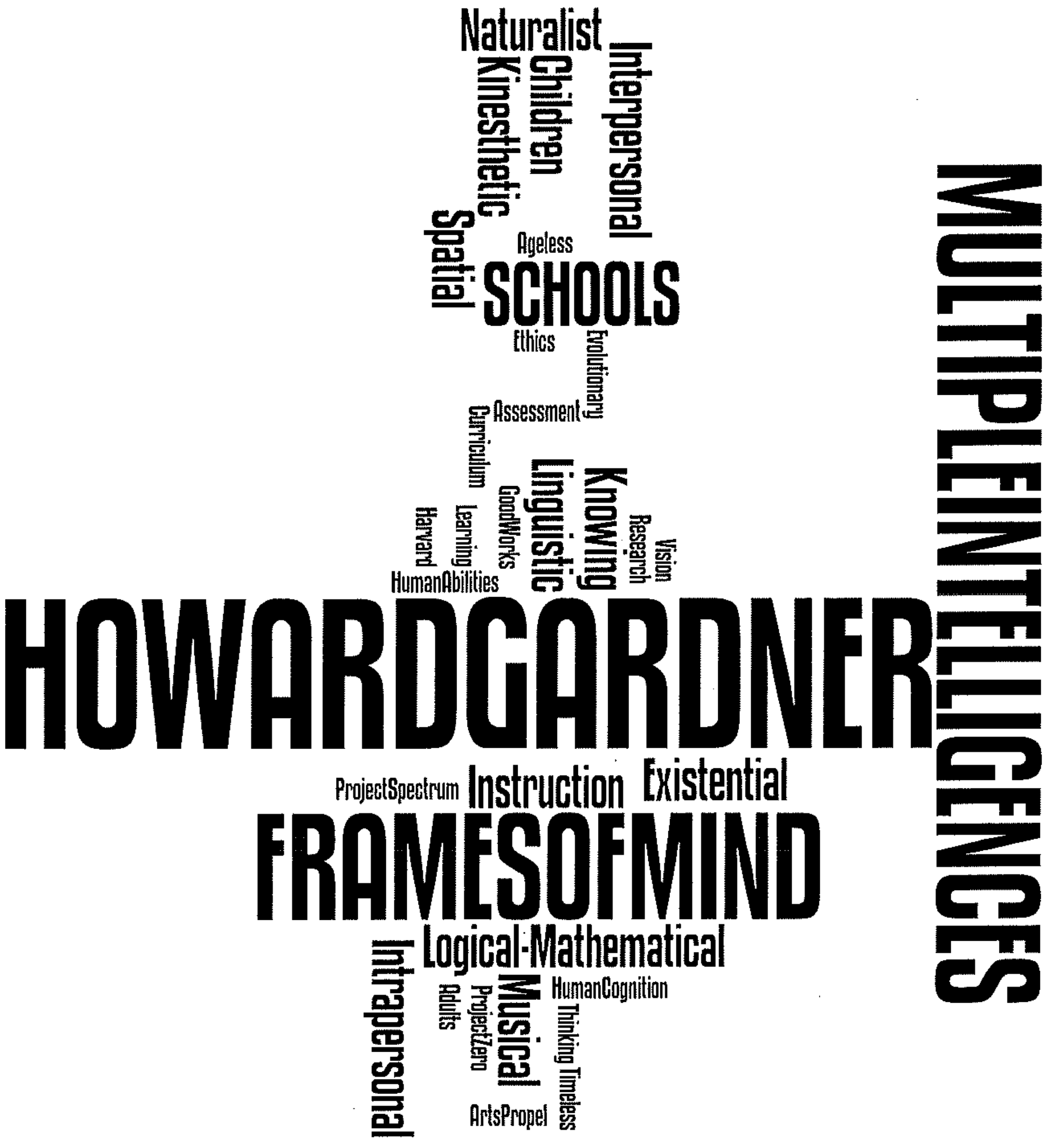
Howard Gardner

Hobbs Professor of Cognition and Education,

Harvard University Graduate School of Education

Nominated by:

Patricia Neudecker


HOWARDGARDNER
MULTIPLEINTELLIGENCES
FRAMESOFMIND
SCHOOLS
Naturalist
Interpersonal
Children
Kinesthetic
Spatial
Ageless
Ethics
Evolutionary
Assessment
Curriculum
Knowing
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Learning
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HumanAbilities
ProjectSpectrum
Instruction
Existential
Logical-Mathematical
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Musical
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Dear Brock International Prize in Education Jurors:

Have you ever pondered the thought that a multitude of intelligences may exist, rather than the notion of one single intelligence? Different from the psychometric and behaviorists eras when it was generally believed that intelligence was a single inherited entity, have you explored research which suggests that individual intelligences exist, each having its own strengths and constraints? Have you questioned the notion that intelligence results from a single factor, and is simply measured by IQ tests? If you can answer yes to any of these questions, you may already be familiar with or have aligned your thinking with Multiple Intelligence Theory and the renowned work of Howard Gardner. I am proud to present the name Howard Gardner as my nomination for the 2011 Brock Prize in Education.

Howard Gardner is the Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education. His work is best described as an effort to understand and explicate the broadest and highest reaches of human thought, with a particular focus on intellectual capacity. He is a synthesizer of a vast amount of research and theory. He is best known in educational circles for his Theory of Multiple Intelligences, a critique of the notion that there exists but a single human intelligence that can be assessed by standard psychometric instruments. Gardner has authored 25 books, which have been translated into 28 languages, and over 450 articles in scholarly journals in the areas of developmental psychology, neuropsychology, education, aesthetics, ethics, and the social sciences. He has received honorary degrees from twenty-two colleges and universities in addition to his PhD from Harvard. Gardner was named one of the one hundred most influential public intellectuals in the world by Foreign Policy and Prospect magazine in 2008.

During the past two decades, Gardner and colleagues at Project Zero have been involved in the design of performance based assessments, education for understanding, the use of multiple intelligences to achieve more personalized curriculum, instruction, and pedagogy, and the quality of interdisciplinary efforts in education. Project Zero carries the reputation of the oldest and most respected educational research site in the world. Currently, Dr. Gardner is investigating the nature of trust in contemporary society and ethical dimensions entailed in the use of the new digital media. Among new research undertakings is a study of effective collaboration among non-profit institutions in education and the study of conceptions of quality, nationally and internationally. The "Good Work" project focuses on the benevolent uses to which human intelligence, creativity, and leadership can be applied. The large scale, multi-site effort identifies individuals and institutions that exemplify good work - work that is quality, socially responsible, and meaningful to practitioners - to determine how to best increase the incidence of good work in our society.

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CURRICULUM VITAE

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EDUCATION

Harvard College, 1961–1965; A.B. in Social Relations
London School of Economics, 1965–1966; Reading in Philosophy and Sociology
Harvard University, 1966–1971; Ph.D. in Social Psychology (Developmental Psychology)
Harvard Medical School and Boston University Aphasia Research Center, 1971–1972; Postdoctoral Fellow

CURRENT POSITIONS

John H. and Elisabeth A. Hobbs Professor of Cognition and Education, Harvard Graduate School of Education (1998–present)
Professor of Education, Harvard Graduate School of Education (1986–1998)
Adjunct Professor of Psychology, Harvard University (1991–present)
Chair, Project Zero Steering Committee (1995–present); Co-Director, Project Zero (1972–2000); Senior Director (2000–present).

ACADEMIC HONORS AND FELLOWSHIPS

Phi Beta Kappa, Junior Year (1964)
A.B. summa cum laude (1965)
Frank Knox Fellowship, London School of Economics (1965–1966)
NIMH Pre-doctoral Fellowship (1966–1971)
Ph.D. Examination passed with Distinction (1968)
Social Science Research Council Fellow (1971–1972)
Livingston Fund Fellowship (1972–1974)
Claude Bernard Science Journalism Award (1975)
MacArthur Prize Fellowship (1981–1986)
National Psychology Award for Excellence in the Media of the American Psychological Association, for the book, Frames of Mind (1984)
William James Award, American Psychological Association (1987)
Educational Press of America, Distinguished Achievement Award (1989)
Who's Who in America (1989–present)
University of Louisville Grawemeyer Award in Education (1990)
Wyoming Seminary Distinguished Alumnus Award (1990)

7. Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books. Selected by five book clubs. British Edition, W. Heinemann. Translated into Spanish, Japanese, Italian, Hebrew, Chinese, French, German, and Russian. Basic Books Paperback, 1985. Tenth Anniversary Edition with new introduction, New York: Basic Books, 1993. Twentieth Anniversary Edition with new introduction. New York: Basic Books, 2004. Translated into Swedish, German, Portuguese, Spanish, Italian, Chinese (Taiwan), French, Norwegian, Hebrew, Slovenian, Korean, Vietnamese, and Czech. Selected by three book clubs. Selected by the Museum of Education for *Books of the Century* exhibit, Columbia, SC, 1999. Tenth Anniversary British Edition, London: HarperCollins (Fontana Press), 1993. Second Edition, Mexico: Fondo de Cultura Economica, 2005.

8. Gardner, H. (1985). *The mind's new science: A history of the cognitive revolution.* New York: Basic Books. Translated into Spanish, Japanese, French, German, Italian, Chinese, and Portuguese. Adopted by six book clubs. Basic Books Paperback with new Epilogue, 1987.

9. Gardner, H. (1989). *To open minds: Chinese clues to the dilemma of contemporary education.* New York: Basic Books. Translated into Italian. Basic Books Paperback with new introduction, 1991.

10. Gardner, H. (1990). *Art education and human development.* Los Angeles: The Getty Center for Education in the Arts. Translated into Italian and Spanish.

11. Gardner, H. (1991). *The unschooled mind: How children think and how schools should teach.* New York: Basic Books. Tenth Anniversary Edition. New York: Basic Books, 2004. Translated into Spanish, Italian, German, Swedish, Norwegian, Chinese (R.C.), Chinese (Taiwan), Portuguese, Croatian, French, Danish, and Greek. Adopted by the Reader's Subscription Book Club. British Edition, London: HarperCollins (Fontana Press), 1993.

12. Gardner, H. (1993). *Multiple intelligences: The theory in practice.* New York: Basic Books. Translated into Spanish, Portuguese, Italian, French, Chinese (Taiwan), Hebrew, Korean, Polish, Chinese (R.C.), Danish, Ukranian, Japanese and Norwegian. Selected by three book clubs. Excerpted in the magazine *Behinderte in Familie, Schule und Gesellschaft, vol. 2*, 1997. Abridged, Danish translation, 1997, Copenhagen: Glydendal Undervisning

13. Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi.* New York: Basic Books. Quality Paperback Book Club. Translated into Swedish, German, Spanish, Chinese (Taiwan), Portuguese, Italian, Slovenian, Korean, Polish, and French.

14. Gardner, H., with the collaboration of Laskin, E. (1995). *Leading minds: An anatomy of leadership.* New York: Basic Books. Translated into German, Italian, Swedish,

25. Gardner, H. (2006). *Multiple Intelligences: New Horizons.* New York: Basic Books. Translated into: Romanian, Chinese. Gardner, H. (2006).

26. *Howard Gardner under fire.* In Jeffrey Schaler (Ed.). Illinois: Open Court Publishing.

27. Gardner, H. (2007). *Five minds for the future*. Boston: Harvard Business School Press.Translated into Arabic, Korean, Italian, Japanese, Danish, Chinese (CC), Chinese (SC), Norwegian, Portuguese, Polish, Russian, Spanish, Swedish, Turkish, Romanian, French, Indonesian, and Thai.

Recent Edited Books

1. Gardner, H. (2007). *Responsibility at work: How leading professionals act (or don't act) responsibly*. San Francisco: Jossey-Bass. Translated into Portuguese

2. Chen J., Moran, S., and Gardner, H. (2009). *Multiple intelligences around the world.* San Francisco: Jossey Bass.

Author of over 450 articles in scholarly journals in the areas of developmental psychology, neuropsychology,
education, aesthetics, ethics, and the social sciences. Author of over 300 topical articles, introductions,
and book reviews in wide-circulation publications

Chapter 1

In a Nutshell

The original scene: Paris, 1900—La Belle Epoque. The city fathers approached a talented psychologist named Alfred Binet with an unusual request. Families were flocking to the capital city from the provinces, and a good many of their children were having trouble with their schoolwork. Could Binet devise some kind of a measure that would predict which youngsters would succeed and which would fail in the primary grades of Paris schools?

As almost everybody knows, Binet succeeded. In short order, his discovery came to be called the "intelligence test"; his measure, the IQ, for "intelligence quotient" (mental age divided by chronological age and multiplied by 100). Like other Parisian fashions, the IQ soon made its way to the United States, where it enjoyed a modest success until World War I, when it was used to test over one million American military recruits. With its use by the U.S. armed forces, and with America's victory in the conflict, Binet's invention had truly arrived. Ever since, the IQ test has looked like psychology's biggest success—a genuinely useful scientific tool.

What is the vision that led to the excitement about IQ? At least in the West, people had always relied on intuitive assessments of how smart other people were. Now intelligence seemed to be quantifiable. Just as you could measure someone's actual or potential height, now, it seemed, you could measure someone's actual or potential intelligence. We had one dimension of mental ability along which we could array everyone.

The search for the perfect measure of intelligence has proceeded apace. Here, for example, are some quotations from an advertisement for one such test:

> Need an individual test which quickly provides a stable and reliable estimate of intelligence in four or five minutes per form? Has three forms? Does not depend on verbal production or subjective scoring? Can be used with the severely physically handicapped (even paralyzed) if they can signal yes or no? Handles two-year-olds and superior adults with the same short series of items and the same format? Only $16.00 complete.

Now, a single test that can do all that is quite a claim. American psychologist Arthur Jensen suggests that we could look at reaction time to assess intelligence: a set of lights go on; how quickly can the subject react? British psychologist Hans Eysenck recommends that investigators of intelligence look directly at brain waves. And with the advent of the gene chip, many look forward to the day when we can glance at the proper gene locus on the proper chromosome, read off someone's IQ, and confidently predict his or her life chances.

There are also, of course, more sophisticated versions of the IQ test. One of them is the SAT. Its name originally stood for Scholastic Aptitude Test, although with the passage of time, the meaning of the acronym has been changed—it became the Scholastic Assessment Test, and, more recently, it has been reduced to the plain old SAT—just the initials. The SAT purports to be a similar kind of measure, and if you add up a person's verbal and math scores, as is often done, you can rate him or her along a single intellectual dimension. (In 2005, a writing component was added.) Programs for the gifted, for example, often use that kind of measure; if your IQ is in excess of 130, you're admitted to the program—if it's 129, "Sorry, no room at the inn."

Along with this one-dimensional view of how to assess people's minds comes a corresponding view of school, which I will call the "uniform view." A uniform school features a core curriculum—a set of facts that everyone should know—and very few electives. The better students, perhaps those with higher IQs, are allowed to take courses that call on critical reading, calculation, and thinking skills. In the uniform school, there are regular assessments, using paper and pencil instruments, of the IQ or SAT variety. These assessments yield reliable rankings of people; the best and the brightest get into the better colleges, and perhaps—but only perhaps—they will also get better rankings in life. There is no question that this ap-

lems 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.

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 considered (again, we differ from rats, birds, or computers). 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 composed of anagrams or tongue twisters in a third.

Given the desideratum 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 the list, I reviewed evidence from various 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, 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 candidate intelligences that satisfied all or a healthy majority of the criteria were selected as bona fide intelligences. A more complete discussion of each of these criteria and of the intelligences that were initially identified may be found in *Frames of Mind* (1983b), especially chapter 4. In that foundational book I also consider how the theory might be disproved and compare it with competing theories of intelligence. An update of some of these discussions is presented in *Intelligence Reframed* (1999a), and in the chapters that follow.

In addition to satisfying the aforementioned criteria, each intelligence must have an identifiable core operation or set of operations. As a neurally based computational system, each intelligence is activated or triggered by certain kinds of internal or external information. For example, one core of musical intelligence is the sensitivity to pitch relations, and one core of linguistic intelligence is the sensitivity to the phonological features of a language.

An intelligence must also be susceptible to encoding in a symbol system—a culturally contrived system of meaning that 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 an intelligence to a human symbol system is no accident. In fact, the existence of a core computational capacity anticipates the actual or potential creation of a symbol system that exploits that capacity. While it may be possible for an intelligence to develop without an accompanying symbol system, a primary characteristic of human intelligence may well be its gravitation toward such an embodiment.

THE ORIGINAL SET OF INTELLIGENCES

Having sketched the characteristics and criteria for an intelligence, I turn now to a brief consideration of each of the intelligences that were proposed in the early 1980s. I begin each sketch with a thumbnail biography of a person who demonstrates an unusual facility with that intelligence. (These biographies were developed chiefly by my longtime colleague Joseph Walters.) The biographies illustrate some of the abilities that are central to the fluent operation of a given intelligence. Although each biography illustrates a particular intelligence, I do not wish to imply that in adulthood intelligences operate in isolation. Indeed, except in abnormal individuals, intelligences always work in concert, and any sophisticated adult role will involve a melding of several of them. Following each biography is a survey of the various sources of data that support each candidate as an intelligence.

Musical Intelligence

When Yehudi Menuhin was three years old, his parents smuggled him into San Francisco Orchestra concerts. The sound of Louis Persinger's violin so entranced the young child 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 (Menuhin, 1977).

Violinist Yehudi Menuhin's musical intelligence manifested itself even before he had touched a violin or received any musical training. His pow-

volved. Then, each of these factors must be recalculated after the bounce of the ball to anticipate the point where contact will be made by the racket. Simultaneously, muscle orders must be given—not just once, but constantly refined on updated information. Finally, the muscles have to respond in cooperation with one another . . . 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. . . . Even if you are returning the serve of an average player, you will have only about one second. Just to hit the ball is clearly a remarkable feat; to return it with consistency and accuracy is a mind-boggling achievement. Yet it is not uncommon. The truth is that everyone who inhabits a human body possesses a remarkable instrument (Gallwey, 1976, pp. 33–34).

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. When she was 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? (Keller, 1983, p. 104).

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 hypotheses that are each evaluated and then accepted or rejected in turn. The anecdote also underscores the nonverbal nature of the intelligence. 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 phenomenon need not imply, however, that discoveries of this sort—the familiar "aha!"—are mysterious, intuitive, or unpredictable. The fact that it happens frequently to some people (e.g. Nobel Prize winners) suggests the opposite. We interpret this phenomenon as the work of the logical-mathematical intelligence.

Along with the companion skill of language, logical-mathematical reasoning provides the principal basis for IQ tests. This form of intelligence has been thoroughly 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 completely understood—and the processes involved in leaps like those described by McClintock remain mysterious.

Logical-mathematical intelligence is supported as well by empirical criteria. Certain areas of the brain are more prominent in mathematical calculation than others; indeed, recent evidence suggests that the linguistic areas in the frontotemporal lobes are more important for logical deduction, and the visuospatial areas in the parietofrontal lobes for numerical calculation (Houdé & Tzourio-Mazoyer, 2003). There are savants who perform great feats of calculation even though they are 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.

> 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 (Lash, 1980, p. 52).

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." In fact, the first "miracle" occurred two weeks later, well before the famous incident at the pump house. 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 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" (Lash, 1980, p. 54).

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.

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 they have been hidden. This skill appears in a highly sophisticated form in religious or political leaders, salespersons, marketers, teachers, therapists, and parents. The Helen Keller–Anne Sullivan story suggests that this interpersonal intelligence does not depend on language. 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—after such an injury, a person is often not the "same person."

Alzheimer's disease, a form of dementia, appears to attack posterior brain zones with a special ferocity, leaving spatial, logical, and linguistic computations severely impaired. Yet people with Alzheimer's often remain

well groomed, socially proper, and continually apologetic for their errors. In contrast, Pick's disease, a variety of dementia that is localized in more frontal regions of the cortex, entails a rapid loss of social graces.

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 cases where the mother (or a substitute figure) is not available and engaged, 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 killing in prehistoric societies required the 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 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;

distinguishing one species from another. Persons with a high degree of naturalist intelligence are keenly aware of how to distinguish the diverse plants, animals, mountains, or cloud configurations in their ecological niche. These capacities are not exclusively visual; the recognition of birdsong or whale calls entails auditory perception. The Dutch naturalist Geermat Vermij, who is blind, depends on his sense of touch.

On the eight criteria for an intelligence, the naturalist intelligence scores well. In this type of intelligence, there is the core capacity to recognize instances as members of a species. There is also the evolutionary history of survival often depending on recognizing conspecifics and on avoiding predators. Young children easily make distinctions in the naturalist world—indeed, some five-year-olds are better than their parents or grandparents at distinguishing among dinosaur species.

Examining the naturalist intelligence through the cultural or brain lenses brings some interesting phenomena into focus. Today few people in the developed world are directly dependent on naturalist intelligence. We simply go to the grocery store or order groceries on the phone or the Internet. And yet, I suggest, our entire consumer culture is based on the naturalist intelligence. It includes the capacities we deploy when we are drawn to one car rather than another, or when we select one pair of sneakers or gloves rather than another.

The study of brain damage provides intriguing evidence of individuals who are able to recognize and name inanimate objects but who lose the capacity to identify living things; less often, one encounters the opposite pattern, where individuals are able to recognize and name animate entities but fail with artificial (man-made) objects. These capacities probably entail different perceptual mechanisms (Euclidean geometry operates in the world of artifacts but not in the world of nature) and different experiential bases (we interact with inanimate objects and tools very differently than with living beings).

My review of the evidence on spirituality proved less straightforward. People have very strong views on religion and spirituality. For many (particularly in the contemporary United States), experiences of the spirit are the most important ones; and many assume that a spiritual intelligence not only exists but represents the highest achievement of human beings. Others, particularly those of a scientific bent, cannot take seriously any

discussion of the spirit or the soul; it smacks of mysticism. And they may be deeply skeptical about God and religion—especially so in the academy. Asked why I had not endorsed a spiritual or religious intelligence, I once quipped, "If I did so, it would please my friends—but it would please my enemies even more!"

Quips are no substitute for scholarship. I devoted the better part of a year to reviewing the evidence for and against a spiritual intelligence. I concluded that at least two facets of spirituality were quite remote from my conception of an intelligence. First, I do not believe that an intelligence should be confounded with an individual's phenomenological experience. For most observers, spirituality entails a certain set of visceral reactions—for example, a feeling that one is in touch with a higher being or "at one" with the world. Such feelings may be fine, but I do not see them as valid indicators of an intelligence. A person with a high degree of mathematical intelligence may undergo feelings of "flow" in the course of solving a difficult problem, but the person is equally mathematically intelligent even if he or she has no such phenomenological reaction.

Second, for many individuals, spirituality is indissociable from a belief in religion and God generally, or even from allegiance to a particular faith or sect: "Only a real Jew/Catholic/Muslim/Protestant is a spiritual being" is the explicit or implicit message. This requirement makes me uncomfortable and takes us far from the initial set of criteria for an intelligence.

But although a spiritual intelligence does not qualify on my criteria, one facet of spirituality seems a promising candidate. I call it the existential intelligence—sometimes described as "the intelligence of big questions." This candidate intelligence is based on the human proclivity to ponder the most fundamental questions of existence. Why do we live? Why do we die? Where do we come from? What is going to happen to us? What is love? Why do we make war? I sometimes say that these are questions that transcend perception; they concern issues that are too big or too small to be perceived by our five principal sensory systems.

Somewhat surprisingly, the existential intelligence does reasonably well in terms of our criteria. Certainly, there are individuals—philosophers, religious leaders, the most impressive statesman—who come to mind as high-end embodiments of existential intelligence. Existential issues arise in every culture—in religion, philosophy, art, and the more mundane stories,

skills that may earmark an individual for a certain vocational or avocational niche.

In brief, MI theory leads to three conclusions:

1. All of us have the full range of intelligences; that is what makes us human beings, cognitively speaking.
2. No two individuals—not even identical twins—have exactly the same intellectual profile because, even when the genetic material is identical, individuals have different experiences (and identical twins are often highly motivated to distinguish themselves from one another).
3. Having a strong intelligence does not mean that one necessarily acts intelligently. A person with high mathematical intelligence might use her abilities to carry out important experiments in physics or create powerful new geometric proofs; but she might waste these abilities in playing the lottery all day or multiplying ten-digit numbers in her head.

All of these statements are about the psychology of human intelligence—to which MI theory seeks to make a contribution. But of course they raise powerful educational, political, and cultural questions. Those questions will engage us in later parts of the book.

Conclusion

I believe that in our society we suffer from three biases, which I have nicknamed "Westist," "Testist," and "Bestist." "Westist" involves putting certain Western cultural values, which date back to Socrates, on a pedestal. Logical thinking, for example, is important; rationality is important; but they are not the only virtues. "Testist" suggests a bias towards focusing on those human abilities or approaches that are readily testable. If it can't be tested, it sometimes seems, it is not worth paying attention to. My feeling is that assessment can be much broader, much more humane than it is now and that psychologists should spend less time ranking people and more time trying to help them.

"Bestist" is a thinly veiled reference to David Halberstam's 1972 book *The Best and the Brightest.* Halberstam's title referred ironically to the figures, among them Harvard faculty members, who were brought to Washington to help President John F. Kennedy and in the process launched the Vietnam War. I think any belief that all the answers to a given problem lie in one certain approach, such as logical-mathematical thinking, can be very dangerous. Current views of intellect need to be leavened with other, more comprehensive points of view.

It is of the utmost importance that we recognize and nurture all of the varied human intelligences and all of the combinations of intelligences. We are all so different largely because we have different combinations of intelligences. If we recognize this, I think we will have at least a better chance of dealing appropriately with the many problems that we face in the world. If we can mobilize the spectrum of human abilities, not only will people feel better about themselves and more competent; it is even possible that they will also feel more engaged and better able to join the rest of the world community in working for the broader good. Perhaps if we can mobilize the full range of human intelligences and ally them to an ethical sense, we can help increase the likelihood of our survival on this planet, and perhaps even contribute to our thriving.

"The unschooled mind: why even the best students in the best schools do not understand"

Howard Gardner

I'm very honoured to have been invited to give the Peterson lecture to gathered representatives of the IB Organization. I must confess that I didn't even know about the IB until a year or two ago. It was my loss and my ignorance but everything that I've learned about it, has intrigued me and I think you have a convert on your hands. (Addendum in 2003: By now I know a fair amount about IB, have studied the Theory of Knowledge Course, and am an unabashed fan).

I'm a developmental psychologist and Geneva is in fact a special place for me. Twenty five years ago I married a developmental psychologist and we decided to launch our honeymoon by coming to Geneva. We met and shook the hand of Piaget.. At the time I knew that I would study cognitive development but of course could not anticipate what I would have to say about developmental psychology in the future. I have had a very lively career over the last 25 years during which I challenged Piaget on several issues because I felt he was very central to my work and I admired him. My three arguments with him were as follows.

First of all, Piaget believed that if you studied children you had to know what they were going to become - what the end state of development is. Piaget thought it was to be a scientist; that's what Piaget was. However, in my own training I had spent a lot of time working in the arts. I felt that there was something wrong with a theory which only talked about the mind of the scientist as being the end-all of a child's development. So I began to explore what development would be like if one thought of participation in the arts as an artist, or a critic, or a performer or a connoisseur as being a viable end state for human development. This is not to say that human beings should develop to become artists any more than they should develop to become scientists but rather that we can develop many different kinds of human beings.

The second argument I had with Piaget, and the one that I became infamous for, was against the notion that there was a single thing called intelligence which could be measured by an intelligence test. Now it's not widely known that Piaget studied in Alfred Binet's laboratory. Binet was dead but the laboratory was still there under the direction of a psychologist named Théodore Simon who had worked with Binet. Piaget became interested in children's minds because of the mistakes the children made on the intelligence tests. Binet was a great scientist, credited with the creation of the IQ test. I do not blame him for any of the abuse done in the name of intelligence and intelligence testing. Binet's ideas affected an American named Lewis Terman who in 1916 created the first normed standardised intelligence tests. For ever afterwards psychologists assumed that they could establish how smart somebody was, and in fact what intelligence is, by giving a test which took an hour or so.

In fact, some people now give the QT (the quick test) which just takes four or five minutes. Why spend an hour if you can test intelligence in four or five minutes? Those of you who are from the United Kingdom, will doubtless recognise [shows a picture] Hans J. Eysenck, the world's most famous psychologist. He used to be a great defender of intelligence tests until this "hair dryer" [picture] came along with 18 electrodes attached to it. Mr. Eysenck and his friends now believe that if you simply put this beanie on a person's head and look at the brain waves for a few seconds, you can tell how smart that person is. Well, I think that the mind and

radical thesis, and I decided I was not going to pre-judge the IB schools. Maybe you are exceptional in that you have succeeded in extinguishing the less productive aspects of the five year old mind. I hope we will have time to discuss that after my talk.

So, my talk is on the subject of education for understanding. If I said to you: what *is* understanding and *how* can we determine whether understanding has been achieved? - that is a much more difficult question.

I am going to define understanding as the capacity - knowledge, skills, concepts, facts - learned in one context, usually the school context, and used in a new context in a place where you haven't been forewarned that you should make use of that knowledge. That's what understanding is. If you were only asked to use knowledge in the same situation in which it was introduced, you might understand, but you might not; we can't tell. But if something new happens out in the street or in the sky or in the newspaper, and you can draw on your earlier knowings, then you understand.

In my book, "The Unschooled mind", I have a section on the 1991 Gulf War which provided brilliant examples in America of not understanding at the highest levels. In history, in political science, in economics and in physics, there were rampant examples of misunderstanding. I will not go into that now. Instead, I'm going to introduce my "problématique" with three quite common sense examples.

In the first five years of life children all over the world, with very little formal tutelage, learn to speak, to understand, to tell stories, to tell jokes, to draw, to sing, to invent new tunes, to engage in pretend play - all the things which Piaget and other psychologists demonstrated. Even though nobody knows how to teach these things, kids learn them all. Then they go to school and suddenly, in the very place where we are supposed to know how to teach them, it's very hard and many of them don't do well. That's a paradox. That's an enigma.

Vignette number two.

Students at the very best universities in the United States (places like MIT and Johns Hopkins), with very high grades in physics, leave their class and are given a problem to solve on the street, or a game to play, which involves various physical principles. Not only do they fail to use what they learned in school but they actually answer in the same way that five-year-olds do, or for that matter in the way pre-Aristotelians and Aristotelians did.

Let me use an example. Ask almost anybody what happens, what forces obtain when you flip a coin. Most people will come up with the following answer (even people who have taken physics courses): you've got a certain amount of force in your hand and you transfer that force to the coin; for a while that force makes the coin go up and then, when the force kind of gets spent, the coin is tired and kind of flips to the ground. (Now, I'm not a physicist so I believe that account, more of less). However, physics friends tell me that the second you release the coin, the only force that obtains on the coin is gravity; that's the only force that's working.

However, that goes against a very powerful theory that you develop when you're young. And it's not that theory that's abandoned, it's Newton's and Galileo's laws of motion that prove very difficult to master.

make the interpreters work hard and make the audience work hard." So what I'm going to do now is give you a fairly technical description of why it is so difficult to go beyond the five-year- old mind.

My analysis has 3 foci which I have introduced to you already. There is the young natural learner: that 3, 4 or 5 year old who speaks so much about the world without formal tutelage. There is a student in most schools who basically masters what school requires so he or she can get to the next level. But I will argue he doesn't really understand. Then there's the individual we want: the person who can use knowledge in new situations. That's my definition of an expert.

There is a form of knowing (theory of knowledge) that goes with each of these 3 foci. The expert is a person who can use the skills that are valued in his or her culture in context. So when an historical example comes up, he can draw on history; when a physical example comes up he can draw from physics, and so on. That's what we want; that's why we go to school. If people are not going to be able to use the knowledge we may as well close schools down. Scholastic knowledge is what we are very good at doing in school; but unless that scholastic knowledge can be activated in new circumstances it remains inert and essentially useless..

We teach people notations, squiggles on a paper like some of you are doing, formal concepts - what is gravity, what is density, what is force. People who have no sense of what it's like in the world can give you a formula and a definition if that's what is called for in class. Then, if you're lucky and you attend an IB school, you get epistemic forms. Epistemic forms means how the people think in the different disciplines because to think like a historian is not the same as to think like a literary critic or a biologist. (This, I have subsequently learned, is the focus of the Theory of Knowledge course).

So that's what school is supposed to do. But in the first years of life a natural learner benefits from what Piaget so brilliantly described: sensory motor knowledge, learning about the world, using your hands and your eyes, exploring the world of objects, the world of liquids poured from one container to another and what I call first order symbolic competence. People use words, pictures, gestures, to communicate meanings. That's what every five-year-old can do.

That's the good part. However, five-year-olds do one thing which is troublesome: they form intuitive conceptions or theories - theory of matter, theories of mind, theories of life. Every normal five-year-old develops these theories. And it's very good for getting along in the world. However, the theories are wrong. School is supposed to replace the erroneous theories with better theories.

So what's a theory of matter? A theory of matter is: if I have a heavy object in this hand, a light object in this hand and I release them at the same time, the heavier one will fall more quickly. That's what you learn intuitively. Heavy things fall more quickly. However, Galileo went to the tower of Pisa, dropped two objects, and since then we understand that that's not in fact what happens. We understand that the laws of acceleration are independent of weight. But as children we develop a very powerful theory of matter and that's very hard to shake.

Here's a theory of life: every five-year-old believes if it's moving it's alive; if it's not moving, it's dead. This is a very useful theory. However it doesn't help for sleeping dogs, and computers are a real problem. Are computers which display moving images alive or dead? It's very hard to say.

disciplined understanding has good taste and uses the knowledge just when it's appropriate. This comes about because there are constraints, also gaps.

What I've tried to do is to say that there are some deep, if you will, some epistemological reasons, why it's very difficult to teach for understanding.

What I want to do now is to take a "Cook's Tour" of the different disciplines to show you that this isn't a problem just for somebody else's discipline; it's a problem for every discipline.

I've already mentioned physics. Most people remain five-year-olds or Aristotelians even though they studied physics. Here is a wonderful example, actually from astronomy; some of you may have seen this film. Twenty-five Harvard students have just graduated, all wearing their gowns and their mortar boards. An interviewer says to the students: "Tell me, why is the earth warmer in the summer than it is in the winter?" Twenty-three out of the 25 students immediately came up with the same answer, the answer which you would come up with if you didn't know what I was lecturing about: namely that the earth is closer to the sun in the summer than it is in the winter. Now if we think about it, that doesn't make any sense because it wouldn't account for the seasons in different parts of the world. The right explanation has to do with the angle of the world on its axis as it spins around. But 23 out of 25 students forget to apply what they have learned in their astronomy classes and give the same five-year-old kind of answer.

You might say physics is hard. How about biology? Perhaps biology is much easier? Research shows that students who have taken not one, but two or three courses in biology focusing on the topic of evolution, still do not understand the basics of evolution. They still believe that something in one generation can be passed on to the next, even if it was acquired in that generation. They are also still perfectionists. They think that each organism is trying to get more perfect and there is an unseen hand that's guiding that perfection rather than simply variation and selection within a particular ecological niche. So problems in physics extend to biology and to the other sciences as well.

What about mathematics? Mathematics is all abstract. It has nothing to do with the real world. So maybe people don't have misconceptions in the area of mathematics. What they have instead, is what I call rigid algorithms. They learn to fill in numbers into a formula.

This is the problem. There are six times as many students as professors. If there are ten professors, how many students are there ? Anybody wants to risk an answer ? I guess the answer is no. Anyway, that is quite a simple problem. The answer is 60. If I ask you to capture the above information in a written equation where S stands for students and P stands for professors, most people will write the following equation: 6S=P. This is because if you parse the sentence it says there are six times as many students as there are professors. However what they are actually writing is "six times sixty equals ten" which is clearly an absurd result.

What happens in mathematics is that students learn how to plug numbers into formulas, how to solve equations. As long as the information is presented to them in a certain canonical order, they will get the answer right. If, however, the problem is presented in a new way, in a way which actually describes understanding of the formalism, most people will not get it right because they will not understand the formalism.

What did he find? He found that the students didn't have a clue about which poems were good (according to the critics) and which were bad. They rejected John Donne. They rejected Gerald Manley Hopkins. They embraced a Sunday poet who couldn't get into the "Cambridge Chronicle" and, when they were asked what accounted for the quality, they replied: if a poem rhymed, scanned, dealt with a pleasant subject, but not too sentimental, it was good. But if it dealt with philosophy or anything tragic or anything abstract, it was bad. So, here you have very, very good students who have studied literature, who, when the book clue is removed (namely this is by a good poet, this is by a bad poet or by a non poet), display the same kind of taste that someone with no education in literature would exhibit.

So, what I've tried to do now in part two is to argue that in every area of the curriculum you have real problems which reveal how difficult it is to educate for understanding. You have misconceptions in the sciences, rigidly applied algorithms in mathematics and scripts and stereotypes in social studies, humanities and the arts. Well, this is the end of the bad news part of the talk. We now move into a mode where I'm going to try to say that there is some hope after all. As I said, one source of hope is in taking some lessons from the old institution of apprenticeships and the new institution of children's museums.

Now, I want to be very clear about this point. People usually misunderstand me to say that we should institute seven year agreements between the apprentice and the master where the apprentice is indentured and has to sweep the floor and that kind of thing, or that we should close schools down in an Ivan Illich sense and put everybody in children's museums. That's not what I mean.

What I mean is that there are very powerful educational messages in these two institutions which I think can help educate for understanding. In the case of the apprenticeship, a young person works for someone who is the master of his or her discipline or craft, and who uses that discipline or craft every day in the course of genuine problem solving. The master poses the problems and requires products from the apprentice at his or her level of competence; when the apprentice becomes more competent then the standards are raised.

The master never has to take kids and test them at the end of the week, or the end of the year because, essentially he and the student are assessing every day. Moreover the master embodies the learning that he or she wants the child to have.

So, in the United States, every teacher can read and write but very few of our elementary school teachers actually *do* read and write. In fact, in a very alarming statistic, the average American school teacher reads one book a year. People who live in a literate world who read and write and talk about what they are reading and writing will have youngsters who do the same. People who simply say you should read but turn on the TV for seven hours give a very different message.

As far as the children's museum is concerned this is a very new invention. Basically, until 25 years ago, there were almost no children's museums. But these are places which contain very lively demonstrations of many of the principles that students learn about in school, across the curriculum. They allow children to explore those principles, those ideas, at their own pace and in ways that are comfortable for that child. Frank Oppenheimer, who founded the *Exploratorium* in San Francisco, said: "Nobody flunks museum." It's a very powerful idea.

A mathematician is not somebody who remembers all the formalisms. A mathematician is somebody who doesn't care if he remembers because, if necessary, he/she can derive it again because he/she understands what it stands for. That's why most of us are not mathematicians.

In the case of the humanities, the cure for stereotypes is the regular adoption of multiple stances. If it becomes a regular habit of mind to look at things from many different points of view, you will gradually abandon stereotypical thinking.

During the Gulf war, my older son went to school where there were kids from many different countries. The teacher had a very good idea. Rather than everybody just giving what the cable news network reported, he had a student from Iran, and a student from Kuwait, and a student from Israel, etc., give their understanding of what was happening every day. Then, a few weeks after that, the teacher asked the kids in the school: "What do you think Moshe will think about this and what do you think Omar will think about this?" That's giving students the opportunity to put themselves into other people's minds.

If you study any revolution, from the point of view of the vanquished as well as the victors, you get a very different story. If you study the American revolution from the point of view of the British, where it was a colonial uprising, and from the point of view of the French, where it was a good opportunity to get at the British, it's a very different story than if you just read the average American text book. That's how you break down stereotypical thinking, but it has to be a regular habit of mind, otherwise it won't work at all.

Well, you might say this is all very good and just what I would expect of a Harvard professor: lots of theory. I actually do a lot of empirical work, but that's another story. However, I am going to describe, as we get to the close of my presentation, a new project that I'm involved in which is actually designed to educate for understanding.

It is based upon three core ideas which I have worked out in conjunction with some colleagues at Harvard:

1. the identification of rich, generative ideas; nutritious topics on which it's worth spending a lot of time;
2. the development of different kinds of teaching languages - multiple ways to approach those topics, so we can be sure that students have maximum access to those ideas; and
3. what I now call "ongoing assessment."

"Ongoing assessment" (which I used to call "assessment in context") means assessment is taking place all the time by students and by peers as well as by the teacher.

We believe that if you can identify rich ideas, explore them in multiple ways and give students much opportunity to assess their own learning, that there is a chance for education for understanding.

I now want to flesh those ideas out because they are very abstract.

First of all, the greatest enemy of understanding is **coverage**. I said that earlier. If you are determined to cover everything in the book, you virtually guarantee that very few students will understand. So, if you want to educate for understanding you've got to make tough choices about what to focus on. And obviously you should focus on those things which have the biggest mileage. If you're teaching a course in history or social studies and you decide, say, to focus on democracy, or if you're teaching a course in biology and you choose to focus

What we then do, which may not be so familiar to you, is we define a whole family of "understanding performances" - these are performances which, if a student can carry them out, will count as evidence for understanding.

This is a play with language, but I think it's an important play, because people tend to think of understanding as something that happens in the head. We say, maybe it does but we don't know whether you understand unless you can perform your understanding publicly. So, your performance involves analyses, critiques, debates, projects that you create, exhibitions that you put on, things like that.

Finally, given the "understanding goals" and the "understanding performances," how are those performances going to be assessed? And, as I think is the case with IB, you make the assessment criteria absolutely clear. People know exactly what they are going to have to be able to do in order to perform an understanding. There are no surprises, no mysteries, no key to the answers, but rather examples all around of what a good performance is and what are not such good performances, from apprentice level all the way to that of a master.

Now I'm going to make an interesting kind of confession to you. I've talked about this stuff for a while and I've researched it for a long time, but, like many other professors, I never actually used it in my own teaching. Last year, I decided to do an experiment with my students who are even more privileged than I.A Richard's Cambridge undergraduates - these are Harvard graduate students. I took my Harvard graduate students in the basic course in cognitive development where they study Piaget, Bruner, Vygotsky and people like that, and I tested them three times during the course of the year: in the beginning, in the middle and at the end. I tested them for two things: their mastery of content and their understanding in terms that I have defined today. Could they use what they were learning in the course to explain new situations ? - things in the newspapers, vignettes which I brought in, and so on. The results were quite shocking!

Imagine a graph in your mind - this is good, this is bad, this is over the course of the year; you can reverse them. In content, the students went steadily up. They knew very little content in the beginning, a fair amount in the middle and were very good at the end. They were good students. They are Harvard students. But you know what happened to the understanding? Absolutely flat. And not a ceiling effect, but a floor effect. They weren't very good in the beginning, they weren't very good in the middle, they weren't very good at the end. There were a few exceptions, just like there are few exceptions everywhere, but even at Harvard, they don't necessarily understand what their professors are teaching!

So fortunately, we got a grant (that's always what you should try to do when you have a negative result) and this year, we've going to try to teach for understanding. It's going to be very different. I hope the results will show we're successful. But if not, we'll just keep doing it again, because obviously it's very important for students to understand.

I'm going to finish with a number of thoughts that I have had during the past year. Little epigrams which summarise the things that are important to me.

First of all, after working for 25 years in the area of psychology I realised that I've been interested primarily in two things. One is how to observe students carefully, and multiple intelligence theory is a way to look at students more carefully. The other is how to observe

Now Piaget said one valuable thing which I didn't adhere to. He said that developmental psychologists should not try to be educators. And he steered clear of ever having any educational theory. I have stepped into the lion's den today and given you an educational theory that comes out of developmental psychology.

I did say, I didn't know whether it would resonate with those of you working in IB because maybe all of your students, all of your teachers, do understand. But, if so, I'd like to hear how you do it and if not, I will be happy to work on the problem together with you.

(transcript 16 June 2003

The Development and Education of the Mind

The selected works of Howard Gardner

Howard Gardner

World Library of Educationalists

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INTRODUCTION

In the middle of the 20th century, young persons whom I knew dreamt about one day becoming astronauts, athletes, or architects. Some thought about becoming writers, a handful considered careers as teachers. I doubt that any contemporaries considered a career as a writer on education. Now, as I introduce a collection of my writings about education, I can spin an autobiography that logically culminates in this volume. And yet, that would be disingenuous.

A scholarly career is anything but a straight line – and that is all to the good. If one could predict a line of work in a discipline with accuracy, it would scarcely be worth carrying out: the surprises are what makes scholarship fun and serious. My own scholarly training has been in psychology. The two great figures in my field – Sigmund Freud and Jean Piaget – both embarked on careers quite different from that originally envisioned. Freud wanted to be a basic scientist in neurology and in fact, before turning to psychoanalysis, constructed a model of how the brain works. (It seems more plausible in 2005 than it did in 1905 or 1955!) Piaget saw himself as a biologist interested in the nature of knowledge. But as he subsequently pointed out, the "detour" that he took to investigate the minds of children lasted a lifetime. While I am under no illusion that my own contributions to psychology rival those of these and other masters, I too followed a career path quite different from that envisioned when I was attracted to psychology by my charismatic undergraduate tutor, Erik H. Erikson (who happened to be a student of Freud's and a colleague of Piaget's).

So, perhaps it is better to spurn autobiographical rationalizations and instead pose four questions about how best to "read" an individual who writes about education.

To begin with, through what disciplinary lens or lenses does the scholar approach educational issues? One approaches Herbert Read, a poet and art critic, quite differently from how one approaches the philosopher John Dewey, the psychologist B.F. Skinner, or the theologian John Henry Cardinal Newman. In my own case, I was trained in developmental psychology, the study of how children evolve in various spheres; cognitive psychology, the effort to model thinking; and neuropsychology, the examination of the effects of brain damage on human cognition and personality. While, among psychologists, I feel a bit of a renegade, I feel very much the psychologist when in the company of those with other disciplinary trainings. When considering human nature, I think almost reflexively in terms of the individual and especially his/her mind; the contributions of biology – neuroscience and genetics – to thought; the equally substantial contributions of parental models, peer examples, teacher input, and the messages that waft thought the culture.

To this scholarly lineage I should add my long-time interest in artistry and artistic cognition. As a child I was a serious pianist, and I have long gained sustenance from involvement

the arts, and the humanities. While it remains for others to critique my writing, from my own perspective my greatest strengths are as a systematizer and a synthesizer. I raise a question – the nature of artistic cognition, the component of intelligence, what it means to understand – read and think widely about the question, and then put forth my own best taxonomy or mosaic or narrative. Much of my early writing put together the work of others; but with the passage of years, I have developed my own strong views and my own (I hope not strident) voice. It will be interesting to see whether readers also discern the shift from Gardner the synthesizer to Gardner the theorizer and occasional provocateur.

While rejecting the presentation of a strict autobiographical account of "how I got here," I have sought to provide information which should help readers understand "where I am coming from." (For those interested in autobiography, I have listed several sources.) In addition, to guide the reader through this collection of papers, I offer a rational account, or at least a rationale, for the selection.

I begin this collection with a set of tributes to the thinkers who had the greatest influence during my intellectual formation. The psychologist Jean Piaget is the giant in my original field of scholarship; like all other cognitive-developmental psychologists, I owe my greatest debt to him. The other three individuals are all persons with whom I had the privilege of working personally. My interests and background are closest to those of Jerome Bruner, and it is probably the case that my career has been more closely modeled after his luminous example than after anyone else's. I was greatly informed – indeed, formed – by the philosophical thinking of Nelson Goodman, the brilliant thinker who started Project Zero; and I was stretched in new and unanticipated ways by my work with Norman Geschwind, an innovative conceptualizer and a keen observer of patients with revealing neurological conditions.

Work with these thinkers led me to pursue two parallel lines of research – one with children, the other with brain-injured adults. This work was rewarding in itself and I believe that I made contributions to the research literatures on children's cognitive development and on the breakdown of cognitive capacities after damage to the brain. Much of this work was carried out with Ellen Winner, whom I had the good fortune to marry in 1982. In the final chapter in this section, written in the late 1970s, I both delineate the reservations that I was developing about the work of Jean Piaget and the synthesis about the nature of human symbolization that I was formulating.

In the next part of the book, I put forth the major claims of the theory of multiple intelligences, the work for which I am best known. The six chapters encompass, respectively, a brief introduction to the theory; a critique of the major misconceptions that I have encountered; a consideration of the political aspects entailed in writing about a topic like intelligence; a proposal of how media can be mobilized to take advantage of our multiple intelligences (MI); my changing views about how best to define intelligence; and a survey of the "MI field" after the first two decades.

My work with Nelson Goodman at Project Zero centered on the nature of artistic cognition and artistic education. Indeed, both my work with children and my work with brain-damaged adults was firmly rooted in artistic cognition. The first three chapters in Part 2 portray, in turn, the relationship between artistry and intelligence; an educational approach to curriculum and assessment called ARTS PROPEL; and a museum exhibit that had remarkable educational power. The final chapter grew out of a series of trips that I made to China in the 1980s in my capacity as an arts educator. My observations and informal experiments (carried out with Ellen Winner) teased out fundamental differences in how our respective cultures think of arts and creativity – and also complexified in instructive ways my own views about the development of creativity.

Upon first learning about multiple intelligences, many individuals see an MI classroom or school as an end in itself. I soon became convinced, however, that MI cannot be a viable

educational end. Rather, the goals of education need to arise from our own values, and they need to be stated explicitly and revisited perennially. Once the territory has been staked out, then it becomes possible to determine how a recognition of MI might – or might not – aid in achieving these educational goals.

Once I began to ponder my own educational philosophy, I became convinced of a supravening educational goal: the development of thinking within the major scholarly disciplines. Of course schools can properly pursue more than one goal. But, to my own mind, if education does not inculcate the major disciplinary ways of thinking, then it has failed in a fundamental way. In the fourth part of this book, I delineate my conception of disciplinary understanding; how difficult it is to achieve; and how, once that goal has been set forth, an approach founded on MI can prove productive.

With the passage of time, the accumulation of age, and, one hopes, the achievement of some measure of wisdom, scholars like me are called upon to offer their more general conspectus of education. In the fifth and final part of the book, I put forth my current – though I dare to hope not my final – thoughts about some broad educational issues. I begin by sketching a view of assessment that is far different from the one currently being pursued not only in the United States but in much of the world. Written in the early 1990s, I believe that "assessment in context" is even more timely and more needed now than it was then.

The next three chapters in the book deal, respectively, with the progressive tradition, in whose camp – despite some lapses – I have remained; the ways in which education changes over time, with particular respect to the theme of globalization; and a possible outline of education in the future. The final chapter in the book presents a bridge from my 20 years of writing on education to my current concern with ethics in the professions – a study that my colleagues and I call the "good work project." While the work on professional ethics is not at present rooted in education, we expect that the ultimate result of the study will include educational interventions for young persons, individuals beginning the professions, and veterans who want or need a refresher on the core values of their profession. Just as I have come to believe that all educational issues harbor value components, I also believe that the inculcation of values is fundamentally an educational challenge – one that never ends for the individual or the species.

To the extent possible, I have ordered these chapters so as to convey a coherent, cumulative story. Indeed, one could read the book from beginning to end – though I doubt that many will find that the best way to approach the book. In lieu of my own autobiographical account, which is now available in many places (Gardner 1989b, Chapters 1 to 4; Gardner, in press; Gardner, n.d.; Winner, n.d.), I am pleased to open the volume with a brief biography of me, written by Mindy Kornhaber, a long-time colleague and friend.

I have written a great deal, though I hope that I can escape the dismissive label "no unpublished thought." Indeed, by my calculation, I have authored or co-authored at least 20 books, 400 articles, and 150 topical articles and reviews, about half of them on education. Clearly, with a 130,000 word limit, I have had to be quite selective! I elected not to quote from any of my books, to update passages that were clearly anachronistic, to correct errors, and, to the extent possible, to eliminate passages that are clearly redundant; in such cases, I refer readers to a chapter or chapters that cover essentially the same ground as the eliminated material. That said, I have permitted a limited amount of repetition or paraphrase, so that each chapter can be read as self-standing. In lieu of separate bibliographies, I have amassed all references into a single master bibliography.

It remains for me to thank the colleagues who have explicitly given me permission to reproduce material that we have co-authored: Veronica Boix-Mansilla, Thomas Hatch, Mindy Kornhaber, Shirley Veenema; and several other long-term colleagues, including Mihaly Csikszentmihalyi, William Damon, David Perkins, Ellen Winner, and Edgar Zurif;

The 25th anniversary of the publication of Howard Gardner's Frames of Mind: The Theory of Multiple Intelligences

In 1983, psychologist Howard Gardner published Frames of Mind, the book in which he introduced his 'theory of multiple intelligences' (MI theory). Gardner wrote this book as a psychologist and thought that he was addressing principally his colleagues in psychology. He devoted little of the book to educational implications and never expected that his ideas would be picked up by educators, first in the United States and then, eventually, in many countries across the globe. During this year, when Gardner turns 65, he will be making a number of presentations in which he reflects on the course of his thinking over the years, as well as his speculations about the future course of work in this tradition.

While many individuals believe that Gardner set out to dislodge IQ and standard intelligence theory, in fact he did not have this target in mind when he began the research that led to the theory. Indeed, as one who had done well on standardized tests and had been trained in the Piagetian tradition, he had devoted little thought or study to theories of intelligence altogether. Rather, it was his empirical work with normal and gifted children, on the one hand, and with brain-damaged patients on the other, that convinced him that the standard view of a 'single, unitary, undecomposable intelligence' could not be correct. The work of synthesizing that led to MI theory consisted of surveying a whole set of literature and disciplines that might yield a more comprehensive and more veridical notion of human intellect.

The most important steps taken by Gardner involved arriving at a working definition of 'an intelligence' and devising a set of criteria of what counts as an intelligence. As he describes it, an intelligence is a (biological and psychological) potential to solve problems and/or create products that are valued in one or more cultural contexts. Armed with this definition and these criteria, Gardner identified seven relatively autonomous capacities that he named the multiple intelligences: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal. In more recent writings, Gardner added an eighth (naturalist) intelligence and continues to speculate about a possible ninth (existential) intelligence.

The two most important scientific implications of the theory are complementary. On the one hand, all human beings possess these 8 or 9 intelligences—that is what makes us human. On the other hand, no two human beings—not even identical twins—exhibit precisely the same profile of intelligences. That is because even when genetics are controlled for (as is the case with monozygotic twins), individuals have different life experiences and are also motivated to differentiate themselves from one another.

In part because he had not thought of himself as an educator, Gardner did not lay out—and indeed never has laid out-- a program for the education of multiple intelligences. He was amazed when, shortly after the book was published, a group of elementary school

This knowledge can and will lead to a superior delineation of human capacities, and, in all probability, to a more authoritative statement of the boundaries between and across different human intelligences.

5. Study of how MI theory has been implemented around the world. While MI ideas have been picked up in a broad range of developed and developing societies, the ways in which these ideas have been used, and the obstacles that they have encountered, differ dramatically and at times in unexpected ways. To document this trend, Gardner and colleagues Jie-Qi Chen and Seana Moran, are editing a book that contains over two dozen essays by theorists and practitioners from a wide gamut of countries and institutions. Among the most striking is the Explorama at Danfoss Universe in Denmark, an entire theme park based on MI theory. Many of the authors are gathering at the March 2008 meeting of the American Educational Research Association; it is expected that the edited book, to be published by Jossey-Bass, will appear in 2009.

In addition to the question of how MI theory has been understood and fashioned in different soils, the book will also address the more general issue of how 'educational memes' travel.

6. Synthesis of MI theory with other work currently being undertaken by Gardner and colleagues. Over the last dozen years, Gardner and a team of researchers have been studying 'good work' (goodworkproject.org) This work focuses on the benevolent uses to which human intelligence, creativity, and leadership can be (but are not necessarily) applied. More recently, Gardner's research group has also begun to examine how the current generation of young people is being affected by the new digital media—another area ripe for investigation in terms of MI theory. Finally, Gardner has recently ventured into the policy arena, as in his recent book *Five Minds for the Future.* Gardner is pondering the relationships – as well as the tensions—between how human beings are understood by scientific study (as in MI theory) and how they should be nurtured by educational institutions.

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A First Course in Mind, Brain, and Education

Peter R. Blake[1] and Howard Gardner[1]

ABSTRACT—We describe what may well be the first course devoted explicitly to the topic of Mind, Brain, and Education (MBE). In the course, students examine four central topics (literacy, numeracy, emotion/motivation, and conceptual change) through the perspectives of psychology, neuroscience, genetics, and education. We describe the pedagogical tools we use to develop the skills critical for synthesizing information across the disciplines associated with MBE.

A NEW FIELD OF STUDY

Disciplines grow, evolve, differentiate, become reorganized, and sometimes disappear. Sixty years ago, the interdisciplinary fields of human relations, social relations, and behavioral sciences appeared to be on the rise. History of science was in its infancy, while no one had thought of cognitive science. Today, history of science is an established field of study, cognitive science has replaced psychology in many universities (and even more bookstores), and hardly anyone remembers Harvard's and John Hopkins' Departments of Social Relations or Yale's Institute of Human Relations.

Intellectual trends within the academy reflect a broader public interest in these disciplines that are deepening and altering our understanding of the world and ourselves. Whereas physics received much attention in the first half of the 20th century, biology flowered in the latter half of the century with new technologies and major breakthroughs at all levels of the organism—from the genome to the brain to the biological system. Increasingly, biology dominated the pages of science journals, newspapers, and magazines, and increasingly, journalists and the general public looked to biology for the answers to many issues, including how best to understand the human mind, human behavior, and human learning.

In the 1990s, scholars in a number of universities were beginning to ponder the implications of new biological findings for teaching and learning in the schools. At the Harvard Graduate School of Education (HGSE), Kurt Fischer conferred with colleagues, like Ann Brown, Howard Gardner, David Perkins, and David Rose, about the desirability of a more explicit connection of cognitive development and emotional development, on the one hand, and the need to introduce newly emerging methods and findings in the biological sciences, on the other. Harvard University already had a promising interdisciplinary program in "Mind, Brain, and Behavior"; faculty of HGSE sought to pattern our own initiative after that model in a number of ways.

It is worth mentioning that our sentiments were not immediately endorsed by other faculty members at the school. Many individuals in education are uneasy with the notion that education should embrace the biological sciences. Some of the uneasiness may result from the technical and occasionally forbidding nature of the work itself. But the deeper suspicion stems from the belief—which we consider completely unwarranted—that if one tries to apply findings from the biological sciences, one is thereby endorsing the view that learning and potential are fixed and cannot be changed. Indeed, at one time, faculty uneasiness with a proposed Mind, Brain, and Education (MBE) focus became so acute that we jokingly proposed the title "Mind, Blank, and Education."

In the year 2000, having allayed the worst fears of our colleagues, we officially announced a concentration in MBE, and in 2002 Fischer and Gardner began to teach a yearlong course called "Cognitive Development, Education, and the Brain." We believe that this course may be the first course on this topic to be regularly offered at a school of education. We have learned much over the years, and the course has changed significantly as a result of these lessons. In this essay, we describe the goals of the course, pedagogy and curriculum, lessons learned, and plans for the future.

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and the kinds of work that would be needed to secure a better answer to the problem that has been posed.

Four Throughlines

At the beginning of the year, we assign basic readings that will help students appreciate the multiple perspectives we seek to cultivate. However, without concrete material to work with, many students will be unable to absorb and make use of the theoretical materials. To ground the course in the fundamental concerns of basic education, we defined four domains of learning: numeracy, language and literacy, motivation and emotion, and conceptual change. We spend several weeks discussing the current theories, methods, research, and educational problems relevant to each domain.

The content for each throughline provides a focal point for discussion and a connection to education. During the first term, we ask students to wear primarily the psychology hat to organize and analyze the research in the four domains. We emphasize a few general theoretical approaches—developmental, modular, information processing—to help students assess the empirical evidence and extrapolate the implications of the research for education. The biological hats do not remain on the shelf during this time, but their use is limited to broad methods, imaging techniques, and key ideas like gene expression.

In the second semester, the biological hats assume a primary role. After consideration of the brain at the neural, anatomical, and functional levels, we revisit the throughlines using research from the neuroscience literature. Genetics plays a limited role, although the connections to education are growing (Grigorenko, 2007a, b). The main challenge for both students and staff is to answer the question: What does the biological level add to our understanding of education? The answer is often clearest in the area of learning disabilities, such as dyslexia, where neural evidence can validate or invalidate theoretical views of reading that in turn influence interventions (Fischer et al., 2007; Wolf, 2004). However, by adopting a neuroeducational perspective such as provided by Rose's Universal Design for Learning, we can push students to find integrative solutions for all students (Rose, Meyer, Strangman, & Rappolt, 2002).

Across the throughlines, general tensions emerge, such as domain-general versus domain-specific capacities and nativist versus connectionist accounts, and we encourage students to wrestle with these antinomies in light of the empirical research we cover. As instructors, we try to remain theory and method agnostic so that students may learn to adopt relevant approaches for the problem at hand rather than trying to force the facts into a particular theoretical framework. Students learn to respect the theoretical orientations within different disciplines with an eye toward integration and application. Our students are prepared to ask appropriate questions of the experts in a field and then determine implications for a curriculum and pedagogy.

Case Studies

The throughlines allow us to focus on how learning generally occurs within different content domains. But of course learning can occur very differently across individuals. To address the issue of individual variability, we are developing case profiles that we revisit in each content segment and with multiple perspectives. The goal, in the words of our colleague David Rose, is not to present textbook examples of specific disabilities but rather to capture the "messy realism" of actual students.

One case, for example, is a bilingual 6-year-old who is recognized as creative and highly sociable by her teachers but who is struggling with phonological processing. Our task is to understand how the elements of her profile interact, what educational risk factors we might predict, and how to help this student succeed. While the potential for reading comprehension problems may appear obvious in this case, less obvious are the emotional and motivational implications of failure and low grades that often stem from and may contribute to this kind of language problem. As her affective neural networks become rewired as a function of her difficulties in learning to read, how will this affect her knowledge, creativity, and interest in learning, and how can we find out? The profiles remind us that, as educators, we must look at the whole child in order to leverage strengths as well as address weaknesses of learners.

LESSONS LEARNED

Since we began this course in 2000, similar programs have appeared across the country and abroad. Several universities now have some form of a mind, brain, behavior initiative, with education the most likely field of application. Reflecting back on the development of our course, we can offer some lessons:

The Value of Synthesizing Activities

A relatively new emphasis in our pedagogy grows out of recent interest in synthesizing (Gardner, 2007). We model for students how to sift through a vast literature, decide what is important, and then organize it in ways that make sense for oneself and for others. A good synthesis respects the methods of each discipline, demonstrates the value added of interdisciplinary work, and exhibits caution about the ultimate claims (Boix-Mansilla, 2006).

Two synthesis activities we have used are minute papers and the provision of metaphors for key course concepts.

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TEN

Howard Gardner

HOW EDUCATION CHANGES

Considerations of History, Science, and Values

THE GLACIAL PACE OF INSTITUTIONAL CHANGE UNDER NORMAL CONDITIONS

The transmission of knowledge and skills to the next generation, the process of education in formal and informal settings, is inextricably bound with the emergence of Homo sapiens over the last several hundred thousand years (Bruner 1960; Donald 1991; Tomasello 2000). Formal schools, however, are just a few thousand years old; and the notion of universal education, in which all young persons in a society receive several years of competent schooling, is still a distant dream in many corners of the globe (Bloom and Cohen, 2001; Bloom, this volume).

For the most part, institutions change slowly. Such gradual change may be a positive element. The practices associated with an institution tend to be worked out by trial and error over long periods of time. While such experimentation does not guarantee a stronger and more effective institution, at least the most problematic structures and procedures are eliminated. When it comes to educational institutions—which have come to bear a primary responsibility for the intellectual and moral health of the next generation—such conservatism is especially to be recommended. We do not—or at least we should not want to—

"recent decades, progress towards universal education has been unprecedented. Illiteracy in the developing world has fallen from 75% of people a century ago to less than 25% today" (2001, p. 1). Still the amount of education in the developing world is modest: the "average number of years spent in school more than doubled between 1965 and 1990, from 2.1 to 4.4, among those age 25 and over in developing countries" (Bloom and Cohen 2001, p. 1). In contrast, in the developed world, nearly all youngsters receive education at least through some secondary school, and in some lands, a third to a half or even more receive some form of postsecondary education.

Following the years of primary school, the burden of education shifts. Complementing the missions stated above, most formal educational institutions also strive to help students obtain fluency in the basic literacies, so that they can deal readily with all manner of texts; assist them in mastering the fundamentals of several key disciplines, particularly mathematics and the sciences; and provide tools so that students can understand and participate in the formal and informal social, economic, and political systems of their country. This latter goal is achieved both through direct instruction in history, literature, and civics and through a demonstration of these processes in the manner in which the school operates. Specifically, in authoritarian cultures, almost all of the processes of education are dictated by a central authority, such as the Ministry of Education or the dominant religious order. In more democratic cultures, students and teachers have considerable say in the governance and activities of the school, and sometimes even curricular choices are left to the local educational establishment.

It would be an exaggeration to claim that education across the developed world is centrally orchestrated. Vast and gritty differences exist across and even within nations. Yet there is surprising convergence in what is considered a reasonable precollegiate education in Tokyo or Tel Aviv, in Budapest or Boston. Following ten to thirteen years of school, students are expected to have studied several sciences, mastered mathematics through beginning calculus, know a good deal about the history and governance of their own country, be able to read and write fluently in their native language. Most nations have or are moving toward standardized curricula and assessments in these areas—another indication of globalization's momentum. Countries differ notably in the extent to

which they require mastery of languages other than the native tongue(s), knowledge of the history and culture of other parts of the world, and acquaintance with "softer" subjects like the arts or literature. International comparisons, such as the International Mathematics and Science Survey (TIMMS), exert increasingly strong pressures in the planning chambers of educational ministries. And programs like the International Baccalaureate are spreading rapidly to many countries—developing as well as developed—throughout the world (Walker, 2002a).

From this description, it may seem that large parts of the world have managed to strip education not only of its religious moorings but also of a clash among competing values. To some extent, this characterization has validity. There is little dispute across the globe that future citizens need to be literate, numerate, capable of scientific thought, and knowledgeable about the history, traditions, and governmental system of the nation in which they are being educated. Yet the specter of values still looms large in two respects. First, competence in science, mathematics, engineering, and technical subjects has come increasingly to be valued, perhaps overvalued, in comparison, say, to the arts, literature, moral education, or philosophy. In this sense, a technical education is equally important to fundamentalist Muslims, Hindus, Christians, and Jews; piano or calligraphy lessons take place after school or on weekends for those who can afford it. Second, especially within democratic societies, there are large and unresolved disputes about what competence means. Thus, within the sciences, competence can mean mastery of large bodies of factual information, familiarity with laboratory procedures, in-depth understanding of selected key concepts, and/or the ability to make new discoveries or raise new questions. And educational policy makers disagree about whether future citizens should know political or social history, embrace triumphalist or critical accounts of their own history, learn to support or to critique the status quo. The sphere of values remains alive and well in education.

Until thirty years ago, even students who received the highest-quality education typically left school during adolescence. Nowadays, however, some form of tertiary education is becoming common, even expected, especially in developed countries. The American option of some years of "liberal arts" is exceptional—and may be an endangered species even in the United States; it is (perhaps reasonably in some countries)

principles. While not rejecting the Piagetian perspective in toto, the influential Russian psychologist Lev Vygotsky (1978) added two important components. First, he noted that there is a great deal of knowledge about such concepts already circulating within the society and that the challenge of education is to help students internalize what has already been established by previous generations. Second, he showed that proper support, or scaffolding, for the learning child is always advisable and sometimes necessary if the child is to achieve more sophisticated understandings and skills. It is illusory to believe that children can on their own figure out the major ideas that have slowly emerged in the scholarly disciplines, even though they may be able to master certain universal understandings without explicit tutelage.

Even though most educators have not read Binet or Skinner, Piaget or Vygotsky in the original (and most parents have not heard of these authorities), the legacies of these intellectual giants have exerted an impact on education around the world. The belief in formal tests as means of selecting and comparing has proved an incredibly powerful twentieth-century virus. Behaviorist methods are widely used, particularly with populations that exhibit cognitive or emotional problems. But discovery methods are also prominent in many scientific and mathematics classes, while concern with the proper forms of support or scaffolding permeate discussions about education, ranging from Head Start programs to apprenticeships in scientific laboratories or medical schools.

THE CHALLENGE POSED BY NEW DISCOVERIES

Just as generals often fight the last war, many educators base their well-intentioned practices on outmoded ideas about human cognition. In the past quarter century, I have had the opportunity to observe two major changes in how scientists think about human learning and to anticipate the emergence of a third. In each case, these paradigm shifts could have major educational implications, ones that remake how teachers work with students. In tracing the course and fate of these understandings, we can gain important insights into what happens when scientific discoveries meet educational practices.

From Intelligence to Intelligences

Let me begin with the example of intelligence. For nearly a century, a consensus has obtained among those who are charged with thinking about intelligence. Put succinctly, the consensus stipulates that there is a single thing called human intelligence; individuals differ from birth in how smart they are; one's intellectual potential is largely determined by one's biological parents; and psychologists assess a person's intellect by administering a test of intelligence. These views date back to the claims of Charles Spearman (1904) and Lewis Terman (1916) at the turn of the century, and they have been espoused in recent years by such experts as the British psychologist Hans Eysenck (1987) and the American social scientists Richard Herrnstein and Charles Murray (1994).

While this consensus was challenged from early on by both scholars (Thurstone 1938) and commentators (Lippmann 1922–1923/1976), only recently has there been a more concerted critique by scientists of various stripes. Among scholars of artificial intelligence, there is a growing recognition that notions such as "general problem solving" are not well-founded and that successful computer programs contain specific knowledge about specific forms of expertise. Among neuroscientists, there is agreement that the brain is not a general, equipotential organ: rather, specific capacities (e.g., language, spatial orientation, understanding of other people) are associated with specific regions of the brain and have evolved over the millennia to entail specific kinds of information processing (for relevant references, see Gardner 1983/1993a, 1985). Among anthropologists and psychologists, an increasingly vocal minority has proposed the existence of several relatively independent forms of intelligence (Battro, this volume; Goleman 1995; Mithen 1996; Rosnow, Skedler, Jaeger, and Rin 1994; Salovey and Mayer 1990; Sternberg 1985; Tooby and Cosmides 1991).

In a formulation developed two decades ago, I argued that human beings are better thought of as possessing half a dozen or more separate sets of capacities that I termed multiple intelligences (Gardner 1983/1993a). As currently construed, the list stipulates eight intelligences (linguistic, logical mathematic, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist), with a possible ninth, or

one's energies in an attempt to raise IQ and one might well hit upon a method that is successful.

The embracing of MI theory, at least at a nominal level, is an example of how a scientific finding can be readily validated by the educational community. However, such a friendly reception is not always the case.

The Challenges of Disciplinary Understanding

Once one has acquired the basic literacies, the next educational milestone entails mastery of various subjects or disciplines. While the list of valued disciplines differs across societies, in general it features a number of sciences (biology, physics, chemistry), several branches of mathematics (algebra, geometry, precalculus), as well as a smattering of more humanistic pursuits (history, geography, one or more art forms). If the literacies represent the consensual curricula for the elementary grades, disciplinary mastery and understanding is the curriculum of choice for secondary schools and perhaps college as well.

Let me say a word about each of these terms. When I speak of *disciplines,* I intend a distinction between subject matter (learning the names, facts, and concepts of a particular subject) and discipline (mastering the distinctive ways of thinking that characterize a scientist, historian, humanist, or artist). Both scientists and historians offer explanations of events, but the nature of the data that they examine and the kinds of explanations that they offer are distinctively and instructively different. When I speak of *understanding,* I venture well beyond the simple capacity to recall what one has read or heard about. An individual who understands a disciplinary topic can apply that understanding to new situations, ones that she has never encountered before. In the absence of such performances of understanding, acquired knowledge remains inert—incapable of being mobilized for useful purposes.

In the past, both traditionalists and progressives woefully underestimated the difficulties entailed in disciplinary understanding. Traditionalists saw disciplinary study chiefly as the mastery of factual and definitional information drawn from various subject matters; and such mastery entailed chiefly repetition, drill, and preconfigured problem

sets (Bereiter and Engelmann 1966; Hirsch 1987, 1996). Progressives believed that disciplinary understanding flowed naturally from the opportunity to explore topics in depth, in natural settings, at one's own pace (Bruner 1960; Dewey 1964; Jervis and Tobier 1988). Just as literacy should arise as a matter of course following opportunities to practice in a literate environment, so disciplinary mastery should arise naturally from deep immersion in the relevant subject matter.

Alas, both of these educational perspectives have proved wrong. A large body of research from the cognitive sciences over the last few decades has documented an alarming state of affairs. It turns out that the understanding of the principal ideas in the various disciplines has proved much more challenging than most educators have believed. The smoking gun can be found in the study of the sciences. Even students who get high grades in the sciences at leading secondary schools and universities turn out to have very tenuous understanding of the principal ideas in various subject areas. This result has been ascertained by examining such students outside of their classroom environment. Not only are most students inadequate in applying properly what they have learned in class, but in many cases, they give the same answers to problems and questions as are given by students who have not even taken the course in the first place! (For a summary of the relevant literature, see Gardner 1991, 1999b.) Thus, for example, even our high-scoring high school and college students fail to evince understanding of evolution, or the laws of motion, or the principles of economics when they are questioned outside a text-test context.

In *The Unschooled Mind* I have laid out this state of affairs in some detail. Whether one looks at the physical sciences, the natural sciences, the human sciences, mathematics, history, or the arts, the same picture emerges: most students prove unable to master disciplinary content sufficiently so that they can apply it appropriately in new contexts. For the most part they have simply memorized facts and definitions and can parrot back this "inert knowledge." Perhaps their teachers were asking them to do only this, so that in such cases, low expectations may well be at work. However, considerable evidence now documents strong cognitive forces that stand in the way of disciplinary understanding.

Why does this happen? I have argued that in the early years of life, young persons develop very powerful theories about the world: theories

The rise of interdisciplinary studies is not a scientific phenomenon; rather it is a historical fact of our time. Trends in our increasingly globalized society have brought interdisciplinary concerns to the fore. Issues like poverty reduction, anti-terrorism, privacy, prevention of disease, energy conservation, ecological balance—the list could be expanded at will—all require input from and syntheses of various forms of disciplinary knowledge and methods. Educational institutions seek, in their ways, to respond to the demand for this kind of skill; and the more adventurous students are attracted to studies that call for a blend of disciplinary expertises. Yet in a world that still believes in one kind of intelligence and that has not appreciated the difficulty of understanding even a single discipline, we are hardly in a position to mount interdisciplinary programs and feel confident about evaluating their success. Perhaps it will be necessary to institute psychological studies of the synthesizing or interdisciplinary mind.

EDUCATIONAL OPTIONS IN AN ERA OF GLOBALIZATION

Nearly everyone recognizes that the youth of today are being prepared for a world that is different in fundamental ways from the world of 1900, 1950, perhaps even 1975. In addition to the obvious differences in political alignments and technological sophistication, youth today partake of a powerful hegemonic cultural message emanating from the United States, as well as strong and divergent cultural countercurrents streaming in from major societies. Any student growing up in such a world needs to be able to navigate among these diverse and powerful messages (see Friedman 2000; Giddens 2000; also see Jenkins, Maira, and Watson, this volume). Yet there is not even the beginning of a synthesis of how this altered world should impact education, particularly education at the primary and secondary levels (see Suárez-Orozco and Qin-Hilliard, this volume). Here, I put forth some suggestions for a curriculum suitable to the era of globalization. I do so with the explicit awareness that all educational recommendations presuppose a certain set of values. Mine are based on an education that is suitable for a democratic society, in which individuals have a fair degree of say in where they live and how they live; in which the use of one's mind to the fullest is a prominent value; and in which all able-bodied individuals are

expected to contribute not only to the security and well-being of their families but also to the health of the broader communities in which they live.

Beginning on a conservative note, I believe that we should not turn our backs on those methods and procedures that have been worked out over long periods of time. Though there is always room for improvement, we know a great deal about how to develop the literacies in young persons, both those who can learn in normal ways and those who have specific learning problems—for example, in the decoding of written alphabetic text.

Once we come to the mastery of disciplines, however, we can no longer afford business as usual. Now that we know the difficulties of disciplinary mastery, we need to recognize that this concern must occupy a large proportion of our pedagogical energies. My recommendation in this area is to cut down radically on the number of subjects to master in precollegiate education: I would favor all students learning at least one science, one area of history, one art form, expression and appreciation in their own language, and especially in countries where the principal language is not widely spoken beyond its borders, expression and appreciation of English.

Once a sharper focus has been adapted, it is indeed possible to teach for disciplinary understanding. Such teaching is best done by focusing on the principal deep ideas in the discipline and approaching them from many different angles (Blythe 1998; Cohen, McLaughlin, and Talbert 1993; Wiske 1998). A depth-over-breadth engagement with a limited number of topics and disciplines is most likely to undermine the misconceptions and to establish deep and robust forms of understanding. Interestingly, the idea of multiple intelligences can be used here. For if one focuses sharply on a limited number of concepts, it is possible to approach these concepts in several ways, exploiting our various human intelligences. Such a multiperspective approach yields two dividends: it reaches more students and it exemplifies what it means to have expertise (Gardner 1999b). After all, the expert is the individual who can think of a topic in lots of different ways.

My focus on a few key disciplines reveals that I believe in the idea of a core curriculum. In that sense I am a traditionalist. But I am completely open to the presentation of the curriculum along any number of

2. *Capacity to think analytically and creatively within disciplines.* Simple mastery of information, concepts, and definitions will no longer suffice. Students will have to master disciplinary moves sufficiently so that they can apply them flexibly and generatively to deal with issues that could not be anticipated by the authors of textbooks.
3. *Ability to tackle problems and issues that do not respect disciplinary boundaries.* Many—perhaps most—of the most vexing issues facing the world today (including the issue of globalization!) do not respect disciplinary boundaries. AIDS, large-scale immigration, and global warming are examples of problems in need of interdiscplinary thinking. One could take the position that it is first necessary to master individual disciplines; moving among or beyond disciplines then becomes the task of tertiary or professional education (Gardner 1999b). However, there is much to be said for beginning the process of interdisciplinary work at an earlier point in education—as is done, for example, in the "theory of knowledge" course required of students in the International Baccalaureate or the courses in "problem-based learning" taught at the Illinois Mathematics and Science Academy. How best to begin to introduce rigorous multiperspective thinking into our classrooms is a challenge that we have only begun to confront; and as noted, our psychological understanding of the mind of the synthesizer has yet to coalesce.
4. *Knowledge of and ability to interact civilly and productively with individuals from quite different cultural backgrounds—both within one's own society and across the planet.* Globalization is selecting for interpersonal competencies, including the ability to think and work with others coming from very different racial, linguistic, religious, and cultural backgrounds (see Maira, this volume; C. Suárez-Orozco, this volume). Mastery and cultivation of these competencies will be the cornerstone of educational systems in the most successful democracies of the twenty-first century (see Suárez-Orozco and Qin-Hilliard, this volume).
5. *Knowledge of and respect for one's own cultural tradition(s).* The terrorists who crashed into the Twin Towers of the World Trade Center privileged the scientific and technical knowledge and cognitive skills that globalization has to offer. At the same time, they despised the Western, and especially the American, values, ethos, and worldview that in many regions of the world—including much of Western Europe—pass as globalization's underside. Societies that nurture the emergence of the instrumental skills needed to thrive *while* not subverting or undermining the expressive domains of culture—values, worldviews, and especially, the domain of the sacred—will endure and may even have the edge in globalization's new regime. Managing the dual process of convergence (in the instrumental domains of culture) and divergence (in the expressive domains of culture) may well be among the most critical tasks of education for globalization. Societies that can manage this psychic jujitsu will thrive.
6. *Fostering of hybrid or blended identities.* Education for globalization will select for the crafting and performing of hybrid identities needed to work, think, and play across cultural boundaries (see C. Suárez-Orozco, this volume). These will be increasingly indexed by multilingual competencies and transcultural sensibilities that will enable children to traverse discontinuous cultural meaning systems; to metabolize, decode, and make meaning in distinct, sometimes incommensurable cultural spaces and social fields. Societies that privilege transculturation and hybridity will be in a better position to thrive, while societies that enforce a regime of compulsive monoculturism and compulsive monolinguism are likely to lose out under globalization's emerging regime.
7. *Fostering of tolerance.* Education for globalization will give those societies that tend to (1) tolerate or, better yet, privilege dissent, (2) foster doubt (in Francis Bacon's sense), and (3) provide equality of opportunity will have a powerful edge over societies that tend to privilege reflex-like consent and inequality of access to opportunity due to various ascribed qualities. More ominously, our world is unlikely to survive unless we become far more successful at fostering tolerant attitudes within and across nations.

CONCLUDING NOTE

Though many may wish that they would go away, the main lines of globalization are here to stay. It is difficult to envision a world in which the economic trends, communication technologies, movements of population, and cultural messages of the past few decades will somehow be reversed. Even events as epochal as those of September 11, 2001, are likely to modulate the forces of globalization rather than derail them in a fundamental way.

COMMENTARY:

A Disciplined Approach to School Reform

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practice; and the considerable pressures that impact the work of teachers, students, and administrators on a daily, if not hourly, basis.

Of many approaches to research and theorizing about schools, the creation of taxonomies or typologies is among the most important. Bethany Rogers has made a contribution to scholarship in delineating four competing foci for the curriculum: the measurements mandated by a political jurisdiction; the concepts and approaches to knowledge as captured in the scholarly disciplines; the passions and approaches of teachers; the interests and the "relevances" of students. Rogers is correct in stating that individuals and organizations differ profoundly in their priorities; and she has made a reasonable case for how her "ideal typology" played out in the four partner organizations. Even if the partner organizations do not enthusiastically endorses Rogers's "placements" of each, both the reformers and the readers benefit from a crystal-clear statement of these options.

We see the utility of this taxonomy in the essay by Donna Muncey and Joyce Payne. These authors have correctly identified the severe tensions that result when an enabling organization (like ATLAS) works with a jurisdiction (like Prince George's County in Maryland) where each party embraces a fundamentally different set of assumptions about authority. The authors go on to show the equally crippling problems that arise when a school deviates from the "authority norms" of the surrounding community, or when a new set of building or community administrators abruptly introduces a new set of authority considerations. It is no wonder that lasting school reform is virtually impossible to achieve under such circumstances--and it is wonderful (if I may borrow the same word stem) that good things can nonetheless happen in this lamentably combative milieu.

"Educating the mind" obviously leaves too much running room--it spans the landscape from strident or subtle propaganda to hermetic study of ancient scratchings. There is no point in mandating that schools accomplish what youth will acquire anyway on the streets, in their families or churches, or from the media. Rather, schools should pass on that often challenging and elusive knowledge that has been built up over the centuries by reflective men and women from several cultures.

But there is way too much knowledge and way too much information, and even those excessive quantities are being doubled with regularity. We need to make hard decisions about which knowledge to teach and which ways of knowing should be privileged.

In The Well-Disciplined Mind (Gardner, 1999), I argue that education from kindergarten through secondary school ought to have as its principal goal an initial mastery of the culture's sense of what is true (and not true); what is beautiful and what is not; and what is good and what is evil. Citizens should live in ways that honor (and add to) truth, that appreciate and create beauty, and that are moral rather than immoral.

To make my argument concrete, I focus on three instances. As an example of truth, I use the theory of evolution--the only plausible scientific explanation of where humans and other species come from. As an example of beauty, I draw on the music of Mozart. As an example from the moral sphere, I focus on the Holocaust undertaken by the Nazis in Germany. I stress that these are only examples--substitute the truth of plate tectonics, the writings of Virginia Woolf,

past, with neither a rationale for why they are included today nor a sense of how they can be cumulative in a child's education. Indeed, youngsters who manage to make sense of the curricula in most schools (or pathways of schools) are virtual magicians; for they are finding patterns where little structure has initially been placed.

Once one determines central understandings from the disciplines, other pieces of the educational puzzle fall into place. One can then construct inviting lessons and projects that bring the student in contact with important ideas; one can envision sequences that obtain across the semester or even, *mirabile dictu*, across years; one can create assessments that monitor the extent to which understandings have been achieved and can be performed.

The disciplines play the central role in this endeavor. Not only are they the chief determiners of which understandings are worth achieving. More important, they furnish the ways in which students can in the future approach questions, concepts, and theories. Thus the student who has learned about the scientific method appreciates the relation among theory, hypothesis, experiment, and data: she can evaluate the report of a controversial medical experiment. The student who has immersed herself deep in works of art understands how an artistic medium can be used to convey certain feelings or capture the ambiguity of a passage or scene: so informed, she can visit an exhibition or attend a performance with some preparedness. The student with historical sensitivity comprehends how one can infer plausible causality through the examination of several primary and secondary sources; she is equipped to read about an event half way around the world and make a determination of whether the analogy of Munich or Vietnam or Nazi Germany is, or is not, relevant.

Finally, there are integral ties between students and disciplines. The disciplines emerge from the human desire to secure answers to questions posed by nearly every young person: Who are we, Where do we come from, What are we made out of, What is going to happen to us? The disciplines represent civilization's cumulative efforts to create means of approaching these questions systematically and ways of securing answers of some reliability. In addition, every growing person wants to achieve competence in the activities and practices that are valued in the culture. Youngsters who live in a culture where the disciplines--be they history or music or gardening or skating—are practiced and valued, will want to enhance their own skills and achieve disciplined expertise. Moreover, as Ted Sizer points out, students will necessarily make sense of the curriculum in their own way, thus ensuring that in some sense they retain ultimate authority over the representations in their own minds.

A Pluralistic Educational Universe Even if my educational vision makes sense to some, it will certainly not be right for everyone, and this is especially true in a large, multicultural society. The essays in this volume suggest some of the productive ways in which one can differentiate educational visions.

A first way has to do with age or developmental level. Education for the young proceeds properly from the interests of young children; in that sense, the students can reasonably be seen as a proper authority for the curriculum. By the time of middle and secondary school, the disciplines themselves rise to the fore. In an introduction to the disciplines, teachers play a crucial role. Then, as the student herself comes to acquire the approaches of particular disciplines, the discipline itself can provide guidance and authority.

educated person. I find nothing surprising or wrong with this. If, however, we live in one society, we then face a difficult choice: do we agree simply to live with alternative visions, or do we seek to hammer out some kind of consensus or compromise?

For a country as heterogeneous as the United States, it seems unreasonable to expect us to endorse "one best system." Yet, I personally find the idea of letting 15,000 district flowers bloom to be at best unwieldy and at worst abhorrent. Therefore I personally favor setting up a small number of K-12 pathways, which appeal quite explicitly to different tastes. These patterns could range from the traditional to the progressive; from one centered on factual mastery to one based on understanding; from one committed to technology to one that highlights experiential learning in the community. Families would choose from among these pathways; and because the number is small, they could be replicated across communities. In that way, a child that moves within or between communities could continue to attend a school that subscribes to the philosophy of his pathway.

How can a community move toward a curriculum that provides genuine education for its youngsters? Delineating the options is a necessary first step. Stakeholders need to commit to honest debate, with a willingness to listen and to compromise. If a reasonable consensus is not possible, that fact should be recognized—and this is my frank, though reluctant conclusion about the Prince George's County ATLAS effort of the middle 1990s. If a reasonable consensus can be reached—as was the case with Gorham, Maine—then one can move toward implementation and, ultimately, toward appropriate assessments.

The Five Minds for the Future
By Howard Gardner

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At the start of the third millennium, we are well attuned to considerations of 'the future'. In conceptualizing the future, I refer to trends whose existence is widely acknowledged: the increasing power of science and technology, the interconnectedness of the world in economic, cultural, and social terms, and the incessant circulation and intermingling of human beings of diverse backgrounds and aspirations.

As one who has witnessed discussions of the future all over the world, I can attest that belief in the power of education—for good or for ill—is ubiquitous. We have little difficulty in seeing education as an enterprise—indeed, *the* enterprise—for shaping the mind of the future.

What kind of minds should we be cultivating for the future? Five types stand out to me as being particularly urgent at the present time. One by one, let me bring them onto center stage.

1. The Disciplined Mind
In English, the word 'discipline' has two distinct connotations. First, we speak of the mind as having mastered one or more disciplines—arts, crafts, professions, scholarly pursuits. By rough estimates, it takes approximately a decade for an individual to learn a discipline well enough so that he or she can be considered an expert or master. Perhaps at one time, an individual could rest on her laurels once such disciplinary mastery has been initially achieved. No longer! Disciplines themselves change, ambient conditions change, as do the demands on individuals who have achieved initial mastery. One must continue to educate oneself and others over succeeding decades.

Such hewing of expertise can only be done if an individual *possesses* discipline—in the second sense of the word. That is, one needs continually to practice in a disciplined way if one is to remain at the top of one's game.

We first acquire a 'disciplined mind' in school, though relatively few of us go on to become academic disciplinarians. The rest of us master disciplines that are not, strictly speaking, 'scholarly'; yet the need to master a 'way of thinking' applies to the entire range of workers—whether it be lawyers, engineers, crafts persons, or business professionals involved personnel, marketing, sales, or management. Such education may take in formal classes or on the job, explicitly or implicitly. In the end, a form of mastery will be achieved, one that must continue to be refined over the years.

Nowadays, the mastery of more than one discipline is at a premium. We value those who are interdisciplinary, multi-disciplinary, or trans-disciplinary. But these claims must be cashed in. We would not value a bilingual person unless he or she can speak more than one language. By the same token, the claim of pluri-disciplinarity (if you'll excuse the neologism) only makes sense if a person has genuinely mastered more than one discipline and can integrate them. For most of us, the attainment of multiple perspectives is a more reasonable goal.

that they also have the capacity to value the complementary 'laser intelligence' that has fully mastered a specific discipline. Such individuals should be identified and cherished. It is crucial that we determine how to nurture synthesizing capacities more widely, since they are likely to remain at a premium in the coming era.

3. The Creating Mind

In our time, nearly every practice that is well understood will be automated. Mastery of existing disciplines will be necessary, but not sufficient. The creating mind forges new ground. In our society we have come to value those individuals who keep casting about for new ideas and practices, monitoring their successes, and so on. And we give special honor to those rare individuals whose innovations actually change the practices of their peers—in my trade, we call these individuals 'Big C' creators.

As a student of creativity, I had long assumed that creating was primarily a cognitive feat—having the requisite knowledge and the apposite cognitive processes. But I have come to believe that personality and temperament are equally, and perhaps even more important for the would-be creator. More than willing, the creator must be *eager* to take chances, to venture into the unknown, to fall flat on her face, and then, smiling, pick herself up and once more throw herself into the fray. Even when successful, the creator does not rest on her laurels. She is motivated again to venture into the unknown and to risk failure, buoyed by the hope that another breakthrough may be in the offing.

It is important to ascertain the relation among the three kinds of minds introduced thus far. Clearly, synthesizing is not possible without some mastery of constituent disciplines—and perhaps there is, or will be, a discipline of synthesizing, quite apart from such established disciplines as mathematics, mime, or management. I would suggest that creation is unlikely to emerge in the absence of some disciplinary mastery, and, perhaps, some capacity to synthesize as well.

4. The Respectful Mind

Almost from the start, infants are alert to other human beings. The attachment link between parent (typically mother) and child is predisposed to develop throughout the early months of life; and the nature and strength of that bond in turn determines much about the capacity of individuals to form relationships with others throughout life.

Of equal potency is the young human's capacity to distinguish among individuals, and among groups of individuals. We are wired to make such distinctions readily; indeed our survival depends upon our ability to distinguish among those who would help and nourish us, and those who might do us harm. But the messages in our particular environment determine how we will label particular individuals or groups. Our own experiences, and the attitudes displayed by the peers and elders to whom we are closest, determine whether we like, admire, or respect certain individuals and groups; or whether, on the contrary, we come to shun, fear, or even hate these individuals.

We live in an era when nearly every individual is likely to encounter thousands of individuals personally, and when billions of people have the option of traveling abroad or of encountering individuals from remote cultures through visual or digital media. A person possessed of a respectful mind welcomes this exposure to diverse persons and groups. A truly cosmopolitan individual gives others the benefit of doubt; displays initial trust; tries to form links; avoids prejudicial judgments.

take corrective action. I would add that as one gets older, it does not suffice simply to keep one's own ethical house in order. One acquires a responsibility over the broader realm of which one is a member. And so, for example, an individual journalist or geneticist may behave in an ethical manner; but if her peers are failing to do so, the aging worker should assume responsibility for the health of the domain. I denote such individuals as 'trustees': veterans who are widely respected, deemed to be disinterested, and dedicated to the health of the domain. To quote the French playwright **Jean-Baptiste Molière**, "we are responsible not only for what we do but for what we don't do."

Tensions Between and Among These Minds

Of the five minds, the ones most likely to be confused with one another are the *respectful* mind and the *ethical* mind. In part, this is because of ordinary language: we consider respect and ethics to be virtues, and we assume that one cannot have one without the other. Moreover, very often they are correlated; persons who are ethical are also respectful, and vice versa.

However, as indicated, I see these as developmentally discrete accomplishments. One can be respectful from early childhood, even without having a deep understanding of the reasons for respect. In contrast, ethical conceptions and behaviors presuppose an abstract, self-conscious attitude: a capacity to step away from the details of daily life and to think of oneself as a worker or as a citizen.

Whistle blowers are a good example. Many individuals observe wrongdoing at high levels in their company and remain silent. They may want to keep their jobs, but they also want to respect their leaders. It takes both courage and a mental leap to think of oneself not as an acquaintance of one's supervisor, but rather as a member of an institution or profession, with certain obligations attendant thereto. The whistle blower assumes an ethical stance, at the cost of a respectful relation to his supervisor.

Sometimes, respect may trump ethics. Initially, I believed that the French government was correct in banning Muslim women from wearing scarves at school. By the same token, I defended the right of Danish newspapers to publish cartoons that poked fun at Islamic fundamentalism. In both cases, I was taking the *American Bill of Rights* at face value—no state religion, guaranteed freedom of expression. But I eventually came to the conclusion that this ethical stance needed to be weighed against the costs of disrespecting the sincere and strongly-held religious beliefs of others. The costs of honoring the Islamic preferences seem less than those of honoring an abstract principle. Of course, I make no claim that I did the right thing—only that the tension between respect and ethics can be resolved in contrasting ways.

In closing

There is no strict hierarchy among the minds, such that one should be cultivated before the others. Yet a certain rhythm does exist. One needs a certain amount of discipline – in both senses of the term—before one can undertake a reasonable synthesis; and if the synthesis involves more than one discipline, then each of the constituent disciplines needs to be cultivated. By the same token, any genuinely-creative activity presupposes a certain discipline mastery. And while prowess at synthesizing may be unnecessary, nearly all creative breakthroughs—whether in the arts, politics, scholarship or corporate life—are to some extent dependent on provisional syntheses. Still, too much discipline clashes with

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Multiple Intelligences, Howard Gardner and New Methods in College Teaching

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they matter then they're knowledge is inert, that is, you can't use it. Indeed, a good kind of litmus test for understanding is to go over the day's newspaper with students or *Time* magazine or your favorite television news hour, and see whether the *students* can explicate or whether *you* can explain what's going on.

We read about Anthrax, which most of us have probably not thought about ever in our life before. Then the question is: to what extent does what we learned about biology help us understand the risks and what we can do about them? You know, we read about terrorism and we ask to what extent are there examples from other realms of life or from other historical eras that can help us understand this? And again, if you can mobilize what you've learned before, that's the sense that it's not all been in vain. But if you never think to apply what you learned about Northern Ireland or about Basques or about the founding of the State of Israel to what's going on nowadays in the Middle East and in this country, then essentially that knowledge was wasted. It's not doing you any good.

A Non-Postmodern Claim

In a book called *The Disciplined Mind* which came out a couple of years ago, I made a distinctly, non-postmodern claim. I claimed that the understandings that we would like people to have are understandings of what's *true* or *not true*. We get the basis for making this judgment from science, math, history as well as folk knowledge, what's *beautiful* and *ugly*, or what's kitsch. (If you don't know what kitsch is, next time you're in a hotel look at the decorations in your room and you'll probably get a good exemplar of kitsch.) And you know, understanding is in the arts but it's also in beauty—and in nature. You know, there *is* beauty in nature.

Most important, I would say, are *good* and *evil*: not just understanding the difference, but in being able to act in a good and not an evil way. I said non-postmodern because, as many of you will know, part of postmodernism is to attack these notions of truth, beauty and goodness as having any coherence at all. Indeed, just last week, Stanley Fish, a very well known and well respected literary critic, wrote an article in *The New York Times*. He basically claimed that postmodernism had not been refuted by terrorism, that there was still no way of talking about good and evil or truth and lying which could encompass our world and the world of—I would use a most non-postmodern phrase—the world of ourselves and our enemies.

I was moved to write a letter to the *Times* and, as is not usually the case, they printed it. I called Fish's argument either incoherent, inconsistent or self-refuting. If I wanted to take Fish's position, I would say, "Look, we're never going to have an uncontested notion of truth, beauty and goodness." But if I would want to take the Gardner position, which is what I believe in, I would say that even though we never reach them, these ideals are something we have to aim for. Indeed, I was going to sign my letter to the *Times* "Howard Gardner, formerly of the Flat Earth Society." (But because I didn't want to sound impertinent, I didn't.) But you know, the more you think like a scientist, the more the notion that there are no truths seems bizarre.

Truth, Beauty and Morality

This is all pretty theoretical. In *The Disciplined Mind*, I take three examples deliberately chosen because they are parts of curricula everywhere. In the area of truth, I look at a science example, the theory of evolution, not because it's been proved true in every regard—that's not the way science works—but rather because it's the only non-faith based explanation we have of where human beings come from.

As a beauty dimension, I chose the work of Mozart; and as an example of morality and immorality, I chose the Holocaust. Without question, those are big topics. And so I didn't just focus on evolution, I focused on what I call *Darwin's finches*. Darwin's finches constitute a very interesting puzzle. If you go to the Galapagos Islands where Darwin went, on each island there is a different species of finch. It was thinking about this question that got Darwin to think about the survival of the fittest among species that are fighting to survive in a particular ecological niche. So I focused on Darwin's finches. Maybe only one out of ten kids could get interested in *evolution* if you just used that word. But it's different if you actually go to the Galapagos or you look at films of it and you ask the question: "Why do all the finches have big beaks on this island and smaller beaks on that island?" Most kids can get into that.

The Holocaust

The Holocaust, of course, is also a vast topic. So I take a historical incident, what is called the Wanssee Conference, which took place in January of 1942. That is the conference at which Hitler's henchmen actually began to implement the Final Solution. There are two interesting things about that conference: One is there is no record, which says that this is where the Final Solution was first implemented. Yet historians all agree that it was. The trains to Auschwitz began the next day, and within a year, a million and a half people were killed. So it's pretty high circumstantial evidence.

It's also interesting—and this gets to the morality issue—that there were 14 persons, all men, at the Wanssee Conference in Berlin. Eight of them had doctorates from Central European universities so having a high degree is no

we'll never get to the ultimate truth, but why shouldn't we try? We'll never get to ultimate understanding, but why shouldn't we use our precious time on earth to understand as much as we can?

Teach A Limited Number of Things in Depth

The worst problem that most of us face is the pressures for coverage. The amount of information in the world increases enormously. It increases the amount of understanding that is required. So we're in an impossible position. We're aware of all this accumulated stuff, and so we feel guilty if we don't try to disperse it.

And yet, I believe—and here is where I am at odds with almost every policy maker in this country—that if you try to cover a lot of stuff, you will not have understanding. I also think that the best way to get understanding is to cover a limited number of things in depth. But that is not a popular point of view. You will not get elected to office if you take that point of view.

Cognitive freudianism was named after Piaget, the cognitivist, and Freud, the Freudian—though there are other freudians like Anna Freud. Cognitive freudianism is a term that I coined some years ago and it is, I think, the nonsociologic reason why understanding is difficult. It is the deep biological, psychological, epistemological reason, to wit: When we're young, we develop very powerful theories about the world, theories of how the physical world works, like the bigger thing falls more quickly to the ground than a smaller thing, or the world is flat because it looks flat or theories about the biological world. "If it's moving it's alive; if it's not moving, it's dead. If it's on a monitor or other screen, who can tell? It might be alive, it might be dead."

These are very common sense notions that kids develop when they're very young, and that nobody has to teach. They just pick the notion up themselves. But while some of these notions are true and many of them are charming, most of them fall flat in the face of the discipline. They just are not backed up by disciplinary insights. *And yet, for evolutionary reasons which we could talk about, these early ideas which I call early conceptions or early engravings, are very difficult to change.* They are very entrenched. It is as if during the first five to ten years of life we had a very powerful engraving in our mind/brain—not because of teaching but just because of living in the world. When we go to school, school is like powder. The powder gets poured in those engravings and it accumulates because people say, "Oh great, look at all the powder. Our kids know so much."

A Disciplined Engraving

The problem is that powder is basically non-disciplinary factual information. One day kids leave school, and depending on how good the memory is, the powder evaporates quickly or not so quickly, and then what is left? That same initial engraving. The nondisciplined theory has never changed. What is needed to happen—and later I'll tell you how I think it happens—is that we've got to rub away that early engraving. We have to smooth it, and then we have to construct a new engraving, a disciplined engraving, which is a more sophisticated way of thinking. We have to construct a disciplined way of thinking.

Eight-Year-Old Creationists

An interesting finding from a psychologist at the University of Toledo named Margaret Evans. If you talk to eight-year-olds all over this country—and I would assume all over the world—you would find that they are all creationists. Every eight-year-old, whether the child grows up in a fundamentalist home or a free thinking home, the home of a Darwinian scholar or the home of somebody who's never studied biology—all eight-year-olds are creationists. Basically, all eight-year-olds believe the world was created at a certain moment, and all the creatures were created at that moment and things have never changed. This is not because of reading the Bible: it is because at the age of eight, kids realize that kids have origins and a default assumption is everything started at the same time.

That is why Darwin's ideas are so deeply difficult to understand: Darwin teaches us that human beings didn't always exist, that monkeys didn't always exist, that fish didn't always exist. It goes back to before the amoeba. So it takes a long time to really understand those ideas. Even if you want ultimately to disagree with him, it takes a long time to understand them because—this is another evolutionary argument—*our mind didn't evolve to think in a disciplined way, it evolved basically to avoid getting eaten before you have a chance to reproduce.* I mean that's the long and the short of it.

The Flat Part Underneath

So it's hard work to undo those things. I have an example some of you will have heard me use. When my son Benjamin was five, I asked him what the shape of the world was. He said, "That's easy, Dad, it's round." I said, "Benjamin, that's very good." And I said to myself, "Does he have a misconception?" So I said, "Benjamin, that's great but tell me, where are you standing?" He said, "That's easy. I'm standing on the flat part underneath." Kids can learn to tell us what they think we want to hear, but it's really making them understand that even though Cambridge looks reasonably flat, that if you go far enough away and you walk long enough you'll discover that, in fact, the earth is spherical.

A List of Intelligences

Linguistic
Mathematical/Logical
Musical
Spatial
Bodily-Kinesthetic
Interpersonal
Intrapersonal
Naturalistic

In each case, the most efficient way to communicate what an intelligence is, is to talk about an individual or a role that exemplifies a lot of that intelligence. So linguistic intelligence is the intelligence of a poet. This is a famous Chinese poet named Li Po. Poets think in words. That is their medium: that is, their chosen form of mental representation. The second form of intelligence is mathematical/logical. It is the intelligence of the scientist, the logician, the mathematician, the computer programmer. I don't have to tell you that in schools throughout the world and especially in Western schools, linguistic and logical intelligence are at a premium. That's not controversial. Kids who are very good in language and logic do well in school, and as long as they stay in school, they think they're smart. If they were ever to venture onto the Jersey Turnpike, then they would discover that those intelligences won't help them very much.

Language logic is really the mind of a law professor. It's the mind of Bill and Hillary Clinton, who are very smart in a scholastic way. What do we do with students whose strengths are not in language/logic? [Not every student is going to have that law professor mind.] We can give up and tell them that they're dumb. Or we can say we're going to make you into language/logic people, which may work in some cases. Or we can say we're going to try to use the intelligences which are stronger as a way of helping you to attain valued educational virtues.

Musical intelligence is, of course, the ability to think musically, to represent the world in music. Spatial intelligence, the ability to imagine large spaces like a pilot or more circumscribed spaces like an architect or a sculpture or a chess player. Bodily kinesthetic intelligence is the intelligence of a dancer, the athlete, the surgeon, the crafts person, the actor, anybody who uses the whole body or parts of the body to make things or to solve problems.

Intelligences Related to Other People

Two forms of intelligence are related to other people: *Interpersonal Intelligence* and *Intrapersonal intelligence*. Interpersonal Intelligence is understanding other people; it is the intelligence of the teacher, the sales person, the religious leader, the politician. Intrapersonal Intelligence, on the other hand, is the ability to understand yourself. The latter, Intrapersonal Intelligence, is tremendously important in a world where we have to make decisions about where to live, whom to live with, what work to pursue, what to do if we want to change careers, homes, or spouses.

An intelligence which I only began to write about recently is "Naturalist Intelligence." It is the intelligence that someone like Charles Darwin had being able to make fine discriminations in the world of nature. Most of us are not farmers or fisherman or hunters any more, but we use our naturalist intelligence to tell one sneaker from the another, one automobile from another. We make the same kind of distinctions and discriminations that were so useful to survival in pre-historic times.

So the claim is that all of us have these intelligences. That is what makes us human. That is extremely important for teachers to know because it means you can count on every one of your students to have linguistic intelligence, logical intelligence, musical intelligence and all the rest. The complementary point is that no two people, not even identical twins, have exactly the same combination and strengths of intelligences. We look different from one another, we have different personalities and temperaments, and we now have scientific evidence that even identical twins, because their experiences are different, have different profiles of intelligences.

If you teach only one way, you're only going to reach one kind of student. Most of us teach the language/logic way because that's what worked for us: we're good for those particular young men and women. But for students who have other strengths, school is very, very difficult. Moreover, once they pick up the notion they can't learn because they can't learn the language-logic way, then you have an additional obstacle to deal with, which is a loss of self-efficacy. *So here are the two big cognitive ideas of today. First, we have many intelligences, many ways of representing and understanding the world . Second, our initial understandings are very powerful, often wrong, and difficult to change.*

Entering the Topic

I want to return now to the three examples from the beginning. I'm going to give you the basic argument of the talk. If you want students to understand and if you're willing to spend time on topics, you can take advantage of MI, of multiple intelligences. You can do this in three ways. The first way is how you approach the topic, how you enter the topic. For example, getting at evolution through Darwin's finches. That's an entry point.

one way. If you teach more than one way, two important things happen. First of all, you reach more kids because kids don't all have this law professor mind. Second, you show what it's like to really understand something, to be an expert. Because an expert is a person who can think about something in more than one way. When you as a teacher—when I as a teacher explain something and the student says, "I don't understand it. Can you explain it another way? Can you show it to me? Can you draw it for me? Can you act it out?" If the answer is no, no, no, then my own understanding is tenuous. In fact, I'm preparing for class on Monday, and I know my understanding is very tenuous because I can only explain this stuff one way. And so between now and Monday, I'm going to try to think about other ways to explain it. That's the way in which multiple intelligences has affected my own teaching.

What Disciplinary Understanding Is Not—And Why Not

I'm going to use here an example from precollegiate education, but I think it will be true for all of us. This is what understanding is not: it's not *cultural literacy.* This is an idea developed by E.D. Hirsch, a literary critic, the second literary critic of today's talk (Stanley Fish being the first). What Hirsch and his colleagues do, as the subtitle says, is list essential names, phrases, dates and concepts.

I've got nothing against cultural literacy. I love people who are culturally literate, but it's not the same as understanding. You could know five million names, dates, phrases and concepts and, as I said earlier, those facts, those propositions, will not bring you any closer to understanding. The problem is that not only Hirsch but most people, including most policy makers, basically have a view of the mind which I call the "empiricist barn." They think of the mind as a barn. Initially, the barn is empty, the famous *tabula rasa.* There is nothing there. Then the mind begins to fill with facts. They are not particularly related: they're just little "F's" floating around. And more facts enter and finally, your mind is crammed with facts. You've got those 5,000 or 5 million little nuggets and those supposedly constitute your cultural literacy. And you know, if you talk to a lot of policy makers, that's really what they will tell you. They think the person who's got the most facts at the end of the day, the person who has eaten the *Encyclopedia Britannica* and spat it out, is the one who is educated.

The Constructivist Barn

I am a proponent of a less popular but I think more persuasive barn, the "constructivist barn." The unschooled mind early in life develops very powerful theories. Even though kids are not taught those theories, they develop them on their own because, presumably, they are equipped to think about the world in that kind of way—the heavier thing falls faster than the lighter, the world is flat. If it's alive it moves, that sort of stuff. It's the common sense and common nonsense point of view.

Kids pick up facts. They are great fact picker-uppers. But my argument is that these early theories have to be razed, R-A-Z-E-D. Kids have to be shown why they don't work. You can't say, "Well, you know, here's a photograph of the earth: it's round. Don't say it's flat any more." You don't get rid of the misconceptions with one quick parry back and forth. Anybody who has a misconception has, over and over again, to see that it doesn't work. Such persons have to construct a new interpretation of the world, an interpretation that's more in keeping with the one that has resulted from careful experimentation and observation. It's only then that children slowly begin to lose their earlier misconception. Then you have a situation where the early theories have been impoverished, and you have a lot of free floating facts around, because again we're good fact collectors. We're like flypaper, facts stick easily. As you get older, they get harder to stick. I can give personal testimony on that.

Going Deeply into Topics

But then here's what school is really all about: it's trying to build disciplinary structures. My strong argument today is that *the best way to build disciplinary structures and perhaps the only way (but certainly the best way) is to go deeply into topics, approach them in many ways, get a very rich representation of them.* We learn in the process how people who do that for a living—whether they are historians, scientists, artists, or mathematicians—how they think about things.

So when you discover something new, you can say well, "Here's how I went about thinking about something that I understood. How should I go about thinking about something that I don't understand so well?" That's what a discipline is. I'm basically a psychologist. The discipline we learn is to conduct experiments. So the habit of mine that I have as a psychologist is any time I read any science in the newspaper or hear about something, I right away say, "What was the control group? Were there placebo effects? What were the variables?" These are no-brainers for me as a psychologist, but it took me ten years to learn how to think that way. You know, the *National Enquirer* makes a sizable profit based on people who never ask those questions.

Interdisciplinary Work

Anyway, disciplinary structures consolidate after a while with good teaching, and then interdisciplinary work becomes possible. I'm now studying interdisciplinary work. Let me simply say that I don't think you can do genuine

Gardner: Well, I'm glad you asked the question about the misconceptions because some people think that you should ignore them or try to get rid of them, but that's not actually the best answer. The best answer is you have to recognize their existence because they are the way that the kids naturally think. Indeed, I think that the best thing is to bring them out on the table, let the kids actually play with them, explore them, ponder them and see where they don't work.

Every misconception has a reason for existing. I'm not a physicist, but if you think that heavier objects accelerate more rapidly than lighter ones, it is because of the air resistance. So it's the confounding of arguments that makes people have the misconception. On their own, almost no kids will come up with the right explanation. After all, it took until Galileo and Newton to figure out the basic laws of motion. But we need to reach the point where the kids see the inadequacies of the misconceptions. They are ready to try to think about another way, and that's where more directed pedagogy will come in. I think that it's important to find out about the misconceptions diagnostically, meaning you need to know what they are. But a lot of them will come out readily without the need for formal testing.

I'm very much a fan of assessment, but I make a distinction between assessment and testing. It's a semantic distinction but it's an important one. When I use the word "testing," I tend to focus on short answer instruments with right or wrong answers, which don't necessarily give you insight into how the child is thinking. When I talk about assessment, it's always giving the child something new and saying make sense of this. Because when the child has to make sense of it, the child shows you what he understands and what he doesn't understand.

A person takes a college board *test* and gets a score back. Such people are really no better off than they were before they took the test, but now they have a number. But you know, if you give them an *assessment* where they actually have to solve some problems and show their thinking or explain some situations, and you get the results back, there is a chance you might understand better where they're off base.

Conference Participant: Could you talk a bit more about how you would deconstruct some common sense idea?

Gardner: Right. If I can paraphrase your question, nowhere in our lives are unschooled ideas more powerful than in the education world. So it's up to us to find out what those ideas are and then correct them. The way we find out what they are is by testing. If the students don't do well, test again. I mean, I used to laugh at the Bush-Gore debates because, Bush would say, "I'd test them once a year"; Gore would say, "I'll test them twice a year." Bush would say, "I'll test the principals." Gore would say, "I'll test the custodians." It's the unschooled mind at work.

One thing I've learned which I should have known from the start, is that you can never get rid of something by criticizing it. The only way you can only get rid of something is by creating something that's new and better. The reason that standardized testing exists is not because it's very good, but because people have been reluctant to use other forms of assessment.

The Coalition of Essential Schools

Working alone, it's pretty tough, especially if you're in the public schools or in a public university. Working with other people, it becomes less difficult. The best example here is something called the *Coalition of Essential Schools*, which is a network of high schools. There are about 1,000 Essential Schools in the country, and they adopt many of the ideas that I'm sympathetic to. One of these ideas is that, "Less is more." It's better to go deeply into topics rather than try to skim a lot of stuff very superficially.

When you graduate from a coalition school, you don't take a bunch of tests. You have to make 14 exhibitions. These are evaluated not only by teachers but by outsiders. When these schools are well done—and there are not that many because it's hard—their graduates are very attractive to colleges. Many of you will know Debbie Meier, who for many years was the principal of Central Park East Schools in East Harlem and who now is a principal of the Mission Hill School in Boston.

Students from the Central Park East Secondary School in East Harlem did very well in getting into college and in graduating from four-year colleges, even though they weren't particularly standardized test types. That is because there was a curriculum there focused on understanding. The school was very committed to it, and Deborah Meier was a very tough customer who the city fought at its peril. She was a great believer that it's better to ask for forgiveness than permission.

So at the secondary level, if you want to fight the establishment, it's hard. You have to be courageous, and you have to be prepared to lose and then fight again. At the tertiary level, it is easier especially in private universities because nobody tells you what to do. But I think the heat is on, especially for public universities. There will be more accountability, and the issue is not the accountability which I am in favor of, it is—to put it in a kind of a sophomoric way—are the assessments going to be stupid ones or smart ones.

There are people who are working on creating smart assessments. You know, the University of Phoenix was mentioned before. There is probably a lot to be learned

profession is an agreement between (1) the laity, the general public, and (2) a group of people who are called professionals. In return for certain services to the society, the professionals are given a certain status and a certain amount of autonomy.

This has not happened in America with pre-collegiate education yet. It doesn't have the respect that it needs and doesn't have the autonomy that it needs. *However, and here is the deep dark secret: Professionalism cannot be given; it has to be seized.* Nobody made doctors professionals, they made themselves professionals. So to with other areas.

In England in the late 1980's, a very demanding test was imposed on all the teachers to give to the students. The teachers said "We won't do this," and the government backed down. I'm not recommending civil disobedience, that's your decision not mine, but I am saying that if doctors are told, "You can't see a patient for more than five minutes because you're in an HMO," the doctor should say, "I have a Hippocratic oath. I've got to see the patient as long as necessary."

It's very hard to be a teacher in pre-collegiate America today, but unless the teachers have a sense of the lines that they won't cross even though they're told to, teaching will never be a profession. So lurking in this question about examinations is the proposition that you may have to give the exam that the state mandates, but if you believe other kinds of exams are better, you've got to give those, too. And the more that you can show people that those are getting at things which are really important, the quicker teaching will become a profession.

CHAPTER 1

Birth and the Spreading of a "Meme"

Howard Gardner

In 1983, I published *Frames of Mind: The Theory of Multiple Intelligences.* At the time, I was a full-time research psychologist living in the Cambridge-Boston area. I divided my time between two research sites: the Boston Veterans Administration Medical Center, where I worked with and studied individuals who had suffered one or another form of cortical damage, and Project Zero, a research group at the Harvard Graduate School of Education that focused on issues of human development and cognition, particularly in the arts. My own work at Project Zero examined the development in children of various skills in several art forms. I had been trained as a developmental psychologist, in the traditions of Jean Piaget, Lev Vygotsky, and Jerome Bruner, and I thought of myself as belonging to, and addressing, that segment of the scholarly community.

Had I not worked in tandem with these populations—normal and gifted children, on the one hand, and once-normal individuals who had suffered brain damage—I would never have conceived of MI theory (as it later came to be called). Like most laypersons and most other psychologists, I would have continued to believe in the IQ orthodoxy: there is a single thing called intelligence; it allows us to do a variety of things more or less well, depending on how "smart" we are; we are born with a certain intellectual potential; this potential is highly heritable (that is, our biological parents are the principal determinants of our intelligence); and psychometricians can tell us how smart we are by administering some form of intelligence test.

But every working day, I was exposed to striking exceptions to this orthodoxy. I encountered brain-damaged individuals whose language was grossly impaired

but who were able to find their way around unfamiliar settings; I observed brain-damaged patients who were lost spatially but could carry out all manner of linguistic tasks. Analogous double dissociations could be observed across the cognitive spectrum. I was so intrigued by such phenomena that in 1975, I published *The Shattered Mind: The Person After Brain Damage.*

Much the same anomaly cropped up in my studies with children. A young person might be excellent in poetry, fiction, and oral expression but have difficulty in drawing even a passable person, plant, or airplane. A classmate might be an excellent draftsman and yet have difficulty speaking, writing, or reading. Such ideas began to be expressed in my 1973 book, *The Arts and Human Development,* and my 1980 book, *Artful Scribbles.* Again, this pattern of dissociations did not comport with the orthodoxy that I had absorbed as a child growing up in the United States in the 1950s and as a student of developmental and cognitive psychology in the 1960s.

This vague intuition that "something is rotten in the state of intelligence theorizing" would probably have remained unredeemed had it not been for a Dutch philanthropic organization, the Bernard Van Leer Foundation. In 1979 the foundation presented a generous grant to the Harvard Graduate School of Education to elucidate the question, "What is known about the nature and realization of human potential?" A big question—I used to quip that it was "more of a West Coast than an East Coast question." In the event, I was asked to prepare a synthesis of what had been determined about human cognition from the biological, psychological, and social sciences.

BIRTH OF THE THEORY

Some years before, I had sketched the barest of outlines of a book called "Kinds of Minds," but that project had never been launched. Receipt of five years of generous support from the Van Leer Foundation gave me an invaluable opportunity. With the help of several gifted research assistants, I surveyed a wide literature about cognition, including studies in genetics, neuroscience, psychology, education, anthropology, and other disciplines and subdisciplines. This survey not only strengthened my growing intuition that cognition was not monolithic; it also provided the hard-empirical evidence with which to substantiate this claim.

Two steps remained. The first was what to call these dissociable human faculties. I considered a variety of labels and finally determined to call them "human intelligences." This lexical turn has offended some ears, and it still generates an underscore when I type the word on my computer. But it had the advantage of drawing attention to the theory, in part because it poached on a territory that had hitherto belonged to a certain kind of psychologist.

to educators. I also paid attention to the particular applications that educators were making and began to communicate directly with educators who had an interest in the theory. By the mid-1980s, I was in contact with the eight teachers who were shortly to launch the Key School (now the Key Learning Community) in Indianapolis, by all accounts the first MI school in the world (see Chapter Twenty-Four). And by the late 1980s, I had had considerable contact with Tom Hoerr, then and now the head of the St. Louis New City School, who used MI ideas in a way quite different from the teachers at the Key Learning Community (see Chapter Twenty-Five).

Because I had not put forth educational goals of my own and because I was intrigued by the multifarious ways in which the theory was being drawn on, I did not address this issue of an "MI education" for a decade. Finally, when I encountered a use that I particularly deplored, I spoke out. I went on television in Australia to denounce an educational program that, among other things, listed the various ethnic groups in a state and mentioned the intelligences that they had and the ones that they lacked. Of course, this was pseudoscience (as well as veiled racism) and deserved to be labeled as such. Fortunately, the program was cancelled shortly after.

MISUNDERSTANDINGS

I also began to delimit some of the common misunderstandings of the theory, including ones that were prominent among educators. In a 1995 article, "Reflections on Multiple Intelligences: Myths and Realities" (1995) and in subsequent publications, I cautioned educators on several points:

- An intelligence is not the same as a sensory system. There are no "visual" or "auditory" intelligences.
- An intelligence is not a learning style. Styles are ways in which individuals putatively approach a wide range of tasks. An intelligence is a computational capacity whose strength varies across individuals.
- An intelligence is not the same as a domain or discipline. A domain or discipline is a social construct. It refers to any profession, academic discipline, hobby, game, or activity that is valued in a society and features levels of expertise. Skill in a domain can be realized using different combinations of intelligences. And strength in a particular intelligence does not dictate in which domains it will be brought to bear.
- People are not born with a given amount of intelligence, which serves as some kind of limit. We each have potentials across the intellectual spectrum; the extent to which these potentials are realized depends on motivation, skill of teaching, resources available, and so forth.

- An individual should not be described, except in informal shorthand, as a "spatial" person, a "musical" person, or "lacking interpersonal intelligence," for example. All of us possess the full spectrum of intelligences, and intellectual strengths change over time through experience, practice, or in other ways.
- There are no official MI or Gardner schools. Many principles, goals, and methods are consistent with the principal assertions of MI theory.

MAJOR EDUCATIONAL IMPLICATIONS

After two decades of considering the educational implications of MI theory, I have concluded that two are paramount. First, educators who embrace MI theory should take differences among individuals seriously and should, inasmuch as possible, craft education so that each child can be reached in the optimal manner. The advent of personal computers makes such individuation easier than ever before; what was once possible only for the wealthy (personal tutoring) will soon be available to millions of learners around the world.

Second, any discipline, idea, skill, or concept of significance should be taught in several ways. These ways should, by argument, activate different intelligences or combinations of intelligences. Such an approach yields two enormous dividends. First, a plurality of approaches ensures that the teacher (or teaching material) will reach more children. Second, a plurality of approaches signals to learners what it means to have a deep, rounded understanding of a topic. Only individuals who can think of a topic in several ways have a thorough understanding of that topic; those whose understanding is limited to a single instantiation have a fragile grasp.

THE MI MEME

But of course I do not own MI theory. To use Richard Dawkins's term, MI is a meme—a unit of meaning, created at a certain place and time, that has spread widely in the past quarter-century. Initially it spread around educational circles in the United States. But soon it ventured abroad, and it became an item of discussion and application not only in schools, but in homes, in museums and theme parks, places of worship, the workplace, and the playground.

The goal of this book is to examine the way in which the "MI meme" has been apprehended and applied in a number of countries around the world. In 2006 Branton Shearer organized a symposium on multiple intelligences in global perspective at the American Educational Research Association meeting in San Francisco. In the wake of that symposium, the editors decided to invite

that the IQ test was developed in France and that this nation, more so than any other developed country, has long been organized around an elite set of schools that select attendees on the basis of measures of linguistic and logical intelligences. The possibility that MI ideas may be of help in dealing with individuals who are not smart in the traditional sense has not been widely embraced—at least not yet!

Although I used to think that the idea did not take hold in the Soviet Union because of economic reasons, there is so far little evidence of interest in the post-Communist Russia. I think that, like some of "old Europe," Russians think that they have education pretty well worked out and may see little reason to consult an American psychologist-turned-educationalist (and perhaps they are right). If it were not for the heroic advocacy of Michaela Singer, it is unlikely that my books would be available in Romania, and so far as I know, they are only rarely available in other former members of the Soviet bloc. My writings are widely available in Scandinavia and the Netherlands, in the Swedish and Danish languages, as well as in English. Individuals in these northern European societies seem to accept the idea of multiple intelligences, but a sense of stretch and discovery is less evident, perhaps because promoting MI ideas in a progressive educational terrain is akin to pushing a door that was already ajar.

In the past few years, I have noted two phenomena. One is that many educators in India are discovering MI ideas and are seeking to implement them. I suspect that as with China, the increasing affluence of the country and the opening of many for-profit schools has catalyzed interest in ideas that have already become trendy in the more developed countries. I also note a steady stream of people writing from the Middle East, including from Iraq and Iran, but not much interest at the ministry or publication level except in Israel. (Note, however, Thomas Armstrong's report of Islamic madrases that embrace MI ideas [see Chapter Two].)

In addition to the influence of authors or individual promoters, memes can be spread by charismatic institutions or powerful practices. Self-declared MI schools in the United States and abroad can prove to be a powerful Petri dish for spreading the ideas. In their twenty years of existence, the Key Learning Community in Indianapolis and the New City School in St. Louis have had thousands of visitors, many from abroad. These visits can have a powerful effect. When visitors from Norway attended the opening of the MI Library at the New City School, they pledged to open an MI library in their country and have just carried through on their pledge. Media that carry MI stories can exert great influence. When *ABC-TV News* and *Newsweek* featured the Key Learning Community, millions of persons learned about MI educational experiments. Happy Cheung's publications and broadcast have had similar reverberations in China. The existence of institutions based on MI ideas, such

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as the Explorama in Danfoss Universe, has exposed families and businesspeople to MI ways of thinking, even if these individuals never encounter the "MI meme" per se. Assessment instruments—qualitative ones, like Spectrum in Scandinavia, and quantitative ones, like the MIDAS in East Asia—spread the MI meme as effectively as books or soapbox speakers. Similarly, instruments designed for special populations, like the DISCOVER approach of June Maker and colleagues, introduce MI ideas beyond mainstream circles.

It is relatively straightforward to do a travelogue, to mention the places where MI ideas have taken hold and where they have not, and to speculate about the carriers of the ideas. But this *tour de horizon* raises two related and more searching questions: Why are certain regions more receptive than others? and What messages is MI bringing to these disparate soils?

The Nature of the Soil

It is useful to think of MI as a new plant (all the while being careful not to stretch the analogy too far). Having blossomed on its home soil, its seeds are now borne to distant terrains. The new soil, however, can be so resistant, so alien, that the seed cannot take hold, and it simply dies.

It may be that the soil is already so stocked with other seeds and plants that there is no room for any additional flora. Often schools and institutions are so busy, or so self-confident, or so beleaguered, that they show no interest in any new ideas or practices.

Or the soil may be so impoverished, so lacking in nutrients, that it cannot absorb any new living matter. I suspect that there are some institutions, regions, and even entire societies that lack resources to attempt anything new, to attend to any new ideas or practices.

At the opposite end of the continuum, some seeds grow naturally and easily in a rich but hitherto sparsely stocked terrain. An MI seed has little trouble in sprouting in a well-resourced environment that has long been receptive to ideas like individual differences, teaching in multiple ways, a focus on arts and creative activities, and so on. These institutions can embrace MI ideas, but they may not be much affected by them. They can rightly say, "We are already doing this, we are happy to wear the MI banner, but [to coin a phrase!] you have simply brought tulips to Holland.

Of course, there are also false positives. As Mindy Kornhaber and colleagues have observed, many places claim to be carrying out MI practices and may even feature banners, slogans, and the like. And yet shorn of the appurtenances, such institutions look indistinguishable from ones that have never heard of MI and ones that are in effect uniform schools (featuring a single way of teaching and assessing). These places may believe that the soil is receptive, but in fact the soil cannot, for whatever reason, actually absorb the seed. So to speak, the seed dies on the vine but continues to cling there,

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THE POLICY LEVEL

Many times these goals are put forth by individuals or single institutions that simply want to make changes at the local level. But as some of the chapters document, more ambitious efforts have been launched to alter practices on a wider scale. In England, Scotland, China, and Norway, for example, MI approaches are explicitly promoted as an alternative to practices that are currently regnant but are seen by some as shortsighted, counterproductive, or even destructive. At times, even in the these countries, policies are announced that seem more congenial to MI approaches. Not surprisingly, supporters of MI are quick to embrace these reformist inclinations (China, Korea, Scotland, Turkey). So long as ministers of education around the world are focused largely on the comparative performance of countries on the Programme for International Student Assessment (PISA)[1] examinations, we can expect that supporters of MI will mount countereforts. And in the event that these supporters find themselves in policymaking positions, they will attempt to institute policies that are more "MI friendly."

I am still mystified by one development. A few years ago, a colleague visited Pyongyang, the capital of North Korea. In a major library there, he saw only two books in English. One was Michael Moore's *Stupid White Men*. The other was *Frames of Mind: The Theory of Multiple Intelligences*. I cannot help wondering how these two memes managed to plant themselves in such seemingly resistant soil.

CONCLUDING NOTE: THE PERSONAL AND THE POLITICAL

The theory of multiple intelligences was developed by a psychologist; it was initially a proposal of how we should think of individual minds. This way of thinking initially proved most congenial to individuals who themselves have a psychological perspective on the world and who are excited rather than threatened by the idea of a plurality of individual differences.

I was surprised to see how this "inside psychology" meme spread quickly to education, first in the United States and then abroad. I was surprised by the staying power of the meme. And I am surprised that this meme has begun to be of interest to those in the policy realm, thus melding the personal and the political. It is striking that an idea that arose as an account of how the human brain/mind evolved and how it is organized today could end up joining forces with movements that give more voice to individuals and promote more democratic classes, schools, and perhaps even societies. I would like to think that this combination would please John Dewey, an American philosopher and psychologist who was perennially rooted in both the personal and the political.

Still, it is salutary to remember that the idea of multiple intelligences remains a minority view in psychology and that most schools around the world remain uniform schools, where a narrow group of topics is taught in the same way to all children and where modes of assessment are unadventurous, to say the least. My own view—or perhaps, to be more accurate, my own hope—is that the new digital media will allow much individualized education in the future that the meme of multiple intelligences will be taken for granted. Should that be the case, the authors in this book will deserve considerable credit for sustaining and enriching MI ideas and practices in the interim.

Note

1. A triennial worldwide test of fifteen-year-old schoolchildren's scholastic performance for the purpose of crosscultural school learning comparison.

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