

JUST HOW ARE YOU INTELLIGENT?

Gardner, H. (1983) *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

The heading for this chapter is an intentional play on words. The usual form of the question, "Just how intelligent *are* you?" implies that you have a certain amount of intelligence. The question here, "Just *how* are you intelligent?" is entirely unrelated to an *amount*, and is asking you instead about the nature of your particular *kinds* of intelligence. This discussion is about how many types of intelligence might exist in humans.

Many of you reading this probably have taken at least one intelligence test in your life (even if you don't remember it), and some of you may have taken several. For the most part, intelligence tests developed over the past 100 years have been designed to produce a single score. That score was called your *Intelligence Quotient* (IQ). If tests of intelligence are designed to produce a single score, a person's intelligence must also be conceptualized as a single, overall, general mental ability. That is exactly how intelligence was interpreted throughout most of the twentieth century. In fact, intelligence was often referred to as "g" for this general mental ability. Each individual's IQ score was used widely to judge, categorize, and describe people in various settings, including school, the workplace, and the military.

However, in the 1970s and 1980s, researchers began to question the validity of the unitary, "IQ-score approach" to human intelligence. Many of the tests themselves were shown to be biased in favor of certain economic classes and ethnic groups, and children's educational opportunities were often being dictated by their IQ scores alone.

As criticisms of this conceptualization of intelligence grew in number and influence, IQ tests began to be used less and less. At the same time, a new, and, at the time, radically different, view of intelligence was making its way into scientific and popular thinking about how our minds work. In stark contrast to the notion of a single, generalized intelligence, this emerging approach expanded the notion of intelligence into many *different* mental abilities, each possessing, in itself, the characteristics of a complete, "free-standing" intelligence. Howard Gardner, as the most prominent proponent of this new view of *multiple intelligences*, introduced it to the world in his 1983 book, *Frames of Mind*, which forms the basis of this chapter.

THEORETICAL PROPOSITIONS

Gardner's theory of multiple intelligences was based on much more than simply observing the various, diverse mental skills people can demonstrate. His ideas stem from his research on the structure of the brain itself. Prior to launching his work on intelligence per se, Gardner had spent most of his career studying the biology and functioning of the brain. Gardner expanded on previous research demonstrating that the human brain is not only diverse in its abilities, but is also extremely specialized in its functioning. In other words, different regions of your brain are "assigned" to carry out specific tasks related to thinking and knowing. This brain specialization may be demonstrated by observing, as Gardner has done, exactly what abilities are lost or diminished when a person experiences damage to a particular region of the brain. For example, in most people language abilities reside primarily in one section of the brain's left hemisphere, vision is centered in the occipital cortex at the rear of the brain, and one specific brain structure located at the base of the visual cortex is responsible for your ability to recognize and discriminate among human faces (see the reading on Michael Gazzaniga's split-brain research).

Carrying the theory of brain specialization a step further, Gardner contends that different parts of the human brain are responsible for different aspects of intelligence, or, more correctly, different intelligences altogether. To defend scientifically his theory of multiple intelligences, Gardner drew upon evidence from many sources and developed criteria for defining a certain set of abilities as a unique intelligence. Gardner described his sources of data as follows:

In formulating my brief on multiple intelligences, I have reviewed evidence from a large and hitherto unrelated group of sources: studies of prodigies, gifted individuals, brain-damaged patients, idiot-savants [a rare form of mental retardation or autism accompanied by extraordinary talent or ability in one or two mental areas], normal children, normal adults, experts in different lines of work, and individuals from diverse cultures. (p. 9)

METHOD

Incorporating information from all of these sources, Gardner then developed a set of eight indicators or "signs" that define an intelligence. Any intellectual ability, or set of abilities, must map onto most of these criteria, if it is to be considered a separate, autonomous intelligence:

1. *Potential isolation of the intelligence by brain damage.* Gardner contended that if a specific mental ability can be destroyed through brain damage, or if it remains relatively intact when other abilities have been destroyed, this provides convincing evidence that the ability may be a separate intelligence unto itself.
2. *The existence of savants, prodigies, and other exceptional individuals relating to the intelligence.* You are aware that certain individuals possess an extreme level of intellectual skill in one particular ability. Some mentally retarded and autistic people demonstrate "strokes of genius," and some people with normal intelligence are *prodigies*, with abilities far beyond others of their age or experience. Gardner believed that the exceptional skills of these individuals lend significant support for considering an ability as a separate intelligence.
3. *A clear set of information-processing (thinking) operations linked to the intelligence.* This refers to mental abilities that are specific to the ability under consideration. For an ability to qualify as an intelligence it must involve a specific set of mental processes, which Gardner calls *core operations*, that exist in specific areas of the brain and are triggered by certain kinds of information. Table 1 lists the core operations for the various intelligences proposed by Gardner.
4. *A distinctive developmental history of the intelligence and the potential to reach high levels of expertise.* Gardner believes that an intelligence must include a developmental path that starts with simple and basic steps and progresses through incremental milestones of increased skill levels.
5. *Evidence that the intelligence has developed through evolutionary time.* Human intelligence has evolved over millions of years as one of many adaptive mechanisms that have allowed us to survive as a species. If a particular set of abilities is to be defined as an intelligence, Gardner believed the skills involved should show evidence of evolutionary development, based on cross-cultural research, and observations of similar types of abilities in nonhuman animals (such as the "mental maps" in the rats in Tolman's research).
6. *Ability to study the intelligence with psychological experiments.* Gardner maintains that any ability proposed as an intelligence must be able to be confirmed using solid experimental techniques. An example of this might be an experiment to determine a person's speed and accuracy in a mental rotation task as a sign of spatial relationships skills. Figure 1 contains a demonstration of this task. How fast can you figure it out?
7. *Ability to measure the intelligence with existing standardized tests.* Here, Gardner was acknowledging the potential value of IQ and other tests of intelligence that had gone before. However, the value he saw was not in the tests' ability to produce a single intelligence score, but in the fact that some of the tests contain various subscales they may, in fact, measure different intelligences.
8. *Aspects of the intelligence may be represented by a system of symbols.* Finally, Gardner proposed that any human intelligence should incorporate a system of symbols. The most obvious of these, of course, are human language and math. Other examples of symbol systems include notation for musical ability and pictures for spatial skills.

In the next section we look at a summary of the intelligences Gardner proposed as part of his original theory in his 1983 book. Each intelligence he included was subjected to analysis using his eight criteria. If an ability failed to meet most of the criteria, it was rejected. Through this process of elimination, Gardner originally suggested seven distinct human intelligences, and later added an eighth.

TABLE 1 Core Operations and Famous Examples of Gardner's Eight Intelligences

INTELLIGENCE	CORE OPERATIONS	FAMOUS EXAMPLES
Linguistic	Syntax (word phrasing), phonology (the sounds speech), semantics (the meaning of words), pragmatics (word usage)	Shakespeare, J.K. Rowling, Dr. Seuss, Woody Allen
Musical	Pitch (frequency of sounds), rhythm, timbre (quality of sounds)	Mozart, Lauryn Hill, Andrea Boccelli, Paul McCartney
Logical-mathematical	Numbers, quantities, categorization, causal relations	Albert Einstein, Carl Sagan, Marie Curie, B.F. Skinner
Spatial	Accurate visualization, mental rotation and transformation of images	Picasso, Frank Lloyd Wright, Leonardo DaVinci, van Gogh
Bodily-kinesthetic	Control of one's own body, control in handling objects	Charlie Chaplin, LeBron James, Serena and Venus Williams
Interpersonal	Awareness of others' feelings, emotions, goals, motivations	Ghandi, Abraham Maslow, Oprah Winfrey
Intrapersonal	Awareness of one's own feelings, emotions, goals, motivations	Plato, Hermann Rorschach, Helen Keller, Bill Gates
Naturalist	Recognition and classification of objects in the environment; sensitivity to the natural world	Charles Darwin, Jane Goodall, Rachel Carson

RESULTS

Gardner discussed each of his original seven intelligences in detail in his 1983 book. Here, we provide brief descriptions of each intelligence, along with a few of Gardner's own words, to give you the "flavor" of the abilities involved. Additionally, Table 1 summarizes the core operations of each intelligence and provides several well-known individuals who may be seen as scoring high on the abilities that comprise each intelligence. Although Gardner does not endorse any single test for measuring multiple intelligences, many have been developed. You can try some of these yourself online simply by searching for "test of multiple intelligence."

Linguistic Intelligence. If you are high in linguistic intelligence, you are able to use words in ways that are more skillful, useful, and creative than the average person. You are able to use language to convince others of your position; you can memorize and recall detailed or complex information; you are better than most at explaining and teaching concepts and ideas to others; and you enjoy using language to talk about language itself. Gardner suggested that talented poets are good examples of individuals possessing high linguistic intelligence:

In the poet's struggles over the wording of a line or stanza, one sees at work some central aspects of linguistic intelligence. The poet must be superlatively sensitive to the shades of meanings of words and must try to preserve as many of the sought-after meanings as possible A sensitivity to the order among words, the capacity to follow the rules of grammar, and, on carefully selected occasions, to violate them. At a somewhat more sensory level—a sensitivity to the sounds, rhythms, inflections, and meters of words—that ability to make poetry even in a foreign tongue beautiful to hear. (pp. 77-78)

Musical Intelligence. You are probably already guessing some of the components of musical intelligence: gifted abilities involving sound, especially, pitch, timbre, and rhythm. Gardner claimed that this is the earliest of all intelligences to emerge. Musical child prodigies serve as examples of individuals who are "musical geniuses." Gardner points to the musical composer to illustrate musical intelligence:

[A] composer can be readily identified by the facts that he constantly has "tones in his head"—that is, he is always, somewhere near the surface of consciousness, hearing tones, rhythms, and larger musical patterns. (p. 101)

Logical-Mathematical Intelligence. This intelligence enables you to think about, analyze, and compute various relationships among abstract objects, concepts, and ideas. High levels of this intelligence may be found among mathematicians, scientists, and philosophers, but may also be present in those individuals who are obsessed with sports statistics, design computer code, or develop algorithms as a hobby:

What characterizes [this] individual is a love of dealing with abstraction The mathematician must be absolutely rigorous and perennially skeptical: no fact can be accepted unless it has been proved rigorously by steps that are derived from universally accepted first principles One obvious source of delight attends the solution of a problem that has long been considered insoluble. (pp. 138-141)

Spatial Intelligence. You would score high in spatial intelligence if you are better than most people in creating, visualizing, and manipulating mental images. These are skills that come naturally and easily to those in various visually oriented professions or avocations such as artists, sculptors, interior decorators, engineers, and architects. To be more specific, Gardner explained that spatial intelligence entails:

The ability to recognize instances of the same element; the ability to transform or to recognize a transformation of one element into another; the capacity to conjure up mental imagery and then to transform that imagery; the capacity to produce a graphic likeness of spatial information; and the like. (p. 176)

The object rotation task in Figure 1 is an example of a skill with which someone high in spatial intelligence would have very little difficulty.

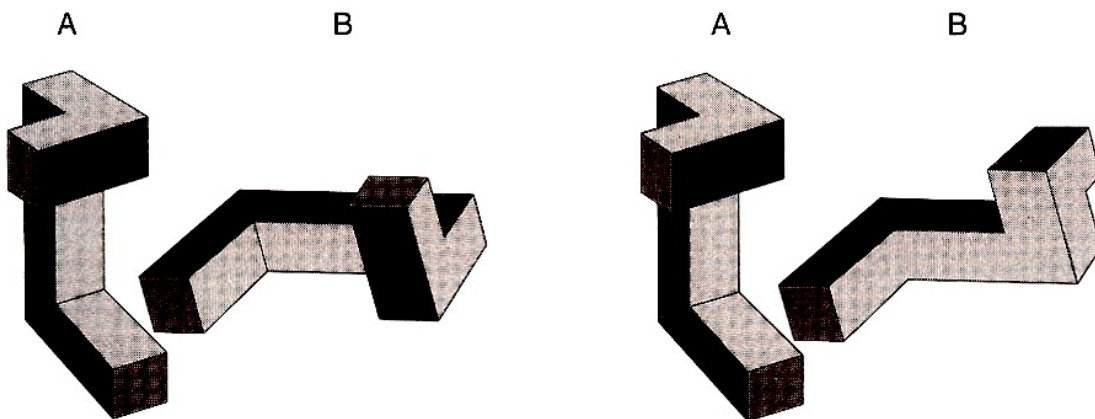


FIGURE 1 Example of Mental Rotation Task to Assess Spatial Intelligent. Are the two figures in each set the same or different?

Bodily Kinesthetic Intelligence. These abilities might be called "physical intelligence." If you are high in bodily kinesthetic intelligence, you are very aware of your own body and bodily movements and are skilled in using and controlling your body to achieve various goals or effects. As you might imagine, dancers, athletes, surgeons, potters, and many actors possess a high degree of bodily intelligence. Gardner goes on to explain:

Characteristic of such an intelligence is the ability to use one's body in highly differentiated and skilled ways, for expressive as well as goal-directed purposes . . . Characteristic as well is the capacity to work skillfully with objects, both those that involve fine motor movements of one's fingers and hands and those that exploit gross motor movements of the body. (pp. 206-207)

The next two intelligences Gardner proposed, while separate, fell into a single category that Gardner called the personal intelligences. One type of personal intelligence is focused inward, while the other is focused outward. He referred to these as *intrapersonal intelligence* and *interpersonal intelligence* respectively.

Intrapersonal Intelligence. How well do you "know yourself"? Gardner proposed that the ability to be aware of and understand who you are, your emotions, your motivations, and the sources of your actions exist in varying degrees among humans. Gardner describes a high degree of intrapersonal intelligence as follows:

The core capacity here is *access to one's own feeling life*—one's range of emotions: the capacity instantly to effect discriminations among these feelings and, eventually, to label them, to enmesh them in symbolic codes, to draw upon them as a means of understanding and guiding one's behavior. (p. 239)

Interpersonal Intelligence. This intelligence is contrasted with intrapersonal intelligence by asking "How well do you know *others*?" Interpersonal intelligence involves skills similar to those of intrapersonal intelligence, but they are outward-directed; focused on the feelings, motivations, desires, and behaviors of other people:

The core capacity here is the ability to notice and make distinctions among other individuals and, in particular, among their moods, temperaments, motivations, and intentions. In an advanced form, interpersonal knowledge permits a skilled adult to read the intentions and desires—even when these have been hidden—of many other individuals and, potentially to act upon this knowledge. (p. 239)

These, then, are the seven sets of abilities that comprised Gardner's original conceptualization of multiple intelligences. He states very clearly in *Frames of Mind* that these formed a working, and somewhat preliminary, list, and, through further study and research, other intelligences might be added or a convincing argument might be made to remove one or more of the original seven. What has happened over the years is that these seven intelligences have maintained their positions in the theory, and, as we shall see, Gardner has added an eighth intelligence.

SUBSEQUENT RESEARCH AND CRITICISMS

Gardner's theory of multiple intelligences, now often referred to as MI Theory, was immediately seized upon by educators, parents, and society in general as proof of a belief they had always held: *people are smart in different ways*. Finally, here was an explanation for those children (and adults, too) who performed poorly on tests and in some subjects in school, but were clearly exceptionally bright in other ways.

MI Theory mapped well onto growing concerns and research about learning disabilities and was largely responsible for the reformulation in education of "learning disabilities" into "learning differences." Indeed, MI Theory has exercised its greatest influence in the area of education, and Gardner's research following the publication of *Frames of Mind* focused on applying his ideas to enhancing the educational process for children and adults.

As Gardner was revisiting his original theory ten years after its original publication, he considered the possibility of other sets of abilities that might qualify as intelligences. Several candidates had been suggested to him by colleagues in various fields, such as a spiritual intelligence, a sexual intelligence, and a digital intelligence (Gardner, 2003). Although Gardner concedes that selecting a certain set of skills that qualify as an intelligence is open to different interpretations, he believed that these and many other suggestions did not meet his eight criteria adequately to be added to his MI Theory. Gardner did, however, find one additional ability that he felt clearly met the criteria for an intelligence. Gardner was asked by a colleague to describe the abilities of history's most influential biologists, and when he attempted to do so, he realized that none of the other seven intelligences fit those individuals very well. This sparked the addition of an eighth ability that he called, *naturalist intelligence*. Gardner explains

The naturalist intelligence refers to the ability to recognize and classify plants, minerals, and animals, including rocks and grass and all variety of flora and fauna. Darwin is probably the most famous example of a naturalist because he saw so deeply into the nature of living things. (quoted in Checkley, 1997)

So, currently, eight intelligences comprise Gardner's MI Theory. Over the years, Gardner has suggested two additional possibilities: *spiritual intelligence* and *existential intelligence*, but has not yet determined that these meet his criteria adequately to be added fully to the list of intelligences. Since the 1983 release of *Frames of Mind*, Gardner has published numerous books and articles refining his theory and applying it in relevant educational

settings. Indeed, MI Theory has been applied in educational settings, especially K-12, more than in any other learning or thinking environment. Only one year after the publication of *Frames of Mind*, the *Key School* in Indianapolis had begun redesigning their curriculum completely around MI theory, and today most schools incorporate the theory to varying degrees.

Although MI Theory is an extremely popular approach to human intelligence and has found widespread support in various research and educational domains, it has certainly not gone uncriticized. New, influential theories that challenge long-standing views in any science are typically targets for intense controversy within the field. MI Theory has been no different. One common objection to MI Theory suggests that Gardner's eight intelligences are not really separate intelligences, but rather merely describe different "thinking styles," all of which may be seen as existing within earlier unified intelligence views discussed at the beginning of this reading (Morgan, 1996). Another criticism contends that the theory contains embedded contradictions that make it too ambiguous to be valid (Klein, 1998). Moreover, Klein contends, because of its ambiguity, MI Theory can be molded "conveniently" to explain virtually any cognitive activity, rendering it impossible to prove or disprove. Finally, some researchers have argued that not enough rigorous scientific research has been done to demonstrate the validity of the intelligences and the effectiveness of applying MI Theory in real world settings. These critics suggest, if future research finds that MI Theory is not a valid or effective tool, a great deal of time and effort will have been wasted and learning thought to have been taking place, in reality, was not (Collins, 1998). These and other criticisms notwithstanding, MI Theory continues to influence strongly the field of human intelligence.

RECENT APPLICATIONS

Between 2000 and the middle of 2003, as this edition was being prepared, approximately 70 scientific articles cited Gardner's book, *Frames of Mind*. If we extend this search to include his other books and articles relating to MI Theory, the number of citations approaches several hundred. Clearly, Gardner's work in this area continues to have a powerful and widespread impact on research and thinking about learning and intelligence. To give you an idea of the diverse applications of MI Theory, here is a brief description of just two of these recent applications.

A cross-cultural study of Gardner's seven intelligences compared British and Iranian students' self-ratings and rating of parents' levels of each intelligence (Furnham et al., 2002). Some of the most interesting findings were (a) Iranian students rated themselves lower in logical-mathematical intelligence, but higher in spatial, musical, and intrapersonal intelligence than did the British students; (b) Iranians perceived their fathers' mathematical and spatial intelligence to be lower, but their fathers' interpersonal and intrapersonal intelligence to be higher than did the British students; (c) the Iranian students rated their mothers' level of intelligence *lower* than did the British students on all but one (intrapersonal) of the seven intelligences; and (d) the Iranians rated their brothers *higher* than the British on all but one scale (mathematical).

Another fascinating study relating Gardner's theory to Sandra Bem's research on androgyny found that people's estimates of their own intelligence was linked to their gender identity (Rammstedt & Rammsayer, 2002). Researchers asked subjects to estimate their own level on various intelligences, and also complete the *Bem Sex Role Inventory* measuring their level of masculinity, femininity, and androgyny. Not only were gender differences found for the logical-mathematical intelligence (masculine) versus musical intelligences (feminine), but also the males' degree of self-perceived masculinity, femininity, or androgyny significantly influenced their estimates of their own level of various intelligences.

CONCLUSION

Gardner's MI Theory has survived over two decades and shows no signs of fading from view. Whether the ideas of the theory continue to grow in importance and influence or are overshadowed by new conceptualizations of intelligence remains to be seen. Whatever its future, however, one point is certain: MI Theory has changed forever how the world looks at learning, teaching, and intelligence. However, Gardner himself cautions that MI Theory is a means to an end and should not be an end in itself:

Educational goals should reflect one's own values, and these can never come simply or directly from a scientific theory. Once one reflects on one's educational values and states one's goals, however, then the putative existence of our multiple intelligences can prove very helpful. And, in particular, if one's educational goals encompass disciplinary understanding, then it is possible to mobilize our several intelligences to help achieve that lofty goal. ... I have come to realize that once one releases an idea into

the world, one cannot completely control its behavior-anymore than one can control those products of our genes called children. Put succinctly, MI has and will have a life of its own, over and above what I might wish for it, my most widely known intellectual offspring. (Gardner, 2002)

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