

3. Bodily/kinesthetic intelligence,
4. Interpersonal intelligence,
5. Intrapersonal intelligence,
6. Naturalistic intelligence,
7. Musical intelligence, and
8. Spatial intelligence.

Linguistic intelligence and mathematical/logical intelligence are the two intelligences assessed using standardized assessments such as the SAT or ACT, intelligence tests such as the Wechsler Adult Intelligence Scale (WAIS) and the Wechsler Intelligence Scale for Children (WISC), and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). Gardner suggested that the emphasis on linguistic and mathematical/logical abilities is one of the biases of conventional ideas about intelligence. In contrast, MI theory proposes that some abilities, such as interpersonal intelligence or naturalistic intelligence, are not as readily measurable but are still important abilities that ought to be acknowledged and nurtured to strengthen human development.

In MI theory, eight criteria must be met for a strength or ability to be considered one of the multiple intelligences: (1) in the brain, the location of an intelligence can be isolated by brain damage; (2) its evolutionary history can be traced and is plausible; (3) its core operations must be readily identifiable; (4) there is a symbol system associated with the ability (such as the alphabet in linguistic intelligence); (5) its developmental history can be traced and a set of optimal performances has been identified; (6) idiot savants, prodigies, and other extraordinary people have been identified; and both (7) experimental psychological tasks and (8) psychometrics evidence support its existence. The following sections summarize each of the eight intelligences meeting the inclusion criteria set forth by MI theory. In addition, examples of careers that are well-suited for individuals who have strengths in a given intelligence are discussed. Activities that can be used to strengthen each of the intelligences also are provided.

### Linguistic Intelligence

Linguistic intelligence is characterized by a sensitivity to languages, including the ability to learn languages and to use languages to achieve goals. It is one of the

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## MULTIPLE INTELLIGENCES

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When Howard Gardner introduced the theory of multiple intelligences (MI) in the early 1980s, he proposed a departure from the conventional view of intelligence. In MI theory, Gardner (1999) defined intelligences 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). In contrast to *g*, a measure of general intelligence that is typically assessed using standardized intelligence tests or achievement tests (such as the SAT or ACT), MI theory has delineated at least eight intelligences that all people have available to them, and use, throughout their lives. It is important to note that, although everyone has access to all of the multiple intelligences, most people have strengths in one or two particular abilities.

The eight intelligences are as follows:

1. Linguistic intelligence,
2. Mathematical/logical intelligence,

later-developing intelligences, because to be linguistically adept requires life experience. Early talkers and readers may not become linguistically gifted if their life experiences are limited. Four components comprise linguistic intelligence: phonology, syntax, semantics, and pragmatics. Linguistically intelligent people are aware of the phonetics, or sounds, of language. As a result, they usually possess an advanced verbal sense of humor—they often use language to make puns, analogies, tongue twisters, and jokes. Those with strong linguistic abilities are able to manipulate the syntax, or structure, of language. They are able to compose exceptionally structured paragraphs and may be particularly sensitive to the composition and grammar in their own and others' oral and written language. Foreign languages come easily, as do reading and memorization. The linguistically gifted tend to be sensitive to semantics, paying close attention to the subtleties of words and their meaning. They are pragmatic in their use of language; they entertain, persuade, teach, and lead through the written and spoken word. Broca's area is the region of the brain that is associated with linguistic intelligence. When Broca's area is damaged, patients are able to comprehend language but are typically unable to generate even simple sentences. In most cultures, language is subject to symbolic encoding (i.e., the alphabet and the written word), thus meeting one of MI's criteria for inclusion.

Examples of linguistically gifted people include Virginia Woolf, whose literary work *A Room of One's Own* spoke to her concerns for women's rights to financial freedom and privacy; and Mark Twain, whose humor and satire have come to characterize American literature. The career paths for linguistically gifted people include creative and scientific writing, performance in the media and onstage, politics and law, teaching at any educational level, and language translation. Activities that can be used to train linguistic intelligence include listening to recordings of famous speakers, reading one book per week, subscribing to a literary magazine, and memorizing poetry and prose.

### Mathematical/Logical Intelligence

Mathematical/logical intelligence is distinguished by the ability to solve problems logically, complete mathematical problems quickly, differentiate logical or numerical patterns, and conduct scientific inquiry. To those gifted in mathematical/logical intelligence, the problem-solving

process is typically rapid and nonverbal. Solutions often present themselves “out of the blue” and may seem to be invisible to the problem solver. Along with linguistic intelligence, mathematical/logical abilities are at the core of intelligence testing. Areas of the brain involved with mathematical/logical intelligence include the frontotemporal lobes (logic) and the parietofrontal lobes (numerical calculation). From a developmental perspective, child prodigies and savants exist, providing additional support for the inclusion of mathematical/logical intelligence in MI theory. Furthermore, Jean Piaget's work documented the developmental path of mathematical/logical abilities. Mathematical operations provide a key example of an intelligence that is subject to an encoding system.

Mathematician John Nash, who was awarded the Nobel Prize in Economics for his analysis of game theory, and astronaut Katherine Sullivan, the first woman to walk in space, are examples of people who are extraordinarily gifted in mathematical/logical intelligence. Career paths for individuals gifted in mathematical/logical intelligence include mathematics and statistics, philosophy, physics, chemistry, biochemistry, engineering, and computer programming. For those strong in mathematical/logical intelligence and linguistic intelligence, careers in scientific communications, research and teaching at the university level, and pharmaceutical drug development may be appropriate. Activities that can be used to train mathematical/logical intelligence include playing math and logic games and brain teasers, learning a computer language, and teaching math and science concepts.

### Bodily/Kinesthetic Intelligence

Bodily/kinesthetic intelligence is distinguished by the ability to expertly control one's body movements and the ability to skillfully handle objects. People who have excellent bodily/kinesthetic intelligence are able to use their hands or their bodies to create items and to solve problems. From an evolutionary perspective, the specialization of body movements has allowed humans to adapt; the development and use of tools further advances the evolution of the human species. In the brain, the motor cortex is responsible for the control of bodily movement. In right-handed people, motor control is located in the left hemisphere; in left-handed people, motor control is located in the right hemisphere. Brain damage, such as apraxia (loss of the ability to carry out movements despite having

the willingness and the ability to perform the movements), provides evidence for the existence of bodily/kinesthetic intelligence. Piaget characterized the qualities associated with this intelligence as the sensorimotor stage of cognitive development. In fact, children's body movements, such as balance, coordination, dexterity, flexibility, reflexes, strength, and expressiveness, develop according to a well-characterized schedule. Those with exceptional bodily-kinesthetic intelligence possess the ability to imagine the movement of their bodies in space and to carry out the actions in physical form.

End-state expertise of bodily-kinesthetic intelligence is illustrated by dancer and choreographer Martha Graham, a pioneer of modern dance, and by Brian Boitano, American figure skating champion. Careers suited for those with bodily-kinesthetic intelligence include actors, stunt people, comedians, dancers, horse trainers, athletes, coaches, figure skaters, and artisans. The following activities can be performed to train bodily-kinesthetic intelligence: taking lessons in a sport such as golf, swimming, gymnastics, or dance; playing charades; taking acting classes; practicing yoga; playing video games that require quick reflexes; and engaging in imagery and visualization experiences that emphasize bodily movements.

### Interpersonal Intelligence

Interpersonal intelligence is characterized by the ability to accurately evaluate the moods, intentions, thoughts, feelings, and motivations of other people. From an evolutionary perspective, interpersonal intelligence affects the ways that people interact with and sustain communities. The interpersonal qualities of leadership, teaching, and healing all take place within a social context and play a role in the survival and evolution of societies. The frontal lobe is indicated as the area of the brain involved with interpersonal intelligence. Damage to this area via injury, lobotomy, or Pick's disease (a type of dementia) results in lasting personality changes, although other problem-solving capacities are left intact. Evidence for a biological basis for interpersonal intelligence has been linked to two factors. During the prolonged childhood of primates, attachment to a mother seems to be an important aspect of normal interpersonal development. In cases when the mother figure is not present or involved with her young, normal development of primates has been shown to be compromised. Next, in

humans, social interactions such as cooperation, leadership, group cohesion, and organization have played salient roles in completing skilled tasks such as hunting, tracking, and the formation and maintenance of communities. Facial expressions, gestures, other body language, and verbal cues make up the symbol system for interpersonal intelligence.

Eminent leaders, such as civil rights activist Martin Luther King, Jr., and humanitarian Oprah Winfrey, are among those individuals who demonstrate the existence of exceptional interpersonal intelligence. Careers suited for those with interpersonal intelligence include teaching, spiritual and political leadership, sales, and acting. The following activities can be used to develop interpersonal intelligence: practice evaluating other people's moods and feelings, teach or counsel people through a volunteer service organization, go to a public place and observe how people interact, meet a new person every day, take a course that focuses on interpersonal communications, make eye contact with others during conversations, and notice people's nonverbal communication (body language) as they interact.

### Intrapersonal Intelligence

Intrapersonal intelligence is characterized by the ability to access and understand one's own internal experiences, including a range of emotions, and to draw on internal experiences as a means of making decisions about, and guiding, one's behavior. People with strong intrapersonal intelligence also have an accurate understanding of how they fit in relation to other people and have a strong sense of self. They have the ability to be both creative and intimate, and they possess the capacity to be alone. Because this particular intelligence is psychically manifested, language, music, or other creative expression is often used to describe the experiences of an intrapersonally intelligent person.

As is the case with interpersonal intelligence, the frontal lobe is involved with personality. Damage to the frontal lobe can alter personality but leave other cognitive functions intact. An individual may be irritable or euphoric in the case of damage to the lower areas of the frontal lobe; or listless, slow, and apathetic if damage occurs in the higher regions. The development of intrapersonal intelligence seems to start in early childhood, as children learn to understand their identities in the context of the world around them. A positive self-concept tends to develop when children

are nurtured and loved. Autistic individuals provide an example of those in whom intrapersonal intelligence is impaired. Although an autistic individual may not be able to refer to him- or herself, he or she typically demonstrates extraordinary abilities in mathematical/logical intelligence or in musical intelligence. Gardner acknowledges that evolutionary evidence of intrapersonal intelligence is difficult to identify. However, intrapersonal intelligence is thought to serve the purpose of assisting people to overcome or manage their basic human instincts after the need for survival has been met. As the symbol system that most closely maps to intrapersonal intelligence, dreams offer symbols that relate to aspects of the self. Finally, intrapersonal intelligence seems to play a role in the advancement of culture, as this particular ability helps people better understand themselves and perhaps proceed to make choices that benefit society.

The fourteenth Dalai Lama, Tenzin Gyatso, is the spiritual and political leader of the Tibetan people and an example of an individual with exceptional intrapersonal intelligence. Through his speeches, writings, and actions, he demonstrates an attitude of peace, harmony, and nonviolence for which he was awarded the Nobel Prize for Peace in 1989. Similarly, Mother Teresa, leader of the Missionaries of Charity Calcutta, felt she was called by God to become a missionary and eventually started an open-air school for the poorest of the poor in the slums of Calcutta. Her self-awareness and devotion to her calling provide another example of an individual with excellent intrapersonal intelligence. Because intrapersonal intelligence is expressed through other intelligences, the career paths for people with well-developed intrapersonal intelligence are varied and include spiritual and political leadership, psychology, psychotherapy, and teaching. To train intrapersonal intelligence, people can engage in counseling or psychotherapy, learn and practice meditation, keep a dream journal, and read self-help books and other inspirational books.

### Naturalistic Intelligence

Naturalistic intelligence is characterized by the ability to recognize and classify different species of flora and fauna in the environment. From an evolutionary perspective, naturalistic intelligence ensured the survival of the human species. Hunters and gatherers necessarily had to distinguish sustainable nutrients from poisonous varieties, and differentiate predators from prey.

Naturalistic intelligence has been subject to encoding and language throughout history: taxonomic and linguistic systems exist for encoding varieties of species. It is unclear which neural centers are involved in naturalistic intelligence. However, in brain-damaged patients, the ability to recognize and classify living organisms is absent, whereas the ability to name and recognize inanimate objects remains intact. The opposite case has been found as well. Some brain-damaged patients retain the ability to name and recognize living objects, whereas they cannot do the same with inanimate objects. This phenomenon provides initial support for the likelihood that abilities associated with naturalistic intelligence may be localized in the brain. Developmental evidence for naturalistic intelligence consists of the observation that children are frequently interested and involved with the identification and naming of objects in the natural world. For example, children may display an enthusiasm for dinosaurs or insects; they may be found digging in the dirt, collecting rocks, and playing in the trees. Later on, naturalistic intelligence may manifest as specific abilities in gardening, hunting and fishing, and hiking and camping, as well as involvement in environmental organizations.

Regarding end-state expertise, naturalist Charles Darwin is an example of an individual who is gifted in naturalistic intelligence. His work to identify and classify species of fossils, plants, and animals became the basis of his theory of natural selection and culminated in his seminal work *On the Origin of Species*. Primatologist Jane Goodall is another example of naturalistic intelligence in action. Goodall's research illustrates her efforts to protect and understand the complex relationships of chimpanzees. Professionally, people with naturalistic intelligence may pursue careers in gardening, environmental science, botany, entomology, veterinary medicine, viticulture (wine making), and wildlife management and preservation. Activities that can be employed to train naturalistic intelligence include spending time in the natural world, studying species of birds and other wildlife, reading magazines that focus on nature, and keeping a nature journal that details observations and questions about the natural world.

### Musical Intelligence

Musical intelligence is characterized by auditory imagery (the ability to mentally hear musical tones), and the ability to hear, recognize, and manipulate

music. From an evolutionary perspective, the use of music to unify people can be traced to Stone Age societies. The right hemisphere of the brain seems to be associated with musical perceptions and production. However, musical abilities are not clearly localized to a specific region of the brain. The presence of savants suggests that there is a biological predisposition for extreme musical abilities. Musical notation gives evidence that music is subject to an encoding system. From a developmental perspective, evidence suggests that infants can demonstrate computational abilities. Even before they are able to play musical instruments, some young children are adept with rhythm and sound, an occurrence that provides developmental evidence for musical intelligence. Later, children with musical abilities quickly master musical instruments and can demonstrate perfect pitch.

End-state expertise in musical intelligence is evidenced in child prodigies who move quickly to an advanced level of performance. For example, Mozart's musical abilities became apparent around the age of 3. By age 4, he had mastered several pieces for the piano and composed his first pieces at age 5. Midori is a contemporary example of extreme musical ability. Attracted to violin music at age 3, she was given her first violin 1 year later. Midori's first public performance as a violinist took place when she was 7 years old. Professionally, people with musical abilities may choose careers as performers, instrument tuners and instrument builders, and music educators. Musical intelligence can be developed by attending concerts and musical performances, taking music lessons, participating in a choir or band, and listening to unfamiliar genres of music.

### Spatial Intelligence

Spatial intelligence is characterized by the ability to recognize and manipulate areas of space. Specifically, people who possess spatial intelligence have the capacity to perceive the world accurately and are able to transform their initial perceptions through mental rotation. They often see things that other people miss and apply their spatial abilities to arts such as sculpture, invention, painting, photography, interior design, and architecture. Other applications of spatial intelligence include navigation, reconnaissance, and piloting aircraft. The posterior region of the right cerebral cortex is the location in the brain where spatial processing occurs. People who sustain brain damage in this region

have difficulty finding their way around a location, recognizing faces, and noticing details. Spatial intelligence contributes to the evolution of a variety of domains, from navigation to sculpture and other visual arts.

Examples of people who possess an end-state expertise in spatial intelligence include Frank Lloyd Wright, whose organic style of architecture emphasized balance between the natural world and the needs of human inhabitants, and Frieda Kahlo, noted Mexican painter, whose artistic style combines surrealism, realism, and symbolism. Careers for those with spatial intelligence include pilot, navigator, sculptor, mechanical engineer, architect, photographer, computer graphics designer, interior designer, and other careers in the visual arts. Spatial intelligence can be developed by studying geometry, learning photography, studying optical illusions, and learning navigation skills.

### Evidence for Spiritual and Existential Moral Intelligences

In the decades following the introduction of MI theory, candidate intelligences have been considered for inclusion in MI theory. The other abilities, including spiritual and existential, have been subjected to the criteria set forth in MI theory. Gardner's assessment is that none of these human abilities meets all eight of the requirements to be included as a multiple intelligence. Gardner does, however, suggest that an aspect of spirituality, namely existential intelligence, does hold up to the eight criteria fairly well. Existential intelligence is concerned with the "big questions" in life and deals with the existence of God and the meaning of life. Yet the lack of biological evidence prevents existential intelligence from being included.

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*See also* Creativity; Individual Differences; Intelligence and Intellectual Development; Intelligence Tests

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