

## Contents

<i>Acknowledgments</i>	<i>xi</i>
1 Minds Viewed Globally	1
<i>A Personal Introduction</i>	
2 The Disciplined Mind	21
3 The Synthesizing Mind	45
4 The Creating Mind	77
5 The Respectful Mind	103
6 The Ethical Mind	127
7 Conclusion	153
<i>Toward the Cultivation of the Five Minds</i>	
<i>Notes</i>	<i>169</i>
<i>Index</i>	<i>175</i>
<i>About the Author</i>	<i>195</i>

# Minds Viewed Globally

## *A Personal Introduction*

FOR SEVERAL DECADES, as a researcher in psychology, I have been pondering the human mind. I've studied how the mind develops, how it is organized, what it's like in its fullest expanse. I've studied how people learn, how they create, how they lead, how they change the minds of other persons or their own minds. For the most part, I've been content to describe the typical operations of the mind—a daunting task in itself. But on occasion, I've also offered views about how we *should* use our minds.

In *Five Minds for the Future* I venture further. While making no claims to have a crystal ball, I concern myself here with the kinds of minds that people will need if they—if *we*—are to thrive in the world during the eras to come. The larger part of my enterprise remains descriptive—I specify the operations of the minds that we will need. But I cannot hide the fact that I am engaged as well in a “values enterprise”: the minds that I describe are also the ones that I believe we *should* develop in the future.

Why the shift from description to prescription? In the interconnected world in which the vast majority of human beings now live, it is not enough to state what each individual or group needs to survive on its own turf. In the long run, it is not possible for parts of the world to thrive while others remain desperately poor and deeply frustrated. Recalling the words of Benjamin Franklin, "We must indeed all hang together, or, most assuredly, we shall all hang separately." Further, the world of the future—with its ubiquitous search engines, robots, and other computational devices—will demand capacities that until now have been mere options. To meet this new world on its own terms, we should begin to cultivate these capacities now.

As your guide, I will be wearing a number of hats. As a trained psychologist, with a background in cognitive science and neuroscience, I will draw repeatedly on what we know from a scientific perspective about the operation of the human mind and the human brain. But humans differ from other species in that we possess history as well as prehistory, hundreds and hundreds of diverse cultures and subcultures, and the possibility of informed, conscious choice; and so I will be drawing equally on history, anthropology, and other humanistic disciplines. Because I am speculating about the directions in which our society and our planet are headed, political and economic considerations loom large. And, to repeat, I balance these scholarly perspectives with a constant reminder that a description of minds cannot escape a consideration of human values.

Enough throat clearing. Time to bring onstage the five *dramatis personae* of this literary presentation. Each has been important historically; each figures to be even more crucial in the future. With these "minds," as I refer to them, a person will be well equipped to deal with what is expected, as well as what cannot be anticipated; without these minds, a person will be at the mercy of forces that he or she can't understand, let alone control. I'll describe each mind briefly; in the course of the book, I'll explain how it works and how it can be nurtured in learners across the age span.

*The disciplined mind* has mastered at least one way of thinking—a distinctive mode of cognition that characterizes a specific scholarly discipline, craft, or profession. Much research confirms that it takes up to ten years to master a discipline. The disciplined mind also knows how to work steadily over time to improve skill and understanding—in the vernacular, it is highly disciplined. Without at least one discipline under his belt, the individual is destined to march to someone else's tune.

*The synthesizing mind* takes information from disparate sources, understands and evaluates that information objectively, and puts it together in ways that make sense to the synthesizer and also to other persons. Valuable in the past, the capacity to synthesize becomes ever more crucial as information continues to mount at dizzying rates.

Building on discipline and synthesis, *the creating mind* breaks new ground. It puts forth new ideas, poses unfamiliar questions, conjures up fresh ways of thinking, arrives at unexpected answers. Ultimately, these creations must find acceptance among knowledgeable consumers. By virtue of its anchoring in territory that is not yet rule-governed, the creating mind seeks to remain at least one step ahead of even the most sophisticated computers and robots.

Recognizing that nowadays one can no longer remain within one's shell or on one's home territory, *the respectful mind* notes and welcomes differences between human individuals and between human groups, tries to understand these "others," and seeks to work effectively with them. In a world where we are all interlinked, intolerance or disrespect is no longer a viable option.

Proceeding on a level more abstract than the respectful mind, *the ethical mind* ponders the nature of one's work and the needs and desires of the society in which one lives. This mind conceptualizes how workers can serve purposes beyond self-interest and how citizens can work unselfishly to improve the lot of all. The ethical mind then acts on the basis of these analyses.

One may reasonably ask: Why these five particular minds? Could the list be readily changed or extended? My brief answer is this: the

five minds just introduced are the kinds of minds that are particularly at a premium in the world of today and will be even more so tomorrow. They span both the cognitive spectrum and the human enterprise—in that sense they are comprehensive, global. We know something about how to cultivate them. Of course, there could be other candidates. In research for this book, I considered candidates ranging from the technological mind to the digital mind, the market mind to the democratic mind, the flexible mind to the emotional mind, the strategic mind to the spiritual mind. I am prepared to defend my quintet vigorously. Indeed, that is a chief burden of the rest of this book.

This may also be the place to forestall an understandable confusion. My chief claim to fame is my positing, some years ago, of a theory of multiple intelligences (MIs). According to MI theory, all human beings possess a number of relatively autonomous cognitive capabilities, each of which I designate as a separate intelligence. For various reasons people differ from one another in their profiles of intelligence, and this fact harbors significant consequences for school and the workplace. When expounding on the intelligences, I was writing as a psychologist and trying to figure out how each intelligence operates within the skull.

The five minds posited in this book are different from the eight or nine human intelligences. Rather than being distinct computational capabilities, they are better thought of as broad uses of the mind that we can cultivate at school, in professions, or at the workplace. To be sure, the five minds make use of our several intelligences: for example, respect is impossible without the exercise of interpersonal intelligences. And so, when appropriate, I will invoke MI theory. But for much of this book, I am speaking about policy rather than psychology, and, as a consequence, readers are advised to think about those minds in the manner of a policymaker, rather than a psychologist. That is, my concern is to convince you of the need to cultivate these minds and illustrate the best ways to do so,

rather than to delineate specific perceptual and cognitive capacities that undergird the minds.

To put some flesh on these bones, I will get personal and say a bit about my own experiences with these kinds of minds. I write as a scholar and author in the social sciences and education, as a person who has considerable experience in the management of a research group. But the task of cultivating minds goes far beyond the charge of teachers and professors; it constitutes a major challenge to all individuals who work with other persons. And so, as I review these minds, I will comment on how they play out in other careers, notably in business and in the professions.

## DISCIPLINED

Even as a young child, I loved putting words on paper, and I have continued to do so throughout my life. As a result, I have honed skills of planning, executing, critiquing, and teaching writing. I also work steadily to improve my writing, thus embodying the second meaning of the word *discipline*: training to perfect a skill.

My formal discipline is psychology, and it took me a decade to think like a psychologist. When I encounter a controversy about the human mind or human behavior, I think immediately about how to study the issue empirically, what control groups to marshal, how to analyze the data and revise my hypotheses when necessary.

Turning to management, I have many years of experience supervising teams of research assistants of various sizes, scopes, and missions—and I have the lessons and battle scars to show for it. My understanding has been enriched by observing successful and not-so-successful presidents, deans, and department chairs around the university; addressing and consulting with corporations; and studying leadership and ethics across the professions over the past fifteen years. Beyond question, both management and leadership are disciplines—

though they can be informed by scientific studies, they are better thought of as crafts. By the same token, any professional—whether she's a lawyer, an architect, an engineer—has to master the bodies of knowledge and the key procedures that entitle her to membership in the relevant guild. And all of us—scholars, corporate leaders, professionals—must continually hone our skills.

### SYNTHESIZING

As a student I enjoyed reading disparate texts and learning from distinguished and distinctive lecturers; I then attempted to make sense of these sources of information, putting them together in ways that were generative, at least for me. In writing papers and preparing for tests that would be evaluated by others, I drew on this increasingly well-honed skill of synthesizing. When I began to write articles and books, the initial ones were chiefly works of synthesis: textbooks in social psychology and developmental psychology, and, perhaps more innovatively, the first book-length examination of cognitive science.<sup>1</sup>

Whether one is working at a university, a law firm, or a corporation, the job of the manager calls for synthesis. The manager must consider the job to be done, the various workers on hand, their current assignments and skills, and how best to execute the current priority and move on to the next one. A good manager also looks back over what has been done in the past months and tries to anticipate how best to carry out future missions. As she begins to develop new visions, communicate them to associates, and contemplate how to realize these innovations, she invades the realms of strategic leadership and creativity within the business or profession. And of course, synthesizing the current state of knowledge, incorporating new findings, and delineating new dilemmas is part and parcel of the work of any professional who wishes to remain current with her craft.

### CREATING

In my scholarly career, a turning point was my publication in 1983 of *Frames of Mind: The Theory of Multiple Intelligences*.<sup>2</sup> At the time, I thought of this work as a synthesis of cognition from many disciplinary perspectives. In retrospect, I have come to understand that *Frames of Mind* differed from my earlier books. I was directly challenging the consensual view of intelligence and putting forth my own iconoclastic notions, which were ripe, in turn, for vigorous critiques. Since then, my scholarly work is better described as a series of attempts to break new ground—efforts at forging knowledge about creativity, leadership, and ethics—than as syntheses of existing work. Parenthetically, I might point out that this sequence is unusual. In the sciences, younger workers are more likely to achieve creative breakthroughs, while older ones typically pen syntheses.

In general, we look to leaders, rather than to managers, for examples of creativity. The transformational leader creates a compelling narrative about the missions of her organization or polity; embodies that narrative in her own life; and is able, through persuasion and personal example, to change the thoughts, feelings, and behaviors of those whom she seeks to lead.

And what of the role of creativity in the workaday life of the professional? Major creative breakthroughs are relatively rare in accounting or engineering, in law or medicine. Indeed, one does well to be suspicious of claims that a radically new method of accounting, bridge building, surgery, prosecution, or generating energy has just been devised. Increasingly, however, rewards accrue to those who fashion small but significant changes in professional practice. I would readily apply the descriptor *creative* to the individual who figures out how to audit books in a country whose laws have been changed and whose currency has been revalued three times in a year, or to the attorney who ascertains how to protect intellectual

property under conditions of monetary (or political or social or technological) volatility.

### RESPECTFUL AND ETHICAL

As I shift focus to the last two kinds of minds, a different set of analyses becomes appropriate. The first three kinds of minds deal primarily with cognitive forms; the last two deal with our relations to other human beings. One of the last two (respectful) is more concrete; the other (ethical) is more abstract. Also, the differences across career specializations become less important: we are dealing with how human beings—be they scientists, artists, managers, leaders, craftspeople, or professionals—think and act throughout their lives. And so, here I shall try to speak to and for all of us.

Turning to respect, whether I am (or you are) writing, researching, or managing, it is important to avoid stereotyping or caricaturing. I must try to understand other persons on their own terms, make an imaginative leap when necessary, seek to convey my trust in them, and try so far as possible to make common cause with them and to be worthy of their trust. This stance does not mean that I ignore my own beliefs, nor that I necessarily accept or pardon all that I encounter. (Respect does not entail a “pass” for terrorists.) But I am obliged to make the effort, and not merely to assume that what I had once believed on the basis of scattered impressions is necessarily true. Such humility may in turn engender positive responses in others.

As I use the term, *ethics* also relates to other persons, but in a more abstract way. In taking ethical stances, an individual tries to understand his or her role as a worker and his or her role as a citizen of a region, a nation, and the planet. In my own case, I ask: What are my obligations as a scientific researcher, a writer, a manager, a leader? If I were sitting on the other side of the table, if I occupied a different niche in society, what would I have the right to expect from those

“others” who research, write, manage, lead? And, to take an even wider perspective, what kind of a world would I like to live in, if, to use John Rawls’s phrase, I were cloaked in a “veil of ignorance” with respect to my ultimate position in the world?<sup>3</sup> What is my responsibility in bringing such a world into being? Every reader should be able to pose, if not answer, the same set of questions with respect to his or her occupational and civic niche.

For more than a decade, I have been engaged in a large-scale study of “good work”—work that is excellent, ethical, and engaging for the participants. In the latter part of the book I draw on those studies in my accounts of the respectful and the ethical minds.

### EDUCATION IN THE LARGE

When one speaks of cultivating certain kinds of minds, the most immediate frame of reference is that of education. In many ways, this frame is appropriate: after all, designated educators and licensed educational institutions bear the most evident burden in the identification and training of young minds. But we must immediately expand our vision beyond standard educational institutions. In our cultures of today—and of tomorrow—parents, peers, and media play roles at least as significant as do authorized teachers and formal schools. More and more parents “homeschool” or rely on various extra-scholastic mentors or tutors. Moreover, if any cliché of recent years rings true, it is the acknowledgment that education must be lifelong. Those at the workplace are charged with selecting individuals who appear to possess the right kinds of knowledge, skills, minds—in my terms, they should be searching for individuals who possess disciplined, synthesizing, creating, respectful, and ethical minds. But, equally, managers and leaders, directors and deans and presidents, must continue perennially to develop all five kinds of minds in themselves and—equally—in those for whom they bear responsibility.

And so, this book should be read from a dual perspective. We should be concerned with how to nurture these minds in the younger generation, those who are being educated currently to become the leaders of tomorrow. But we should be equally concerned with those in today's workplace: how best can we mobilize our skills—and those of our coworkers—so that all of us will remain current tomorrow and the day after tomorrow?

### THE OLD AND THE NEW IN EDUCATION

Let me turn now to education in the formal sense. For the most part, education has been quite conservative. This is not necessarily a bad thing. Educators have consolidated a massive amount of practical knowledge over the past centuries. I remember a conversation twenty years ago with a professor of psychology in China. I had felt that her college class, a simple recitation by one student after another of the seven laws of human memory, was largely a waste of time. With the aid of an interpreter, we talked for ten minutes about the pros and cons of different pedagogies. In the end my Chinese colleague cut off the discussion with these words: "We have been doing it this way for so long that we *know* it is right."

I discern two legitimate reasons for undertaking new educational practices. The first reason is that current practices are not actually working. We might *think*, for example, that we are educating young persons who are literate, or immersed in the arts, or capable in scientific theorizing, or tolerant of immigrants, or skilled in conflict resolution. But if evidence accrues that we are not successful in these pursuits, then we should consider altering our practices . . . or our goals.

The second reason is that conditions in the world are changing significantly. Consequent upon these changes, certain goals, capacities, and practices might no longer be indicated, or might even come to be

seen as counterproductive. For example, before the invention of the printing press, when books were scarce, it was vital for individuals to cultivate a faithful and capacious verbal memory. Now that books (and notebook-sized search engines) are readily available, this goal—and the attendant mnemonic practices—are no longer at a premium. On the other hand, the ability to survey huge bodies of information—print and electronic—and to organize that information in useful ways looms more important than ever. Changing conditions may also call for new educational aspirations: for example, when no group can remain isolated from the rest of the world, respect for those of a different background and appearance becomes vital, even essential, rather than simply a polite option. Whether in charge of a classroom, a club, or a corporation, we need constantly to consider which minds are crucial, which to prioritize, and how to combine them within a single organization, as well as within a single skull.

At the start of the third millennium, we live at a time of vast changes—changes seemingly so epochal that they may well dwarf those experienced in earlier eras. In shorthand, we can speak about these changes as entailing the power of science and technology and the inexorability of globalization (the second meaning of *global* in the subtitle of this chapter). These changes call for new educational forms and processes. The minds of learners must be fashioned and stretched in five ways that have not been crucial—or *not as crucial*—until now. How prescient were the words of Winston Churchill: "The empires of the future will be empires of the mind."<sup>4</sup> We must recognize what is called for in this new world—even as we hold on to certain perennial skills and values that may be at risk.

### SCIENCE AND TECHNOLOGY

Modern science began during the European Renaissance. Consider, first, the experiments and theorizing about the physical world. The

insights into motion and the structure of the universe that we associate with Galileo Galilei, and the understandings of light and gravity that emanated from Isaac Newton, created a body of knowledge that continues to accumulate at an ever accelerating rate. In the biological sciences, a similar trend has occurred in the past 150 years, building on Charles Darwin's formulations about evolution and the ensuing discoveries of Gregor Mendel, James Watson, and Francis Crick in genetics. While slight differences may obtain in how these sciences are practiced across different labs, countries, or continents, essentially there is only one mathematics, one physics, one chemistry, one biology. (I'd like to add "one psychology," but I'm not as certain about that claim.)

Unlike science, technology did not have to wait on the specific discoveries, concepts, and mathematical equations of the past five hundred years. Indeed, that is precisely why in many respects the China of 1500 seemed more advanced than its European or Middle Eastern counterparts. One can fashion perfectly functional (even exquisite) writing implements, clocks, gunpowder, compasses, or medical treatments even in the absence of cogent scientific theories or well-controlled experiments. Once science has taken off, however, its link to technology becomes much tighter. It is barely conceivable that we could have nuclear weapons, nuclear power plants, supersonic airplanes, computers, lasers, or a medley of effective medical and surgical interventions in the absence of the sciences of our epoch. Those societies that lack science must either remain deprived of technological innovations or simply copy them from societies that have developed them.

The undoubted hegemony of science and technology creates new demands. Young people must learn to think scientifically if they are to be able to understand and participate in the modern world. Without understanding the scientific method, citizens cannot make reasonable decisions about which medical course to follow when confronted with a set of options or how to evaluate competing claims about child rearing, psychotherapy, genetic testing, or treat-

ment of the elderly. Without having some mastery of computers, citizens cannot access the information that they need, let alone be able to use it productively, synthesize it revealingly, or challenge it knowledgeably. And needless to say, in the absence of some mastery of science and technology, individuals can scarcely hope to contribute to the continuing growth of these vital sectors. Moreover, informed opinions about controversial issues like stem cell research, nuclear power plants, genetically modified foods, or global warming presuppose a grounding in the relevant science and technology.

Having solved major mysteries about the physical and the biological worlds, scientists and technologists have more recently turned their attention to the understanding of the human mind and brain. More knowledge about psychology and neuroscience has been accrued in the past fifty years than in all prior historical eras combined. We now have well-developed, empirically based theories of intelligence, problem solving, and creativity—along with the tools, software, and hardware based (or purportedly based) on these scientific advances. Educators, professionals, managers, and leaders in business need to be cognizant of what has been established, and what may soon be established, about the nature, workings, potentials, and constraints of the human mind. Curricula developed fifty or a hundred years ago no longer suffice. But don't toss out the exquisitely evolved infant with the sudsy bathwater of earlier eras. It is easy—but dangerous—to conclude that all education in the future should simply concentrate on mathematics, science, and technology. And it is equally easy—and equally dangerous—to conclude that the forces of globalization should change everything.

#### THE LIMITS OF SCIENCE AND TECHNOLOGY: TWO CAVEATS

"Education is inherently and inevitably an issue of human goals and human values." I wish that this statement were mounted prominently



above the desk of every policymaker. One cannot even begin to develop an educational system unless one has in mind the knowledge and skills that one values, and the kind of individuals one hopes will emerge at the end of the day. Strangely enough, however, many policymakers act as if the aims of education are self-evident; and as a consequence, when pressed, these policymakers often emerge as inarticulate, contradictory, or unbelievably prosaic. How often my eyes have glazed over as I have read vacuous proclamations about “using the mind well” or “closing the achievement gap” or “helping individuals realize their potential” or “appreciating our cultural heritage” or “having the skills to compete.” Recently, in speaking to ministers of education, I’ve discovered a particularly Sisyphean goal: “leading the world in international comparisons of test scores.” Obviously, on this criterion, only one country at a time can succeed. To state educational goals in this day and age is no easy undertaking; indeed, one purpose of this book is to posit several more gritty goals for the future.

A first caveat: science can never constitute a sufficient education. Science can never tell you what to do in class or at work. Why? What you do as a teacher or manager has to be determined by your own value system—and neither science nor technology has a built-in value system. Consider the following example. Let’s say that you accept the scientific claim that it is difficult to raise psychometric intelligence (IQ). From this claim one can draw two diametrically opposite conclusions: (1) don’t bother to try; (2) devote all your efforts to trying. Possibly you will succeed, and perhaps far more easily than you had anticipated. Same scientific finding; opposite pedagogical conclusions.

A second caveat, related to the first, is that science—even with engineering, technology, and mathematics thrown in—is not the only, and not even the only important, area of knowledge. (This is a trap into which many enthusiasts of globalization fall. See the collected speeches and writings of Bill Gates and Thomas Friedman, to name two gurus of our time.) Other vast areas of understand-

ing—the social sciences, the humanities, the arts, civics, civility, ethics, health, safety, training of one’s body—deserve their day in the sun, and, equally, their hours in the curriculum. Because of its current societal hegemony, the aforementioned fix on science threatens to squeeze out these other topics. Equally pernicious, many individuals feel that these other areas of knowledge ought to be approached using the same methods and constraints as does science. That this would be an enormous blunder is an understatement: What sense could we make of the greatest works of art or literature, or the most important religious or political ideas, or the most enduring puzzles about the meaning of life and death, if we only thought of them in the manner of a scientific study or proof? If all we did was quantify? What political or business leader would be credible, at a time of crisis, if all he could do was offer scientific explanations or mathematical proofs, if he could not address the hearts of his audience? The great physicist Niels Bohr once mused on this irony: “There are two kinds of truth, deep truth and shallow truth, and the function of Science is to eliminate the deep truth.”

At the workplace, the same caveats prevail. While it is obviously important to monitor and take into account scientific and technological advances, the leader must have a much broader purview. Political upheavals; migrations of population; new forms of advertising, public relations, or persuasion; trends in religion or philanthropy—all of these can exert impact on an organization, be it profit or nonprofit, dispensing widgets or wisdom. A full life, like a full organization, harbors multiple disciplines. Excessive focus on science and technology reminds me of the myopia associated with ostriches or Luddites.

## GLOBALIZATION

Globalization consists of a set of factors that weaken or even eliminate individual states, a process sometimes termed “deterritorialization.” Historians note various periods of globalization: in earlier

eras, the land mass conquered first by Alexander the Great and then, a few centuries later, by the Romans—in more recent times, the transcontinental explorations and trades of the sixteenth century, the colonization of the latter nineteenth century—are seen as instances of total or partial globalization.

Following two world wars, and a prolonged cold war, we have now embarked on what may be the ultimate, all-encompassing episode of globalization. The current incarnation features four unprecedented trends: (1) the movement of capital and other market instruments around the globe, with huge amounts circulating virtually instantaneously each day; (2) the movement of human beings across borders, with well more than 100 million immigrants scattered around the world at any time; (3) the movement of all matter of information through cyberspace, with megabytes of information of various degrees of reliability available to anyone with access to a computer; (4) the movement of popular culture—such as stylish clothing, foods, and melodies—readily, even seamlessly, across borders so that teenagers the world over look increasingly similar, even as the tastes, beliefs, and values of their elders may also converge.<sup>5</sup>

Needless to add, attitudes toward globalization differ enormously within and across states. Even the most vocal celebrants have been somewhat muted by recent events, such as those reflecting another global phenomenon called “stateless terrorism.” But by the same token, even the most vocal critics take advantage of the undeniable accoutrements—communicating by e-mail and mobile phone, seizing on commercial symbols that are recognized the world over, holding protests in places that can be readily reached and easily monitored by diverse constituencies. While periods of retrenchment and pockets of isolationism are to be expected, it is virtually inconceivable that the four major trends just cited will be permanently stemmed.

The curricula of schools the world over may be converging, and the rhetoric of educators is certainly loaded with similar buzzwords

(“world-class standards,” “interdisciplinary curricula,” “the knowledge economy”). Nonetheless, I believe that current formal education still prepares students primarily for the world of the past, rather than for possible worlds of the future—Churchill’s “empires of the mind.” To some extent, this actuality reflects the natural conservatism of educational institutions—a phenomenon with which I expressed some sympathy earlier. More fundamentally, however, I believe policymakers the world over have not come to grips adequately with the major factors outlined in these pages.

To be specific: rather than stating our precepts explicitly, we continue to assume that educational goals and values are self-evident. We acknowledge the importance of science and technology but do not teach scientific ways of thinking, let alone how to develop individuals with the synthesizing and creative capacities essential for continual scientific and technological progress. And too often, we think of science as the prototype of all knowledge, rather than one powerful way of knowing that needs to be complemented by artistic and humanistic and perhaps also spiritual stances. We acknowledge the factors of globalization—at least when they are called to our attention—but have not figured out how to prepare youngsters so that they can survive and thrive in a world different from one ever known or even imagined before.

Turning to the workplace, we have become far more aware of the necessity of continuing education. Consciousness of the five minds is probably greater in many corporations than it is in many school systems. Nonetheless, much of corporate education is narrowly focused on skills: innovation is outsourced to Skunk Works; ethics is the topic of an occasional workshop. Few corporate settings embrace a liberal arts perspective, except for those executives with the time and resources to attend a seminar at the Aspen Institute. We do not think deeply enough about the human qualities that we want to cultivate at the workplace, so that individuals of diverse appearance and background can interact effectively with one

another. Nor do we ponder how to nurture workers who will not simply pursue their self-interest but will realize the core mission of their calling, or how to cultivate citizens who care passionately about the society in which they live and the planet that they will pass on to their successors.

I issue two—but only two—cheers for globalization. Even if the forces just cited could be handled benignly, that does not constitute a justification for ignoring or minimizing the nation, the region, and the locale. We should, for sure, think globally, but we should, for equally strong reasons, act locally, nationally, and regionally. The individual who thinks only of those at distant sites is as myopic as the individual who thinks only of those across the street or along the border. Our principal interactions will continue to be with those who live nearby, even as many of our problems and opportunities will be specific to our nation or region. As human beings, we cannot afford to sacrifice the local for the global, any more than we can afford to sacrifice the arts and humanities in our efforts to remain current with science and technology.

Earlier, I introduced the five kinds of minds that we will need to cultivate in the future, if we are to have the kinds of managers, leaders, and citizens needed to populate our planet. I hope to have made the initial case for the importance of these minds. To approach my brief sharply:

- Individuals without one or more disciplines will not be able to succeed at any demanding workplace and will be restricted to menial tasks.
- Individuals without synthesizing capabilities will be overwhelmed by information and unable to make judicious decisions about personal or professional matters.
- Individuals without creating capacities will be replaced by computers and will drive away those who do have the creative spark.

- Individuals without respect will not be worthy of respect by others and will poison the workplace and the commons.
- Individuals without ethics will yield a world devoid of decent workers and responsible citizens: none of us will want to live on that desolate planet.

No one knows precisely how to fashion an education that will yield individuals who are disciplined, synthesizing, creative, respectful, and ethical. I have argued that our survival as a planet may depend on the cultivation of this pentad of mental dispositions. Indeed, without respect, we are likely to destroy one another; without ethics, we return to a Hobbesian or Darwinian world, where the common good is nowhere to be seen. But I firmly believe that each human faculty should also be justified on noninstrumental grounds as well. As a species, we human beings have impressive positive potentials—and history is replete with individuals who exemplify one or more of these kinds of minds: the discipline of a John Keats or a Marie Curie; the synthesizing capacities of Aristotle or Goethe; the creativity of a Martha Graham or a Bill Gates; the respectful examples of those who sheltered Jews during the Second World War or who participated in commissions of truth and reconciliation during more recent decades; the ethical examples of ecologist Rachel Carson, who alerted us to the dangers of pesticides, and of statesman Jean Monnet, who helped Europe move from belligerent to peaceful institutions. Education in the broadest sense should help more human beings realize the most impressive features of the most remarkable representatives of our species.

## The Disciplined Mind

THE MOST IMPORTANT scientific discovery about learning in recent years comes from cognitive researchers who have examined student understanding. In a typical paradigm, a secondary-school or college student is asked to elucidate a discovery or phenomenon with which she is not familiar but which lends itself to explanation in terms of a concept or theory that has been already studied. The results are surprising, consistent, and disheartening. Most students, including those who attend our best schools and receive the highest grades, are not able to explain the phenomenon about which they are being questioned. Even more alarmingly, many give precisely the same answer as those who have never taken the relevant courses and have presumably never encountered the concepts relevant to a proper explanation. Using terminology that I expand on later, these students may have accumulated plenty of factual or subject matter knowledge, but they have not learned to think in a *disciplined* manner.

Consider a few examples, deliberately drawn from different realms of study. In physics, students continue to think of forces like

gravity or acceleration as contained within specific objects, rather than as operating in essentially equivalent fashion on all manner of entities. Asked to predict which of two objects will fall to the ground more rapidly, such students attend to the weight of the objects ("the brick is heavier than the shoe, and so it will hit the ground first"), rather than to the laws of acceleration ("absent friction, all objects accelerate at the same velocity"). In biology, either students resist the idea of evolution altogether, or they see evolution as a teleological process, with organisms guided over time by an invisible hand toward ever more perfect forms. Whether or not they have been exposed to creationist ideas or the concept of intelligent design, the idea of natural selection, as a completely unguided process, proves deeply inimical to their way of thinking. In the arts, despite exposure to contemporary forms, students continue to judge works in terms of their photographic realism, in the case of the visual arts, and in terms of simple rhyme schemes and sentimental subject matter, in the case of poetry. When asked to account for contemporary events, history students who can unravel the complex causes of past events, like World War I, fall back on simplistic uncausal explanations. "It's because of that bad guy"—whether his name happens to be Adolf Hitler, Fidel Castro, Muammar al-Qaddafi, Saddam Hussein, or Osama bin Laden. In psychology, students who have learned about the extent to which our behavior is actually determined by unconscious motivation or by external factors over which we have no control continue to magnify the power of the individual intentional agent.

Lest you think that these are isolated instances, I must emphasize that the patterns just described have been observed time and again, in subjects ranging from astronomy to zoology, from ecology to economics, and in societies all over the world. Neither Americans nor Asians nor Europeans are immune from these misconceptions. Indeed, in cases like that of biological evolution, students can be exposed to the key ideas in a number of courses and environments; yet

when questioned, they cling to Lamarckian ("a giraffe's neck is long because its parent strained to reach the furthestmost branch") or literal biblical ("on the fifth day . . .") accounts of the origin and evolution of species. Clearly, quite powerful forces must be at work to prevent students from thinking in a disciplinary manner.

One important contributing factor—itsself drawn from evolutionary theory—can be simply stated. Human beings did not evolve over the millennia in order to have accurate explanations of the physical, biological, or social worlds. Indeed, to revert to the examples just cited, current ideas about physical forces derive principally from discoveries by Galileo, Newton, and their contemporaries, while the theory of evolution awaited the five-year voyage and the decades of reflections and synthesizing by Charles Darwin. (It's intriguing to speculate about the status of our current knowledge had those three titans never been born.) Understandings about history, the humanities, and the arts are less tied to specific times, places, and scholars, but also depend on the emergence over the centuries of sophisticated understandings on the part of the scholarly community. Such understandings might well *not* have arisen at all, or have taken different form, or may change materially in the years ahead. If one accepts evolutionary theory, it becomes clear that our existence has depended on the abilities of every one of our ancestors to survive until reproduction—nothing less, nothing more.

Moving beyond standard school subjects, we encounter the same kinds of inadequate or inappropriate thinking across the professions. Beginning law students, for example, insist on reaching a decision that is morally satisfying; this long-engrained way of thinking clashes with their teachers' insistence that decisions must be based on precedent and on process, and not on one's personal moral code. Rookie journalists prepare a coherent, well-rounded story, as if they were trying to hold the interest of a captive audience. They are unable to think backward, writing a story in such a way that it will immediately command the reader's attention while

also surviving the blue pencil of the editor or the severe space limitations of the new front-page layout. The worker who has just been appointed to a managerial position attempts to retain earlier friendships as if nothing had changed; she does not understand that her new job requires that she listen, be listened to, and be respected, rather than that she win a contest of popularity or continue to exchange gossip or intimacies with former peers. The new board member fails to understand that he must now behave in a disinterested manner vis-à-vis the very CEO or president who courted her for months and then invited her to join a select, prestigious group.

In these career examples, we encounter an analogous process at work. Individuals bring to a new job the habits and beliefs that served them well before. In ordinary life, young persons are rewarded for searching for a moral solution, for relating a delicious tale at its own pace, for being a faithful friend. It does not suffice simply to advise them, "From now on, pay strict attention to precedents," or "Defend yourself against the editor's instincts to revise copy," or "Keep your distance from former associates." The old habits die hard, and the new ways of thinking and acting are hardly natural. The aspiring upwardly mobile professional must understand the reasons for these new ideas or practices; eradicate the earlier, no-longer-functional habits; and gradually consolidate a mode of behavior that is appropriate for a new position.

#### INSIGHTS FROM THE PAST AND THE PRESENT

For much of its relatively short history (a few thousand years), formal schooling has been characterized by its religious orientation. Teachers were typically members of a religious order; the texts to be read and mastered were holy books; and the lessons of school were moral in character. The purpose of school was to attain sufficient literacy so that one could read the sacred texts—indeed, in

many cases, the ability to chant, rather than the capacity to understand or interpret, sufficed. Any talk of understanding the world—let alone adding to current understanding through further work in a discipline—would have seemed exotic. Folklore, common sense, an occasional word from the wise sufficed. (Some varieties of Islamic education still embrace this vision.)

Seven hundred years ago, in both its Chinese and its European guises, an educated elite was expected to master a set of performances. Upon completion of his education, the Confucian scholar could distinguish himself in calligraphy, archery, music, poetry, horsemanship, participation in rituals, and mastery of important texts. His counterpart in Europe was able to exhibit the performances of the trivium (grammar, rhetoric, and logic) as well as the quadrivium (music, geometry, astronomy, and arithmetic). Instead of being asked to understand and apply, the apt student would simply repeat—indeed, often memorize verbatim—the wisdom of the intellectual ancestors: Confucius or Mencius in the East; Aristotle or Aquinas in the West. Perhaps this is what that Chinese teacher of psychology, mentioned in the previous chapter, had in mind when she impatiently told me, "We have been doing it this way for so long that we *know* it is right."

Professional education, as we know it today, did not exist. To the extent that there was division of labor, individuals either learned their trade from older members of the same family—the Smiths learned to be blacksmiths from their elders—or were apprenticed to a master: "Young Jones seems to be good with his hands; he should be apprenticed to barber Cutter, so that he can learn to trim hair and lance boils." Only the ministry embraced a more formal mechanism of selection, training, and attainment of membership in the priesthood.

The Renaissance triggered a slow but inexorable change in education in the West. While a religious patina remained—and indeed continues—in many places, education became far more secular.

Nowadays, most teachers are not religiously trained, religious texts play a smaller role, and the inculcation of morality is considered the arena of family, community, and church, rather than the burden of the daily classroom. (Note that when these other institutions fail, responsibility for moral education reverts to the school. This may explain the recent emphasis on character education as pressure mounts—particularly in the United States—to allow religion into the public school classroom.) Oral recitations and written synopses continue to be valued, but there are recognitions that not all knowledge comes from the past; that knowledge is best construed as tentative; and that, particularly in the sciences, the theories and methods to be mastered will change over time.

In the last century or so, schools for the professions have mushroomed. One no longer “reads” law; one goes to law school. Medical education no longer takes place at fly-by-night trade schools—sought-after specialties can take up to ten years of formal training. Only qualified institutions can issue (or revoke) the all-important license. Increasingly, the training of managers and executives takes place at business schools and various executive education programs, with well-resourced corporations spawning their own educational facilities and tracks. So much do we take this posttertiary sector for granted that we forget how new (and controversial) it once was. Apprenticeships and mentor-ships still exist—indeed, in some ways and in some places they remain as important as ever—but they are rarely considered a substitute for formal training.

All of these educational efforts are dedicated toward the acquisition of the appropriate disciplinary knowledge, habits of minds, and patterns of behavior. Whether a student is learning general science at the beginning of adolescence, particle physics in high school, the principles of civil law at the start of law school, or the fundamentals of marketing in business school, the goal is the same: to eradicate erroneous or unproductive ways of thinking, and to put in their stead the ways of thinking and doing that mark the disciplined professional.

## SUBJECT MATTER VERSUS DISCIPLINE

Why, despite the best motivated efforts, do so many students continue to adhere to erroneous or inadequate ways of thinking? A major reason, I believe, is that neither teachers nor students nor policymakers nor ordinary citizens sufficiently appreciate the differences between *subject matter* and *discipline*. Most individuals in most schools or training programs are studying subject matter. That is, like many of their teachers, they conceive their task as committing to memory a large number of facts, formulas, and figures. In science, they memorize the definitions of key terms, the formula for acceleration, the number of planets, or atomic weights, or facial nerves. In mathematics, they memorize key algebraic formulas and geometric proofs. In history, they accumulate the names and dates of key events and eras. In the arts, they know who created key works and when. In the social sciences, they learn the specifics of particular experiments and the key terms of influential theories. In law school, they master the facts of the cases. In medical school, they know the names of all the bones in the body. In business school, they fill in spreadsheets and learn to employ the terminology of sales and finance. By and large they are examined on this information: if they are good students, and have studied assiduously, they will be seen as having succeeded in their courses. And, as illustrated in Alan Bennett's play (and subsequent movie) “The History Boys,” they may even succeed in gaining entrance to Oxford.<sup>1</sup>

*Disciplines* represent a radically different phenomenon. A discipline constitutes a distinctive way of thinking about the world. Scientists observe the world; come up with tentative classifications, concepts, and theories; design experiments in order to test these tentative theories; revise the theories in light of the findings; and then return, newly informed, to make further observations, redo classifications, and devise experiments. Individuals who think scientifically are aware how difficult it is to ferret out causes; they do not

confuse correlation (A occurs before B) with causation (A caused B); and they are aware that any scientific consensus is subject to being overthrown, either gradually or more rapidly, in the wake of a dramatic new finding or a revolutionary theoretical paradigm.

Equivalent sketches can be given for other disciplines. For example, historians attempt to reconstruct the past from scattered and often contradictory fragments of information, mostly written, but increasingly supported by graphic, filmic, or oral testimony. Unlike science, history only happened once; it cannot be subjected to experiments or to the strict testing of rival hypotheses. Writing history is an imaginative act, which calls on the historian to place herself in remote settings and, in effect, to don the skins of the participants. Every generation necessarily rewrites history, in terms of its current needs, understandings, and available data. Scholars of literature proceed from written texts that bear only a contingent relationship to the times and events that they attempt to depict: as a dramatist, George Bernard Shaw could write equally about his own time, the era of Joan of Arc, the mythical past, or the imagined future. Literary scholars must use their tools, chief among them their own imaginations, to enter into a world of words created by an author (like Shaw) for the purpose of conveying certain meanings and achieving certain effects on readers. Historians differ on their implicit or explicit theories of the past (e.g., the Great Man Theory as opposed to the determinant role of economic, demographic, or geographic factors). By the same token, literary scholars differ in terms of the relative attention paid to the author's biography, her aesthetic intents, the literary genre employed, the historical times in which the author lived, and the historical or mythical era in which the protagonists are said to have lived.

Don't get me wrong—to study science, history, literature, indeed anything, one needs information. But shorn of their connections to one another, to underlying questions, to a disciplined way of constructing this pile of information, facts are simply “inert knowledge”—

to use the pithy phrase of the British American philosopher Alfred North Whitehead. Indeed, with respect to epistemology, there is no difference between the following three statements: “The earth is 93 million miles away from the sun around which it rotates”; “The American North and South fought the Civil War for four years in the 1860s”; and “The playwright William Shakespeare portrayed the great Roman leader Julius Caesar in a play of the same name.” They are simply truthful propositions. These factual statements only gain meaning by being placed in the context, respectively, of the layout of the solar system (and how that has been determined), the struggles about slavery and union that rent the American fabric for decades, and the aesthetically imaginative way in which one sixteenth-century English author re-created certain personages portrayed in Plutarch's *Lives*.

Distinctive ways of thinking characterize the professions as well and, in the happiest circumstances, are modeled by skilled practitioners. Educator Lee Shulman delineates the “signature pedagogies” of each profession.<sup>2</sup> In law, the teacher engages in a Socratic dialogue with students; every time a student comes up with a possible solution to a case, the teacher dredges up a counterexample until, in most cases, the student throws up her hands in confusion. In medicine, the student accompanies a senior physician on rounds, observes the recorded data on each patient as well as the interactions of the moment, and seeks to arrive at both a diagnosis and a recommended course of treatment. In design school, students sit at work areas, with physical models or digital models on a computer screen; they work together to come up with designs, and the teacher circulates among them, making occasional supportive or critical comments. In business school, students come to class prepared to discuss a multifaceted case; aware that the information is necessarily incomplete, they nonetheless have to recommend a course of action, one that might lead to the salvation, prospering, or destruction of a division or even an entire corporation. None of



these pedagogical encounters captures with full fidelity what might happen on a day-to-day basis once the student becomes a professional, but these experiences are thought to constitute the best possible preparation for work. No doubt, an increasing proportion of this education will be carried out in the future via simulations or other virtual realities.

Signature pedagogies demonstrate that the life of the professional is not equivalent to the life of the young student. For these pedagogies to be effective, both students and teachers must operate on a level quite different from that typically followed in the years before professional school. That is, students must see information not as an end in itself or as a stepping-stone to more advanced types of information (“I took Algebra I to prepare for Algebra II”), but rather as a means to better-informed practice. For their parts, teachers—acting to some extent as coaches—must provide feedback on their students’ abilities to pick up the distinctive habits of mind and behavior of the professional. To the extent that examinations or feedback focuses on factual information, the student may be well prepared to become a certain kind of professor, but not a practicing professional.

In this book, I say little about the traditional crafts or trades. I should stress, though, that each of these—from weaving rugs to repairing electrical circuits—entails at least one discipline. To the extent that personal service or personal touch continues to be valued, these disciplines will provide a good livelihood for those who have mastered them. But my focus here falls chiefly on the scholarly disciplines that one should acquire by the end of the adolescence, and the one or more professional disciplines needed to be a productive worker in society.

#### HOW TO DISCIPLINE A MIND

Over the years, teachers have fashioned ways in which to convey disciplines to young minds. Indeed, in no other way could we con-

tinue to have a steady supply of scientists, mathematicians, artists, historians, critics, lawyers, executives, managers, and other kinds of scholars and professionals. The training of disciplinarians takes place through the identification of mutual interests and gifts (“you have the talent to become a scientist/historian/literary critic/lawyer/engineer/executive”); the modeling of ways of thinking (“here’s how we go about proving a theorem of this sort”); the successful completion of certain signature assignments (“that’s a good analysis of Sonnet 23; let’s see whether you can carry out an analogous interpretation of Sonnet 36”); the provision of timely, useful feedback on earlier disciplinary efforts (“you did a pretty good job of analyzing those data, but next time, think through the specifics of the control conditions more carefully before you start the experiment”—or, in the case of business school, “realize that the data may have been massaged so as to make a particular manager look good”); and the passing through successive hoops *en route* to becoming a master of the discipline (“you’ve now learned how to write a good lead to the story; the next job is to order the paragraphs so that the important points will survive, even if the story has to be cut in half”).

But most young persons are not going to enter the ranks of one specific discipline. And so educators face a choice: do not teach them the discipline at all; introduce them to the facts of the subject and let them fend for themselves; or strive at least to give them a taste—a “threshold experience” in David Perkins’s term<sup>3</sup>—of what it is like to think in a disciplined manner.

I believe it is essential for individuals in the future to be able to think in the ways that characterize the major disciplines. At the precollegiate level, my own short list includes science, mathematics, history, and at least one art form (such as figure drawing, playing an instrument, or writing one-act plays). I choose those disciplines because they are gateways: one science introduces methods used in several; a course of history opens up the gates to a range of social sciences; one art form eases entry into others. Should they lack

such disciplinary acumen, students will be completely dependent on others as they attempt to formulate views about their medical options, the political scene, new works of art, economic prospects, child rearing, possible scenarios of the future, among many other topics. These forms of thinking will serve students well, no matter what profession they eventually enter. In the absence of these forms of thinking, undisciplined individuals may not even be able to ascertain *which* persons or ideas are reliable guides, informants, opinion leaders. And so they become easy game for charlatans and demagogues. Mastery of the basic skills is a necessary but not sufficient prerequisite. Knowledge of facts is a useful ornament but a fundamentally different undertaking than thinking in a discipline.

Of course, once one enters a university, a graduate school, or the workplace, the target profession determines the relevant discipline, subdiscipline, or set of disciplines. Mathematics, mechanics, and management each feature specific disciplines. Facts and figures are welcome ornaments, but the structure and processes of disciplines are the Christmas trees on which those ornaments must be hung.

How to achieve a disciplined mind? Whether one has in mind the discipline of history, law, or management, four steps are essential:

1. Identify truly important topics or concepts within the discipline. Some of these will be content—for example, the nature of gravity, the components of a civil war, the rise of the novel, the penal code of one's state, the laws of supply and demand. Some of these will be methodological: how to set up a scientific experiment; how to make sense of an original, authenticated document from the past; how to analyze a Shakespearean sonnet, a classical sonata form, a medieval triptych, a recent decision by the U.S. Supreme Court, a balance sheet.
2. Spend a significant amount of time on this topic. If it is worth studying, it is worth studying deeply, over a signifi-

cant period of time, using a variety of examples and modes of analysis.

3. Approach the topic in a number of ways. Here is where an education for disciplinary understanding takes advantage of the variety of ways in which individuals can learn. Any lesson is more likely to be understood if it has been approached through diverse entry points: these can include stories, logical expositions, debate, dialogue, humor, role play, graphic depictions, video or cinematic presentations, embodiments of the lesson in question in the ideas, behaviors, and attitudes of a respected person. This is not to say that every topic ought to be taught in three or thirty canonical ways—but rather that any topic worth studying is open to a plurality of approaches.

Here, by the way, is where one kind of mind—the disciplined mind—encounters my theory of multiple intelligences. While a specific discipline may prioritize one kind of intelligence over the others, a good pedagogue will invariably draw on several intelligences in inculcating key concepts or processes. The study of architecture may highlight spatial intelligence, but an effective teacher of architectural design may well underscore and make use of logical, naturalist, and interpersonal perspectives.

A variety of entry points achieves two important goals. First of all, the teacher reaches more students, because some learn better through stories, others through debate, works of art, or identification with a skilled practitioner. Second, such an approach demonstrates what genuine understanding is like. Any individual with a deep understanding of a topic or method can think about it in a variety of ways. Conversely, an individual exhibits her current limitations when she can only conceptualize her topic in a single way. One cannot be disciplined without such

conceptual agility. As I'll discuss in the following chapters, multiple ways of thinking about a topic are also essential for the synthesizing and the creating minds.

4. Most important, set up "performances of understanding" and give students ample opportunities to perform their understandings under a variety of conditions. We customarily think of understanding as something that occurs within the mind or brain—and of course, in a literal sense, it does. Yet neither the student nor the teacher, neither the apprentice nor the master, can ascertain whether the understanding is genuine, let alone robust, unless the student is able to mobilize that putative understanding publicly to illuminate some hitherto unfamiliar example. Both teacher and students ought to strive to perform their current understandings; much of training should consist of formative exercises, with detailed feedback on where the performance is adequate, where it falls short, why it falls short, what can be done to fine-tune the performance.

Why talk about performances of understanding? So long as we examine individuals only on problems to which they have already been exposed, we simply cannot ascertain whether they have truly understood. They *might* have understood, but it is just as likely that they are simply relying on a good memory. The only reliable way to determine whether understanding has truly been achieved is to pose a *new* question or puzzle—one on which individuals could have not been coached—and to see how they fare. Understanding the nature of a civil war does not mean knowing the dates of the nineteenth-century American or the twentieth-century Spanish struggles; it means judging whether the Vietnamese battles of the 1960s or the Rwandan conflicts of the 1990s should be considered examples of civil wars, and if not, why not. Knowing how to behave

in a business crisis does not mean stating what General Motors did fifty years ago; it means having a conceptualization and procedure in place so one can act appropriately in case of a sudden spurt in illness among consumers of one's product or an unexpected decline in profits. When critics deride business schools as being too academic, they usually mean that the ultimate uses of the purveyed knowledge are not evident; students are not forced to stretch or flex their text or lecture- or discussion-obtained knowledge. Here, in brief, is why most standardized measures of learning are of little use; they do not reveal whether the student can actually make use of the classroom material—the subject matter—once she steps outside the door. And here is why traditional training in the crafts requires a culminating masterpiece before the journeyman can rise to the level of master.

To be sure, one can go too far in requiring performances of understanding. I have little sympathy with currently popular techniques of job interviews, where candidates are required to come up with putatively creative responses under conditions of stress. Unless the actual job in question requires employees to come up with ten trademarks in two minutes, or to figure out how to light a bulb using only a battery and a wire, such performances are more likely to sift out the glib than to identify the deeply disciplined or the genuinely creative.

Finally, we arrive at the explanation for the smoking-gun examples introduced at the beginning of the chapter. Students may succeed on items to which they have already been exposed; they fail when asked to explicate examples that were not, so to speak, in the textbook or the homework assignment. And so, bearing in mind these telltale examples, we ask students of physics to predict what will happen to familiar objects when they are launched into

outer space initially and over a specified period of time; or we ask students of history to discourse on what might be the issues spawning a civil war in Chechnya or to explain the reasons provoking a recent terrorist attack; or we ask students of literature to analyze the poems of a recently chosen poet laureate or to critique a newly written play about Anthony and Cleopatra; or we ask medical students to outline a course of treatment for a newly discovered strain of flu; or we ask those enrolled in business school to recommend a course of action to a recently turned-around airline that has suddenly been threatened with a potentially debilitating strike. There is no need for students to respond to these challenges in the manner of a distinguished disciplinarian—that feat takes years to accomplish. But if their responses are essentially indistinguishable from those of individuals who have never studied the designated topics—if, indeed, the way that they approach the problem demonstrates little or no disciplinary method—we must then face the uncomfortable possibility that factual knowledge may have increased without a correlative increase in disciplinary sophistication.

The absence of disciplinary thinking matters. Shorn of these sophisticated ways of thinking, individuals remain essentially unschooled—no different, indeed, from uneducated individuals—in how they think of the physical world, the biological world, the world of human beings, the world of imaginative creations, the world of commerce. They have not benefited from the genuine progress achieved by learned individuals in the past few thousand years; though they may sport trendy dress and use up-to-date argot, the undisciplined students are essentially stranded in the same intellectual place as barbarians. They are not able to understand what is said about current events, new scientific discoveries or technological feats, new mathematical techniques, new works of art, new forms of financing, new environmental regulations; accordingly, they will not be able to have informed opinions about the events of the day, the year, the century. They feel alienated and stupid—or,

equally bad, they feel resentment, antagonism, even hatred, vis-à-vis those who do seem to be able to perform their understandings in a disciplined manner.

But, you might retort, individuals bereft of disciplinary understanding can still get along in daily life and make a decent, perhaps even a spectacular living—and I would not dispute this riposte. (I read the celebrity magazines too—though, like you, only at the supermarket checkout counter.) Yet, I would add, such persons are then completely dependent on others when they must make decisions about their own health or welfare or vote on issues of importance for their time. Moreover, there are fewer and fewer occupations in which one can progress without at least some sophistication in scientific, mathematical, professional, commercial, and/or humanistic thinking. Scholarly disciplines allow you to participate knowledgeably in the world; professional disciplines allow you to thrive at the workplace.

Another retort: disciplinary thinking is all well and good, but—in the absence of facts, figures, other kinds of information—one can't really use it. This response also harbors some truth: we do need to know some things, and we appropriately respect individuals who have lots of knowledge at their mental fingertips. But two more important considerations trump a mountain of facts. First, in this day of search engines, ubiquitous physical and virtual encyclopedias, and increasingly powerful handheld computers, nearly all required or desired information can be retrieved almost instantaneously. Just as the book made a photographic memory a luxury, current computers render forced memorization even less important. And if one believes that it is desirable for individuals to memorize speeches or poems or melodies, such an exercise should be done for its own sake (“it’s beautiful, it’s satisfying”), and not for the will-o’-the-wisp goal of improving general mnemonic capacity.

Second, in the course of acquiring a disciplined approach to consequential topics, individuals will indeed pick up useful information: the relative positions and distances of the other planets, the

important figures and events of a civil war, the literary devices used by Shakespeare or Pirandello to create powerful characters and dramatic tension, the organizational charts of major corporations and the identities of those who inhabit them. Moreover, this "core knowledge" or "cultural literacy" will be both more entrenched and more flexible because it has been acquired in a meaningful context; it is not merely part of a forced regimen of committing someone else's list to memory.

In the end there remains a far more important reason for disciplinary understanding. That is because, like the most salient experiences of life (from orgasm to philanthropy), its achievement breeds a desire for more. Once one has understood well a particular play, a particular war, a particular physical or biological or managerial concept, the appetite has been whetted for additional and deeper understanding, and for clear-cut performances in which one's understanding can be demonstrated to others and to oneself. Indeed, the genuine understander is unlikely in the future to accept only superficial understandings. Rather, having eaten from the tree of understanding, he or she is likely to return there repeatedly for ever more satisfying intellectual nourishment.

In stressing the importance—the indispensability—of disciplinary thinking, I have drawn examples from students in precollegiate or liberal arts education. And indeed, these are the appropriate locales for initial mastery of the ways of thinking of science, mathematics, history, and the arts. I applaud the fact that, in making decisions about admissions, many professional schools give greater weight to success in these disciplinary tracks than they do to prelaw, premed, prebusiness, or preengineering courses of study. After all, the purpose of the professional school is to train you in the particular profession, and the best preparation is one in which one's mind becomes disciplined in the major scholarly ways of thinking.

As one shifts to professional training—whether at a graduate school (as in law or medicine) or a high-level apprenticeship (as

happens in many consultancies, book publishing, or journalism)—the disciplinary accent changes. Far less decontextualized learning—far fewer tests based simply on reading and lecture: one is thrown gradually or harshly into a world that more closely resembles the world of practice. We might say that the focus now is on discipline in action. It does not help simply to understand that a lawyer or engineer or manager thinks differently; placed in the shoes of the lawyer, engineer, or manager, one must act differently as well. Thinking and action are more closely allied than ever before. Those who are unable to acquire the distinctive practices, or, in Donald Schön's phrase, to become "reflective practitioners,"<sup>4</sup> should be counseled out of the profession—or, if I may be permitted a wisecrack, should be encouraged to become professors.

Perhaps at one time, an individual could acquire his professional license and then coast on his laurels for the next thirty or even fifty years. I know of no career—from manager to minister—to which this characterization still applies. Indeed, the more important the profession is considered to be, and the higher the position an individual occupies within that profession, the more essential to continue one's education, broadly construed. Sometimes the lifelong learning occurs in formal courses; more often, in informal seminars, executive retreats, high-level conversations and war stories, even in reading books like this one. To some extent, the disciplinary training involves acquisition of new skills—for example, ones connected to technological or financial innovations; but at least as important are new and higher levels of understanding within the disciplines as traditionally constituted. Thus, the scholar comes to understand the various ways in which new knowledge is developed and propagated; the executive comes to understand which managerial capacities are needed for specific niches, which are much more generic, how leadership must adjust to changing conditions in the media or the marketplace. One could attempt to teach these ideas in professional schools, but for the most part they would not

be well understood. We might say that these constitute the disciplinary curriculum for later life.

### THE OTHER KIND OF DISCIPLINE

That brings us to the other, equally important sense of *discipline*. An individual is disciplined to the extent that she has acquired the habits that allow her to make steady and essentially unending progress in the mastery of a skill, craft, or body of knowledge. With young children, we tend to think of discipline with respect to athletics and the arts. A child disciplined in that sense returns to the basketball or the tennis court each day and practices her moves; or, to shift to the arts, such a child works steadily to improve her violin playing or her calligraphy or her balletic plié. However, an equally important connotation of discipline occurs within a scholastic context. The primary student disciplined in that respect practices her reading or sums or writing each day (OK—she can have alternate Sundays off!); the secondary student works faithfully on her scientific lab exercises, her geometric proofs, or her analysis of written and graphic documents drawn from history. As a child, I practiced on the piano keyboard each afternoon; now with equivalently steady regularity, I revert to the computer keyboard each evening. Whether those forms of disciplines are integrally related remains controversial: despite the wishes of parents, pedagogues, and some psychologists, individuals can be quite disciplined in one sphere and notably erratic in others.

The earliest writers about education stressed the importance of daily drill, study, practice, mastery. Unlike the disciplinary understanding sketched earlier, this kind of discipline has hardly had to fight for a place in the schools. Indeed, it sometimes appears as if observers praise this form for its own sake. Such observers call for more homework even when evidence indicates that it does little or no good in the primary years; they praise the child who sits dutifully at

her desk at home and tear their hair out when a child has the television or the CD blaring, or refuses to take out the books until the evening (or the early morning) before the final examination.

In the future, we need a less ritualistic, more deeply internalized form of discipline. Such a disciplined individual continues to learn, but not because she has been programmed to spend two hours a night hitting the books. Rather, she continues to learn, to develop her disciplinary understanding, for two other reasons: (1) she realizes that, given the accumulation of new data, knowledge, and methods, she must become a lifelong student; (2) she has come to enjoy—indeed, she has become passionate about—the process of learning about the world. This motivation should be equally apparent in the executive who ventures to exotic locales and attends institutes, giving up the opportunity to ski, snorkel, or play hooky; and in the physician who regularly surveys several Web sites and journals dedicated to her specialty. As Plato remarked so many years ago, “Through education we need to help students find pleasure in what they have to learn.”

### DISCIPLINE GONE AWRY

In considering the five minds, for the most part I concentrate on how to nurture each one. Still, it is salutary to remember that every psychological capacity has its pathological form. It is good to be careful, undesirable to be obsessive-compulsive. It is great to experience “flow”—but one should experience that phenomenal state from creative acts that are constructive and not from ones that are criminal, dangerous, or foolish.

With respect to the disciplined mind, a number of cautionary notes should be registered. To begin with, every discipline has its excessive forms: we all joke about the lawyer who brings his legal arguments to the kitchen table, the basketball court, or the bedroom.

Specific disciplines can also come to dominate discourse unduly. Fifty years ago, behavior was seen primarily through a psychoanalytic lens: nowadays, evolutionary psychology and Rational Choice Theory exercise excessive influence in the academy and on the streets. Individuals need to be aware of the limits of the mastered disciplines, when to draw on them, when to temper or shelve them. Having more than one disciplinary skill is an advantage here; one can, for example, consider a work of art from a number of perspectives, ranging from aesthetic to biographical to commercial. Of course, it is important not to confuse those perspectives with one another, or to invoke one when it is manifestly inappropriate in a given context.

Is it possible to be *too* disciplined? As a person of German (and Jewish) background, I am tempted to answer “No,” if not “Nein.” I do believe that one can become ever more deeply entrenched in a discipline and that even greater depth can be advantageous for one’s work. But one wants to avoid two perils. First of all, a discipline should not be pursued obsessively, compulsively, for its own sake. One’s understanding of law should deepen because such depth yields understanding and pleasure; simply reading every case that is published and parading one’s knowledge thereof is a sign of immaturity, not judgment. And then, too, one must remain ever aware that no topic can be fully mastered from a single disciplinary perspective. One must remain humble about the leverage gained from one discipline, or indeed, even from a multitude of disciplines. Methods should be tools, not chains.

Recently, I have heard of young piano prodigies who play the piano seven, eight, or even more hours a day. Sometimes they are cajoled to do so by overly ambitious parents or teachers; sometimes, remarkably, they want to sustain such a regimen themselves. Over a short period of time, such immersion can be justified, and it may do no harm. But such a slavish routine suggests a lack of distance on what disciplinary immersion can and cannot obtain, and what the long-term costs might be.

One of the greatest pianists ever was Artur Rubinstein (who eventually anglicized his name to Arthur). As a youth, Rubinstein was a prodigy, and, like most prodigies, he worked very hard on his craft. Once he became world renowned—feted wherever he traveled—he ceased to work on his craft with sufficient regularity and assiduity. A frank self-examination elicited a depressing picture:

*I must confess with sorrow that I was not very proud of myself. The dissipated life I was leading, my constant preoccupation with the opposite sex, the late hours spent nightly with my intellectual friends, the theaters, the shows, the rich food at lunch and dinner, and worst of all, my passionate attraction for all of this never allowed me to concentrate on my work. I prepared my concerts using the large repertoire I had accumulated but without the urge to play better, without referring to the text, relying entirely on my fine memory and my cleverly acquired knowledge of how to use certain encores to arouse the audience to the right pitch of enthusiasm. To put it in a nutshell, I couldn't boast of one single piece which I played entirely faithful to the text and without some technical shortcomings . . . I knew that I was born a true musician but instead of developing my talent I was living on the capital of it.<sup>5</sup>*

Rubinstein came to realize that he could not live on this capital indefinitely without replenishing it. As he commented to an acquaintance, “When I don’t practice for a day, I know. When I don’t practice for two days, the orchestra knows it. And when I don’t practice for three days, the world knows it.”<sup>6</sup> And so he gradually relinquished the life of the sybarite, settled down, launched a family, and began to practice the repertoire with greater regularity and scrupulousness. Unlike most pianists, he was able to play publicly and at a high level throughout his seventies and eighties. He stands as an example of someone who was ultimately able to wed the two meanings of discipline: mastery of a craft, and the capacity to renew that craft through regular application over the years.

I hope to have convinced you that, while the process is arduous, a disciplined mind can be fashioned; and that its achievement represents an important, indeed indispensable, milestone. Alas, a disciplined mind alone no longer suffices. More and more knowledge now lies in the spaces between, or the connections across, the several disciplines. In the future, individuals must learn how to synthesize knowledge and how to extend it in new and unfamiliar ways.

## CHAPTER 3

### The Synthesizing Mind

*"Hell is a place where nothing connects with nothing."*

—VARTAN GREGORIAN, CITING DANTE

IN THE WESTERN sacred tradition, the story of human beings begins in the Garden of Eden, when Adam was enticed to take a first bite of fruit from the Tree of Knowledge. For the generations that immediately followed the biblical Adam, knowledge accumulated at a sufficiently slow rate that it could be passed on orally (though perhaps not in apple-sized chunks), from parent to child, and on down to each succeeding generation. But humans are distinguished by the fact that we continue to accumulate knowledge at increasingly rapid rates. Indeed, the Bible itself represents an effort to collate the most important knowledge that had accrued to that point—knowledge heavily skewed, of course, toward religious and moral messages.