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***A Man Can Conceal Another,* by Max Ernst**

A Multiplicity of Intelligences

Rather than having just an intelligence defined by IQ, humans are better thought of as having eight, maybe nine, kinds of intelligences, including musical, spatial and kinesthetic

by Howard Gardner

As a psychologist, I was surprised by the huge public interest in *The Bell Curve,* the 1994 book on human intelligence by the late Harvard University psychologist Richard J. Herrnstein and policy analyst Charles Murray. Most of the ideas in the book were familiar not only to social scientists but also to the general public. Indeed, educational psychologist Arthur R. Jensen of the University of California at Berkeley as well as Herrnstein had written popularly about the very same ideas in the late 1960s and the early 1970s. Perhaps, I reasoned, every quarter-century a new generation of Americans desires to be acquainted with "the psychologist's orthodoxy" about intelligence—namely, that there is a single, general intelligence, often called *g,* which is reflected by an individual's intelligence quotient, or IQ.

This concept stands in contrast to my own view developed over the past decades: that human intelligence encompasses a far wider, more universal set of competences. Currently I count eight intelligences, and there may be more. They include what are traditionally regarded as intelligences, such as linguistic and logical-mathematical abilities, but also some that are not conventionally thought of in that way, such as musical and spatial capacities. These intelligences, which do not always reveal themselves in paper-and-pencil tests, can serve as a basis for more effective educational methods.

Defining Brainpower

The orthodox view of a single intelligence, widely, if wrongly, accepted today in the minds of the general population, originated from the energies and convictions of a few researchers, who by the second decade of this century had put forth its major precepts. In addition to its basic assumption, the orthodoxy also states that individuals are born with a certain intelligence or potential intelligence, that this intelligence is difficult to change and that psychologists can assess one's IQ using short-answer tests and, perhaps, other "purer" measures, such as the time it takes to react to a sequence of flashing lights or the presence of a particular pattern of brain waves.

Soon after this idea had been proposed—I like to call it "hedgehog orthodoxy"—more "foxlike" critics arose. From outside psychology, commentators such as American newspaper columnist Walter Lippmann challenged the criteria used to assess intelligence, contending that it was more complex and less fixed than the psychometricians had proposed.

From within psychology, scientists questioned the notion of a single, overarching intelligence. According to their analyses, intelligence is better thought of as a set of several factors. In the 1930s Louis L. Thurstone of the University of Chicago said it makes more sense to think of seven, largely independent "vectors of the mind." In the 1960s Joy P. Guilford of the University of Southern California enunciated 120 factors, later amended to 150. Scottish investigator Godfrey Thomson of the University of Edinburgh spoke around the 1940s of a large number of loosely coupled faculties. And in our own day, Robert J. Sternberg of Yale University has proposed a triarchic theory of intellect. These arches comprise a component that deals with standard computational skill, a component that is sensitive to contextual factors and a component that is involved with novelty.

Somewhat surprisingly, all these commentators—

whether in favor of or opposed to the notion of single intelligence—share one conviction. They all believe that the nature of intelligence will be determined by testing and analyzing the data thus secured. Perhaps, reason orthodox defenders like Herrnstein and Murray, performance on a variety of tests will yield a strong general factor of intelligence. And indeed, there is evidence for such a "positive manifold," or high correlation, across tests. Perhaps, counter pluralists like Thurstone and Sternberg, the right set of tests will demonstrate that the mind consists of a number of relatively independent factors, with strength in one area failing to predict strength or weakness in other areas.

But where is it written that intelligence needs to be determined on the basis of tests? Were we incapable of making judgments about intellect before Sir Francis Galton and Alfred Binet cobbled together the first set of psychometric items a century ago? If the dozens of IQ tests in use around the world were suddenly to disappear, would we no longer be able to assess intellect?

Break from Orthodoxy

Nearly 20 years ago, posing these very questions, I embarked on quite a different path into the investigation of intellect. I had been conducting research primarily with two groups: children who were talented in one or more art form and adults who had suffered from strokes that compromised specific capacities while sparing others. Every day I saw individuals with scattered profiles of strengths and weaknesses, and I was impressed by the fact that a strength or a deficit could cohabit comfortably with distinctive profiles of abilities and disabilities across the variety of humankind.

On the basis of such data, I arrived at a firm intuition: human beings are better thought of as possessing a number of relatively independent faculties, rather than as having a certain amount of intellectual horsepower, or IQ, that can be simply channeled in one or another direction. I decided to search for a better formulation of human intelligence. I defined an intelligence as "a psychobiological potential to solve problems or to fashion products that are valued in at least one cultural context." In my focus on fashioning products and cultural values, I departed from orthodox psychometric approaches, such as those adopted by Herrnstein, Murray and their predecessors.

Criteria for an Intelligence

1. *Potential isolation by brain damage.* For example, linguistic abilities can be compromised or spared by strokes.

2. *The existence of prodigies, savants and other exceptional individuals.* Such individuals permit the intelligence to be observed in relative isolation.

3. *An identifiable core operation or set of operations.* Musical intelligence, for instance, consists of a person's sensitivity to melody, harmony, rhythm, timbre and musical structure.

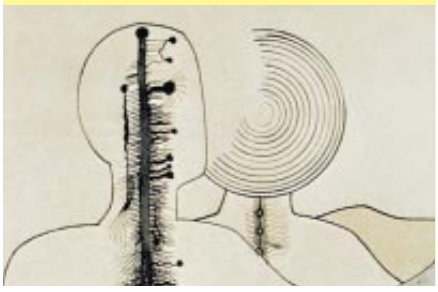
4. *A distinctive developmental history within an individual, along with a definable nature of expert performance.* One examines the skills of, say, an expert athlete, salesperson or naturalist, as well as the steps to attaining such expertise.

5. *An evolutionary history and evolutionary plausibility.* One can examine forms of spatial intelligence in mammals or musical intelligence in birds.

6. *Support from tests in experimental psychology.* Researchers have devised tasks that specifically indicate which skills are related to one another and which are discrete.

7. *Support from psychometric findings.* Batteries of tests reveal which tasks reflect the same underlying factor and which do not.

8. *Susceptibility to encoding in a symbol system.* Codes such as language, arithmetic, maps and logical expression, among others, capture important components of respective intelligences.



To proceed from an intuition to a definition of a set of human intelligences, I developed criteria that each of the candidate intelligences had to meet [*see box at left*]. These criteria were drawn from several sources:

• Psychology: The existence of a distinct developmental history for a capacity through which normal and gifted individuals pass as they grow to adulthood; the existence of correlations (or the lack of correlations) between certain capacities.

• Case studies of learners: Observations of unusual humans, including prodigies, savants or those suffering from learning disabilities.

• Anthropology: Records of how different abilities are developed, ignored or prized in different cultures.

• Cultural studies: The existence of symbol systems that encode certain kinds of meanings—language, arithmetic and maps, for instance.

• Biological sciences: Evidence that a capacity has a distinct evolutionary history and is represented in particular neural structures. For instance, various parts of the left hemisphere dominate when it comes to motor control of the body, calculation and linguistic ability; the right hemisphere houses spatial and musical capacities, including the discrimination of pitch.

The Eight Intelligences

Armed with the criteria, I considered many capacities, ranging from those based in the senses to those having to do with planning, humor and even sexuality. To the extent that a candidate ability met all or most of the criteria handily, it gained plausibility as an intelligence. In 1983 I concluded that seven abilities met the criteria sufficiently well: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic (as exemplified by athletes, dancers and other physical performers), interpersonal (the ability to read other people's moods, motivations and other mental states), and intrapersonal (the ability to access one's own feelings and to draw on them to guide behavior). The last two can generally be considered together as the basis for emotional intelligence (although in my version, they focus more on cognition and understanding than on feelings). Most standard measures of intelligence primarily probe linguistic and logical intelligence; some survey spatial intelligence. The other

four are almost entirely ignored. In 1995, invoking new data that fit the criteria, I added an eighth intelligence—that of the naturalist, which permits the recognition and categorization of natural objects. Examples are Charles Darwin, John James Audubon and Rachel Carson. I am currently considering the possibility of a ninth: existential intelligence, which captures the human proclivity to raise and ponder fundamental questions about existence, life, death, finitude. Religious and philosophical thinkers such as the Dalai Lama and Søren A. Kierkegaard exemplify this kind of ability. Whether existential intelligence gets to join the inner sanctum depends on whether convincing evidence accrues about the neural basis for it.

The theory of multiple intelligences (or MI theory, as it has come to be called) makes two strong claims. The first is that all humans possess all these intelligences: indeed, they can collectively be considered a definition of *Homo sapiens,* cognitively speaking. The second claim is that just as we all look different and have unique personalities and temperaments, we also have different profiles of intelligences. No two individuals, not even identical twins or clones, have exactly the same amalgam of profiles, with the same strengths and weaknesses. Even in the case of identical genetic heritage, individuals undergo different experiences and seek to distinguish their profiles from one another.

Within psychology, the theory of multiple intelligences has generated controversy. Many researchers are nervous about the movement away from standardized tests and the adoption of a set of criteria that are unfamiliar and less open to quantification. Many also balk at the use of the word "intelligence" to describe some of the abilities, preferring to define musical or bodily-kinesthetic intelligences as talents. Such a narrow definition, however, devalues those capacities, so that orchestra conductors and dancers are talented but not smart. In my view, it would be all right to call those abilities talents, so long as logical reasoning and linguistic facility are then also termed talents.

Some have questioned whether MI theory is empirical. This criticism, however, misses the mark. MI theory is based completely on empirical evidence. The number of intelligences, their delineation, their subcomponents are all subject to alteration in the light of new findings. Indeed, the existence of the naturalist intelligence could be asserted only after evidence had accrued that parts of the temporal lobe are dedicated to the naming and recognition of natural things, whereas others are attuned to human-made objects. (Good evidence for a neural foundation comes from clinical literature, which reported instances in which brain-damaged individuals lost the capacity to identify living things but could still name inanimate objects. Experimental findings by Antonio R. Damasio of the University of Iowa, Elizabeth Warrington of the Dementia Research Group at National Hospital in London and others have confirmed the phenomenon.)

Much of the evidence for the personal intelligences has come from research in the past decade on emotional intelligence and on the development in children of a "theory of mind"—the realization that human beings have intentions and act on the basis of these intentions. And the intriguing finding by Frances H. Rauscher of the University of Wisconsin–Oshkosh and her colleagues of the "Mozart effect"—that early musical experiences may enhance spatial capacities—raises the possibility that musical and spatial intelligences draw on common abilities.

All humans possess all these intelligences: indeed, they can collectively be considered a definition of *Homo sapiens,* cognitively speaking.

It is also worth noting that the movement toward multiple intelligences is quite consistent with trends in related sciences. Neuroscience recognizes the modular nature of the brain; evolutionary psychology is based on the notion that different capacities have evolved in specific environments for specific purposes; and artificial intelligence increasingly embraces expert systems rather than general problem-solving mechanisms. Within science, the believers in a single IQ or general intelligence are increasingly isolated, their positions more likely to be embraced by those, like Herrnstein and Murray, who have an ideological ax to grind.

If some psychologists expressed skepticism about the theory of multiple intelligences, educators around the world have embraced it. MI theory not only comports with their intuitions that children are smart in different ways; it also holds out hope that more students can be reached more effectively if their favored ways of knowing are taken into account in curriculum, instruction and assessment. A virtual cottage industry has arisen to create MI schools, classrooms, curricula, texts, computer systems and the like. Most of this work is well intentioned, and some of it has proved quite effective in motivating students and in giving them a sense of involvement in intellectual life.

Various misconceptions, however, have arisen: for example, that every topic should be taught in seven or eight ways or that the purpose of school is to identify (and broadcast) students' intelligences, possibly by administering an octet of new standardized tests. I have begun to speak out against some of these less advisable beliefs and practices.

My conclusion is that MI theory is best thought of as a tool rather than as an educational goal. Educators need to determine, in conjunction with their communities, the goals that they are seeking. Once these goals have been articulated, then MI theory can provide powerful support. I believe schools should strive to develop individuals of a certain sort—civic-minded, sensitive to the arts, deeply rooted in the disciplines. And schools should probe pivotal topics with sufficient depth so that students end up with a comprehensive understanding of them. Curricular and assessment approaches founded on MI theory, such as Project Spectrum at the Eliot-Pearson Preschool at Tufts University, have demonstrated considerable promise in helping schools to achieve these goals.

The Future of MI

Experts have debated various topics in intelligence—including whether there is one or more—for nearly a century, and it would take a brave seer to predict that these debates will disappear. (In fact, if past cycles repeat themselves, a latter-day Herrnstein and Murray will author their own *Bell Curve* around 2020.) As the person most closely associated with the theory of multiple intelligences, I record three wishes for this line of work.

The first is a broader but not infinitely expanded view of intelligence. It is high time that intelligence be widened to incorporate a range of human computational capacities, including those that deal with music, other persons and skill in deciphering the natural world.

A Sampling of Intelligences

The examples of each intelligence are meant for illustrative purposes only and are not exclusive—one person can excel in several categories. Note also that entire cultures might encourage the development of one or another intelligence; for instance, the seafaring Puluwat of the Caroline Islands in the South Pacific cultivate spatial intelligence and excel at navigation, and the Manus children of New Guinea learn the canoeing and swimming skills that elude the vast majority of seafaring Western children.

Maya Angelou

1. LINGUISTIC

A mastery and love of language and words with a desire to explore them.

Poets, writers, linguists: T. S. Eliot, Noam Chomsky, W. H. Auden

Paul Erdös

2. LOGICAL-MATHEMATICAL

Confronting and assessing objects and abstractions and discerning their relations and underlying principles.

Mathematicians, scientists, philosophers: Stanislaw Ulam, Alfred North Whitehead, Henri Poincaré, Albert Einstein, Marie Curie

Joni Mitchell

3. MUSICAL

A competence not only in composing and performing pieces with pitch, rhythm and timbre but also in listening and discerning. May be related to other intelligences, such as linguistic, spatial or bodily-kinesthetic.

Composers, conductors, musicians, music critics: Ludwig van Beethoven, Leonard Bernstein, Midori, John Coltrane

Frida Kahlo

4. SPATIAL

An ability to perceive the visual world accurately, transform and modify perceptions and re-create visual experiences even without physical stimuli.

Architects, artists, sculptors, mapmakers, navigators, chess players: Michelangelo, Frank Lloyd Wright, Garry Kasparov, Louise Nevelson, Helen Frankenthaler

Alvin Ailey

5. BODILY-KINESTHETIC

Controlling and orchestrating body motions and handling objects skillfully.

Dancers, athletes, actors: Marcel Marceau, Martha Graham, Michael Jordan

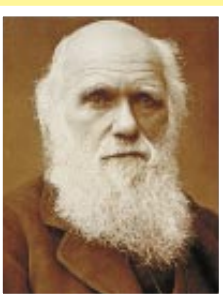
Margaret Mead

6. and 7. PERSONAL INTELLIGENCES

Accurately determining moods, feelings and other mental states in oneself (intrapersonal intelligence) and in others (interpersonal) and using the information as a guide for behavior.

Psychiatrists, politicians, religious leaders, anthropologists: Sigmund Freud, Mahatma Gandhi, Eleanor Roosevelt

Charles Darwin

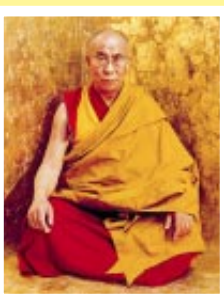


8. NATURALIST

Recognizing and categorizing natural objects.

Biologists, naturalists: Rachel Carson, John James Audubon

Dalai Lama



9. EXISTENTIAL

(possible intelligence): Capturing and pondering the fundamental questions of existence. More evidence, however, is needed to determine whether this is an intelligence.

Spiritual leaders, philosophical thinkers: Jean-Paul Sartre, Søren A. Kierkegaard

EMILE WAMSTEKER *AP Photo* (Angelou); GEORGE CSICSERY, from the documentary film *N Is a Number: A Portrait of Paul Erdös* (Erdös); HENRY DILTZ *Corbis* (Mitchell); ART RESOURCE (*Self-Portrait with a Monkey*, 1940) (Kahlo); NORMAND MAXON *Alvin Ailey American Dance Theater* (Ailey); APA/ARCHIVE PHOTOS (Mead); POPPERFOTO/ARCHIVE PHOTOS (Darwin); MICHAEL O'NEIL *Outline* (Dalai Lama)

But it is important that intelligence not be conflated with other virtues, such as creativity, wisdom or morality.

I also contend that intelligence should not be so broadened that it crosses the line from description to prescription. I endorse the notion of emotional intelligence when it denotes the capacity to compute information about one's own or others' emotional life. When the term comes to encompass the kinds of persons we hope to develop, however, then we have crossed the line into a value system—and that should not be part of our conception of intelligence. Thus, when psychologist and *New York Times* reporter Daniel Goleman emphasizes in his recent best-seller, *Emotional Intelligence,* the importance of empathy as part of emotional intelligence, I go along with him. But he also urges that individuals care for one another. The possession of the capacity to feel another's suffering is not the same as the decision to come to her aid. Indeed, a sadistic individual might use her knowledge of another's psyche to inflict pain.

My second wish is that society shift away from standardized, short-answer proxy instruments to real-life demonstrations or virtual simulations. During a particular historical period, it was perhaps necessary to assess individuals by administering items that were themselves of little interest (for example, repeating numbers backward) but that were thought to correlate with skills or habits of importance. Nowadays, however, given the advent of computers and virtual technologies, it is possible to look directly at individuals' performances—to see how they can argue, debate, look at data, critique experiments, execute works of art, and so on. As much as possible, we should train students directly in these valued activities, and we should assess how they carry out valued performances under realistic conditions. The need for ersatz instruments, whose relation to real-world performance is often tenuous at best, should wane.

My third wish is that the multiple-intelligences idea be used for more effective pedagogy and assessment. I have little sympathy with educational efforts that seek simply to "train" the intelligences or to use them in trivial ways (such as singing the math times tables or playing Bach in the background while one is doing geometry). For me, the educational power of multiple intelligences is exhibited when these faculties are drawn on to help students master consequential disciplinary materials.

It is high time that the view of intelligence be widened to incorporate a range of human computational capacities.

I explain how such an approach might work in my book, *A Well-Disciplined Mind*, which will appear in the spring of 1999. I focus on three rich topics: the theory of evolution (as an example of scientific truth), the music of Mozart (as an example of artistic beauty), and the Holocaust (as an example of immorality in recent history). In each case, I show how the topic can be introduced to students through a variety of entry points drawing on several intelligences, how the subject can be made more familiar through the use of analogies and metaphors drawn from diverse domains, and how the core ideas of the topic can be captured not merely through a single symbolic language but rather through a number of complementary model languages or representations.

Pursuing this approach, the individual who understands evolutionary theory, for instance, can think of it in different ways: in terms of a historical narrative, a logical syllogism, a quantitative examination of the size and dispersion of populations in different niches, a diagram of species delineation, a dramatic sense of the struggle among individuals (or genes or populations), and so on. The individual who can think of evolution in only one way—using only one model language—actually has only a tenuous command of the principal concepts of the theory.

The issue of who owns intelligence has been an important one in our society for some time—and it promises to be a crucial and controversial one for the foreseeable future. For too long, the rest of society has been content to leave intelligence in the hands of psychometricians. Often these test makers have a narrow, overly scholastic view of intellect. They rely on a set of instruments that are destined to valorize certain capacities while ignoring those that do not lend themselves to ready formulation and testing. And those with a political agenda often skirt close to the dangerous territory of eugenics.

MI theory represents at once an effort to base the conception of intelligence on a much broader scientific basis, one that offers a set of tools to educators that will allow more individuals to master substantive materials in an effective way. Applied appropriately, the theory can also help each individual achieve his or her human potential at the workplace, in avocations and in the service of the wider world. SA

About the Author

HOWARD GARDNER is pure Harvard. He started his career as a student there in 1961 and went on to complete a Ph.D. and a postdoctoral fellowship at Harvard Medical School. Now Gardner is a professor of education and co-director of Harvard's Project Zero—an umbrella project that encompasses some two dozen different studies related to cognition and creativity. At one time a serious pianist, Gardner has always been involved in the arts. His interest in psychology and the arts led him to do postdoctoral work in neurology, studying how artists and musicians are affected after a stroke. At Project Zero, Gardner met his wife, Ellen Winner, who was studying children's understanding of metaphor. Gardner has four children, all of whom are somehow involved in the arts—one plays piano, another plays bass, one is a photographer and the oldest is an arts administrator.

Gardner has written several books on multiple-intelligences theory and other topics, including *Frames of Mind*, *The Mind's New Science* and *The Unschooled Mind*. Ironically, the popular misinterpretation of his MI theory has inspired Gardner to study ethics. "I've learned that when you develop ideas, you have to have a certain sense of responsibility for how they're used," he says.

COURTESY OF HOWARD GARDNER