

Multiple Intelligences : The First Thirty Years
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In the years since I published Frames of Mind, I have often been asked how I first got the idea of - or for - the theory of multiple intelligences. Probably the most truthful answer is “I don’t know.” However, such an answer satisfies neither the questioner nor, to be frank, me. With the benefit of hindsight, I would mention several factors, some more remote, some directly feeding into my discoveries:

As a young person I was a serious pianist and enthusiastically involved with other arts as well. When I began to study developmental and cognitive psychology in the middle 1960s, I was struck by the virtual absence of any mention of the arts in the key textbooks. An early professional goal was to find a place for the arts within academic psychology. I am still trying! In 1967 my continuing interest in the arts prompted me to become a founding member of Project Zero, a basic research group at the Harvard Graduate School of Education begun by a noted philosopher of art, Nelson Goodman. For 28 years (1972-2000), I was the co-director of Project Zero and I am happy to say that the organization has continued to thrive under new leadership.

As my doctoral studies were drawing to a close, I first encountered the writings of Norman Geschwind, a notable behavioral neurologist. I was fascinated by Geschwind’s discussion of what happens to once normal or gifted individuals who have the misfortune of suffering from a stroke, tumor, wound, or some other form of traumatic brain damage. Often the symptoms run counter to intuition: for example, a patient who is alexic but not agraphic loses the ability to read words but can still decipher numbers, name objects, and write normally. Without having planned it that way, I ended up working for twenty years on a neuropsychological unit, trying to understand the organization of human abilities in the brain, how they develop, how they (sometimes) work together, and how they breakdown under pathological conditions.

I have always enjoyed writing, and by the time I began my postdoctoral work with Geschwind and his colleagues in 1971, I had already completed three books. My fourth book, The Shattered Mindⁱ, published in 1975, chronicled what happens to individuals who suffer from different forms of brain damage. In a manner later brought to a literary art form by Oliver Sacks, I documented how different parts of the brain are dominant for different cognitive functions. After I completed The Shattered Mind, I thought that I might write a book that describes the psychology of different human faculties—a modern (and hopefully more scientifically grounded) reformulation of phrenology. In 1976 I actually wrote an outline for a book with the tentative title Kinds of Minds. One could say that this book was never written and indeed I had totally forgotten about it for many years. But one could also say that it eventually emerged silently from the file cabinet and transmogrified into Frames of Mind.

So much for the more remote causes of the theory.

In 1979, a group of researchers affiliated with the Harvard Graduate School of Education received a sizeable grant from a Dutch foundation, the Bernard Van Leer Foundation. This grant was designed for a grandiose purpose, one proposed by the Foundation. Members of the Project on Human Potential (as it came to be called) were commissioned to carry out scholarly work on the nature of human potential and how it could best be realized. Thinking of the United States, I've sometimes quipped that Human Potential is more of a "West coast" topic than an "East coast" topic. When the Project principal investigators carved out our respective projects, I received an inviting assignment: to write a book chronicling what had been established about human cognition through discoveries in the biological and behavioral sciences. And so was born the research program that ultimately led to the theory of multiple intelligences.

Support from the Van Leer Foundation allowed me, with the aid of many valued colleagues, to carry out an extensive research program. I saw this grant as providing an once-in-a-lifetime gift: we had the opportunity to collate and synthesize what I and others had learned about the development of cognitive capacities in normal and gifted children as well as the breakdown of such capacities in individuals who suffered some form of pathology. To put it in terms of my daily calendar, I was seeking to synthesize what I had been learning in the mornings from my study of brain damage with what I was learning in the afternoons from my study of cognitive development. My colleagues and I combed the literature from brain study, genetics, anthropology, psychology, and other relevant fields in an effort to ascertain the optimal taxonomy of human intellectual capacities.

I can identify a number of crucial turning points in this investigation. I don't remember when it happened but at a certain moment, I decided to call these faculties "multiple intelligences" rather than "assorted abilities" or "sundry gifts." This seemingly minor lexical substitution proved very important; I am quite confident that if I had written a book called "Seven Talents" it would not have received the attention that Frames of Mind received. As my colleague David Feldman has pointed outⁱⁱ, the selection of the word: "intelligence" propelled me into direct confrontation with the psychological establishment that has long cherished and continues to cherish IQ tests. However, I disagree with Feldman's claim that I was motivated by a desire to "slay IQ:" neither the documentary nor the mnemonic evidence suggests to me that I had much interest in such a confrontation.

A second crucial point was the creation of a definition of an intelligence and the identification of a set of criteria that define what is, and what is not, an intelligence. I can't pretend that the criteria were all established a priori; rather, there was a constant fitting and refitting of what I was learning about human abilities with how best to delineate and then apply what ultimately became eight discrete criteria. I feel that the definition and the criteria, as laid out in the opening chapters of this book, are among the most original parts of the work; but neither has received much discussion in the literature.

When drafting Frames of Mind, I was writing as a psychologist and to this day that remains my primary scholarly identification. Yet, given the mission of the Van Leer Foundation and my affiliation with the Harvard Graduate School of Education, it was clear to me that I needed to say something about the educational implications of MI theory. And so, I conducted background research about schools and about education, more broadly defined; in the concluding chapters, I

touched on some educational implications of the theory. This nod toward education turned out to be another crucial point because it was educators, rather than psychologists, who found the theory of most interest.

By 1981, I had drafted the book that you are now reading; thereafter I revised. The main lines of the argument had become clear. I was claiming that all human beings possess not just a single intelligence (often called by psychologists “g” for general intelligence). Rather, as a species we human beings are better described as having a set of relatively autonomous intelligences. Most lay and scholarly writings about intelligence focus on a combination of linguistic and logical intelligences. The particular intellectual strengths, I often maintain, of a law professor. However, a fuller appreciation of human cognitive capacities emerges if we take into account spatial, bodily-kinesthetic, musical, interpersonal, and intrapersonal intelligences (the list as of 1983). We all have these intelligences, that’s what makes us human beings, cognitively speaking. Yet at any particular moment, individuals differ for both genetic and experiential reasons in their respective profiles of intellectual strengths and weaknesses. And so, using the analogy of the era, I content that we have not one general-purpose computer, but rather a set of discrete computers, the multiple intelligences, that operate somewhat independently of one another. No intelligence is in and of itself artistic or non-artistic; rather several intelligences can be put to aesthetic ends, if individuals so desire. I am using my linguistic intelligence here, but scarcely in the manner of a novelist or poet. No educational implications follow directly from this psychological theory. But if individuals differ in their intellectual profiles, it makes sense to take this fact into account in devising an educational system for individuals, groups, or even nations.

By the time that Frames of Mind had appeared in 1983, I had already published half a dozen books. Each had had a modestly positive reception and a reasonable sale. I did not expect anything different from Frames of Mind, a lengthy and (for a trade audience) somewhat technical book, filled with hundreds of references and devoid of illustrations. But within a few months after its publication, I realized that this book was different. Not that the reviews were that exuberant or the sales that monumental. Rather, there was genuine “buzz” about the book. I was invited to give many talks, and when I showed up at a site, people had at least heard about the theory and were eager to learn more about it. I even received invitations from abroad to talk about the book. Echoing artist Andy Warhol, I sometimes quip that “MI theory” gave me my fifteen minutes of fame. While I have done a number of things in my professional life and written about a broad range of topics, I realize that I am likely always to be known as the “father of multiple intelligences” or, less palatably, as the “MI guru.”

For the first decade following the publication of Frames of Mind, I had two primary connections to the theory. The first relation was that of a bemused observer. I was amazed at how many individuals claimed that they wanted to revise their educational practices in the light of MI theory. Within a year or so, I had already met with eight public school teachers from Indianapolis who would shortly begin the Key School (now the Key Learning Community), the first school in the world organized explicitly around MI theory. I began to receive a steady stream of communications asking or telling me how to use MI theory in various kinds of schools or for various populations, from gifted young people to those with severe learning difficulties. While I tried to be responsive to these communications (a somewhat more demanding exercise in the pre-e-mail era), I always maintained that I was a psychologist and not an educator. I did not presume

to know how best to teach a class of young persons or run an elementary or secondary school or, for that matter, to design a program in a children's museum or a science museum, let alone a method of selection or promotion for a corporation.

My second relation was as a director of research projects that grew out of MI theory. The most ambitious effort was Project Spectrum, a collaboration with Jie-Qi Chen, David Feldman, Mara Krechevsky, Janet Stork, Julie Viens, and others.ⁱⁱⁱ The goal of Project Spectrum was to create a set of measures whereby one could ascertain the intellectual profile of young children: preschoolers and those in the primary grades. We ended up devising fifteen separate tasks that were designed to assess the several intelligences in as natural a manner as possible. We had a great deal of fun devising the Spectrum battery and using it with different populations. We also learned that creating assessments is a difficult task and one that requires an enormous investment of money and time. I decided, without saying so in so many words, that I did not want myself to be in the assessment business, though I was very pleased if others chose to create instruments in an effort to assess the various intelligences.

In this context, I should add that instruments that purpose to assess intelligences need to focus on what subjects can actually accomplish, putatively given a specific intelligence or intelligences. Many "MI tests" actually assess preferences and are dependent on self-reports, neither of which is necessarily a reliable index of the strength of the intelligence(s) in question. But I don't mean to dismiss such MI assessments: much can be learned about how people conceive of themselves, and through comparisons in response patterns among and across different groups of subjects.

Let me mention two other research projects that grew out of the first wave of interest in MI theory. Working with Robert Sternberg, another critic of standard views of intelligence, my colleagues and I created a middle school curriculum called Practical Intelligences for School.^{iv} Working with colleagues from the Educational Testing Service, my colleagues and I developed a set of curriculum-and-assessment instruments designed to document learning in three art forms: graphic arts, music, and literary expression.^v

To my surprise and pleasure, interest in multiple intelligences survived the transition to the 1990s. By that time, I was prepared to undertake several new activities, variously related to MI theory. The first was purely scholarly. Building on the notion of different kinds of intelligences, I carried out case studies of individuals who stood out, putatively, as remarkable in terms of their particular profile of intelligences. This line of work led to my books on creativity (Creating Minds),^{vi} leadership (Leading Minds),^{vii} and extraordinary achievement, more broadly (Extraordinary Minds).^{viii} You can see that I was getting a lot of mileage by injecting book titles with the term 'mind'!

The second was an extension of the theory. In 1994-5 I took a sabbatical and used part of that time to review evidence for the existence of new intelligences. I concluded that there was ample evidence for a naturalist intelligence (the ability to make consequential distinctions among organisms and entities in the natural world); and suggestive evidence as well for a possible existential intelligence ("the intelligence of big questions").^{ix} I also explored much more deeply the relation between intelligences, which I construe as biopsychological potentials, and the various domains and disciplines that exist in various cultures. While intelligences may possess

the same names as cultural activities, they are not the same thing: as one example, the performance of music entails several intelligences (among them bodily and interpersonal); as another example, individuals strong in spatial intelligences can pursue a range of careers and avocations (running the gamut from sculpture to surgery). What we know and how we parse the world may well be in part a reflection of the intelligences with which our species has been endowed.

I also proposed three distinct uses of the term “intelligence”^x:

*A property of all human beings (All of us possess these 8 or 9 intelligences)

*A dimension on which human beings differ (No two people—not even identical twins—possess exactly the same profile of intelligences)

*The way in which one carries out a task in virtue of one’s goals (Joe may have a lot of musical intelligence but his interpretation of that Bach partita made little sense to us)

A third activity featured a more proactive relationship to the uses and interpretations of my theory. For the first decade, I had been content simply to observe what others were doing and saying in the name of MI theory. But by the middle 1990s, I had noticed a number of misinterpretations of the theory. As one example, the concept of intelligences was often conflated with that of learning styles; in fact, an intelligence (the power of a computer) is not at all the same as a style (the way in which one allegedly approaches a range of tasks). As another example, I noted the frequent confounding of a human intelligence with a societal domain (e.g. musical intelligence being misleadingly equated with mastery of a certain musical genre or role). I had also learned of practices that I found offensive; for example, describing different racial or ethnic group in terms of their characteristic intellectual strengths and deficiencies. And so, for the first time, I began publicly to differentiate my “take” on MI from that of others who had learned about and tried to make use of the theory.^{xi} And I acquired a new concern about the responsibilities that attend to individuals who put forth ideas that become well known; this concern ultimately led me, and other colleagues, to an ambitious study of professional responsibility, which came to be known as the “GoodWork Project.”

A final feature of this second “1990s” phase entailed a more active involvement with educational reform. This involvement took both a practical and a scholarly form. On the practical level, my colleagues and I at Harvard Project Zero began working with schools as they attempted to implement MI practices and other educational programs that we have developed, such as one focused on teaching for understanding and, more recently, applications emerging from the GoodWork Project. In 1995 we also launched a Summer Institute which continues today and attracts practitioners and scholars from around the world.^{xii}

On the scholarly side, I began to articulate my own educational philosophy. In particular, I focused on the importance in the pre-collegiate years of achieving understanding in the major disciplines—science, mathematics, history, and the arts. For a host of reasons, achieving such understanding proves quite challenging. Efforts to cover too much material lead to superficial recall and doom the achievement of genuine understanding. We are most likely to enhance

understanding if we probe deeply in a relatively small number of topics. And once the decision is made to “uncover” rather than “cover,” it is possible to take advantage of our multiple intelligences. Put concretely, we can approach topics in a number of ways; we can make use of analogies and comparisons drawn from a range of domains; and we can express the key notions or concepts in a number of different symbolic forms.^{xiii}

In light of three decades of research and reflection, I can summarize the educational implications of MI theory quite crisply: the so-called elevator speech. An educator convinced of the relevance of MI theory should ‘individualize’ and ‘pluralize.’ By *individualizing*, I mean that the educator should know as much as possible about the ‘intelligences profile’ of each student for whom he has responsibility; and, to the extent possible, the educator should teach and assess in ways that bring out that child’s capacities. By *pluralizing*, I meant that the educator should decide on which topics, concepts, or ideas are of greatest importance, and should then present them in a variety of ways. Pluralization achieves two important goals: when a topic is taught in multiple ways, one reaches more students. Additionally, the multiple modes of delivery convey what it *means* to understand something well. When one has a thorough understanding of a topic, one can typically think of it in several ways, thereby making use of one’s multiple intelligences. Conversely, if one is restricted to a single mode of conceptualization and presentation, one’s own understanding is likely to be tenuous.

This line of analysis has led to a perhaps surprising conclusion. “Multiple intelligences” should not, in and of itself, be an educational goal. Educational goals need to reflect one’s own (individual or societal) values, and these values can never come simply or directly from a scientific theory. Once one reflects on one’s educational values and states one’s educational goals, however, then the putative existence of our multiple intelligences can prove very helpful. And, in particular, if one’s educational goals encompass disciplinary understanding, then it is possible to mobilize our several intelligences to help achieve that lofty goal; for example, by employing multiple modes of presentation and various avenues of assessment.

Since the turn of the millennium, my relationship to MI theory has been less intimate. The infant and child that was MI theory is now a young adult: as a parent and grandparent, I know that it is best for the theory to make its own way, without excessive managing from its forbears. Nonetheless, I have continued to be involved in several ways.

First of all, when possible, I have continued to help out institutions that want to apply the idea of multiple intelligences. And when not able to do so myself, I am fortunate enough to have a small cohort of “MI colleagues” to whom I can turn. In addition to the Key Learning Community, I’ve had a long standing relationship with the New City School in St. Louis, an impressive middle school which has pioneered in many MI applications and also featured the first MI library. In 2005, I was excited to learn of the Explorama at the Danfoss Universe Theme Park in southwestern Denmark. This facility, consisting of dozens of games and exercises, represents an optimal instantiation of MI ideas. Each of the displays mobilizes a distinct set of intelligences, and by predicting one’s own performance profile, one can even assess one’s own intrapersonal intelligence. I’ve also lent a hand, upon request, to any number of schools, libraries, museums, and workplaces that seek to base practices on MI ideas.

While MI interest first occurred in the United States, it soon spread to the corners of the globe. The ideas have been particularly pursued in Latin America, Scandinavia, Southern Europe, Australia, the Philippines, Korea and China. Interest in England, France, Germany, Russia and Japan has been less salient; though I have had a wonderful alliance for over a decade with the dedicated band that constitutes the MI Society of Japan. Taking note of these international trends, and energized by a symposium organized in 2006, by Branton Shearer, my colleagues Jie-Qi Chen, Mindy Kornhaber, Seana Moran, and I decided to sponsor a conference and edit a book on the theme “Multiple Intelligences Around the World.” The book, which appeared in 2009, features 42 authors from 15 countries, on five continents, each describing their experiences with MI ideas and practices. Of course, I take pride in the numerous wonderful ways in which these ideas have been used and adapted. As an inveterate social scientist, I’ve also been intrigued by the many (and not always consistent) ways in which the ideas have been understood, and have sought, when possible, to relate these applications to conditions in the particular country or region of the world.

As just one example, let me mention the case of China. While I had visited China several times in the 1980s, and even written a book about my experiences there, I was unprepared for the overwhelming interest in MI ideas in China. In 2004, a conference on MI featured 2500 papers; and I learned that there were at least 100 books on multiple intelligences in Chinese. Naturally, I was curious to learn the reasons. From a journalist I met in Shanghai, I received a wonderful answer. She said to me “In America, when people hear about MI, they think of their child. She may not be good in math, or in music, but she has wonderful interpersonal intelligence,” they declare. “In China,” she went on, “these are simply eight areas in which we want all our children to excel.” When I returned to China six years later, I learned that a great many schools, particularly for young children, claim to be based on MI ideas. Again, I queried widely why this was the case. From one informant, I received a surprising reply. He said, “If we had a psychologist in China who was pushing for progressive ideas in education, we would not need to quote the words or ideas of Howard Gardner. But in the absence of such a person, mentioning you and your ideas is a good way to open up our rather rigid educational system.”

A third activity in which I’ve been involved entails efforts to answer the most frequent critiques of MI theory. In 2006, anthologist Jeffrey Shaler put together a book called “Howard Gardner under Fire” and invited 13 scholars to critique my work. By agreement only four of them wrote directly about MI theory, but several others criticized it in passing. In 2009, psychologist and assessment expert Branton Shearer published a collection “MI at 25.” Here, a wide range from scholars, including linguist Noam Chomsky, psychologists Mihaly Csikszentmihalyi and Michael Posner, educators Deborah Meier and Linda Darling-Hammond, and political analyst Charles Murray, put forth their own assessments and criticisms of the theory. With respect both to the Shaler and Shearer volumes, I composed detailed responses to each of the critics. While few scholars—or, for that matter, non scholars—cherish criticism, there is no doubt that I learned a good deal from having to grapple with this wide range of discussion. In recent years, I have also authored and co-authored several direct responses to criticisms of the theory in psychological and educational journals.

While it is not possible to detail these discussions, which take place over hundreds of pages, it may be useful to mention the kinds of criticisms that I take seriously, and, at least in passing, as

opposed to those that are of little interest to me. I am very interested in discussions of the particular criteria that I've put forth, and the extent to which particular candidate intelligences do, or do not, meet these criteria. Analysis of the possible cultural biases in the list also interest me. And of course, empirical evidence on the relationship, or lack of relationship among different candidate intelligences is central to my concerns. On the other hand, I am not engaged by quarrels about the term *intelligence*, or the way that I define it; by efforts to restrict intelligence only to academic problem solving skills; or by performances on instruments that do not sample intellectual abilities in an 'intelligence-fair' way. Put concretely, I'm much more interested in measures of interpersonal intelligence which examine directly how a person works with a group of peers than in paper-and-pencil measures that involve selecting the correct answer out of a multiple choice array.

In speaking of measurement, I touch on the issue on which psychologists interested in intelligence have spilled the most liquid or electronic ink. Having put forth the theory, they maintain, I should be required to test it and, on the basis of the results of those tests, either revise or scuttle the theory. In their view, the fact that I've elected not to become a psychometrician is no defense! I can well understand their loyalty to their instrumentation and to their way of thinking. Moreover, as a scholar, I do monitor efforts by others to test the theory; taking particular pleasure, of course, in those empirical studies that support the general enterprise. At the same time, however, I must stress that I've never felt that MI theory was one that could be subjected to an 'up and down' kind of test, or even series of tests. Rather, it is and has always been fundamentally a work of synthesis; and its overall fate will be determined by the comprehensiveness of the synthesis, on the one hand, and its utility to both scholars and practitioners, on the other.

The reader may have noted that I've not mentioned changes in the theory itself, along the lines that occurred in the first 10 or 15 years after the publication of Frames of Mind. In fact, the theory has remained relatively constant in the last decade. I've considered the possibility of an additional intelligence—pedagogical intelligence, or the ability to teach others—but have not done the systematic study needed before its addition to The List. I've collaborated on reviews and updates of the theory, with Seana Moran and Mindy Kornhaber, and a definitive up-to-date summary of the theory, with Katie Davis, Scott Seider, and Joanna Christodoulou. But my own scholarly interests have moved in new directions. It is probably the case that significant revisions of the theory will need to be undertaken by persons other than myself.

As already noted, my major scholarly work since the middle 1990s, the GoodWork Project, has focused on how professionals act responsibly. Though the work was stimulated in part by misapplications of MI theory, it has had a relatively independent life. On a trip to Manila in 2005, I was quite moved to learn that Mary Joy Abaquin, founder of an MI school, had succeeded in wedding my two interests. Since that time, Mary Joy has presented awards each year to individuals who are outstanding in one or more of the intelligence, while at the same time putting their talents to use in the service of the wider community. Few things could make a scholar more pleased than the discovery that someone has been able to effect a powerful relationship, and for that matter, a practical one, between two major lines of work, each of which he has pursued for decades.

This, then, is how the first decades of multiple intelligences look to me. I am grateful to the many individuals who have taken an interest in the theory, both within my research group and across the country and the globe. I have tried to be responsive to their inquiries and to build on what they have taught me. And I have come to realize that once one releases an idea—a “meme”—into the world, one cannot completely control its behavior... anymore than one can control those products of our genes called children. Put succinctly, MI has and will have a life of its own, over and above what I might wish for it, my most widely known intellectual offspring.

I’ve already indicated that the future of MI theory lies primarily in the minds, and the hands, of individuals other than myself. Still, it may be appropriate for me to step back, for a moment, and consider what lines of work might be undertaken by others.

To begin with, there will be efforts to propose new intelligences. In recent years, in addition to the explosion of interest in emotional intelligences, there have also been serious efforts to describe a spiritual intelligence and a sexual intelligence. My colleague Antonio Battro^{xiv} has proposed the existence of a digital intelligence and has indicated how it may fulfill the criteria that I have set forth. The noted cognitive neuroscientist Michael Posner has challenged me to consider “attention” as a kind of intelligence.^{xv} I’ve also mentioned my own recent interest in the possibility of a ‘pedagogical intelligence.’

I have always conceded that, in the end, the decision about what counts as an intelligence is a judgment call; not an unambiguous determination following upon the rigorous application of an algorithm. So far, I am sticking to my 8 ½ intelligences but I can readily foresee a time when the list could grow, or when the boundaries among the intelligences might be reconfigured. For example, to the extent that the so-called Mozart effect gains credibility, one might want to rethink the relation between musical and spatial intelligences. Other hot spots might include whether logical and mathematical intelligences should be split up into separate intelligences; or whether other candidate intelligences; for example, dealing with healing or with spiritual matters, might be proposed in cultural groups with which I am not familiar.

Much work needs to be done on the question of how the intelligences can best be mobilized to achieve specific pedagogical goals. I do not believe that educational programs created under the aegis of MI theory lend themselves to the kinds of randomized control studies that the United States government is now calling for in education. But I do believe that well choreographed “design experiments” can reveal the kinds of educational endeavors where an MI perspective is appropriate and where it is not. To state just one example, I think that MI approaches are particularly useful when a student is trying to master a challenging new concept; say, gravity in physics, or the Zeitgeist in history. For a long time I was skeptical that MI ideas can be useful in mastering a foreign language, but I’ve been impressed by the numerous teachers of foreign languages who claim success using MI approaches. Also, I think that the potential of MI ways of thinking for dealing with various kinds of learning problems has hardly been scratched. I am enormously enthusiastic about the efforts of David Rose, my valued colleague, and others at his organization, www.cast.org, to create curricula that can address the full range of learners. As Rose puts it, we should not think of students as disabled; we should instead consider whether it is our curricula may be disabled.

Were I personally granted more time and energy to explore the ramifications of MI theory, I would devote those precious gifts to two endeavors. First of all, as indicated above, I have become increasingly fascinated by the ways in which societal activities and domains of knowledge emerge and become periodically reconfigured. Any complex society has 100-200 distinct occupations at the least; and any university of size offers at least 50 different areas of study. Surely these domains and disciplines are not accidents; nor are the ways that they evolve and combine simply random events. The culturally constructed spheres of knowledge must bear some kind of relation to the kinds of brains and minds that human beings have, and the ways that those brains and minds grow and develop in different cultural settings. Put concretely, how does human logical-mathematical intelligence relate to the various sciences, mathematics, and computing software and hardware that have emerged in the last few thousand years, and those that may emerge one year or 100 years from now? Which makes which or, more probably, how does each shape the other? Will computers augment or even substitute for particular intelligences or combinations of intelligences? How does the human mind deal with interdisciplinary studies: are they natural or unnatural cognitive activities? Or to be a bit wild, what would “MI” perspective reveal about dogs or birds or other primates? I would love to be able to think about these issues in a systematic way.

Second, from the start, one of the appealing aspects of MI theory was its reliance on biological evidence. At the time, in the early 1980s, there was little relevant evidence from genetics or evolutionary psychology; such speculations were mere hand-waving. There was powerful evidence from the study of neuropsychology for the existence of different mental faculties; and, whatever new details may emerge, that evidence constituted the strongest leg on which to justify MI theory.

Of course, knowledge has accumulated at a phenomenal rate in both brain science and genetics. At the risk of seeming hyperbolic, I am prepared to defend the proposition that we have learned as much from 1981 to 2011 as we did in the previous 500 years. As an amateur geneticist and neuroscientist, I have tried as best I can to keep up with the cascade of new findings from these areas. I can say with some confidence that no findings have radically called into question the major lines of MI theory. But I can say with equal confidence that in light of the findings of the last two decades, the biological basis of MI theory needs urgently to be brought up to date.

At the time that MI theory was introduced, it was very important to make the case that human brains and human minds are highly differentiated entities. It is fundamentally misleading to think about a single mind, a single intelligence, a single problem-solving capacity. As an acquaintance recently remarked, exposure to the idea of multiple intelligences made her see in Technicolor what had previously appeared to be only in black and white! And so, along with many others, I tried to make the argument that the mind/brain consists of many modules/organs/intelligences, each of which operates according to its own rules in relative autonomy from the others.

Happily, nowadays, the argument for modularity is largely established. Even those who believe strongly in ‘general intelligence’ and/or neural plasticity feel the need to defend their position, in a way that was unnecessary in decades past. But it is time to revisit the issue of the relationship between general and particular intelligences. This revisiting can and is being done in various intriguing ways. Psychologist Robbie Case proposed the notion of central conceptual structures:

broader than specific intelligences but not as all-encompassing as Piagetian general intelligence.^{xvi} Philosopher Jerry Fodor contrasts impenetrable dedicated modules with a permeable central system.^{xvii} The team of Marc Hauser, Noam Chomsky, and Tecumseh Fitch suggests that the unique quality of human cognition is its capacity for recursive thinking; perhaps it is recursion that characterizes advanced thinking in language, number, music, social relations, and other realms.^{xviii} Electrophysiological and radiological studies indicate that various brain modules may already be activated in newborns. Neural imaging studies of individuals solving IQ-style problems suggest that certain areas of the brain are most likely to be drawn on for these kinds of problems; and there may be evidence for genes that contribute to unusually high IQ, as there clearly are genes that cause retardation. And our own case studies of unusually high performances suggests a distinction between those who (like musicians or mathematicians) are outstanding in one area, as opposed to those generalists (politicians or business leaders) who display a relatively flat profile of cognitive strengths. I think it would be worthwhile to study in detail the differences between those who deploy a focused laser intelligence and those who display an ever-vigilant and shifting searchlight intelligence.

Were I granted another lifetime or two, I would like to rethink the nature of intelligence with respect to our new biological knowledge, on the one hand, and our most sophisticated understanding of the terrain of knowledge and societal practice, on the other, another Project on Human Potential, perhaps! I don't expect this wish to be granted. But I am glad to have had the chance to make an opening move some thirty years ago; to have been able to revisit the game-board periodically; to get to know and to work with wonderful colleagues in many corners of the globe, and to lay out this problematic so that other interested players can have their chance to engage.

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