HOWARD GARDNER

A Rounded Version: The Theory of Multiple Intelligences

HOWARD GARDNER (b. 1943), professor of education and adjunct professor of psychology at Harvard University, is codirector of Harvard's Project Zero, a program dedicated to improving education in schools by emphasizing creativity in thinking and problem solving. By emphasizing the arts and the newer electronic technologies associated with learning, the program cultivates a "culture of thinking" in the classroom as opposed to a culture of rote learning. Gardner has received a MacArthur Foundation award (1981), which supported his research for five years, and has won a number of important awards in the field of education, including the Grawemeyer Award in Education (1990), given for the first time to an American. Among his many books are *Leading Minds: An Anatomy of Leadership* (1995) and *Extraordinary Minds: Portraits of Exceptional Individuals and an Examination of Our Extraordinariness* (1997).

Perhaps the most important and best-known product of Project Zero is the theory of multiple intelligences, which Gardner first published in *Frames of Mind* (1983). (His more recent book, *Intelligence Reframed: Multiple Intelligence for the 21st Century* [1999], offers a revisitation and more detailed elaboration on multiple intelligence theory and its application.) In *Frames of Mind*, he noted that the general attitude toward intelligence centers on the IQ (intelligence quotient) test that Alfred Binet (1857–1911) devised. Binet believed that intelligence is measurable and that IQ tests result in numerical scores that are reliable indicators of a more or less permanent basic intelligence. Gardner offered several objections to that view. One

From *Multiple Intelligences: The Theory in Practice.*

was that IQ predictors might point to achievement in schools and colleges but not necessarily to achievement in life. For example, students with middling scores performed at extraordinary levels in business, politics, and other walks of life, whereas high-achieving students often settled for middling careers. The reports on high-performing executives indicated a considerable intelligence at work, but it was not necessarily the kind of intelligence that could be measured by the Binet tests.

Gardner also was intrigued by findings that local regions of the brain controlled specific functions of the mind. For example, studies had established that certain regions of the brain were specialized for language functions, whereas others were specialized for physical movement, music, mathematics, and other skills. When those portions of the brain suffered damage, as with stroke or accident, the functions for which they were specialized were adversely affected. These observations, which were plentiful in the work of neurologists during and after World War II, led Gardner to propose the existence of a variety of intelligences rather than only one.

As he explains in the following essay from his book *Multiple Intelligences: The Theory in Practice* (1993), his studies led him to propose seven distinct intelligences. The first is linguistic, which naturally includes language. This intelligence applies not only to learning languages but also to using language well—as, for example, in the case of poets and writers. The second is logical-mathematical, which refers to the applications of mathematics and of logical reasoning. Our society uses these verbal-mathematical forms of intelligence as the practical measure of intelligence: the SATs, for instance, depend almost entirely on measuring these forms.

Gardner adds five more forms of intelligence. Spatial intelligence concerns the ways in which we perceive and imagine spatial relations. Some people, such as architects and sculptors, are clearly more gifted than others at imagining space. Musical intelligence is seen as distinct from other forms of intelligence if only because some people, such as child prodigies, are apparently born with superior musical abilities. Bodily-kinesthetic intelligence shows up in dancers and athletes, like Mikhail Barishnikov and the late Jackie Joyner-Kersee, who perform extraordinarily with their bodies. But bodily-kinesthetic intelligence also applies to detailed physical work, such as the manipulations necessary for the work of surgeons, dentists, and craftspeople, such as weavers, potters, metalworkers, and jewelers.

Finally, Gardner also defines two kinds of personal intelligence that are difficult to isolate and study but that he feels must be regarded as forms of intelligence. Interpersonal intelligence concerns the way we get along with other people. People with a high interpersonal intelligence might be salespeople, teachers, politicians, or evangelists. They respond to others and are sensitive to their needs and their concerns. They understand cooperation, compromise, and respect for other people's views. The second kind of personal intelligence—intrapersonal—refers to how one understands oneself. The self-knowledge to recognize one's strengths and weaknesses and to avoid an inflated sense of self-importance constitutes a high degree of intrapersonal intelligence.

Gardner sees all these intelligences working together in the individual. As he says, when one of them dominates, the individual can appear freakish, as the person with autism who easily multiplies huge numbers in his head but cannot relate to other human beings. Because the individual must nurture all these intelligences to develop into a complete person, Gardner is working to revise educational practices to reflect all varieties of intelligence.

Greeks in the time of Plato and Aristotle seem to have understood much of what Gardner says. They included music and dance, for example, in the curriculum of their schools. They developed linguistic and interpersonal skills in the teaching of rhetoric and made logic and mathematics central to their teaching. One of Socrates' most famous statements, in fact—"Know thyself"—admonishes us to develop intrapersonal intelligence.

Gardner's Rhetoric

Rather than open the essay by describing the multiple intelligences, Gardner starts with a dramatic scene and a hypothetical story. He describes two eleven-year-old children who take an IQ test and then are regarded in special ways by their teachers: one is expected to do well in school, the other is expected to do less well. The expectations are met. But years later the student with the lower IQ is vastly more successful in business than the student who scored higher. Why is this so? The rest of the essay answers that implied rhetorical question.

One of the most important devices Gardner relies on is enumeration. He has seven different kinds of intelligence to discuss and takes each one in turn. The reader is not aware of a special range of importance to the seven forms of intelligence: the first, musical intelligence, is not necessarily the most important or the first to be recognized in an individual. Bodily-kinesthetic is not necessarily less important because it comes after musical intelligence. By placing logical-mathematical intelligence in the middle of the sequence, Gardner suggests that this form of intelligence, which our society traditionally treats as first in importance, should take its place beside a range of intelligences that are all more or less equal in value.

Just as important as the use of enumeration is Gardner's use of parallelism in the structure of each of the intelligences he enumerates. For each he offers a subhead that identifies the specific intelligence and then a "sketch with a thumbnail biography" that helps establish the nature of the intelligence. Then Gardner discusses the details of each intelligence and suggests ways in which it may relate to other forms of intelligence. This method has the advantage of extreme clarity. Likewise, paralleling examples and quotations in describing each intelligence makes the point over and over and ultimately produces a convincing argument without the appearance of argument.

Gardner makes another important rhetorical decision regarding the size and nature of the paragraphs. Modern readers, conditioned by newspapers and magazines, expect paragraphs to be short and direct. Gardner's paragraphs reflect a decision to communicate with a general reading audience rather than an audience of specialists or specially educated readers. For that reason, a single subject may sometimes be discussed in two or more adjacent paragraphs, with the paragraph break acting as a "breather" (see paras. 19–20 and 22–23).

All these rhetorical devices aid the reader in absorbing complex material. Gardner's primary efforts in this essay are to facilitate communication. He keeps his language simple, his sentences direct, and his paragraphs brief. For the modern reader, this is a recipe for understanding.

PREREADING QUESTIONS: WHAT TO READ FOR

The following prereading questions may help you anticipate key issues in the discussion on Howard Gardner's "A Rounded Version: The Theory of Multiple Intelligences." Keeping them in mind during your first reading of the selection should help focus your reactions.

- What constitutes an intelligence, according to Gardner?
- What is the most compelling evidence for the theory of multiple intelligences?

A Rounded Version: The Theory of Multiple Intelligences

Coauthored by Joseph Walters

Two eleven-year-old children are taking a test of "intelligence." They sit at their desks laboring over the meanings of different words, the interpretation of graphs, and the solutions to arithmetic problems. They record their answers by filling in small circles on a single piece of paper. Later these completed answer sheets are scored objectively: the number of right answers is converted into a standardized score that compares the individual child with a population of children of similar age. 1

The teachers of these children review the different scores. They notice that one of the children has performed at a superior level; on all sections of the test, she answered more questions correctly than did her peers. In fact, her score is similar to that of children three to four years older. The other child's performance is average—his scores reflect those of other children his age. 2

A subtle change in expectations surrounds the review of these test scores. Teachers begin to expect the first child to do quite well during her formal schooling, whereas the second should have only moderate success. Indeed these predictions come true. In other words, the test taken by the eleven-year-olds serves as a reliable predictor of their later performance in school. 3

How does this happen? One explanation involves our free use of the word "intelligence": the child with the greater "intelligence" has the ability to solve problems, to find the answers to specific questions, and to learn new material quickly and efficiently. These skills in turn play a central role in school success. In this view, "intelligence" is a singular faculty that is brought to bear in any problem-solving situation. Since schooling deals largely with solving problems of various sorts, predicting this capacity in young children predicts their future success in school. 4

"Intelligence," from this point of view, is a general ability that is found in varying degrees in all individuals. It is the key to success in solving problems. This ability can be measured reliably with standardized pencil-and-paper tests that, in turn, predict future success in school. 5

What happens after school is completed? Consider the two individuals in the example. Looking further down the road, we find that the "average" student has become a highly successful mechanical 6 engineer who has risen to a position of prominence in both the professional community of engineers as well as in civic groups in his community. His success is no fluke—he is considered by all to be a talented individual. The "superior" student, on the other hand, has had little success in her chosen career as a writer; after repeated rejections by publishers, she has taken up a middle management position in a bank. While certainly not a "failure," she is considered by her peers to be quite "ordinary" in her adult accomplishments. So what happened?

This fabricated example is based on the facts of intelligence testing. IQ tests predict school performance with considerable accuracy, but they are only an indifferent predictor of performance in a profession after formal schooling.[1] Furthermore, even as IQ tests measure only logical or logical-linguistic capacities, in this society we are nearly "brain-washed" to restrict the notion of intelligence to the capacities used in solving logical and linguistic problems. 7

To introduce an alternative point of view, undertake the following "thought experiment." Suspend the usual judgment of what constitutes intelligence and let your thoughts run freely over the capabilities of humans—perhaps those that would be picked out by the proverbial Martian visitor. In this exercise, you are drawn to the brilliant chess player, the world-class violinist, and the champion athlete; such outstanding performers deserve special consideration. Under this experiment, a quite different view of *intelligence* emerges. Are the chess player, violinist, and athlete "intelligent" in these pursuits? If they are, then why do our tests of "intelligence" fail to identify them? If they are not "intelligent," what allows them to achieve such astounding feats? In general, why does the contemporary construct "intelligence" fail to explain large areas of human endeavor? 8

In this chapter we approach these problems through the theory of multiple intelligences (MI). As the name indicates, we believe that human cognitive competence is better described in terms of a set of abilities, talents, or mental skills, which we call "intelligences." All normal individuals possess each of these skills to some extent; individuals differ in the degree of skill and in the nature of their combination. We believe this theory of intelligence may be more humane and more veridical than alternative views of intelligence and that it more adequately reflects the data of human "intelligent" behavior. Such a theory has important educational implications, including ones for curriculum development. 9

[1] Jencks, C. (1972). *Inequality*. New York: Basic Books. [Gardner's note]

What Constitutes an Intelligence?

The question of the optimal definition of intelligence looms large in our inquiry. Indeed, it is at the level of this definition that the theory of multiple intelligences diverges from traditional points of view. In a traditional view, intelligence is defined operationally as the ability to answer items on tests of intelligence. The inference from the test scores to some underlying ability is supported by statistical techniques that compare responses of subjects at different ages; the apparent correlation of these test scores across ages and across different tests corroborates the notion that the general faculty of intelligence, g, does not change much with age or with training or experience. It is an inborn attribute or faculty of the individual. 10

Multiple intelligences theory, on the other hand, pluralizes the traditional concept. An intelligence entails the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community. The problem-solving skill allows one to approach a situation in which a goal is to be obtained and to locate the appropriate route to that goal. The creation of a *cultural* product is crucial to such functions as capturing and transmitting knowledge or expressing one's views or feelings. The problems to be solved range from creating an end for a story to anticipating a mating move in chess to repairing a quilt. Products range from scientific theories to musical compositions to successful political campaigns. 11

MI theory is framed in light of the biological origins of each problem-solving skill. Only those skills that are universal to the human species are treated. Even so, the biological proclivity to participate in a particular form of problem solving must also be coupled with the cultural nurturing of that domain. For example, language, a universal skill, may manifest itself particularly as writing in one culture, as oratory in another culture, and as the secret language of anagrams in a third. 12

Given the desire of selecting intelligences that are rooted in biology, and that are valued in one or more cultural settings, how does one actually identify an "intelligence"? In coming up with our list, we consulted evidence from several different sources: knowledge about normal development and development in gifted individuals; information about the breakdown of cognitive skills under conditions of brain damage; studies of exceptional populations, including prodigies, idiots savants, and autistic children; data about the evolution of cognition over the millennia; cross-cultural accounts of cognition; psychometric studies, including examinations of correlations among tests; and psychological training studies, particularly measures of transfer and generalization across tasks. Only those candi- 13 date intelligences that satisfied all or a majority of the criteria were selected as bona fide intelligences. A more complete discussion of each of these criteria for an "intelligence" and the seven intelligences that have been proposed so far, is found in *Frames of Mind*.[2] This book also considers how the theory might be disproven and compares it to competing theories of intelligence.

14 In addition to satisfying the aforementioned criteria, each intelligence must have an identifiable core operation or set of operations. As a neutrally based computational system, each intelligence is activated or "triggered" by certain kinds of internally or externally presented information. For example, one core of musical intelligence is the sensitivity to pitch relations, whereas one core of linguistic intelligence is the sensitivity to phonological features.

15 An intelligence must also be susceptible to encoding in a symbol system—a culturally contrived system of meaning, which captures and conveys important forms of information. Language, picturing, and mathematics are but three nearly worldwide symbol systems that are necessary for human survival and productivity. The relationship of a candidate intelligence to a human symbol system is no accident. In fact, the existence of a core computational capacity anticipates the existence of a symbol system that exploits that capacity. While it may be possible for an intelligence to proceed without an accompanying symbol system, a primary characteristic of human intelligence may well be its gravitation toward such an embodiment.

The Seven Intelligences

16 Having sketched the characteristics and criteria of an intelligence, we turn now to a brief consideration of each of the seven intelligences. We begin each sketch with a thumbnail biography of a person who demonstrates an unusual facility with that intelligence. These biographies illustrate some of the abilities that are central to the fluent operation of a given intelligence. Although each biography illustrates a particular intelligence, we do not wish to imply that in adulthood intelligences operate in isolation. Indeed, except for abnormal individuals, intelligences always work in concert, and any sophisticated adult role will involve a melding of several of them. Following each biography we survey the various sources of data that support each candidate as an "intelligence."

[2] Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences*. New York: Basic Books. [Gardner's note]

Musical Intelligence

When he was three years old, Yehudi Menuhin was smuggled into the San Francisco Orchestra concerts by his parents. The sound of Louis Persinger's violin so entranced the youngster that he insisted on a violin for his birthday and Louis Persinger as his teacher. He got both. By the time he was ten years old, Menuhin was an international performer.[3]

17 Violinist Yehudi Menuhin's musical intelligence manifested itself even before he had touched a violin or received any musical training. His powerful reaction to that particular sound and his rapid progress on the instrument suggest that he was biologically prepared in some way for that endeavor. In this way evidence from child prodigies supports our claim that there is a biological link to a particular intelligence. Other special populations, such as autistic children who can play a musical instrument beautifully but who cannot speak, underscore the independence of musical intelligence.

18 A brief consideration of the evidence suggests that musical skill passes the other tests for an intelligence. For example, certain parts of the brain play important roles in perception and production of music. These areas are characteristically located in the right hemisphere, although musical skill is not as clearly "localized," or located in a specifiable area, as language. Although the particular susceptibility of musical ability to brain damage depends on the degree of training and other individual differences, there is clear evidence for "amusia" or loss of musical ability.

19 Music apparently played an important unifying role in Stone Age (Paleolithic) societies. Birdsong provides a link to other species. Evidence from various cultures supports the notion that music is a universal faculty. Studies of infant development suggest that there is a "raw" computational ability in early childhood. Finally, musical notation provides an accessible and lucid symbol system.

20 In short, evidence to support the interpretation of musical ability as an "intelligence" comes from many different sources. Even though musical skill is not typically considered an intellectual skill like mathematics, it qualifies under our criteria. By definition it deserves consideration; and in view of the data, its inclusion is empirically justified.

Bodily-Kinesthetic Intelligence

Fifteen-year-old Babe Ruth played third base. During one game his team's pitcher was doing very poorly and Babe loudly criticized him from third base. Brother Mathias, the coach, called out,

[3] Menuhin, Y. (1977). *Unfinished Journey*. New York: Knopf. [Gardner's note]

> "Ruth, if you know so much about it, YOU pitch!" Babe was surprised and embarrassed because he had never pitched before, but Brother Mathias insisted. Ruth said later that at the very moment he took the pitcher's mound, he KNEW he was supposed to be a pitcher and that it was "natural" for him to strike people out. Indeed, he went on to become a great major league pitcher (and, of course, attained legendary status as a hitter).[4]

21 Like Menuhin, Babe Ruth was a child prodigy who recognized his "instrument" immediately upon his first exposure to it. This recognition occurred in advance of formal training.

22 Control of bodily movement is, of course, localized in the motor cortex, with each hemisphere dominant or controlling bodily movements on the contra-lateral side. In right-handers, the dominance for such movement is ordinarily found in the left hemisphere. The ability to perform movements when directed to do so can be impaired even in individuals who can perform the same movements reflexively or on a nonvoluntary basis. The existence of specific *apraxia* constitutes one line of evidence for a bodily-kinesthetic intelligence.

23 The evolution of specialized body movements is of obvious advantage to the species, and in humans this adaptation is extended through the use of tools. Body movement undergoes a clearly defined developmental schedule in children. And there is little question of its universality across cultures. Thus it appears that bodily-kinesthetic "knowledge" satisfies many of the criteria for an intelligence.

24 The consideration of bodily-kinesthetic knowledge as "problem solving" may be less intuitive. Certainly carrying out a mime sequence or hitting a tennis ball is not solving a mathematical equation. And yet, the ability to use one's body to express an emotion (as in a dance), to play a game (as in a sport), or to create a new product (as in devising an invention) is evidence of the cognitive features of body usage. The specific computations required to solve a particular bodily-kinesthetic *problem,* hitting a tennis ball, are summarized by Tim Gallwey:

> At the moment the ball leaves the server's racket, the brain calculates approximately where it will land and where the racket will intercept it. This calculation includes the initial velocity of the ball, combined with an input for the progressive decrease in

[4] Connor, A. (1982). *Voices from Cooperstown.* New York: Collier. (Based on a quotation taken from *The Babe Ruth Story*, Babe Ruth & Bob Considine. New York: Dutton, 1948.) [Gardner's note]

> velocity and the effect of wind and after the bounce of the ball. Simultaneously, muscle orders are given: not just once, but constantly with refined and updated information. The muscles must cooperate. A movement of the feet occurs, the racket is taken back, the face of the racket kept at a constant angle. Contact is made at a precise point that depends on whether the order was given to hit down the line or cross-court, an order not given until after a split-second analysis of the movement and balance of the opponent.
>
> To return an average serve, you have about one second to do this. To hit the ball at all is remarkable and yet not uncommon. The truth is that everyone who inhabits a human body possesses a remarkable creation.[5]

25 ***Logical-Mathematical Intelligence.*** In 1983 Barbara McClintock won the Nobel Prize in medicine or physiology for her work in microbiology. Her intellectual powers of deduction and observation illustrate one form of logical-mathematical intelligence that is often labeled "scientific thinking." One incident is particularly illuminating. While a researcher at Cornell in the 1920s McClintock was faced one day with a problem: while *theory* predicted 50-percent pollen sterility in corn, her research assistant (in the "field") was finding plants that were only 25- to 30-percent sterile. Disturbed by this discrepancy, McClintock left the cornfield and returned to her office, where she sat for half an hour, thinking:

> Suddenly I jumped up and ran back to the (corn) field. At the top of the field (the others were still at the bottom) I shouted "Eureka, I have it! I know what the 30% sterility is!" . . . They asked me to prove it. I sat down with a paper bag and a pencil and I started from scratch, which I had not done at all in my laboratory. It had all been done so fast; the answer came and I ran. Now I worked it out step by step—it was an intricate series of steps—and I came out with [the same result]. [They] looked at the material and it was exactly as I'd said it was; it worked out exactly as I had diagrammed it. Now, why did I know, without having done it on paper? Why was I so sure?[6]

26 This anecdote illustrates two essential facts of the logical-mathematical intelligence. First, in the gifted individual, the process of problem solving is often remarkably rapid—the successful scientist copes with many variables at once and creates numerous

[5] Gallwey, T. (1976). *Inner Tennis.* New York: Random House. [Gardner's note]

[6] Keller, E. (1983). *A Feeling for the Organism* (p. 104). Salt Lake City: W. H. Freeman. [Gardner's note]

hypotheses that are each evaluated and then accepted or rejected in turn.

The anecdote also underscores the *nonverbal* nature of the intel- 27
ligence. A solution to a problem can be constructed *before* it is articulated. In fact, the solution process may be totally invisible, even to the problem solver. This need not imply, however, that discoveries of this sort—the familiar "Aha!" phenomenon—are mysterious, intuitive, or unpredictable. The fact that it happens more frequently to some people (perhaps Nobel Prize winners) suggests the opposite. We interpret this as the work of theological-mathematical intelligence.

Along with the companion skill of language, logical-mathemati- 28
cal reasoning provides the principal basis for IQ tests. This form of intelligence has been heavily investigated by traditional psychologists, and it is the archetype of "raw intelligence" or the problem-solving faculty that purportedly cuts across domains. It is perhaps ironic, then, that the actual mechanism by which one arrives at a solution to a logical-mathematical problem is not as yet properly understood.

This intelligence is supported by our empirical criteria as well. 29
Certain areas of the brain are more prominent in mathematical calculation than others. There are idiots savants who perform great feats of calculation even though they remain tragically deficient in most other areas. Child prodigies in mathematics abound. The development of this intelligence in children has been carefully documented by Jean Piaget and other psychologists.

Linguistic Intelligence

> At the age of ten, T. S. Eliot created a magazine called "Fireside" to which he was the sole contributor. In a three-day period during his winter vacation, he created eight complete issues. Each one included poems, adventure stories, a gossip column, and humor. Some of this material survives and it displays the talent of the poet.[7]

As with the logical intelligence, calling linguistic skill an "intelli- 30
gence" is consistent with the stance of traditional psychology. Linguistic intelligence also passes our empirical tests. For instance, a specific area of the brain, called "Broca's Area," is responsible for the production of grammatical sentences. A person with damage to this

[7] Soldo, J. (1982). Jovial juvenilia: T. S. Eliot's first magazine. *Biography*, 5, 25–37. [Gardner's note]

area can understand words and sentences quite well but has difficulty putting words together in anything other than the simplest of sentences. At the same time, other thought processes may be entirely unaffected.

The gift of language is universal, and its development in chil- 31
dren is strikingly constant across cultures. Even in deaf populations where a manual sign language is not explicitly taught, children will often "invent" their own manual language and use it surreptitiously! We thus see how an intelligence may operate independently of a specific input modality or output channel.

Spatial Intelligence

> Navigation around the Caroline Islands in the South Seas is accomplished without instruments. The position of the stars, as viewed from various islands, the weather patterns, and water color are the only sign posts. Each journey is broken into a series of segments; and the navigator learns the position of the stars within each of these segments. During the actual trip the navigator must envision mentally a reference island as it passes under a particular star and from that he computes the number of segments completed, the proportion of the trip remaining, and any corrections in heading that are required. The navigator cannot *see* the islands as he sails along; instead he maps their locations in his mental "picture" of the journey.[8]

Spatial problem solving is required for navigation and in the use 32
of the notational system of maps. Other kinds of spatial problem solving are brought to bear in visualizing an object seen from a different angle and in playing chess. The visual arts also employ this intelligence in the use of space.

Evidence from brain research is clear and persuasive. Just as the 33
left hemisphere has, over the course of evolution, been selected as the site of linguistic processing in right-handed persons, the right hemisphere proves to be the site most crucial for spatial processing. Damage to the right posterior regions causes impairment of the ability to find one's way around a site, to recognize faces or scenes, or to notice fine details.

Patients with damage specific to regions of the right hemisphere 34
will attempt to compensate for their spacial deficits with linguistic strategies. They will try to reason aloud, to challenge the task, or

[8] Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences*. New York: Basic Books. [Gardner's note]

even make up answers. But such nonspatial strategies are rarely successful.

35 Blind populations provide an illustration of the distinction between the spatial intelligence and visual perception. A blind person can recognize shapes by an indirect method: running a hand along the object translates into length of time of movement, which in turn is translated into the size of the object. For the blind person, the perceptual system of the tactile modality parallels the visual modality in the seeing person. The analogy between the spatial reasoning of the blind and the linguistic reasoning of the deaf is notable.

36 There are few child prodigies among visual artists, but there are idiots savants such as Nadia.[9] Despite a condition of severe autism, this preschool child made drawings of the most remarkable representational accuracy and finesse.

37 ***Interpersonal Intelligence.*** With little formal training in special education and nearly blind herself, Anne Sullivan began the intimidating task of instructing a blind and deaf seven-year-old Helen Keller. Sullivan's efforts at communication were complicated by the child's emotional struggle with the world around her. At their first meal together, this scene occurred:

> Annie did not allow Helen to put her hand into Annie's plate and take what she wanted, as she had been accustomed to do with her family. It became a test of wills—hand thrust into plate, hand firmly put aside. The family, much upset, left the dining room. Annie locked the door and proceeded to eat her breakfast while Helen lay on the floor kicking and screaming, pushing and pulling at Annie's chair. [After half an hour] Helen went around the table looking for her family. She discovered no one else was there and that bewildered her. Finally, she sat down and began to eat her breakfast, but with her hands. Annie gave her a spoon. Down on the floor it clattered, and the contest of wills began anew.[10]

38 Anne Sullivan sensitively responded to the child's behavior. She wrote home: "The greatest problem I shall have to solve is how to discipline and control her without breaking her spirit. I shall go rather slowly at first and try to win her love."

[9] Selfe, L. (1977). *Nadia: A Case of Extraordinary Drawing in an Autistic Child.* New York: Academic Press. [Gardner's note]

[10] Lash, J. (1980). *Helen and Teacher: The Story of Helen Keller and Anne Sullivan Macy* (p. 52). New York: Delacorte. [Gardner's note]

39 In fact, the first "miracle" occurred two weeks later, well before the famous incident at the pumphouse. Annie had taken Helen to a small cottage near the family's house, where they could live alone. After seven days together, Helen's personality suddenly underwent a profound change—the therapy had worked:

> My heart is singing with joy this morning. A miracle has happened! The wild little creature of two weeks ago has been transformed into a gentle child.[11]

40 It was just two weeks after this that the first breakthrough in Helen's grasp of language occurred; and from that point on, she progressed with incredible speed. The key to the miracle of language was Anne Sullivan's insight into the *person* of Helen Keller.

41 Interpersonal intelligence builds on a core capacity to notice distinctions among others; in particular, contrasts in their moods, temperaments, motivations, and intentions. In more advanced forms, this intelligence permits a skilled adult to read the intentions and desires of others, even when these have been hidden. This skill appears in a highly sophisticated form in religious or political leaders, teachers, therapists, and parents. The Helen Keller–Anne Sullivan story suggests that this interpersonal intelligence does not depend on language.

42 All indices in brain research suggest that the frontal lobes play a prominent role in interpersonal knowledge. Damage in this area can cause profound personality changes while leaving other forms of problem solving unharmed—a person is often "not the same person" after such an injury.

43 Alzheimer's disease, a form of presenile dementia, appears to attack posterior brain zones with a special ferocity, leaving spatial, logical, and linguistic computations severely impaired. Yet, Alzheimer's patients will often remain well groomed, socially proper, and continually apologetic for their errors. In contrast, Pick's disease, another variety of presenile dementia that is more frontally oriented, entails a rapid loss of social graces.

44 Biological evidence for interpersonal intelligence encompasses two additional factors often cited as unique to humans. One factor is the prolonged childhood of primates, including the close attachment to the mother. In those cases where the mother is removed from early development, normal interpersonal development is in serious jeopardy. The second factor is the relative importance in humans of social interaction. Skills such as hunting, tracking, and

[11] Lash (p. 54). [Gardner's note]

killing in prehistoric societies required participation and cooperation of large numbers of people. The need for group cohesion, leadership, organization, and solidarity follows naturally from this.

Intrapersonal Intelligence. In an essay called "A Sketch of the 45
Past," written almost as a diary entry, Virginia Woolf discusses the "cotton wool of existence"—the various mundane events of life. She contrasts this "cotton wool" with three specific and poignant memories from her childhood: a fight with her brother, seeing a particular flower in the garden, and hearing of the suicide of a past visitor:

> These are three instances of exceptional moments. I often tell them over, or rather they come to the surface unexpectedly. But now for the first time I have written them down, and I realize something that I have never realized before. Two of these moments ended in a state of despair. The other ended, on the contrary, in a state of satisfaction.
>
> The sense of horror (in hearing of the suicide) held me powerless. But in the case of the flower, I found a reason; and was thus able to deal with the sensation. I was not powerless.
>
> Though I still have the peculiarity that I receive these sudden shocks, they are now always welcome; after the first surprise, I always feel instantly that they are particularly valuable. And so I go on to suppose that the shock-receiving capacity is what makes me a writer. I hazard the explanation that a shock is at once in my case followed by the desire to explain it. I feel that I have had a blow; but it is not, as I thought as a child, simply a blow from an enemy hidden behind the cotton wool of daily life; it is or will become a revelation of some order; it is a token of some real thing behind appearances; and I make it real by putting it into words.[12]

This quotation vividly illustrates the intrapersonal intelligence— 46
knowledge of the internal aspects of a person: access to one's own feeling life, one's range of emotions, the capacity to effect discriminations among these emotions and eventually to label them and to draw upon them as a means of understanding and guiding one's own behavior. A person with good intrapersonal intelligence has a viable and effective model of himself or herself. Since this intelligence is the most private, it requires evidence from language, music, or some other more expressive form of intelligence if the observer is to detect it at work. In the above quotation, for example, linguistic intelligence is drawn upon to convey intrapersonal knowledge; it embodies the

[12] Woolf, V. (1976). *Moments of Being* (pp. 69–70). Sussex: The University Press. [Gardner's note]

interaction of intelligences, a common phenomenon to which we will return later.

We see the familiar criteria at work in the intrapersonal intelli- 47
gence. As with the interpersonal intelligence, the frontal lobes play a central role in personality change. Injury to the lower area of the frontal lobes is likely to produce irritability or euphoria; while injury to the higher regions is more likely to produce indifference, listlessness, slowness, and apathy—a kind of depressive personality. In such "frontal-lobe" individuals, the other cognitive functions often remain preserved. In contrast, among aphasics who have recovered sufficiently to describe their experiences, we find consistent testimony: while there may have been a diminution of general alertness and considerable depression about the condition, the individual in no way felt himself to be a different person. He recognized his own needs, wants, and desires and tried as best he could to achieve them.

The autistic child is a prototypical example of an individual 48
with impaired intrapersonal intelligence; indeed, the child may not even be able to refer to himself. At the same time, such children often exhibit remarkable abilities in the musical, computational, spatial, or mechanical realms.

Evolutionary evidence for an intrapersonal faculty is more diffi- 49
cult to come by, but we might speculate that the capacity to transcend the satisfaction of instinctual drives is relevant. This becomes increasingly important in a species not perennially involved in the struggle for survival.

In sum, then, both interpersonal and intrapersonal faculties pass 50
the tests of an intelligence. They both feature problem-solving endeavors with significance for the individual and the species. Interpersonal intelligence allows one to understand and work with others; intrapersonal intelligence allows one to understand and work with oneself. In the individual's sense of self, one encounters a melding of inter- and intrapersonal components. Indeed, the sense of self emerges as one of the most marvelous of human inventions—a symbol that represents all kinds of information about a person and that is at the same time an invention that all individuals construct for themselves.

Summary: The Unique Contributions of the Theory

As human beings, we all have a repertoire of skills for solving 51
different kinds of problems. Our investigation has begun, therefore, with a consideration of these problems, the contexts they are found

in, and the culturally significant products that are the outcome. We have not approached "intelligence" as a reified[13] human faculty that is brought to bear in literally any problem setting; rather, we have begun with the problems that humans *solve* and worked back to the "intelligences" that must be responsible.

52 Evidence from brain research, human development, evolution, and cross-cultural comparisons was brought to bear in our search for the relevant human intelligences: a candidate was included only if reasonable evidence to support its membership was found across these diverse fields. Again, this tack differs from the traditional one: since no candidate faculty is *necessarily* an intelligence, we could choose on a motivated basis. In the traditional approach to "intelligence," there is no opportunity for this type of empirical decision.

53 We have also determined that these multiple human faculties, the intelligences, are to a significant extent *independent*. For example, research with brain-damaged adults repeatedly demonstrates that particular faculties can be lost while others are spared. This independence of intelligences implies that a particularly high level of ability in one intelligence, say mathematics, does not require a similarly high level in another intelligence, like language or music. This independence of intelligences contrasts sharply with traditional measures of IQ that find high correlations among test scores. We speculate that the usual correlations among subtests of IQ tests come about because all of these tasks in fact measure the ability to respond rapidly to items of a logical-mathematical or linguistic sort; we believe that these correlations would be substantially reduced if one were to survey in a contextually appropriate way the full range of human problem-solving skills.

54 Until now, we have supported the fiction that adult roles depend largely on the flowering of a single intelligence. In fact, however, nearly every cultural role of any degree of sophistication requires a combination of intelligences. Thus, even an apparently straightforward role, like playing the violin, transcends a reliance on simple musical intelligence. To become a successful violinist requires bodily-kinesthetic dexterity and the interpersonal skills of relating to an audience and, in a different way, choosing a manager; quite possibly it involves an intrapersonal intelligence as well. Dance requires skills in bodily-kinesthetic, musical, interpersonal, and spatial intelligences in varying degrees. Politics requires an interpersonal skill, a linguistic facility, and perhaps some logical aptitude.

[13] **reified** Regarding an abstraction (e.g., intelligence) as if it were a concrete thing.

Inasmuch as nearly every cultural role requires several intelligences, it becomes important to consider individuals as a collection of aptitudes rather than as having a singular problem-solving faculty that can be measured directly through pencil-and-paper tests. Even given a relatively small number of such intelligences, the diversity of human ability is created through the differences in these profiles. In fact, it may well be that the "total is greater than the sum of the parts." An individual may not be particularly gifted in any intelligence; and yet, because of a particular combination or blend of skills, he or she may be able to fill some niche uniquely well. Thus it is of paramount importance to assess the particular combination of skills that may earmark an individual for a certain vocational or avocational niche.

QUESTIONS FOR CRITICAL READING

1. In the heading preceding paragraph 10, Gardner asks, "What Constitutes an Intelligence?" After reading this essay, how would you answer that question? How effectively does Gardner answer it?
2. What is the relation of culture to intelligence? See paragraph 11.
3. Why does society value logical-mathematical intelligence so highly? Do you feel it is reasonable to do so? Why?
4. What relationship do you see between intelligence and problem solving? What relationship do you see between education and problem solving?
5. Do you think that education can enhance these seven forms of intelligence? What evidence can you cite that intelligence is not fixed but can be altered by experience?
6. Why is it important "to assess the particular combination of skills that may earmark an individual" (para. 54)?

SUGGESTIONS FOR WRITING

1. Gardner says that his theory of MI (multiple intelligences) was shaped by his observations of "the biological origins of each problem-solving skill" (para. 12). Why is this important to his theory? How has he connected each of the intelligences to a biological origin? What biological issues are not fully accounted for in the theory of multiple intelligences?
2. In which of these seven forms of intelligence do you excel? Describe your achievements in these forms by giving specific examples that help your reader relate your abilities to the intelligences you have cited.

Now that you have identified your primary intelligences, what implications do they suggest for your later life?

3. Gardner is keenly interested in reforming education in light of his theory of multiple intelligences. How could education be altered to best accommodate seven forms of intelligence? What would be done differently in schools? Who would benefit from the differences you propose? How would society in general benefit from those differences?
4. Describe a problem-solving situation that requires two or more of the intelligences that Gardner describes. If possible, draw your example from your own experience or the experience of someone you know. Describe how the several intelligences work together to help solve the problem.
5. In some discussions of the forms of intelligence, commentators add an eighth—the naturalist's ability to recognize fine distinctions and patterns in the natural world. What might be the biological origin for that intelligence? In what cultural context might that intelligence be crucial? Do you feel that there is such an intelligence as represented by the naturalist or that it is included in other forms of intelligence?
6. **CONNECTIONS** What relationship do you see between Plato's discussion of the soul and Gardner's discussion of intelligence? See paragraphs 41–55 in Plato. Which of Gardner's intelligences does Socrates seem to favor in Plato's dialogue?
7. **CONNECTIONS** Which writers in this section of the book could best adapt Gardner's theories to their own? Consider Plato's discussion of the cave and the implied limits of knowledge. What are the limits of the seven intelligences? How might Karen Horney have used Gardner's theories to explain the different ways in which the sexes regard each other? Do the different sexes excel in different forms of intelligence? How might Gardner or Horney defend or argue against such a view? Might Francis Crick use Gardner's theories to suggest different forms of consciousness?