (CAS). Assessments such as these are moving away from focusing on producing a single IQ score. Instead, these new theory-based tests, often called **neuropsychological assessments**, emphasize the existence of multiple intelligences.

The mainstream acceptance of these instruments faces many challenges. Many practitioners and researchers believe that theories that seem to be well written and show promise in controlled settings may not hold up in actual clinical or classroom environments (Benson, 2003). In addition, many of these theoretical models have yet to fully establish operational definitions of their constructs. Despite these challenges that must be overcome, these relatively new instruments show promise and should become valuable tools counselors can use in assessing intelligence either on their own or as supplemental measures to use in conjunction with more empirically supported instruments such as the Wechsler scales.

Assessing Low-Functioning Populations

Assessing clients with intellectual disabilities (previously referred to as **mental retardation** in earlier versions of the *Diagnostic and Statistical Manual*) is a challenge for counselors using currently available assessment instruments. According to Sparrow and Davis (2000) there is a growing need for instruments capable of effectively assessing these individuals in many psychological and school-based settings. As the trend toward offering services and interventions to younger populations and those with greater needs grows, the development of instruments that can attain accurate measures of intelligence and cognitive functioning of individuals with diminished abilities will become more important. Though still a relatively new instrument, the Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998) shows promise in this area. The UNIT is a nonverbal instrument that requires no language on the part of the counselor or the client. Researchers are hopeful that nonverbal tests such as the UNIT will fill an important void in the delivery of services to lower functioning individuals (Lopez, 1997; McCallum & Bracken, 1997).

Group-Administered Tests

As the amount of time counselors have to work with clients continues to decrease, the use of group-administered tests increases. Across clinical and school-based settings alike, counselors are being asked to do more with less. **Managed care companies** are reducing the number of sessions clients receive and limiting reimbursement for many testing-related activities. In schools, counselors have multiple demands on their time that make the traditional evaluation of intelligence impractical. In response to these time constraints, group-administered intelligence tests might play an important role. While these tests are an attractive alternative, counselors should be cautioned that the evidence supporting the viability of group-administered intelligence tests is still weak. Many of the group-administered tests now available do not meet the psychometric rigors of standardization and validation of individually administered intelligence tests (Sparrow & Davis, 2000). The use of these instruments is questionable, and they should never be used as the lone measure of intelligence collected. Despite the inadequacy of current instruments, the need for quicker, more efficiently administered tests will only increase and the appeal of a viable group-administered test will continue to drive research and development in this area.

KEYSTONES

- Major theories of intelligence include Spearman's *g* Factor Approach, Cattell's Fluid and Crystallized Intelligences, Cattell-Horn-Carroll Theory, Thurstone's Primary Mental Abilities, Vernon's Hierarchical Model of Intelligence, Sternberg's Triarchic Theory, Piaget's Cognitive Development Model, Gardner's Multiple Intelligences, Emotional Intelligence, and the Information-Processing View.
- The floor of an intelligence test is the lowest level of intelligence the instrument measures, while the ceiling of an intelligence test is the highest level of intelligence the instrument measures.
- A full (overall) scale IQ is a composite score of the subtests used to define overall intelligence. Raw scores are transformed to standard scores, with most intelligence tests having a floor of 40 and a ceiling of 160 (i.e., a range of 40 to 160), a mean of 100, and a standard deviation of 15.
- Commonly used individual, standardized intelligence tests are the Stanford-Binet Intelligence Scales, 5th edition, the Wechsler Scales (WAIS-IV, WISC-IV, and WPPSI-IV), and the Kaufman Brief Intelligence Test-2nd Edition (KBIT-2).
- Two commonly normed referenced intelligence instruments that are ideal for those with language or motor ability impairments are the Universal Nonverbal Intelligence Test (UNIT) and Comprehensive Test of Nonverbal Intelligence, 2nd Edition (CTONI-2).
- Widely used group intelligence tests include the Cognitive Abilities Test, Form 7 (CogAT-7), Test of Cognitive Skills, InView, and Wonderlic Personnel Test.

KEY TERMS

achievement tests

activity-based learning

adaptation

analytic intelligence

bar-on model of emotional social intelligence

basal levels

California Achievement Tests

Cattell-Horn-Carroll (CHC) model

Cattell-Horn *Gf-Gc* model

Cognitive Abilities Test, Form 7 (CogAT-7)

Cognitive Abilities Test (CogAT-7) Screening Form

cognitive ability

Cognitive Development theory

Comprehensive Test of Nonverbal Intelligence, Second Edition (CTONI-2)

constructivist learning

contextual perception

core subtests

creative intelligence

crystallized intelligence

deviation IQ

emotional intelligence

empirically based assessments

factor-analytic theories

fluid intelligence

full scale IQ

g factor

general ability factor

General Ability Index

group intelligence tests

information-processing theories

intelligence

intelligence ceiling

intelligence floor

interactionism

interpersonal intelligence

intrapersonal intelligences

InView

Iowa Test

Kaufman Adolescent and Adult Intelligence Test (KAIT)

Kaufman Assessment Battery for Children, Second Edition (KABC-II)

Kaufman Brief Intelligence Test, Second Edition (KBIT-2)

Luria-Nebraska Neuropsychological Battery

managed care companies

mental ability model

mental retardation

mixed ability model

neuropsychological assessments

neuropsychology

nonverbal IQ

norm-referenced test

organization

practical intelligence

Primary Mental Abilities Test (PMA)

ratio IQ

routing test

schema

school ability tests

short-term memory

simultaneous processing

Slosson Intelligence Test-Primary (SIT-P)

Slosson Intelligence Test-Revised Third Edition (SIT-R3)

standard age score

Stanford-Binet Intelligence Scale

Sternberg Triarchic Abilities Test (STAT)

successive processing

supplemental subtests

Test of Cognitive Skills, Second Edition (TCS/2)

Test of Nonverbal Intelligence, Fourth Edition (TONI-4)

theory of Multiple Intelligences

theory-based assessments

Three Stratum theory

trait model of emotional social intelligence

triarchic theory of intelligence

Universal Nonverbal Intelligence Test (UNIT)

verbal IQ

Vernon's theory of intelligence

Visual Processing (Gv)

Wechsler Abbreviated Scale of Intelligence

Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV)

Wechsler Bellevue Intelligence Scale

Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV)

Wechsler Preschool and Primary Scale of Intelligence (WPPSI-IV)

Wonderlic Cognitive Ability Test

Wonderlic Personnel Test

ADDITIONAL RESOURCES

- Discovering Psychology: Testing and Intelligence

   http://www.learner.org/series/discoveringpsychology/16/e16expand.html

This website has a 27-minute video discussing the history of intelligence testing. In particular, it discusses the work of Alfred Binet and talks about the issue of bias in testing and the influence of culture. The text of the site contains an interview with Dr. Howard Gardner.

- *Ivey Business Journal.*

   http://www.iveybusinessjournal.com/topics/leadership/the-effective-leader-understanding-and-applying-emotional-intelligence#.UiKHKCqF-Y0

The *Ivey Business Journal* website has articles on other areas of psychology as it relates to succeeding in business, such as "Neuroscience and Leadership: The Promise of Insights."

- Mensa International

   http://www.mensa.org

Mensa International is an organization for people who are intellectually gifted and have high IQs. Mensa has an Education and Research Foundation and raises funds to provide scholarships to students. Mensa also has a research journal that publishes on issues related to intelligence.

- Neag Center for Gifted Education and Talent Development

  http://www.gifted.uconn.edu/nrcgt/ford5.html

This website discusses the cautions, concerns, and considerations of testing intelligence with diverse populations. It also provides resources for working with gifted and talented kids and young adults.

- Kaufman, S. B. (2009, October 25). Intelligent testing: The evolving landscape of IQ testing. *Psychology Today*.

  http://www.psychologytoday.com/blog/beautiful-minds/200910/intelligent-testing

This article discusses some criticisms and concerns of IQ testing and how the field has evolved.

- Role of Intelligence Testing in Society

  http://sitemaker.umich.edu/356.loh/modern_intelligence_testing

This website discusses modern intelligence testing but also has links to biographies of the more famous intelligence theorists such as Alfred Binet, Lewis Terman, Charles Spearman, and Howard Gardner. In addition, there are links to a discussion of intelligence testing in the past and the future as well as a link to harmful aspects of intelligence testing.

- The Performance Improvement Blog

  http://stephenjgill.typepad.com/performance_improvement_b/2007/12/un-intelligence.html

This is a blog that explores the use of intelligence testing. Join an international debate on the use of intelligence testing.

Student Study Site: Visit the Student Study Site at **www.sagepub.com/watson** to access additional study tools, including quizzes, web resources, and journal articles.