"A fascinating, ambitious, valuable map of modern creativity and the modern period." —*New York Times Book Review*

Creating Minds

An ANATOMY *of* CREATIVITY

SEEN THROUGH *the* LIVES *of* FREUD, EINSTEIN, PICASSO, STRAVINSKY, ELIOT, GRAHAM, *and* GANDHI

HOWARD GARDNER

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HOWARD GARDNER

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Praise for Howard Gardner's *Creating Minds*

"A humanistic spirit pervades [*Creating Minds*]. . . . Gardner isn't trying to reduce creativity to maze-running. . . . He is tentative rather than dogmatic, attuned to exceptions and complexities as well as commonalities."

—*The Houston Chronicle*

"Gardner may well have uncovered some fundamental aspects of the creative personality and of the process of creativity. His discussion will inevitably open up more of this fascinating territory."

—*New Scientist*

"[Gardner's] books are lucid, cross-disciplinary examinations of heady topics: *Creating Minds* . . . and *Leading Minds* . . . are rarities, being academic studies that are as readable as they are compelling."

—*The Boston Globe*

"Mention Howard Gardner's name to a growing cadre of educators and the response verges on the reverence teenagers lavish on a rock star. . . . [*Creating Minds*] is sure to get attention not only for Gardner's typology of intelligence but also because of his guru-like status."

—*Newsweek*

"One of the notable characteristics of creativity that Howard Gardner emphasizes in this new study is the special amalgam of the childlike and the adult: Creative personalities, he argues, often display features such as innocence and freshness, as well as selfishness and retaliation. . . . Their demanding personalities and devotion to their own creative breakthroughs (which tend, Gardner argues, to take place at 10-year intervals) also make creative people very hard to live with. But the creative process depends upon the support of caring individuals."

—*Washington Post*

"Few things inspire more wonder than the power of genius. . . . Gardner derives his view of genius from his earlier, groundbreaking research on the specialized nature of intelligence. . . . From this perspective, he questions whether creative minds of the caliber of Freud's or Einstein's will ever come to dominate the 21st century. These earlier geniuses made their mark by challenging the well-established thinking of the day. But today, Gardner says, there is really no such thing as establishment thought."

—*US News and World Report*

"[Gardner's] enthusiasm and long experience show. *Creating Minds* is a stimulating work that fulfills the author's wish to write a book of the sort he himself likes to read: 'a jargon-free one with only the most essential visual aids'. . . . Gardner's writing style is remarkable in other regards too. He is a fluent writer, at great ease with the English language—and so confident of his ideas that he is not afraid to express them clearly. . . . Everyone who is interested in understanding and fostering creativity—and maybe that should be all of us—should read this rich, enthusiastic book to learn more about creativity, about seven fascinating creative minds—and maybe about the creative potential of ourselves and those in our care."

—*Times-Picayune* (New Orleans)

"Rejecting the idea that creativity can be measured on a single linear scale, [Gardner] argues instead that many forces are at work to drive the creative individual, including such unexpected motivations as competition, ego, vanity and fear of death. This is a nice thought for those of us who feel that if pushed enough we could all write the next great symphony."

—*The Dallas Morning News*

"[This] groundbreaking work on brain functioning by Harvard researcher Howard Gardner has shed further light on the vitality and centrality of imagination and its close intellectual relatives."

—*Pittsburgh Post Gazette*

"[A] boldly ambitious study. . . . Each of the seven creative geniuses whom Gardner incisively limns transcended interpretive frames or conventions that became entrenched during the 19th century; each forged a new 'system of meaning'; and each, in Gardner's view, struck a 'Faustian bargain,' sacrificing a rounded personal life for the sake of an all-consuming mission. . . . This highly stimulating synthesis illuminates the creation of the modern age."

—*Publishers Weekly*

"A delightful look at creativity . . . rich, readable, and thought-provoking."

—*Vision*

"Gardner has uncovered other intelligences we had failed to notice because we had no tools sensitive enough to measure them."

—*Business World*

"It takes chutzpah to come up with a scheme for analyzing creativity—especially in subjects already exhaustively examined. But for psychologist and MacArthur fellow Gardner (Harvard Graduate School of Education), it amounts to a natural progression from his earlier dissections of intelligence."

—*Kirkus Reviews*

"Illuminating and entertaining, *Creating Minds* provides an unforgettable synthesis of the ideas that have shaped contemporary culture. . . . As the guide in this tour of the theater of the mind, Gardner is at his best: insightful, civilized, and precise. I can't think of a more stimulating book about creativity."

—Mihaly Csikszentmihalyi, author of *Creativity*

"*Creating Minds* is both informative and a wonderful read."

—Robert Ornstein, author of *Roots of the Self*

OTHER BOOKS BY HOWARD GARDNER

The Quest for Mind (1973)
Arts and Human Development (1973)
The Shattered Mind (1975)
Developmental Psychology (1978)
Artful Scribbles (1980)
Art, Mind, and Brain (1982)
Frames of Mind (1983)
The Mind's New Science (1985)
To Open Minds (1989)
The Unschooled Mind (1991)
Multiple Intelligences: The Theory in Practice (1993)
Leading Minds (with Emma Laskin) (1995)
Extraordinary Minds (1997)
The Disciplined Mind (1999)
Intelligence Reframed (1999)
Good Work (with Mihaly Csikszentmihalyi and William Damon) (2001)
Changing Minds (2004)
Multiple Intelligences: New Horizons (2006)
The Development and Education of the Mind (2006)
Five Minds for the Future (2007)
Truth, Beauty, and Goodness Reframed (2011)

For Andrew
Benjamin
Jay
Kerith

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PREFACE TO THE 2011 EDITION

THOUGH PARENTS SHOULD NOT have a favorite child, authors ought to be permitted to have a favorite book. I've written well over twenty books, but in many ways *Creating Minds* is my favorite. Preparation of the book was a labor of love. I reveled as I dove into the rich repositories of information about the seven master creators whom I was describing: examining primary sources, reading biographies and notebooks of Sigmund Freud, watching the films of dancer Martha Graham shot in the 1930s and 1940s, poring over the drafts of T. S. Eliot's *The Waste Land*, listening again and again to Igor Stravinsky's pathbreaking compositions, looking at sketches for Pablo Picasso's boldest canvases, attempting to piece together the many fragments of autobiography left by Mahatma Gandhi, and puzzling over Albert Einstein's most important scientific papers. It was like being enrolled in seven elective college or graduate school courses.

As a studious youngster growing up in Scranton, Pennsylvania, in the 1950s, I loved to read. What captured my interest most were biographies and histories, drawn from many lands, but focused particularly on Western Europe, from which my family came, and the United States, our new home. I had scarcely heard of psychology when I entered college, and so it was natural for me to declare myself a history major. But only when I encountered the psychohistorical and psychobiographical writings of Erik Erikson did I find an intellectual home. And so I shifted my studies to the social sciences and found myself increasingly drawn to the psychology of human development.

A conflict within me between an interest in the emotional side of human experience and a curiosity about its more cognitive dimensions was resolved—at least temporarily—in favor of cognition when I began to read the works of the Swiss psychologist Jean Piaget at the close of my college career. I read Piaget intensively during a postgraduate year in England. During that time of leisure, I also became far better acquainted with the ideas and art forms of the modern era: the music of Igor Stravinsky; the paintings of the cubists; the writings of T. S. Eliot; and the astonishing outpouring of scientific, artistic, and political creativity that had taken place in the principal European countries in the first decades of the twentieth century. Although I decided to pursue graduate studies in

developmental psychology, I had already become keenly fascinated with the society that had produced such sparkling works while at the same time plunging into two devastating world wars and then engaging in a dogged cold war.

Interest in history and biography took a back seat for a while as I mastered the methods and techniques of experimental developmental psychology. I am grateful for this systematic training. However, soon after my graduate studies began, I felt keenly the lack of interest among my teachers and peers in the puzzles of artistic creation. My own background had included intensive work in music; I had spent innumerable evenings during my postgraduate year exploring the arts of the modern era; and yet I searched in vain for any reference to these facets of life in my professors' lectures and in the assigned readings. I was therefore primed when I learned of a new research enterprise at Harvard called Project Zero, which was focusing specifically on the nature of artistic knowledge and education.

Under the aegis of Project Zero, I have for more than forty years studied human development in normal and gifted children, as well as the breakdown of human capacities and gifts under conditions of brain damage. The project's animating interest has been the nature of human symbolization, with particular reference to those forms of symbolizing that are key to the arts. Put more concretely, my colleagues and I have probed how youngsters become musicians or poets or painters, why most of them do not, and how these and other artistic capacities develop or atrophy or are nurtured within our own and others' cultures.

By a curious twist, the words *art* and *creativity* have become closely linked in our society. It is for this reason, I suppose, that during the recent decades I was generally considered to be studying "creativity." There is no necessary association: People can be creative in any sphere of life, and the arts can be the scene of bathos or boredom, as well as of beauty, beatitude, or bedlam. Nonetheless, because of the quirk, I was regularly invited to conferences on creativity; regularly interviewed by journalists interested in creativity; and, in general, assimilated inappropriately to membership in the "creativity research mafia." I did not mind this slight case of mistaken identity, to be sure, given my lifelong interests in the achievements of certain extraordinary human beings.

Although I had written a good deal about creativity, particularly in the arts, I had not initially thought about doing a comparative biographical study of this type. The impetus came following the

publication in 1983 of the book for which I am best known: *Frames of Mind: The Theory of Multiple Intelligences* (3rd ed., 2011). In that book, drawing on examples from both ordinary and extraordinary individuals, I described seven relatively autonomous forms of human intelligence. Once I had pluralized intelligence, many people asked me whether I also believed that there were several kinds of creativity. Though I had intuitions about this question, it occurred to me that it would be fascinating to study creative individuals who, by hypothesis, stood out in the various intelligences and to see what I might discover about the nature of their several creativities.

And so, having made that initial decision, I then had the challenge of selecting individuals of undeniable creativity who seemed to stand out in terms of a particular intelligence. I flirted with the idea of selecting subjects from the full span of human history but rejected that tack. So that my subjects would be at least roughly comparable, I elected to pick individuals who had lived in the latter part of the nineteenth and the first part of the twentieth century. The one other criterion, important for many biographers, was that I had at least a fundamental sympathy with the subjects. I did not want to devote myself to the study of the juvenilia of a writer, or the childhood sketches of a painter, whose mature work I did not like.

Though the details of the subjects' lives were fascinating in themselves, I saw this work as fundamentally social scientific rather than humanistic. That is, I was looking for concepts and generalizations that might illuminate the study of creativity more broadly. As I detail in Chapter 2, I wanted to begin to build a bridge between the detailed psychological studies of individual creators, by scholars such as Howard Gruber, and the quantitative, historiometric studies of scores of creators, by scholars such as Dean Keith Simonton. And so the chief substantive chapters, dedicated to my seven masters, are bookended by more general reflections about how to study creative processes and what findings have emerged from this study.

Toward the conclusion of the book, I interrogated myself about several issues: Did I select the right persons and the proper domains, did I have the right measures of creativity, would my conclusions have obtained with reference to other persons and to other historical eras? The republication of this book, twenty years after it was initially drafted, gives me the opportunity to revisit these and other questions that have occurred to me in the interim.

I have had few second thoughts about the eras or the individuals studied. A century ago, Europe and, to a lesser extent, Russia and

America hosted individuals of remarkable creativity. I might have studied James Joyce or Marcel Proust rather than T. S. Eliot, and I had similar choices in the other performance domains, but the list has held up well. Closer to our own era, I might have studied a film director such as Ingmar Bergman or a scholar such as Noam Chomsky, but I don't think that the conclusions would have been substantially altered.

But there are other issues where conclusions might have been different. In my original sample, individuals had been born on the periphery of cultural centers and had moved to such places as London or Vienna. Had I studied the philosopher Ludwig Wittgenstein instead, I would have detected an opposite pattern. Coming from a powerful and wealthy family, Wittgenstein was born and grew up at the center of culture in Vienna: no need for him to move to a major metropolis to encounter other young people of enormous potential! But Wittgenstein found Vienna to be oppressive: He moved first to Cambridge, England, then to Norway, and finally to the United States. Perhaps genius needs to gain distance from wherever it first resided.

My sample also may have led to the unwarranted conclusion that creators are necessarily difficult persons, particularly in their later years. I would have difficulty making this argument with reference to Charles Darwin who, by all reports, was a humane family member and a generous scholar. But in addition to living in an earlier era, Darwin was distinguished in other ways. Like Wittgenstein, he came from wealth and never had to work for a living. Like Wittgenstein, Darwin was born in the center of things—in England—and achieved distance through his famous five-year trip around the world on the *Beagle*. Perhaps most important, Darwin had or feigned illness throughout his adult life; first his wife Emma protected him from unwarranted intrusions, and then his colleague Thomas Henry Huxley (nicknamed "Darwin's bulldog") barnstormed Britain, defending Darwin's controversial claims. Perhaps Darwin had the protection that genius needs and did not have to erect barriers on his own.

My point here is not to argue about each of my initial conclusions but rather to illuminate the nature of the bridge that I was trying to build, from case studies to broad generalizations. One must begin with patterns observed in the original sample. When an apparent exception arises—such as the absence of a move from the periphery to the center of culture—one needs to see whether the basic point can be rescued by a broader reformulation—gaining distance from one's customary locale. And one has to be open to the possibility

that the generalization was an accident, based on the particular sample chosen or the specific time period focused upon. Examples such as that of Darwin force one to rethink earlier conclusions.

As it happens, just a few years after finishing *Creating Minds*, I had the opportunity to carry out a further study. Editor and agent John Brockman asked me if I wanted to write a short book with the topic wide open. At the time, I had become friendly with D. Carleton Gajdusek, an outstanding Nobel laureate in biology and a fascinating, larger-than-life personality. In thinking about Carleton's remarkable career, I planned to conceptualize my portrait around four different roles that he had assumed: The Master (who has climbed to the top of an already existing field), the Maker (who devises a new area of study or practice), the Influencer (who changes the behaviors of others), and the Introspector (who thinks deeply about him- or herself).

As I was nearing the end of my research, and preparing to write this short book, Gajdusek was arrested and subsequently convicted of pedophilia. (After serving a short sentence, he left the United States and died of natural causes a decade later.) Faced with the question of whether to write a book about a convicted felon, I decided that I could not do so. Instead, I chose to write brief accounts of four individuals, each of whom exemplified one of the four Gajdusek-inspired roles.

Two of the roles were well filled by personalities from this book: Freud (a Maker) was an individual who had founded psychoanalysis —a new field of study *and* practice; Gandhi (an Influencer) was an individual who had influenced the thoughts and behaviors of many thousands, perhaps millions, of his fellow human beings.

The book, called *Extraordinary Minds*, gave me an opportunity to test the scheme of the present book in two ways. For the Master, I decided to write about Wolfgang Amadeus Mozart, certainly a master of classical music and a person who had lived more than a century before my seven subjects. Even that relatively short period of time revealed many differences between the Europe at the crest of the Enlightenment and the same pursuits at the crest of the modern era. Far more so than those who came later, Mozart was the practitioner of a craft, who wrote basically on commission, and who had to worry throughout his life about basics of health and money.

For the Introspector, I chose to write about Virginia Woolf. Her achievements as a writer of fiction and of essays spoke for themselves. But I also had felt—and had been criticized for—the dearth of women in my original sample. The inclusion of Woolf

proved equally instructive. Though she came from an illustrious family and lived amid a highly literate and intellectual family, she did not have any formal education. As she famously observed, it was difficult to become a writer unless one had three hundred guineas (slightly more than 300 pounds) and a room of one's own. Also, as is well known, Woolf suffered from severe mental illness and eventually committed suicide. The inclusion of Woolf forced me to consider the very different challenges facing a talented woman, a century ago, and the devastating effects of depression in an era when treatments were woefully inadequate.

Researching and writing *Extraordinary Minds* helped me to consider two other issues. The first was the lessons that the rest of us can learn from individuals who are highly creative. I culled three: (1) Creative individuals spend a considerable amount of time reflecting on what they are trying to accomplish, whether or not they are achieving success (and, if not, what they might do differently). (2) Creative individuals leverage their strengths. They determine their strongest area and build their achievements around these potent intelligences. They do not worry about what they do not do as well; they can always get help from others and perhaps barter their areas of strength with those who have complementary skills. (3) Creative individuals frame their experiences. Such people are highly ambitious, and they do not always succeed, by any means. But when they fail, they do not waste much time lamenting; blaming; or, at the extreme, quitting. Instead, regarding the failure as a learning experience, they try to build upon its lessons in their future endeavors. Framing is most succinctly captured in aphorism by French economist and visionary Jean Monnet: "I regard every defeat as an opportunity."

The other issue, touched upon in *Creating Minds*, concerns the role of pathology in creative genius. Of course, the imputed relationship between the wound and the bow has long been a staple of studies of those who achieve. And in *Creating Minds* I noted that my creators each had had periods of mental fragility and that they ranged from a distanced relationship to other persons (Einstein) to an inclination toward frank sadism (Picasso). While the two new persons did not directly challenge my earlier conclusions, my immersion in the life of Gajdusek catalyzed much reflection on the relationship between his great gifts and his predilection for pushing the envelope, both in terms of his scientific work and his relations to others, in this case, particularly young boys.

I continue to ponder whether the link between monumental achievement on the one hand and a tendency to behave according

to one's own rules on the other is a cardinal feature of creative genius. At present, I am reluctant to state such a strong conclusion. There are certainly individuals such as Darwin or composer Johannes Brahms or writer Thomas Mann who did not stand out in terms of their defiance of convention. And yet, I feel confident in declaring that the character trait of thinking outside the box with reference to one's own work life often, if not inevitably, spills over into other sectors of life.

My focus on the modern era was quite explicit: In fact, my working title for this book was "The Creators of the Modern Era"—a pun that appealed more to me than to my publishers! Not only did my seven creators reflect the era in which they were brought up, but as would be the case with any remarkable septet, they helped to create the art, the science, and even the politics (Einstein and the atomic bomb, Gandhi and the disappearance of colonization) of the middle of the twentieth century. But even twenty years ago, I was aware that this era was at an end, and that we had embarked on an era that was postmodern: both in the literal sense, of succeeding the modern era, and in the rhetorical sense, an era exhibiting its own epistemology and aesthetics.

A tad presciently, I include in *Creating Minds* a short discussion of how creativity might differ in the era that succeeded modernism.

Briefly, the postmodern era is a time when any claim of ultimate truth or morality is shunned, where genres are blurred and readily mixed, and when seriousness is challenged and irony is favored. And had I been more prescient, I would have anticipated the dominance of the digital media: global communication, the collapse of time and space, instant access to knowledge and to personal messages, and powerful interpersonal networks.

Even the short span of some decades is significant enough to raise the question of whether creativity, circa 2010, differs qualitatively from creativity in 1910. (Woolf famously quipped, "On or about December 1910, human character changed.") I believe that in a number of ways, the kind of solitary individual, the lonely creativity of earlier eras, is far rarer.

To begin with, anything that becomes known in one part of the world is readily available throughout the world. And so, whether we are talking about a new genre of painting or a new line of scientific work, all interested persons can have access to it right away, and their subsequent activities may thus be affected.

Second, the potential for, and in some cases the necessity for, collaboration is patent. One hundred years ago, science was largely an individual matter; fifty years ago, science was carried out by

small teams, or even pairs, most famously by the two men who deciphered the genetic code, James Watson and Francis Crick. Nowadays, we are in the era of Big Science, where dozens or even hundreds of scholars collaborate on a single project. An experiment at the Hadron collider can involve three thousand scientists! And while far less prevalent, more of artistic work is collaborative—across genres and disciplines, and even with teams of creators. Consider this testimony from Carla Peterson: "Rather than creating a unique movement language à la Martha Graham or Merce Cunningham . . . [choreographers today] are focusing on conceptual issues, drawing on collaborators, appropriating, sampling, referencing, and di-aloging with other artists' works, notions of authorship, dissolving of genres, the rethinking of dance's relationship with movement, and with audiences are all in play" (quoted in Gardner 2011, p. 73). And with the instant availability of work in one's own genre, the prospect of borrowing or even stealing works of others is prevalent.

At least in developed countries, the relationship between "pure creativity" and the actual or potential marketability of works has also been altered. At the time of this writing, and despite the financial meltdown that began in 2008, a far larger proportion of work, particularly in the sciences, is paid for by commercial entities and is oriented toward potential marketability. Both in the physical and the natural sciences, the relation between "pure" science on the one hand and technology on the other has become increasingly blurred. And in the famous examples of Bill Gates, Steve Jobs, Mark Zuckerberg, and other creators of the digital revolution, we see traditional conceptual creativity wedded to skill in the realms of technology and commerce.

In the arts, the role of commerce is complex. Potentials for huge amounts of money—for the artists and for those tied to them commercially—are greater than ever before. At the same time, because of the power of advertising and consumerism, artworks fall increasingly in two camps: the esoteric, now available via technologies such as the web, and those works that have mass appeal and entail vast sums of money. It is increasingly difficult for works that fall between these poles to see the light of day.

Finally, and happily, the advent of the digital media is a boon for education around the world. Not only is it possible for anyone with access to a computer to sample the world's achievements but also those who want to produce have an unprecedented opportunity to acquire skills, either alone at their personal computer or smart communication device or via live or robotic tutors. The ten years it

used to take to master a domain can happen much more rapidly.

Could creative work of the highest caliber emerge from an individual who resides far from creative centers and who works almost entirely in remote fashion? At present, I think that it is unlikely; creative people seem to want and need the "offline" contact with others as much as they ever did. Metropolises and megatropolises seem as seductive as ever. However, I have no trouble envisioning a future where the proverbial isolated creator—call her Isabella—seated at her computer could come to the forefront of her field though she'd never met any of the leaders firsthand. Indeed, Isaac Newton virtually accomplished this feat nearly a half a millennium ago. It is even possible that the generalizations that have emerged from my own studies would turn out to be truer for Isabella than for those who were engaged in regular face-to-face contacts with others in her field.

To the extent that creativity in our time has a different shade than creativity in earlier eras, what happens to the findings and analytic frameworks that predominated when I was a student and a younger scholar? Truth to tell, the study of creativity remains a marginal topic in psychology and related fields, and quantum advances are few and far between. So far as I have been able to ascertain, in the past two decades no powerful new approaches have threatened dominant concepts, frameworks, or paradigms.

That said, we may be on the cusp of important breakthroughs in two areas. Turning first to the realm of computers, intelligent systems have advanced enormously in recent decades. Not only has this advance blurred the lines between art, science, and technology, but increasingly, creative individuals work so intensely with computational devices that the role of each is harder to ascertain. I am not predicting the onset of the singularity, where brain and machine or body and silicon merge. Rather, I am suggesting that our judgments of creativity will no longer be restricted to outputs of individual humans or human beings in the future. Of course, we should remember that, at least to this point, the programming is done by human beings, and so are the rules governing the display and evaluation of creative products. But all of this could change, and perhaps more quickly than most can imagine.

The other realm poised for breakthrough is that of the biological understanding of creativity. I do not mean that we will discover the genetics of creativity; I believe that creativity is an emergent of individuals "at promise" when they live in a specified society, with certain values and opportunities. But I do believe that we will discover a good deal about what happens in the brains, as well as

the minds, of creative individuals. Perhaps we will discover the extent to which those brains and those minds may have been different from the beginning or, more likely, how they learn and how they make use of what they have learned. And these lessons, in turn, may help us to encourage creativity in a larger portion of the populations, in domains new as well as old.

Of increasing interest to me as I approach the age of seventy, we will learn more about the psychology and biology of creativity in the later years of life. It has long been maintained, with both anecdotal and empirical evidence, that creative breakthroughs—and especially the most dramatic ones—occur in the early decades of adulthood. I don't expect this to change soon; indeed, given the digital explosion, the mean age of breakthroughs may even drop further—look out, current record-holders Mozart and Picasso!

And yet, given the greater health and the increased longevity of our population, and the ease of "keeping up," we may well encounter creativity across the decades and perhaps even new and cherished forms of creativity during the later years of life. After all, just considering the seven individuals in this book—all reasonably long-lived—although their seminal breakthroughs occurred during their first decades, they continued to produce work of significance into their 70s and perhaps even beyond. We will need to determine whether the apparent decline in creativity is a direct function of the aging process, in which case it will be difficult to change, or whether factors of health, access to information, and motivation are key. In the latter case, the examples of Verdi, Titian, Picasso, and—in our own era—such individuals as biologist E. O. Wilson, linguist Noam Chomsky, composer Elliott Carter, painter Jasper Johns, or choreographer Merce Cunningham will be more common.

As noted earlier, my study focused on seven individuals who, broadly speaking, were the products of Western civilization and education. To be sure, it was Mahatma Gandhi who, asked about Western civilization, famously quipped, "It's a good idea, it should be tried." Yet Gandhi freely admitted that he was a product of a British education in a British colony, and his achievements would have been inconceivable without his lengthy immersion in the life and achievement of the West. And I would go so far as to say that the picture of individual revolutionary creativity sketched here is a distinctly Western one, born in Athens and Rome; confirmed in the Enlightenment Era of Europe; and then marshaled for various ends in the America of Hollywood, Silicon Valley, and Wall Street.

American—indeed Western—hegemony are at an end. This century will either be dominated by models from the East—China,

India, and Japan—or be even more multipolar, with beachheads spanning the Southern as well as the Northern Hemispheres. Any serious study of creativity in the future must avoid parochialism. It must look both at the approaches to creative work in major non-Western civilizations and at the achievements, perhaps measured by a new set of criteria. Such a study will need to examine individual versus group creativity, revolutionary versus evolutionary creativity, creativity in new as opposed to standard domains, and the ways in which societal fields (institutions, gatekeepers, teachers) steer the promotion and evaluation of creative efforts. The tools and insights of computational studies and brain studies will be key. Realistically speaking, I will not be able to undertake such a study, nor is it likely that I'll be able to read about it. But if the study of creativity is to advance, it will have to become a global undertaking.

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YOUTH

Your unhappy and silly youth.
Your arrival from the provinces in the city.
Misted-over windowpanes of streetcars,
Restless misery of the crowd.
Your dread when you entered a place too expensive.
But everything was too expensive. Too high.
Those people must have noticed your crude manners,
Your outmoded clothes, and your awkwardness.

There were none who would stand by you and say,

You are a handsome boy,
You are strong and healthy,
Your misfortunes are imaginary.

You would not have envied a tenor in an overcoat of camel hair
Had you guessed his fear and known how he would die.

She, the red-haired, because of whom you suffer tortures,
So beautiful she seems to you, is a doll in fire.
You don't understand what she screams with her lips of a clown.

The shapes of hats, the cut of robes, faces in the mirrors,
You will remember all that unclearly, as something from long ago,
Or as what remains from a dream.

The house you approach trembling,
The apartment that dazzles you—
Look, on this spot the cranes clear the rubble.

In your turn you will have, possess, secure,
Able to be proud at last, when there is no reason.

Your wishes will be fulfilled, you will gape then
At the essence of time, woven of smoke and mist,

An iridescent fabric of lives that last one day,
Which rises and falls like an unchanging sea.

Books you have read will be of use no more.
You searched for an answer but lived without answer.

You will walk in the streets of southern cities,
Restored to your beginnings, seeing again in rapture
The whiteness of a garden after the first night of snow.

—Czeslaw Milosz

(Translated, from the Polish, by the author and Robert Hass)

PART I

INTRODUCTION

1

CHANCE ENCOUNTERS IN WARTIME ZURICH

TOM STOPPARD'S COMEDY *Travesties*, first performed in 1974, is set in Zurich during the First World War. The plot ostensibly revolves around the efforts of Henry Carr, a minor official in the British consulate and an amateur actor, to stage Oscar Wilde's turn-of-the-century farce *The Importance of Being Earnest*. But the glitter of *Travesties* comes from the portraits of historical personalities who happen to be living in Switzerland at the time, and whose activities are being recalled many years later by an aging, forgetful, and self-congratulatory Carr.

Though Stoppard does not hesitate to mix fact and fancy, it is indeed true that many individuals of historical moment congregated in war-spared Zurich during what was universally called the Great War. Carr reminisces: "Zurich during the war. Refugees, spies, exiles, painters, and poets, writers, radicals of all kind."[1] The Stoppard play centers on three of these figures: a little-known Irish writer, James Joyce; an obscure Russian revolutionary, V. I. Lenin; and a half-crazed Rumanian artist-intellectual, Tristan Tzara, who is fashioning dadaism, an aesthetic brand of nihilism. These exiles go about their business—respectively, writing the great novel; planning the Russian Revolution; and redefining art, politics, and life.

While Wilde's play, redolent of an earlier and less turbulent era, is being rehearsed, the protagonists banter about themes of the modern era. Lenin declares: "Literature must become party literature. . . . As for me, I'm a barbarian. Expressionism, futurism, cubism . . . I don't understand them and I get no pleasure from them." Tzara puts forth his view: "Doing the things by which is meant Art is no longer considered the proper concern of the artist. . . . Nowadays, an artist is someone who makes art mean the things he does." Joyce puts him in his place: "You are an overexcited little man, with a need for self-expression far beyond the scope of your natural gifts. This is not discreditable. Neither does it make you an artist. An artist is the magician put among men to gratify—capriciously—their urge for immortality."

As members of the audience, we can view *Travesties* not only as

an amusing farce about makeshift theater but also as a backstage glimpse at a trio of individuals in the course of creating what would come to be regarded as the modern era. It is as if the principal figures of the Enlightenment had all been choirboys during the 1740s, or the leading American transcendentalists had been college classmates in the 1820s.

Though casting a glance three-quarters of a century backward, *Travesties* is very much a play of our era. Its rapid shifts across conflicting interpretive frames, political credos, and aesthetic codes constitute homage to the contributions of pivotal "modern" figures like Joyce, Lenin, and Tzara. The arguments placed in the mouths of the characters represent a conversation that has continued throughout the twentieth century. Above all, the conceit that these culturally diverse individuals, armed with their radically different agendas, could have congregated in the same European city and, at least in theory, have come to know each other, is plausible only in a world that is no longer a collection of localities—André Malraux's museum without walls, Marshall McLuhan's global village.

SEVEN CREATIVE THINKERS

Remaining anchored in the Great War, between 1914 and 1918, we can readily locate a comparable set of historical figures—potential characters in an expanded *Travesties*—whose impact on our time has been compelling.

- The neurologist-turned-psychologist Sigmund Freud (1856–1939) was living in Vienna, continuing to see patients, observing with satisfaction the rising influence of his psychoanalytic movement, glancing nervously at his Zurich-based rival Carl Jung, and worrying about not only the fate of his son on the battlefront but also, more generally, the survival of an inherently destructive human society.
- The theoretical physicist Albert Einstein (1879–1955) had just moved from Zurich to Berlin, where he served as a distinguished professor of physics at the university and also as the director of a new physics institute. A pacifist, he declared his opposition to the war being waged by his countrymen. Having separated from his wife, he promised her the proceeds of the Nobel Prize, which he was confident he would soon receive for his pathbreaking reconceptualizations of time,

space, and light.

- Pablo Picasso, the Spanish-born painter (1881–1973) who had moved to Paris at the beginning of the century, was gradually shedding the cubist style of painting, which he and Georges Braque had constructed together in the early 1900s. The war years had seen the death of his beloved mistress, Eva; traveling to Rome to devise scenery for the Ballets Russes, he met and fell in love with the Russian ballerina Olga Koklova.
- Igor Stravinsky (1882–1971), the Russian-born composer, had created for the Ballets Russes a set of spectacular ballets, including the highly controversial *Le sacre du printemps* (1913). When the First World War broke out, he elected to remain in Western Europe and was in fact headquartered in Switzerland for most of the war. There he worked on two of his most innovative works, *Histoire du soldat* and *Les noces*.
- T. S. Eliot (1888–1965), the St. Louis–born poet, moved to Europe in the early 1900s; defying his family's wishes, he decided to remain there when the First World War broke out. With startling speed, he became an important literary figure in England. Eliot published his first important poem, "The Love Song of J. Alfred Prufrock," at the start of the war and then worked over the next years on his pathbreaking *The Waste Land* (1922).
- Martha Graham (1894–1991), the dancer born near Pittsburgh, had moved with her family to Southern California. Ignoring her parents' wishes, she began during the war years to study with dance pioneers Ruth St. Denis and Ted Shawn. In the early 1920s, she traveled to Europe and also across much of America. Breaking away from the Denishawn troupe, she formed her own company and soon fashioned a distinctly modern form of dance.
- Mahatma Gandhi (1869–1948), the Indian political and spiritual leader, had just returned to his native land after two decades abroad in England and in South Africa. Despite his opposition to British rule, he elected to support the efforts of the Allied powers during the Great War. He continued to develop innovative methods of peaceful resistance; at the end of the war he launched in India a nonviolent political revolution with worldwide reverberations.

Any short list of individuals who gave birth and form to the modern era must be notable for its absences: Why T. S. Eliot rather than Marcel Proust or Virginia Woolf? Why Mahatma Gandhi rather

than Mao Zedong or Martin Luther King Jr.? Why Martha Graham rather than Isadora Duncan or George Balanchine? Equally, any set of domains will call attention to those that have been bypassed: why dance rather than athletics, why statesmanship rather than business, why physics rather than biology? Even the date of focus is not immune from argument: A case can be (and has been) made that the modern era ought properly to begin with the political revolutions of 1776, 1789, or 1848 or with the ideas or events of 1500 or 1815; that the true origin of the modern aesthetic lies in the fin de siècle paintings of Paul Cézanne, the music of Gustav Mahler, or the poetry of Stéphane Mallarmé; or that scientific breakthroughs of a fundamental nature are more properly associated with the quantum mechanics of the late 1920s, the deciphering of the genetic code at mid-century, or the recent insights of chaos theory.

Less controversial, however, is my assertion that the seven individuals I have named and the domains that they represent constitute *a representative and fair sample* drawn from the larger pool of individuals whose discoveries gave rise to one or another version of the modern era. Any study that ignored all of them would be suspect; any study that includes the present ensemble is at least on the right track. More crucially, if we can understand the creative breakthroughs achieved by Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi, we will surely understand some facets of human creation construed more broadly. I claim as well that a grasp of the underpinnings of their creations should help to elucidate the "modern era"—an era whose fundamental ensemble of ideas has animated the twentieth century, an era that is fast receding from our "postmodern" perspective. Had these seven figures all inhabited the Zurich of Tom Stoppard's imagination—and it is not physically impossible that they could all have found themselves at the same table in a café on the *Bahnhofstrasse* in the summer of 1916 —*Travesties* could serve as a tract on, of, and for our times.

THE PURPOSES OF THIS BOOK

In writing about seven creative "modern masters" or "masters of the modern era," I have in mind three principal purposes. First, I seek to enter into the worlds that each of the seven figures occupied during the period under investigation—roughly speaking, the half century from 1885 to 1935. In so doing, I hope to illuminate the

nature of their own particular, often peculiar, intellectual capacities, personality configurations, social arrangements, and creative agendas, struggles, and accomplishments.

Illumination of seven disparate creative breakthroughs carried out by seven singular characters is no small assignment. Were I working in the humanistic tradition, I would likely focus on one of these individuals and try to understand his or her contributions as fully as possible. Comparisons would play only a minor role in my presentation. But because I approach this assignment as a social scientist, my focus takes the form of a *search for patterns*—for revealing similarities and for instructive differences.

As my second goal, I seek conclusions about the nature of the Creative Enterprise writ large. I believe that if we can better understand the breakthroughs achieved by individuals deliberately drawn from diverse domains, we should be able to tease out principles that govern creative human activity, wherever it arises. I shall argue that creative breakthroughs in one realm cannot be collapsed uncritically with breakthroughs in other realms; Einstein's thought processes and scientific achievements differ from those of Freud, and even more so from those of Eliot or Gandhi. A single variety of creativity is a myth. Yet, I shall also supply evidence that certain personality configurations and needs characterize creative individuals in the twentieth century, and that numerous other commonalities color our ways of conceiving, articulating, and responding to ideas.

And finally, I seek conclusions about the sparkling, if often troubled, handful of decades that I term "the modern era." While creative individuals can be drawn from disparate periods of history and from diverse cultures, there is an advantage in selecting a group of individuals who were roughly contemporaneous (Freud was born in 1856, Martha Graham in 1894, and the remaining figures in between these framing dates) and who were influenced by the civilization of Western Europe, broadly construed. Such a selection allows me to comment not only on the particular achievements of a group of talented persons but also on the times that formed them, and that they in turn helped define.

I argue that the arts, crafts, scientific understandings, and intellectual syntheses that were regnant in the nineteenth century were no longer viewed as adequate; and that, in response to the perceived inadequacies, these seven creators forged a new agenda, which has accordingly been worked through—and perhaps exhausted—in this, "their" century. The character of that reformulation entails, paradoxically, a return to the basic elements

of each domain: the simplest forms, sounds, images, puzzles—a purification process that involves a strange yet productive amalgam of the most elemental impulses with the most sophisticated understandings. I argue, further, that each creative breakthrough entails an intersection of the childlike and the mature; the peculiar genius of the modern in the twentieth century has been its incorporation of the sensibility of the very young child.

The heart of such a study is, necessarily, the intensive probing entailed in our seven case studies. But before embarking on that assignment in part II, I must undertake several tasks. In the remainder of this chapter, I comment on the particular creative breakthroughs focused on in this book, thus providing an informal introduction to my major themes. I also review briefly some of the appeals and some of the pitfalls of focusing on a particular historical era. Then, in chapter 2, I introduce my own approach to studies of creativity, locating it within the perspective of other recent efforts by social scientists.

ORGANIZING THEMES

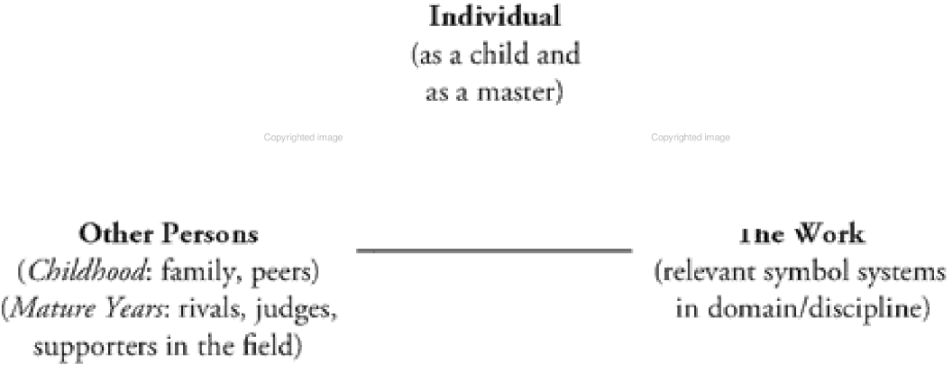
Although I cannot summarize the contents of this book in a single phrase or a simple set of elements, I can ease the entry into my more complex framework by introducing a set of key distinctions. To begin, this framework has three core elements: a creating *human being*, an *object* or *project* on which that individual is working, and the *other individuals* who inhabit the world of the creative individual. The superstructure needed to account for creative activity is based on these three core elements and on the relationships among them, specifically:

1. *The relationship between the child and the master*. In a developmental study, it is natural to look for continuities, as well as disjunctions, between the world of the talented, but still unformed, child and the realm of the confident master. Equally important in a study of creativity is sensitivity to the innovator's ways of drawing on the worldview of the young child.
2. *The relationship between an individual and the work in which he or she is engaged*. Every individual works in one or more domains or disciplines, in which he or she uses the current symbolic systems or contrives new ones. Throughout these pages, I am concerned with individual ways of mastering, then

laboring in, and ultimately revising the nature of such domains.

3. *The relationship between an individual and other persons in his or her world*. Though creative individuals are often thought of as working in isolation, the role of other individuals is crucial throughout their development. In this study I examine the roles of family and teachers during the formative years, as well as the roles of crucial supportive individuals during the times in which a creative breakthrough seems imminent.

As a provisional representation of these factors, I propose the following:



By introducing these elements at the outset, I wish to stress that all creative activity grows, first, out of the relationships between an individual and the objective world of work and, second, out of the ties between an individual and other human beings. Later I detail some of the dynamic interactions among these three "nodes" in the triangle of creativity. Now, however, as a perhaps welcome respite from the terminological thicket, let me indicate how these themes—each to be highlighted in a separate chapter—will be realized in the case studies.

From the World to the Self—And Back Again

While our seven masters all exerted a profound effect on the domains in which they worked, Freud has the strongest claim to the actual creation of a new domain—that amalgam of psychological

theory and therapeutic practice called psychoanalysis. As a youth, Freud displayed a protean ability to absorb information from a gamut of disciplines and a galaxy of other individuals. And, indeed, Freud came to the discovery of psychoanalysis through a synthesis of various scientific perspectives and clinical approaches that he had mastered. Still, at least as important was the solitary activity entailed in his own nightly analysis of himself—the first psychoanalysis.

Few investigators of any era have had as strong a conviction that they were solitary explorers of virgin territory as did Freud, but even in this case Freud received strong, and perhaps indispensable, support from a single other individual—his valued friend Wilhelm Fliess. Once he had enunciated his basic theory, Freud could risk a break with the eccentric Fliess. But shortly thereafter, he began drawing into his fold an ever-expanding circle of individuals with whom he shared his psychoanalytic understanding and who eventually became the principal vehicles for its future developmental course. The trajectory from the solitary investigator to a dialogue among confidants to interaction with the many members of the newly emerging discipline constitutes the framework for my first case study.

The Child and the Master

For most readers the actual conceptualizations of Einstein—while known superficially from capsule summaries in the media—constitute a formidable intellectual challenge. After all, Einstein was making technical contributions to physics, that most advanced of the sciences. Yet Einstein was able to effect a breakthrough precisely because he did *not* simply accept as given the paradigms and agendas of the physics of his time. Instead, he insisted on going back to first principles: in setting for himself the most fundamental problems and in looking for the most comprehensive yet simplifying explanatory axioms.

In so doing, Einstein was, in a way, returning to the conceptual world of childhood: the search for basic understandings unhampered by conventional delineations of a question. Indeed, the very puzzles that he first pursued as a youth—the behavior of the point of the compass, the “thought experiment” of riding on a light beam—later fueled his most innovative scientific work. My treatment of Einstein accordingly stresses the continuing dialectic between the common experiential agendas of childhood and the

complex challenges of a finely articulated intellectual domain.

Prodigiousness and Beyond

All of our modern masters showed formidable gifts in childhood, but none other approached the spectacular level of skill displayed by the youthful Picasso. A gifted draftsman in the first decade of his life, he was by late adolescence painting with as much finesse as any other artist of his time—and laying the groundwork for seventy-five more years of productivity. Picasso provides an opportunity to consider the contributions of prodigiousness to early dazzling attainments and its transmutation into a form that permits the achievement of more lasting contributions—the finest example in our time of the "Mozart enigma."

The Politics of Music

Picasso's and Stravinsky's names are often coupled—and appropriately so since these two individuals were almost exact contemporaries who knew, respected, and learned from each other. Each had launched a fundamental reorientation of his domain by the time he was thirty years old, and each pursued a lengthy subsequent creative life, during which he introduced further innovations while also revisiting, always in a distinctive manner, the major artistic milestones of earlier eras.

With Arnold Schönberg and Béla Bartók, Stravinsky dominates classical music in the twentieth century. His creative breakthrough stimulates a consideration of what it is like to initiate a fundamental transformation of a traditional domain while also reorienting neighboring domains, such as the dance and theater. Some creative figures—for instance, theoretical physicists—can work in relative isolation, but not a musical composer. Because nearly all of Stravinsky's work was collaborative, an examination of his creative activity casts light on the political factors that permeate the planning, staging, and critical review of artistic performances.

The Marginal Master

Moving readily from one culture to another is a distinctly modern phenomenon, and our creative masters found it necessary—as well

as inviting—to immerse themselves in diverse cultural settings. Their gravitation to cosmopolitan settings like Paris or Zurich is hardly a coincidence. More so than others, Eliot affords an opportunity to consider the marginality of the modern creative figure—caught between cultures, "inhabiting" diverse time periods, experiencing painful personal anxieties and disjunctions on the border of mental disturbance. And, because Eliot was born into a decidedly nonmarginal family, he also exemplifies the extent to which creative individuals may strive to *make* themselves ever more marginal.

Representative of poets—individuals whose creative heights are typically reached by the thirties—Eliot also yields insight into the formation of subsequent productive identities: in his case, as a critic, playwright, and editor. His life provides an opportunity to consider which options remain open to an aging creative individual.

A Creative American Woman

The youngest of our modern masters and the only one still alive at the time of this book's conception, Graham stood out from her contemporaries in two instructive respects. First, she was quintessentially American. She drew her inspiration from her homeland—her New England heritage, the Appalachian surroundings of her youth, and the spaces and populations of the broad plains—as well as from the traditions of Western Europe and the Orient. Second, as a woman, she faced obstacles stemming from prevalent attitudes and expectations in a male-dominated creative world.

Transcending the limits placed on women in earlier eras, Graham created her own artistic forms, her own institution, her own legacy. Perhaps more so than other creative figures—and in a manner reminiscent of the biologist Barbara McClintock, the anthropologist Margaret Mead, the artist Georgia O'Keeffe, the writer Virginia Woolf, and other pioneering twentieth-century women—Martha Graham had to create her own paragons, her own role models. Not surprisingly, she ended up inspiring many female artists, making it easier for them to find or create an audience for their distinctive mode of expression.

A Person Who Affects Others' Lives

In my study Einstein and Freud function as individuals of science, embodying what I call the logical-mathematical intelligence (in Einstein's case) and the intrapersonal intelligence (in Freud's case). Four other figures are identified with artistic breakthroughs, each representing a different intellectual strength: Picasso as a visual-spatial master, Stravinsky as a musical innovator, Eliot as a manipulator of language, and Graham as a fashioner of bodily-kinesthetic intelligence.

Less likely to arise in discussions of creativity is the realm of human relations—as it can be seen at work in politics, religion, teaching, commerce, and the clinical professions. One reason is parochial: Artists and scientists, more than other professionals, have often become involved in discussions of creativity. The other reason is more substantive: Creative breakthroughs in the human realm tend to occur gradually, over centuries rather than decades, and so are less readily identified with a specific individual at a particular historical moment.

In my view the only figure of recent times who warrants comparison with the great *interpersonal innovators* of earlier times —Christ, Buddha, Mohammed, Confucius, Socrates—is the Indian statesman and religious leader Mahatma Gandhi. Following extensive analysis, as well as carefully fashioned experiments in which he was personally engaged, Gandhi fashioned a novel, nonviolent approach to human conflict: *satyagraha* sought the attainment of valued political goals without enervating confrontations, demeaning submissions, or recourse to violence. In my study Gandhi represents a person whose ideas and, even more dramatically, whose courageous personal example directly affected the behaviors of millions of people. Moreover, Gandhi exerted his impact in ways more constructive than those adopted by twentieth-century totalitarian leaders and potentially more significant than those associated with commercialism and the mass media.

As this montage indicates, my approach to the study of creativity begins in focused biography—in an intensive examination of the periods in the life of a creative individual when a breakthrough was conceptualized, realized, and reacted to by knowledgeable individuals and relevant institutions. I seek to transcend a concatenation of specific biographies by searching for common properties and illuminating distinctions across a small set of instructive cases. In terms of the core elements described earlier, the studies of Einstein and Picasso focus on the relationship between the child and master; the studies of Freud, Stravinsky, and

Gandhi, on the relationship between the creator and other individuals; and the studies of Eliot and Graham, on the marginal position of creators with respect to the domains and fields in which they work. A concern with the dialectic between creator and work permeates the studies. Each includes a focus on the changing relationship of the individual to the domain of work, as well as an examination of how that individual formulated and promulgated new symbol systems in the domain. Finally, to provide a perspective on an important period in recent human history, I deliberately focus on individuals who were roughly contemporaneous.

THE STUDY OF CONTEMPORARIES

While many researchers deem the study of creativity to be a difficult challenge, and some consequently elect not to pursue it, few question the legitimacy of such an undertaking. When it comes to studying a particular historical era and to drawing general conclusions therefrom, however, more ticklish questions arise.

As noted, my decision to investigate a number of masters active between, roughly, 1885 and 1935 grew out of a complex of circumstances. Initially, I had wanted to study individuals who represented the range of human intelligences in which I had become interested. It was important that there exist sufficient information about these individuals so that their creative processes and interim products could be examined. Alas, we do not have enough demythologized information about Bach or Aquinas, let alone Confucius or Moses, to analyze their creativity with much confidence.

It seemed wise to select individuals who had lived at a time when record keeping was widespread and the documents of that period remained for inspection. Also, enough time needed to have elapsed for a solidifying of judgments about the quality and significance of each person's breakthrough.

The decision to study individuals who lived and worked in the first part of the twentieth century seemed a reasonable response to this nexus of issues. I could then assemble individuals who were different from one another, in respect to chosen domains, yet at least somewhat similar in terms of the milieus in which they lived. As it happens, five of our principal figures lived in Western Europe, and the other two—Gandhi and Graham—were each influenced decisively by the civilization of Europe. In a sense, then, these

individuals serve as "controls" for one another—individuals inhabiting the same general life and cultural space, yet ones who have chosen (or who were chosen) to work in distinct realms of experience.

Of course, each of these individuals possessed a full range of intelligences and drew on those in his or her work. Yet, it seems fair to maintain that each highlighted a different human intelligence, and that each one's creative breakthrough represented the sophisticated use of the symbols, images, and operations associated with a particular intelligence operating in a particular discipline or domain.

THE ILLUMINATION OF AN ERA

Transcending discussions of individuals with their particular intelligences and personalities, can one say something substantive about an era? Certainly this Hegelian notion has been bruited about quite a lot. In its relatively pure form, the claim is that history has its own dynamic, with specific issues and ideas necessarily coming to the fore at a given time, and then giving way in crisp fashion to another set of issues at another time. Perhaps, indeed, even the specific issues have been preordained, or, if not so, the need for some kind of a reaction to prior events dictates the particular form of an era.

I have no commitment to the view that there exists some kind of zeitgeist, some spirit of the time that expresses itself through particular individuals who happen to be present in its wake and who thereby serve (perhaps unwittingly) as its vehicles. I see history as contingent: No spirit has determined in advance what will happen. In fact, it is often accidents—such as a stray bullet or an erupting volcano—that cause the most dramatic historical upheavals.

But belief in an underlying organizational framework is not restricted to those of a Hegelian disposition. In recent years, the innovative French scholar Michel Foucault argued that historical eras are characterized by certain underlying (and typically unconscious) assumptions about the nature of knowledge. Assuming such a structuralist stance vis-à-vis the seventeenth century, Foucault discerned the same taxonomic assumptions about knowledge operating in such diverse fields as biological classification, economic exchanges, and linguistics. Though these "frames" do not operate in lockstep, they tend to appear and

disappear at about the same time.

Suppose one could demonstrate that a number of actors living at the same moment in fact epitomized the same forces or achieved comparable accomplishments, or that a number of disciplines exhibited the same conceptualization or classificatory scheme. Such a demonstration would by no means prove the operation of some sort of an overarching spirit. It is far more prudent to assume that the very fact that one individual was working in a certain way influenced others, either directly or indirectly. When a number of individuals live in the same era and actually know of one another's work, such mutual influence may well become the rule.

In the present study, it is important that individuals like Picasso and Stravinsky knew each other and worked together. Eliot and Stravinsky were friends in later life. Freud and Einstein had a casual acquaintance and engaged in a memorably pointed correspondence about war. Certain ideas associated with these creators became such common coin that anyone working during the era would have encountered them. Thus, Picasso's cubist paintings, Eliot's portrait of *The Waste Land*, Freud's ideas about unconscious motivation, and Einstein's incorporation of the observer into the space-time complex were all widely known within a decade after having been formulated. Many reasons account for common themes and co-occurrences across disciplinary domains; accordingly, we need not posit occult forces at work. Indeed, it would be odd if highly creative individuals did *not* somehow take others' novel conceptualizations into account in their own work.

THE MODERN ERA

Many, perhaps most, eras of human history seem to have proceeded without a memorable label attached to them. Yet, as observers, we often focus on eras that seem to have been characterized by a pervasive mood or ethos. For example, the rediscovery of ancient texts paralleled the growth in art, science, and "civilization" of the European Renaissance; and the highlighting of the ideas of rationality, progress, secularism, perfectibility, and liberty marked the Enlightenment. Other eras, in contrast, are defined by their relative lacks, such as the Dark Ages in Western Europe, or the Period of the Warring States in feudal China.

At least with respect to the domains of knowledge and culture, the era of concern here has also acquired a set of labels: "modernism,"

"modernity," or, in my terms, "the modern era." These labels are typically seen as positive ones, though they are not without disquieting connotations. They have already developed a mythic status in potted accounts of the twentieth century.

According to the "standard historical story" (which, like most standard stories, has been revised of late), a period of cultural quiescence and conservatism followed the revolutions of the late eighteenth century and the upheavals of the Napoleonic wars. Bourgeois civilization, with its tight-laced moral code, increasingly determined standards of behavior and thought. Science and art evolved gradually and without dramatic breakthroughs or reversals. Still, by the end of the nineteenth century, these entrenched norms were being widely challenged; themes of decadence were particularly noticeable in the arts (consider Oscar Wilde's writings and his life) but apparent as well in politics (the decline of liberalism) and humanistic writings (the nihilism of Nietzsche). In the sciences, the Newtonian mechanical world order and the rational view of human behavior were seen as insufficient at best and perhaps fundamentally flawed.

Fatal blows to the nineteenth-century consensus were struck in rapid succession around the turn of the century, with our seven modern creators playing major roles in the onslaught. First, in a series of powerful revelations around 1900, Freud punctured the veneers of middle-class morality and human rationality, discerning a complex of unconscious motivations and strivings, often of a sexual or aggressive nature. Just a few years later, Einstein challenged long-accepted assumptions about the absolute status of time and space, replacing a stable, "objective" Newtonian world with an observer-determined, relativistic one.

Following sharply upon these scientific reorientations, accepted canons of artistic practice had all been undermined by the end of the second decade of the twentieth century. In the visual arts, Picasso, Braque, and their contemporaries demonstrated that faithful representation was not of the essence in the arts, created a genre in which aspects of form were dominant, and laid the foundation for a purely abstract art. Stravinsky and Schönberg struck with equal fervor at the assumptions of a single tonality and a simple rhythmic base; Stravinsky embraced primitive but complex rhythmic pulsations and polytonality, while Schönberg created his own cerebral, twelve-tone approach to composition. Similar revolts against classical verse and narrative forms were led by English authors like Eliot, Joyce, and Woolf, as well as their counterparts in other European lands, and against classical balletic forms by such

innovators as Duncan, St. Denis, and Graham, and, ultimately as well, by modern ballet's Balanchine.

It is no accident that many cultural historians have fixed their attention on Vienna in the period from 1890 to 1920. If there was a single birthplace of the modern sensibility, it can most defensibly be located in the fading milieu of the Hapsburg empire. But examinations of other cities—Paris, Budapest, Prague, Berlin, St. Petersburg—tell similar stories, and there would have been a modern era, even had Vienna unaccountably sunk into the Danube a century before. Prevalent throughout Western and Central Europe in the late 1800s and early 1900s were declining institutions and disappearing shared understandings, on the one hand, and feverish creative impulses, often disturbingly unchanneled and sometimes disconcertingly wild, on the other.

An application of the label "modern" to the political realm proves more problematic. The momentous decline of the Pax Europa, the formation of nation-states in Italy and Germany, the launching of the first wars that could be called global conflicts, and the rise and ultimate defeat of fascism do not lend themselves to any simple characterization. Nor am I entirely convinced by Modris Eksteins's intriguing argument that intimations (if not provocations) of ultimate military conflagrations can be discerned in the groundbreaking artworks at the beginning of the century. Rather than realizing new conceptions of life and death, the wars of the twentieth century in many ways simply rehearsed ancient human frailties in sharper tones.

If anything, innovative political activities and novel political forms appeared not in the established nations of Western Europe but rather in the developing nations—the founding of the first Communist state in the Soviet Union, the successful accomplishment of a peasant revolution in China, and the relatively nonviolent transition to independence in India. It can be argued that the creative geniuses of the twentieth century in the political realm are Lenin, Mao Zedong, and Gandhi, rather than Benito Mussolini, Adolf Hitler, Winston Churchill, Charles de Gaulle, or even Jean Monnet, the architect of the European Market. If a bond exists among the creators of the modern era, it may need to extend across the Ural Mountains to the far side of the Euroasian landmass.

We know little about the roots and the unfolding of the creative impulses in specific individuals, yet we know even less about how to locate, name, and characterize historical eras. In the present study, an effort to apply social- and cognitive-scientific insights to the phenomena of creativity, I cannot hope to resolve vexing

epistemological issues in intellectual and cultural history. And yet, in pursuing this inquiry into the lives, minds, and worlds of seven remarkable individuals, I have been tempted to determine whether in fact there may be a larger story as well.

And I have concluded that there is: This "story of the modern era" chronicles the dissolution of conventions, practices, and interpretive frames that grew up over the centuries and became entrenched throughout Europe (and the many regions affected by Europe) during the nineteenth century. Once these conventions came to be strongly challenged in certain artistic and scientific domains, the chances that they would be questioned elsewhere were greatly enhanced, for two related reasons: first, because the very knowledge that there *could* be a new painting raised the likelihood of a new dance or poetry or politics; second, because for the first time in human history, events in one part of the world could be known virtually instantly all over the world. Cubism was displayed in the New York Sixty-Ninth Regiment Armory less than a half dozen years after it had been invented; Einstein's general theory of relativity was tested in a solar eclipse halfway around the world after an even briefer interval of time; Gandhi's hunger strikes were politically effective only because the telegraph reported them immediately throughout India and all over the world.

That conventions will be challenged is one thing, and, indeed, a characteristic of all eras of revolution. The *nature* of the challenge is another. I find a noteworthy similarity in challenges that occurred across the domains under investigation. The similarity inheres in the search for *the most elementary, the most elemental forms* within a domain; a wrestling with the kinds of issues and concepts that traditionally occupy the young child; and an attempt to capture —for the record, so to speak—the death of one kind of civilization and the birth of a new, as-yet-undefined one. Such a revolution may occur but once in a century, and perhaps even only once in a millennium. I elaborate on this major change in the epilogue.

To sum up then: While the characterizing of historical eras is fraught with risk, the special characteristics of the period around 1900 warrant such an effort. Not only were the principal creative figures exposed to common forces and events, but they often were actually cognizant of and influenced by one another's activities. A study of each one's efforts, while illuminating in itself, gains significance when considered in light of the parallel events and insights occurring in the lives of the cocreators of the modern era.

So far, I have introduced our seven creative figures, presented major themes that are realized in their creative efforts, and

discussed some perils and promises of a study that purports to portray a historical era. In what follows, the creative breakthroughs achieved by the seven individuals form my major area of focus. Before embarking on the individual case studies in part II, however, I need to locate this effort within the broader landscape of earlier studies of creative individuals, works, and processes.

2

APPROACHES TO CREATIVITY

IN A SURPRISINGLY faithful way, the history of behavioral scientists' attempts to study human creativity parallels the history of their attempts to investigate human intelligence. Like *intelligence,* the term *creativity* has been applied over the years as an honorific label to a wide range of individuals, situations, and products. Such lay use of the terms *creative, creativity,* or *creating* may have sufficed on the streets; but as happened with the term *intelligence,* the variant forms of *creativity* have seemed in need of more precise formulation.

THE STUDY OF CREATIVITY SHADOWS THE STUDY OF INTELLIGENCE

Thanks to the revolution in psychological measurement (or psychometrics), associated particularly with the work of Alfred Binet in Paris and Lewis Terman in California, the concept of "intelligence" and its putative measure "IQ" were operationalized early in the twentieth century—as it happens, at the birth of the modern era, as I have defined it. Every individual was thought to possess a certain amount of intelligence, possibly as his or her birthright, possibly as a result of nurture; the kinds of brief verbal and numerical items that populate IQ tests were thought sufficient to indicate an individual's intelligence. Many intelligence tests were devised, but they tended to incorporate the same kinds of items and to correlate highly with one another; if one is psychometrically "bright" on a Stanford-Binet measure of intelligence, one is likely to stand out equivalently on the measures devised by David Wechsler and by other leaders of the intelligence intelligentsia.

It was not surprising—and was perhaps overdue—when, at mid-century, a leading psychologist, Joy P. Guilford, called for a scientific focus on creativity. As a psychometrician, Guilford had in mind a program that would parallel the apparently successful

mission undertaken earlier in the century with reference to intelligence. Arguing that creativity is by no means equivalent to intelligence, Guilford asserted the need for an arsenal of measures designating *which* individuals had the potential to be creative.

The key idea in the psychologist's conception of creativity has been *divergent thinking.* By standard measures intelligent people are thought of as convergers—people who, given some data or a puzzle, can figure out the correct (or at any rate, the conventional) response. In contrast, when given a stimulus or a puzzle, creative people tend to come up with many different associations, at least some of which are idiosyncratic and possibly unique. Prototypical items on a creativity test ask for as many uses as possible for a brick, a range of titles for a story, or a slew of possible interpretations of an abstract line drawing: A psychometrically creative individual can habitually issue a spectrum of divergent responses to such an item, at least some of which are rarely encountered in the responses of others.

After considerable debate and experimentation in the decades following Guilford's challenge, psychologists reached three conclusions. First, creativity is not the same as intelligence. While these two traits are correlated, an individual may be far more creative than he or she is intelligent, or far more intelligent than creative. Moreover, when talented individuals are examined, it is clear that psychometric creativity is independent of psychometric intelligence, once a threshold IQ of 120 has been reached.

The other two conclusions pertain to the classical issues surrounding all testing. Creativity tests *are* reliable. That is, if an individual takes the same creativity test more than once, he or she is likely to get a similar score. Moreover, correlations in a person's measured creativity score are robust even across creativity tests (of course, creativity tests, like intelligence measures, are typically considered valid if their results correlate with other measures presumed to reflect the construct in question).

The remaining conclusion is, in my view, devastating for the enterprise of measuring creativity using paper-and-pencil tests. Despite a few suggestive findings, it has not been possible to demonstrate that creativity tests are *valid.* That is, high scores on a creativity test do not signal that one is necessarily creative in one's actual vocation or avocation, nor is there convincing evidence that individuals deemed creative by their discipline or culture necessarily exhibit the kinds of divergent-thinking skills that are the hallmark of creativity tests.

Even more so than intelligence tests, then, tests of creativity have

failed to satisfy the expectations they were designed to meet. Except for certain targeted research purposes, creativity tests (and the thinking that underlines them) have made little difference in the broader research and educational communities. They have, however, triggered some constructive reactions among cognitively oriented researchers.

COGNITIVE APPROACHES TO CREATIVITY

Many commentators have criticized creativity tests for the seemingly banal view of human creativity they embody. One alternative tack has been to devise more demanding test items—ones that seem to require genuine insight or mental leaps rather than cocktail-hour glibness. Researchers in the tradition of Gestalt psychology have favored items like the "tumor problem": In this classic puzzle, the solution for dealing with a pernicious tumor without destroying the vital surrounding tissue is to direct sublethal dosages of radiation from several vantage points. In another favorite, the "three-line" problem, the solver is challenged to connect nine dots arranged in a three-by-three matrix without lifting the pencil. The creative move here is to extend the line beyond the confines of the target configuration. Such problems begin to refute the charge of banality; but they tend to favor individuals who are already familiar with the domain in question (e.g., X-ray technology, geometrical puzzles), and they have little demonstrable relation to creativity outside of the testing environment. Both also reward individuals who happen to excel in visual problem solving, while penalizing those more comfortable with numbers or words.

A second reaction has been characteristic of cognitive science (particularly that branch called artificial intelligence). Researchers from this investigative tradition disparage the superficiality of psychometric creativity items as well as the lack of clarity about the mental processes allegedly used to solve these items. Instead, such cognitive researchers call for a computer-based investigation of full-scale scientific problem solving, a process requiring creative thought processes for attainment of an original solution.

In a prototypical instance, researchers have devised a computer program called BACON. When supplied with raw (unprocessed) data—for example, about the varying pressures on a gas and the volume that the gas accordingly occupies—the program computes

an underlying principle—in this case, the same inverse ratio between pressure and volume that Robert Boyle discovered in the seventeenth century and that has come to be known as Boyle's law. Computer programs of this sort have been able to rediscover many scientific laws through induction and generalization.

At the very least, these computer simulations constitute demonstrations or existence proofs—illustrations that a computing entity can, when furnished with the relevant data, ferret out a scientific law. However, it is by no means evident that BACON and human scientists use identical or equivalent processes. As Mihaly Csikszentmihalyi has pointed out, the computer program must begin with the problem and the data that are supplied in the particular form favored by the cognitive scientist; and it must use the algorithms it has been programmed to employ. In contrast, the human problem solver must select the problem to be investigated; determine which of an infinite array of potential data are relevant to a solution of the problem; and ascertain which kinds of analyses to perform on that data in reaching for a solution, painstakingly inventing new means of analyses when necessary.

While the particular claims seem to me to be overwrought, the general approach taken by the cognitivists constitutes a definite step forward. Cognitive researchers, among them Margaret Boden, David Perkins, and Robert Sternberg, have described the ways in which creative individuals identify problem and solution "spaces" that appear promising; search within these spaces for approaches appropriate to the problem at hand and for leads that may pay off; evaluate alternative solutions to problems; deploy resources of energy and time to advance their program of investigation in an efficient manner; and determine when to probe further and when to cut losses and move on, and more generally, reflect on their own creating processes. Some cognitive researchers have shown these principles at work in specific domains, such as jazz improvisation or imaginative writing. In all, the cognitivists have identified ways to examine creative work at the appropriate level of complexity.

A third arrow of criticism aimed at the psychometric approach calls for a focus on *unambiguous* instances of creative processes, as embodied in the behavior and thinking of productive artists, scientists, and other workers. In general, those sympathetic to this tradition have favored careful case studies of individuals like Charles Darwin (as carried out by the psychologist Howard Gruber), Antoine Lavoisier (as carried out by the historian of science Frederic Holmes), or Pablo Picasso (as carried out by the Gestalt psychologist of art Rudolf Arnheim). Such studies differ from the

investigations usually carried out by humanistically oriented biographers in their focus on the development of networks of ideas, their use of concepts and models drawn from the cognitive sciences, and their search for principles that may extend beyond the particular individual under investigation.

The most elaborated instance of this work has come from Howard Gruber and his students over the past few decades. Gruber's work is characterized by careful attention to the ways in which generative ideas, and sets of ideas, evolve and deepen over significant periods of time. The Gruber team has uncovered a number of principles that seem to characterize the work of major scientists, like Charles Darwin or Jean Piaget (the latter was Gruber's own teacher). Such individuals engage in a wide and broadly interconnected network of enterprises; exhibit a sense of purpose or will that permeates their entire network, giving direction to their daily and their yearly activities; favor the creation and exploitation of images of wide scope (such as the branching tree of evolution); and display a close and continuing affective tie to the elements, problems, or phenomena that are being studied. Gruber speaks of an "evolving systems" approach to the study of creativity: That is, one monitors simultaneously the organization of knowledge in a domain, the purpose (s) pursued by the creator, and the affective experiences he or she undergoes. While these systems are only "loosely coupled," their interaction over time helps one understand the ebb and flow of creative activity over the course of a productive human life.

In many ways, my approach is faithful to Gruber's tradition. I favor the use of individual case studies, the adoption of a developmental perspective, the monitoring of several different systems, and the examination of the ways in which they interact. I diverge from the Gruber tradition by using a deliberately broad comparative focus on creativity across diverse domains; examining instances of creativity drawn deliberately from a specific historical-cultural era; and focusing on how individual breakthrough, domain of practice, and reactions of the surrounding community are dynamically related.

APPROACHES IN TERMS OF PERSONALITY AND MOTIVATION

Up to this point, my discussion of creativity has drawn primarily on

two approaches within psychology: the venerable testing, or psychometric, tradition and the more recent cognitive perspective. For many years, however, there has existed a complementary approach to creativity within psychology, one associated with the noncognitive aspects of the individual—in particular, with facets of personality and motivation.

Paralleling the psychometric approach, researchers using one paradigm have examined the personality traits of individuals deemed creative by their community. Typically, individuals participating in these studies are asked to select apt descriptions of themselves and also to respond to ambiguous stimuli (such as inkblots or silhouettes) in ways thought to "evoke" or "project" their underlying personality structure.

In a representative study conducted by the Berkeley Institute of Personality Assessment, "creative architects," as distinguished from their less creative peers, exhibited a greater incidence of such personality traits as independence, self-confidence, unconventionality, alertness, ready access to unconscious processes, ambition, and commitment to work. However, it is not clear whether people who already exhibit these characteristics become creative or whether, as a result of acknowledged creativity, people come to exhibit such positively tinged traits. Also, individuals who work closely with those deemed creative seem to exhibit a similar profile of traits.

Psychoanalytic Perspectives

It is not surprising that Freud, arguably the most important psychologist of his era, also contributed to an understanding of creativity—and this, despite his oft-quoted laments that "before creativity, the psychoanalyst must lay down his arms" and that "the nature of artistic attainment is psychoanalytically inaccessible to us." To begin with, Freud's illustration of the centrality of unconscious processes underscored the point that creative activity is not a direct reflection of deliberate intention; much of its impetus and significance remain hidden from the individual creator and, quite possibly, from those in his or her community as well.

Having demonstrated the importance of sexuality in motivating human behavior in general, Freud called attention to the sexual factors that undergird a creative life. In Freud's view, creative individuals are inclined (or compelled) to sublimate much of their libidinal energy into "secondary" pursuits, such as writing, drawing,

composing, or investigating scientific puzzles. He would have found many data of interest in the seven cases presented here.

Freud's convictions about the importance of infantile development also colored his view of creative activity. Freud was impressed by the parallels between the child at play, the adult daydreamer, and the creative artist. As he once phrased it:

> Might we not say that every child at play behaves like a creative writer, in that he creates a world of his own, or, rather, rearranges the things of his world in a new way which pleases him? . . . The creative writer does the same as the child at play. He creates a world of phantasy which he takes very seriously—that is, which he invests with large amounts of emotion—while separating it sharply from reality.

Freud's view of the creative life, particularly that of the artist, has attracted considerable attention—and much criticism. The evidence on which Freud drew his conclusions is considered shaky, particularly in instances where the subject is long dead (for example, Leonardo, Shakespeare) and has left little reliable autobiographical material. And, while Freud's characterizations may apply to some creative individuals, they apply to noncreative individuals as well; hence, they cannot distinguish the effective artist or scientist from the ineffective or banal one. Yet, despite such criticisms, Freud's work remains appropriately influential in the study of creativity, including the present inquiry. Like other revolutionary figures, Freud helped frame the terms within which the personality and motivation of creative individuals have subsequently been described.

Behaviorist Perspective

While the psychoanalytic tradition shares little else with the American behaviorist school, representatives of both perspectives agree that individuals engage in creative activity largely because of the material rewards they secure. In Freud's account, artists seek power and money and, unable to secure these directly, find a haven in creative activities; or they attain indirectly from their creative work some of the libidinal and Oedipal pleasures they crave. In Skinner's behavioral terms, people engage in creative activity because of a previous history of rewards, or "positive reinforcements." Recently, however, a number of psychologists have put forth a rather different picture of the factors that motivate

creative activity.

Intrinsic Motivation

In a series of illuminating experimental demonstrations, social psychologist Teresa Amabile has called attention to the importance of "intrinsic motivation." Contrary to what is predicted by classical psychological accounts, Amabile has shown that creative solutions to problems occur more often when individuals engage in an activity for its sheer pleasure than when they do so for possible external rewards. Indeed, knowledge that one will be judged on some criterion of "creativeness" or "originality" tends to narrow the scope of what one can produce (leading to products that are then judged as relatively conventional); in contrast, the absence of an evaluation seems to liberate creativity.

Embracing a different vocabulary, Mihaly Csikszentmihalyi has described a highly sought-after affective state called the flow state or flow experience. In such intrinsically motivating experiences, which can occur in any domain of activity, people report themselves as fully engaged with and absorbed by the object of their attention. In one sense, those "in flow" are not conscious of the experience at the moment; on reflection, however, such people feel that they have been fully alive, totally realized, and involved in a "peak experience." Individuals who regularly engage in creative activities often report that they seek such states; the prospect of such "periods of flow" can be so intense that individuals will exert considerable practice and effort, and even tolerate physical or psychological pain, in pursuit thereof. Committed writers may claim that they hate the time spent chained to their desks, but the thought that they would *not* have the opportunity to attain occasional periods of flow while writing proves devastating.

During an individual's immersion in a domain, the locus of flow experiences shifts: What was once too challenging becomes attainable and even pleasurable, while what has long since become attainable no longer proves engaging. Thus, the journeyman musical performer gains flow from the accurate performance of familiar pieces in the repertoire; the youthful master wishes to tackle the most challenging pieces, ones most difficult to execute in a technical sense; the seasoned master may develop highly personal interpretations of familiar pieces, or, alternatively, return to those deceptively simple pieces that may actually prove difficult to execute convincingly and powerfully. Such an analysis helps explain

why creative individuals continue to engage in the area of their expertise despite its frustrations, and why so many of them continue to raise the ante, posing ever-greater challenges for themselves, even at the risk of sacrificing the customary rewards.

THE HISTORIOMETRIC APPROACH

Studies in the cognitive tradition, on the one hand, and the personality and motivation tradition, on the other, have constituted the large majority of social-scientific investigations of creativity in recent years. One additional perspective, less well known perhaps, also deserves mention in this survey: the historiometric approach associated particularly with the work of the psychologist Dean Keith Simonton.

Unlike the approaches reviewed so far, Simonton's is inherently a *methodology* for investigation and hence can be applied equally to issues of cognition, personality, motivation, or creative works themselves. Simonton formulates (or operationalizes) classical puzzles concerning creativity as clearly as possible; he then seeks quantitative data that can help resolve those issues. The topics considered range from the personality traits of creative individuals to the circumstances of their training to the properties of their most highly esteemed works. In contrast to Gruber, Simonton uses a quantitative approach and deals with as large a database as possible; in contrast to Amabile, Simonton eschews experimental intervention and relies instead on the historical record.

In a typical approach, historiometric investigators like Simonton review large bodies of data to determine the decade of life in which creative individuals are most productive. Such studies have led to the findings that maximal productivity typically occurs between ages thirty-five and thirty-nine, but that profiles differ appreciably across disparate domains of knowledge: Thus, poets and mathematicians reach an apogee in their twenties or thirties, while historians or philosophers may peak decades later.

In another, different line of work, Simonton demonstrates that the most highly esteemed creators not only are more productive in general, but that they produce more "bad" works that have long been ignored as well as more "good" works that are esteemed by posterity. Using such an approach, Simonton and other historiometricians have managed to provide at least provisional answers to a host of questions long debated by experts on

creativity. Of course, the investigations depend on the particular ways in which the historiometrician chooses to frame the problem and on the quality of the available historical data. The method provides few fresh insights about particular creative breakthroughs or particular creators, but it proves invaluable for assessments of individuals in a broader context.

In my own view, the work by Gruber and his associates on individual case studies, along with the work by Simonton and his associates in the historiometric tradition, are among the most exciting recent lines of investigation in the area of creativity. Not surprisingly, they are also the most pertinent to my exploration of creative individuals. While my method and sympathies are closer to Gruber's evolving systems approach, I crave as well the precise and copious background information that the historiometric school can provide. In my judgment, a comprehensive science of creativity must somehow succeed in spanning the gap between these approaches. This book may be regarded as one effort to proceed at least the first step away from findings rooted in individual cases to generalizations that can elucidate creativity within and across domains. Accordingly, in part III, I compare the case studies on a series of dimensions.

MY APPROACH TO CREATIVITY

Even to begin to encompass creativity, one must take into account a huge number of factors and their multifarious interactions. In this book, I seek to provide a readable account of my conclusions while also presenting enough technical information for interested readers to evaluate and build on my methods, data, and findings. In the remainder of this chapter, and in chapter 10, I focus on these research issues. It is possible to appreciate the case studies and the conclusions without immersing oneself in these matters of detail; armed with the brief apparatus introduced in chapter 1, readers have the option of jumping immediately to part II. But I have arranged my presentation in such a way that the nonspecialist can follow the gist of my methods.

My approach consists of four separate components. There is no hard-and-fast line separating these components, but I find it useful to conceive of them as discrete contributors to the study.

1. *Organizing Themes:* These are the most general themes that guided my inquiry and that gave rise to the principles around

which the individual case studies have been formulated.

2. *Organizing Framework:* My study presupposes an interdisciplinary analytic framework, worked out in conjunction with a number of valued colleagues.
3. *Issues for Empirical Investigation:* Growing out of the framework are a host of issues and questions, which case studies ought, at least in principle, to be able to clarify.
4. *Emerging Themes:* Two themes not originally part of my research agenda emerged with increasing clarity as I pursued the individual case studies. Because these themes were not anticipated, they in some sense constitute my discoveries in this study.

In the four following sections, I provide further details on each of these components. For the sake of convenience, I have labeled each component, and its respective subcomponents, with separate letters and numbers; these are reproduced in table 2.1 and discussed again in the final chapters.

Let me now, in turn, touch on each of the components, providing sufficient background so that its role in the case studies can be properly appreciated.

TABLE 2.1. FOUR PRINCIPAL COMPONENTS IN THE STUDY OF CREATIVITY

I. Organizing Themes
A. Relation Between the Child and the Adult Creator
B. Relation Between the Creator and Others
C. Relation Between the Creator and His or Her Work
II. Organizing Framework
A. Developmental Perspective
1. Life-Course Perspective

2. Creation of a Work

B. Interactive Perspective: Interaction Among Individuals, Domains, and Fields

1. Definition

2. Multidisciplinary Framework

3. “Where Is Creativity?”

C. Fruitful Asynchrony

III. Issues for Empirical Investigation

A. Individual Level

1. Cognitive Issues

2. Personality and Motivational Issues

3. Social-Psychological Issues

4. Life Patterns

B. Domain Level

1. Nature of Symbol Systems

2. Kind of Activity

3. Status of Paradigm

C. Field Level

1. Relation to Mentors, Rivals, and Followers

2. Level of Political Controversy

3. Hierarchical Organization

IV. Emerging Themes

A. Cognitive and Affective Support at the Time of the Breakthrough

B. The Creator's Faustian Bargain

ORGANIZING THEMES REVISITED

The organizing themes, introduced in chapter 1, are the most intuitive of the components. As such, they provide an accessible way for us to discuss each of the seven creators of the modern era. Any of the themes could be employed with reference to any of the creators, but I have chosen to discuss each creator in terms of a theme that is particularly appropriate to his or her life circumstances.

The organizing themes can be grouped broadly into three categories that may be ordered in any way. The first concerns *the relationship between the child and the adult creator*. This theme reflects my belief that important dimensions of adult creativity have their roots in the childhood of the creator. In the study of Einstein, this theme provides a way of examining the connection between the kinds of questions a gifted child ponders, and the nature of training and thinking required for the adult practitioner to answer such questions. In the study of Picasso, I turn my attention to the relationship between the productivity associated with youthful prodigiousness, on the one hand, and with mature mastery, on the other.

The second organizing theme probes *the relationship between the creator and other individuals*. These other individuals include those

who are closest to the creator (family members, confidants), as well as those who are involved in his or her education (as teachers or mentors) or subsequent career (as colleagues, rivals, or followers). In three of the remaining case studies I treat the relationship between the creator and other people directly; in two cases, more abstractly.

With Freud, I examine the relationship between Freud and many other individuals during his youth; the gradual narrowing of the ensemble until Freud is virtually alone; and then, following the principal discoveries of psychoanalysis, the opening up again to a wider circle of associates. With Gandhi, I highlight the ways he affected the behaviors of others, while with Stravinsky, I portray the vexing political pressures that surround an individual who chooses to work in a collaborative domain.

In two of the cases I explore a more abstract kind of relationship to the world of others. With Eliot and Graham, I discuss two kinds of marginality: a marginality of choice, which Eliot sought; and an enforced marginality, which Graham experienced because of her gender and her nationality.

The third organizing theme focuses on the *relationship between the creator and work in a domain*. Early in life, the creator generally discovers an area or object of interest that is consuming. At first the creator seeks to master work in that domain in the manner of others working within the culture; increasingly, however, the very relationship to the domain becomes problematic. The individual then, willingly or unwillingly, feels constrained to try inventing a new symbol system—a system of meaning—that is adequate to the chosen problems or themes and that can eventually make sense to others as well. In each chapter I examine in detail the ways in which a creator forges a new system of meaning in a distinctive domain; it turns out that surprising commonalities hold across the domains as well.

ORGANIZING FRAMEWORK

In effect, this trio of organizing themes embodies the principal features of the framework that has guided this study. They serve as an informal way of introducing enduring concerns with human development (as in the relation between child and master); the development of work (as happens when the creator begins to deviate from common practices in the domain); and the relations

and tensions among individual talent, the domain of work, and the field of judges. I turn now directly, and somewhat more formally, to an introduction of the principal features of this framework.

A Developmental Perspective

To a developmental psychologist, the study of creativity is necessarily anchored in the study of human development. Both the evolution of specific creative works and the more general trajectory of growth of mastery in a domain require consideration in the light of principles governing development.

The Life-Course Perspective. By virtue of species membership, all normal children undergo a lengthy period of exploration of their environment, a period during which they have the opportunity to discover the principles that govern the physical world, the social world, and their own personal world. Not only does this discovery of universals become the background against which further learnings and discoveries necessarily take place, but the very *processes of discovering* themselves become models for later exploratory behaviors, including efforts to probe phenomena never before conceptualized.

The quality of these early years is crucial. If, in early life, children have the opportunity to discover much about their world and to do so in a comfortable, exploring way, they will accumulate invaluable "capital of creativity," on which they can draw in later life. If, on the other hand, children are restrained from such discovering activities, pushed in only one direction, or burdened with the view that there is only one correct answer or that correct answers must be meted out only by those in authority, then the chances that they will ever cast out on their own are significantly reduced.

Many creative individuals do point with some distress to the restrictiveness of their early childhood; and in the pages that follow, I describe parents who were quite strict. (Sometimes, as a reaction, creative individuals bend too far in the opposite direction in rearing their own children.) But even those who suffered a strict regimen somehow managed to retain the spark of curiosity, possibly because they were strong and rebellious personalities, but even more likely because they encountered at least one role model who did not simply toe the line but rather encouraged a more adventurous stance toward life.

What may distinguish creative individuals is their ways of

productively using the insights, feelings, and experiences of childhood. For some purposes, it may prove adaptive to erase memories of childhood. But when it comes to the forging of new understandings and the creation of new worlds, childhood can be a very powerful ally. Indeed, I contend that the creator is an individual who manages a most formidable challenge: to wed the most advanced understandings achieved in a domain with the kinds of problems, questions, issues, and sensibilities that most characterized his or her life as a wonder-filled child. It is in this sense that the adult creator draws repeatedly on the capital of childhood. In different eras, different periods of childhood will be drawn upon; it seems that the special burden of the modern era is to mine the early years of childhood.

As the educational psychologists Benjamin Bloom and Lauren Sosniak have documented with respect to talented adults, one can usually identify a situation or even a moment when these young individuals first fell in love with a specific material, situation, or person—one that continues to hold attraction for them. Following the philosopher Alfred North Whitehead, they speak of an initial romance; borrowing a term from David Feldman, I allude to a crystallizing experience.

No matter how potent such an intoxication, at least ten years of steady work at a discipline or craft seem required before that métier has been mastered. The capacity to take a creative turn requires just such mastery, and accordingly, significant breakthroughs can rarely be documented before a decade of sustained activity has been accomplished. Even Mozart, arguably the exception that proves the rule, had been composing for at least a decade before he could regularly produce works that are considered worthy of inclusion in the repertory. With the seven creators in question, at least a decade—and in some instances, more time—elapsed before innovative achievement had coalesced. And, as typical, another decade passed before a second major innovation was forged.

Yet it would be unwarranted to contend that one first follows die craft for ten years and only then strikes out on one's own. My own analysis suggests the reverse pattern. Individuals who ultimately make creative breakthroughs tend from their earliest days to be explorers, innovators, tinkerers. Never satisfied simply to follow the pack, they can usually be found experimenting in their chosen métier, and elsewhere as well. Young musical performers, for example, often reveal their gift for composing by a constant effort to "rewrite a piece" according to their own preferred specification,

budding scientists do not brook received wisdom, but rather demand to see for themselves. Often this adventurousness is interpreted as insubordination, though the more fortunate tinkerers receive from teachers or peers some encouragement for their experimentation.

At any rate, after a period of skill development, with or without overt challenge to authority, the future innovator clearly shows a readiness to cast off in new directions. A specific personality configuration must be at work here, since so many people who attain a comparable level of competence are satisfied simply to remain at that level or to make minor adjustments, rather than to strike out audaciously on their own. Sometimes events intervene, for example, when a crisis in the discipline alerts a whole generation of young workers to the need for rethinking. Even here, however, a certain doggedness is required. For example, many young researchers knew that a struggle was under way to decipher the structure of DNA, but it took the special gifts and pertinacity of James Watson and Francis Crick—as well as strokes of luck—to crack the code.

Creation of a Work. At this point in the general trajectory of development, I examine human creativity most intensively: Einstein as he engages in thought experiments about light, Graham as she searches for a distinctly American form of bodily expression, and Gandhi as he experiments with various stances between human beings in an effort to resolve bitter conflict without violence. I look at the individual's construction (or constructing) of the domain in which he or she works, the location of problem areas or uncertainties in this domain, and the casting out for new leads or perspectives that more adequately address a felt lack or a promising new direction.

Consistent with a cognitive perspective, I attempt to re-create the mental model, the representational map, that each individual formed about the chosen creative task. At first accepting the common language or symbol system of the domain, each creator finds soon enough that it proves inadequate in one or more respects. He or she will probably try minor changes at first, because no one finds it that inviting or facile to alter the entire legacy of a domain, one that may have been built up painstakingly over decades or even centuries.

Yet, characteristically, the creator finds further change necessary —whether because the creative individual is dissatisfied with an ad hoc solution or because the particular problem can be solved only

by a fundamental reorientation or because of some other factor(s) depends on the particular circumstances. But in any event, a seemingly local solution needs to be abandoned in favor of a far more extensive reorientation or reconceptualization.

These are the times that try the mettle of the creator. No longer do the conventional symbol systems suffice; the creator must begin, at first largely in isolation, to work out a new, more adequate form of symbolic expression, one equal to the problem or product in all of its complexity. Often initial efforts do not work out satisfactorily, and the creator must return to the drawing boards (sometimes literally!). In this pursuit there are no guarantees or even reliable guides; the creator must trust his or her own intuition and must be braced for repeated and unrequited failures.

In each of the case studies, I carefully examine the moments of creative breakthrough. Cognitive work at this time differs in terms of not only the particular intelligences that are mobilized but also the kinds of creative activity in which the individual is involved. Put succinctly, it is a different matter to solve a mathematical problem or define a psychological construct than it is to stage an effective performance or to influence the behavior of millions of one's countrymen. The readily invoked terms *problems* and *solutions* prove far more suited for standard scientific work than for creation in the arts or in the social sphere.

Let me summarize the developmental features that recur in the seven analyses: (1) a concern with the universals of childhood as well as the particularities of specific childhoods; (2) an examination of initial interest and its conversion into sustained mastery of a domain; (3) the discovery or creation of novel or discrepant elements at some point after mastery has been obtained; (4) the ways in which the creator deals with the initial novelty and embarks on a *program* of exploration; (5) the supportive or inhibitory roles played by other individuals during the period of isolation; (6) the ways in which a new symbol system, language, or mode of expression is gradually worked out; (7) the initial reactions of the relevant critics and the ways in which these reactions are transformed over a significant period of time; and (8) the events surrounding a second, more comprehensive innovation that often occurs during middle life.

Interactive Perspective: Interaction among Individuals, Domains, and Fields

Over the past several years, in conjunction with colleagues, and especially with Mihaly Csikszentmihalyi and David Feldman, I have evolved the "interactive perspective" on creativity, which informs this book. While not overly complex, the perspective is multifaceted and requires some background and elaboration. I have begun to introduce the framework in the guise of the three intuitive organizing themes. I propose here to introduce the perspective more formally in three phases: via a definition, a multidisciplinary research perspective, and the reformulation of a familiar question. Following this introduction, I explain how the perspective informs the case studies that constitute the heart of this investigation.

Definition. Let me begin, then, by offering a definition of the creative individual, which I have found useful in my own work: The creative individual is a person who regularly solves problems, fashions products, or defines new questions in a domain in a way that is initially considered novel but that ultimately becomes accepted in a particular cultural setting.

Parts of this definition (such as the notion that creativity involves problem solving and that it connotes both initial novelty *and* ultimate acceptance) would be accepted by nearly every psychologically oriented researcher of creativity. Less standard (and therefore more revealing) are four other features:

1. My statement that a person must be creative *in a domain*, rather than across all domains, directly challenges the conceptualization of an all-purpose creative trait that underlies tests of creativity. I am focusing on the particular domains or disciplines within which an individual works, and the ways those domains may be refashioned as a result of a creative breakthrough.
2. My claim that creative individuals *regularly* exhibit their creativity calls into question the possibility of having a once-in-a-lifetime burst of creativity. Indeed, as Gruber has so well illustrated, creative individuals wish to be creative, and they organize their lives so as to heighten the likelihood that they will achieve a series of creative breakthroughs. In general, only the creative individual who dies at a young age is a likely candidate for one-shot creativity.
3. By insisting that creativity can involve the *fashioning of products* or the *devising of new questions* as well as the solution of problems, I challenge psychometric and computer simulation approaches, which prove far better at resolving extant problems than at forging new products or at defining

new problems. Of course, much creative work does involve the solution of problems already recognized as such. But at the higher reaches, creativity is far more often characterized by the fashioning of a new kind of product, or by the discovery of an unknown or neglected set of issues or themes that call for fresh exploration.

4. I assert that creative activities are only known as such when they have been *accepted in a particular culture*. No time limit is assumed here; a product may be recognized as creative immediately—or not for a century or even for a millennium. But the crucial (if controversial) point here is that nothing is, or is not, creative *in and of itself*. Creativity is inherently a communal or cultural judgment. The most one can say about an entity before it has been evaluated by the community is that it (or he or she) is "potentially creative." And evaluation must be undertaken by a relevant portion of one's community or one's culture: No other arbiters are available.

Multidisciplinary Framework. Clearly, the bulk of work in the area of creativity has been carried out by researchers trained in psychology and related individual-centered disciplines. Yet it has become increasingly clear that creativity is precisely the kind of phenomenon or concept that does *not* lend itself to investigation completely within a single discipline. As Peter Medawar, the Nobel Prize–winning immunologist, once declared:

> The analysis of creativity in all its forms is beyond the competence of any one accepted discipline. It requires a consortium of talents: Psychologists, biologists, philosophers, computer scientists, artists, and poets would all expect to have their say. That "creativity is beyond analysis" is a romantic illusion we must now outgrow.

I believe that, ultimately, the understanding of creativity will entail explorations at four different levels of analysis:

1. *The Subpersonal*. As yet, little is known about the genetics and the neurobiology of creative individuals. We know neither whether creative individuals have distinctive genetic constitutions, nor whether there is anything remarkable about the structure or functioning of their nervous systems. Yet, any scientific study of creativity will ultimately need to address these biologically oriented questions, and I expect that such study will soon be undertaken.
2. *The Personal*. Those trained in the psychological tradition will continue to provide major input into our understanding of

creative individuals, processes, and products. As in the past, and in my own review of earlier psychological research, there will be two major lines of investigation. One will focus on the cognitive processes that characterize creative individuals; a complementary tradition will focus on the personality, motivational, social, and affective aspects of creators.

3. *The Impersonal*. Inherent in my view of creativity is a conviction that an individual cannot be creative in the abstract; as Feldman has insisted, all of us exhibit whatever creativity we have via specific *domains or disciplines*. Thus, any creative individual makes his or her contributions in particular domains, which can themselves be described in terms of the current level of knowledge and practice. Einstein's achievements must be appreciated with reference to the physics of 1900, just as Gandhi's recipe for human interaction must be seen in light of earlier modes of interaction between occupying and indigenous populations. The impersonal study is carried out by historians, philosophers, students in artificial intelligence, and, most especially, experts drawn from the domain itself. Because this perspective represents an attempt to capture the nature of knowledge per se, I see it as primarily epistemological in nature.
4. *The Multipersonal*. Surrounding any potentially creative individual or product is a host of other individuals and institutions sanctioned to evaluate the appropriateness and quality of the contribution at hand. I adopt Csikszentmihalyi's term "field" to describe this congeries of forces, the study of which is fundamentally sociological. Such a multipersonal perspective examines the ways that members of the field—judges, editors, agents, media professionals, encyclopedia writers, and other evaluators—make initial, provisional assessments, as well as the processes by which, aided by the perspective of time, they render more authoritative judgments. Sometimes, as with physics, the field consists of a small cohort of trained experts; but in areas like popular entertainment, the field may number in the millions.

The full-blown study of creativity can best proceed—as I try to do here—through examination of creative phenomena from the multiple perspectives of the neurobiologist, the psychologist, the domain expert, and the sociologically oriented student of the field. Yet, because of my own training and because of the preponderance of psychological studies, it is probably inevitable that I will place

heaviest emphasis on personal factors, drawing on biological, epistemological, and sociological perspectives to enhance the picture I am fashioning. There is a sense—for which I do not apologize—in which this study of creativity reflects the "great man/great woman" view of creativity.

Where Is Creativity? In a difficult and complex area of study like creativity, important conceptual advances are not easy to come by. It was therefore a significant moment when Csikszentmihalyi suggested that the conventional question, "What is creativity?" be replaced by the provocative inquiry, "Where is creativity?"

Csikszentmihalyi identifies three *elements* or *nodes* that are central in any consideration of creativity: (1) the individual person or talent; (2) the domain or discipline in which that individual is working; and (3) the surrounding field that renders judgments about the quality of individuals and products. (These three nodes correspond, roughly, to the core elements introduced in chapter 1 and to the second, third, and fourth disciplinary perspectives just outlined.) In Csikszentmihalyi's persuasive account, creativity does not inhere in any single node, nor, indeed, in any pair of nodes. Rather, creativity is best viewed as a dialectical or interactive process, in which all three of these elements participate:

We can now revisit the figure introduced in chapter 1 and consider its operation in dynamic form. One begins with a set of individuals of varying abilities, talents, and proclivities, each engaged in work in a particular domain. At any historical moment, that domain features its own rules, structures, and practices, within

which the individuals are socialized and according to which they are expected to operate. Such individuals address their work to the field, which in turn examines the various products that come to its attention. Of the many individuals and works that undergo scrutiny by the field, only a few are deemed worthy of sustained attention and evaluation. And of those works that are appreciated at a given historical moment, only a small subset are ever deemed to be *creative*—highly novel, yet appropriate for the domain. The works (and the workers) so judged come to occupy the most important spot in the dialectic: They actually cause a refashioning of the domain. The next generation of students, or talents, now works in a domain that is different, courtesy of the achievements of highly creative individuals. And in this manner the dialectic of creativity continues.

To help concretize this scheme, assume that there are a thousand budding painters at work in Paris, each with his or her peculiar strength and style. All of these individuals attempt some mastery of the domain of painting, as it now exists; and all address their work to the field—the set of critics, art school departments, gallery owners, agents, and the like. Of these thousand individuals, a few will be selected as worthy of attention by the field; and at least today, sheer novelty of the work is likely to constitute a significant factor in their selection. Of this smaller circle of talented individuals, one or two at most will paint in a manner that becomes so highly valued that their efforts will ultimately exert some effect on the domain—on the structure of knowledge and practice to be mastered by the next generation of painters. Thus, creativity lies not in the head (or hand) of the artist or in the domain of practices or in the set of judges: Rather, the phenomenon of creativity can only—or, at any rate, more fully—be understood as a function of interactions among these three nodes. I have sought to capture the complexity of this dialectic interaction through the multidirectional arrows in the figure.

Painting, however, may seem an idiosyncratic domain, perhaps one where the field assumes undue importance. What of a contrasting domain, such as mathematics, where monetary considerations are presumably unimportant and where less fickle standards can accordingly be invoked? I submit that the processes at work here are parallel. Substitute for our thousand visual artists an equal number of young mathematicians, say, topologists. Each of these students must master the domain as currently practiced. Those who wish to advance must then address their proofs and discoveries to the field—in this case, a set of journal editors,

professors, prize committees, and supportive or jealous peers. Only a few of the young topologists will stand out in terms of professorships and publications; and of these, even fewer will sufficiently affect the domain in which they work so that the next generation of youthful topologists must master a somewhat altered domain.

Biographies of significant figures are studded with instances (sometimes bizarre) where an ultimately esteemed work was either ignored, misinterpreted, or completely scorned by the field. One might go so far as to maintain that initial rejection is the likely fate of any truly innovative work. But it is also possible to mount the opposite case. For example, with respect to our modern masters, following their initial, usually lonely struggles, most of them became well known and esteemed within a decade—a remarkably short period of time, given the perspective of history.

Such a statement is likely to rekindle a question that has doubtless been on the minds of many readers. Surely, one might say, there are many other individuals whose work is just as original, just as creative, just as notable, but who for one reason or another have had the misfortune of being ignored. And surely one can come up with examples from history—Gregor Mendel in biology, Vincent Van Gogh in painting, Emily Dickinson in poetry, or J. S. Bach in music—where an individual was not prized during his or her lifetime and sometimes for decades thereafter. Are we not concerned here with success and celebrity, rather than with sheer, unadorned creativity?

In addressing this question, it is important to indicate what has *not* been claimed: I am not claiming that there are necessarily different biological or psychological processes at work in the individual who is ultimately deemed creative as compared to the one who is not so judged. Emily Dickinson may have looked no different to her peers in Amherst, or to a neuroanatomist probing her brain, than would her hypothetical untalented twin sister, Amelie, who also felt that she herself was an estimable poet. Nor am I claiming that those who are esteemed are necessarily any greater in any absolute sense than those who are not.

My claim is simply the following: In the absence of a judgment by a competent field, one simply cannot determine *whether* an individual merits the epithet “creative.” We can confidently state that Freud and Einstein were creative because there is more than a century of supporting opinion (and relevant controversy) on which to draw. We can with some confidence conclude that their close friends Wilhelm Fliess and Michele (Michelangelo) Besso were not,

except perhaps within that little-recognized domain of intellectual midwifery. As for the dozens of other physicists or psychologists who may have thought of themselves as creative but who have not as yet been judged by the field, we must simply render the proverbial Scottish verdict "Not proved."

Fruitful Asynchrony

In the case studies in part II, I discuss the modern masters in terms of their personal talents, the nature of the domain in which they worked, and the operation of the relevant field of individuals and institutions. In addition to the intrinsic importance of these factors, I explore the utility of one final organizing theme. Specifically, I claim that *there exist certain kinds of asynchrony within or across these nodes* and that these may well enhance the likelihood of creativity.

Where there is *pure synchrony,* all three of the nodes mesh perfectly. One might claim that, in the case of a universally acclaimed prodigy, the prodigy's talents mesh perfectly with the current structure of the domain and the current tastes of the field. Creativity, however, does not result from such perfect meshes. In using the term *asynchrony,* I refer to a lack of fit, an unusual pattern, or an irregularity within the creativity triangle. Asynchrony *within a node* occurs when there is an unusual pattern at one of the three nodes. For instance, there may be an unusual profile of intelligences within an individual (as when the young Picasso displayed precocious spatial intelligence but very meager scholastic intelligences); a domain that is experiencing a large amount of tension (as when different schools of music were vying for hegemony in Stravinsky's time); or a field that is just beginning to shift in a new direction (as occurred when certain enterprising critics emerged around the time that modern dance was taking form).

Asynchrony *across nodes* is equally important. For example, the talent profile of an individual may be unusual for a domain (as when Freud's acute personal intelligences proved atypical in a scientist). Or an individual may find himself or herself in tension with a field as currently constituted (as when Einstein could not get a job after completing his degree). Or there may be tension between a domain and a field (as when classical music was moving sharply in an atonal direction, while the audiences and critics continued to favor tonal music).

Naturally, some asynchrony will mark any productivity, whether highly creative or not. My claim is based on two other propositions: First, there can be cases of asynchrony that are too modest or too pronounced; neither proves productive for creativity. An intermediate amount of tension or asynchrony, here termed *fruitful asynchrony*, is desirable. Second, the more instances of fruitful asynchrony that surround a case, the more likely that genuinely creative work will emerge. However, an excess of asynchrony may prove nonproductive: What is desirable is to have substantial asynchrony, without being overwhelmed by it.

As with the developmental perspective and the creativity triangle, I do not submit the hypothesis of fruitful asynchrony as a claim to be tested empirically. Rather, it constitutes an integral part of the framework I have brought to this set of case studies. The value of this framework will be determined by whether the phenomena of creativity have been elucidated. Growing out of the framework, however, are a host of issues that can be illuminated empirically, and to these I now turn.

ISSUES FOR EMPIRICAL INVESTIGATION

In the following case studies I focus on a number of issues that fall, roughly speaking, under the organizational rubric described thus far. I do not undertake to discuss and evaluate every issue systematically with respect to every subject, as in rigorous application of the historiometric approach. Rather, I hold these issues in the background until they appear pertinent in a particular case. In part III, I revisit these issues, in light of the relevant case studies, and present my tentative conclusions. When appropriate, I "score" a dimension and present a rough-and-ready assessment of its fate; in other cases, I offer only an impressionistic account.

Individual Level

Among the issues to be examined are the following at the level of the individual:

1. I begin by addressing cognitive issues—the nature of the intellectual strengths and weaknesses (the particular intelligences) displayed by specific creators and evidence of prodigious behavior in early life.

2. With respect to personality and motivation, I explore the extent to which these creators conform to the traditional view of the creative personality. I focus on the nature of relations to other individuals, the extent of self-promotion, and the kinds of childlike features that seem preserved in these creative masters. I also touch on the individuals' ways of expressing emotions and the degree of tension they had to sustain in their lives.
3. Turning next to social-psychological factors, I examine the nature of the relationship between the child and his or her parents, the attitude toward discipline and permissiveness within the home, and the extent of marginality that characterized each individual's relationship to the society and toward other persons in the chosen domain.
4. Finally, with respect to life patterns, I look for evidence of peaks and valleys in the productivity of the creators—particularly a test of the ten-year rule of productivity, that tendency to make major breakthroughs at ten-year intervals. Also, I consider what it means to be productive in different domains and at different points in the life cycle.

Domain Level

At the level of the domain I take the following steps:

1. I consider the nature of the symbol systems with which the creators worked.
2. I describe the individuals' kinds of creative practices in terms of five distinct kinds of activities. These activities are also touched on in the interludes.
3. Finally, I consider the status of the paradigms, or principal approaches, as they exist in the domains wherein the creators are working. Included is a consideration of the susceptibility of the paradigm to continued innovation throughout the life of the creator.

Field Level

At the level of the field my approach is as follows:

1. I begin with an examination of the relation of the creators to the mentors, rivals, and followers in the field.
2. I then treat the extent and nature of political controversy

within the domain.

3. In conclusion, I touch on the extent to which hierarchical organization dominates the functioning of the field.

To repeat: It is beyond the scope of this work to arrive at a decisive, quantitative answer to these questions. Instead, they should be regarded as issues that guided my empirical inquiry, issues that ultimately ought to be resolved by a combination of case study and historiometric investigation.

EMERGING THEMES

Each of these empirical issues grew organically out of the framework and thus constituted part of my overt agenda when this inquiry began. Two other issues, however, were not part of the initial inventory, and their emergence constitutes a discovery for me. Because these emerging themes became an important part of the story of creativity that has ultimately emerged, I need to mention them briefly here.

Support at the Time of Breakthrough

The first issue surfaced during examinations of the period during which a creator made his or her most important breakthrough. I knew that at least some creators had close confidants during this time. But what emerged from the study was more dramatic: Not only did the creators all have some kind of significant support system at that time, but this support system appeared to have a number of defining components.

First, the creator required both affective support from someone with whom he or she felt comfortable and cognitive support from someone who could understand the nature of the breakthrough. In some situations, the same person could supply both needs, while on other occasions, such double duty was unsuccessful or impossible.

The relationship between the creator and "the other" can be usefully compared with two other kinds of relationship: the relationship between the caretaker and the child, in early life, and the relationship between a youngster and his or her peers, in the course of growing up. In some respects, the individual who is attempting to convey a new symbol system resembles the caretaker who is introducing a youngster to his or her language and culture;

and in some respects, an individual developing such a system resembles a youngster interacting with a sympathetic peer. In any event, as a psychologist interested in the *individual* creator, I was surprised by this discovery of the intensive social and affective forces that surround creative breakthroughs.

The Creator's Faustian Bargain

The second discovery covers a longer time span, sometimes encompassing much of the creator's adult life. My study reveals that, in one way or another, each of the creators became embedded in some kind of a bargain, deal, or Faustian arrangement, executed as a means of ensuring the preservation of his or her unusual gifts. In general, the creators were so caught up in the pursuit of their work mission that they sacrificed all, especially the possibility of a rounded personal existence. The nature of this arrangement differs: In some cases (Freud, Eliot, Gandhi), it involves the decision to undertake an ascetic existence; in some cases, it involves a self-imposed isolation from other individuals (Einstein, Graham); in Picasso's case, as a consequence of a bargain that was rejected, it involves an outrageous exploitation of other individuals; and in the case of Stravinsky, it involves a constant combative relationship with others, even at the cost of fairness. What pervades these unusual arrangements is the conviction that unless this bargain has been compulsively adhered to, the talent may be compromised or even irretrievably lost. And, indeed, at times when the bargain is relaxed, there may well be negative consequences for the individual's creative output.

I have now introduced the full armamentarium (no less a word will do!) under-girding this study: a trio of broad themes that guided me as I embarked on the original study; a developmental, interactive, and synchronous organizational framework that has directed the particular investigations; a set of empirical issues that the study was designed to illuminate; and a pair of themes that emerged quite unexpectedly during the study and that may be considered discoveries in themselves.

In part II, I turn attention to those individuals who, to my mind, made signal creative breakthroughs at the start of the twentieth century. These individuals have been chosen because of the indisputable importance of their work; they have been chosen as well because each exemplifies a particular intellectual strength,

talent, or intelligence as realized in a domain of their culture. As far as I am concerned, there is no order of priority among intelligences, nor is there order with respect to the question of whose work is more important, more innovative, or more creative than that of others. I have therefore elected to present these individuals roughly in the order of the historical moments of their most important breakthroughs. It is perhaps apposite to begin with Freud, because he is the one individual whose tools have themselves helped enhance our understanding of the creative mind. Throughout part II, the organizing framework just introduced will remain largely in the background; but in the interludes and in part III, I return explicitly to it, as I attempt to summarize what I have learned from this study.

PART II

THE CREATORS OF THE MODERN ERA

3

SIGMUND FREUD: ALONE WITH THE WORLD

Freud, ca. 1891

BEGINNING IN 1902, somewhere between five and twenty Viennese men began to gather regularly on Wednesday evenings in the home of a physician-turned-psychologist named Sigmund Freud.

Included within these ranks over the next few years were several young physicians, among them Wilhelm Stekel, Paul Federn, and Alfred Adler. Other group members, drawn from various corners of society, included the musicologist Max Graf, the music critic David Bach, the publisher Hugo Heller, the army surgeon Major General Edwin Hollering, and a former glassblower Otto Rank. Guests included the psychiatrists Ernest Jones from London, Carl Jung from Zurich, and Sandor Ferenczi from Budapest. After enjoying coffee and cigars, these men listened to papers prepared by one of the members or, occasionally, by a guest; then, adhering to a rigidly observed procedure, each offered commentary on the paper. In general, the last to speak was Sigmund Freud.

THE FIRST DISCIPLES

To an eavesdropper, Freud's Wednesday evening fellowship would have seemed an eccentric lot, engaged in a decidedly exotic activity. Several of the members were mavericks; most were loners; nearly all were Jews, accustomed to a degree of ostracism in Vienna. Most papers described unusual medical or psychiatric conditions, such as hysteria, obsession, or paranoia: Often the etiology of the condition was sexual and, on occasion, the presenters vividly described their own dreams or sexual practices. Critiques of one another's papers were often harsh, sometimes needlessly so. But until Freud had spoken, it was not clear what the "official verdict" on a paper would be.

Convening of the Wednesday Psychological Society marked an important turning point in Freud's life. Following a reasonably promising, but hardly triumphant, career as a medical researcher and a physician in private practice, Freud had withdrawn from professional circles. With little support—and sometimes considerable opposition—from his peers, he had developed the basic tenets of psychoanalytic theory and practice. Now, following the publication of *The Interpretation of Dreams* (1900), which he believed to be his most important work, Freud sensed for the first time that others might take his ideas seriously and even help introduce them to a wider world.

Perhaps, as his long-term associate Ernest Jones maintained, the particular collection of men who gathered at Nineteen Berggasse were mostly of the second rank: "I was not highly impressed with the assembly. It seemed an unworthy accompaniment to Freud's

genius, but in the Vienna of those days, so full of prejudice against him, it was hard to secure a pupil with a reputation to lose, so he had to take what he could get." Indeed, they represented an almost irresistible target for the Viennese satirist Karl Krauss, and one can envision a latter-day Tom Stoppard recreating in *Travesties* format this collection of marginal neurotics. But from the central core of the Wednesday Psychological Society emanated the formidable Vienna Psychoanalytic Society and, ultimately, the International Psychoanalytic Society. Like faithful foot soldiers, these men, their associates, and their successors helped spread their commanding officer's revolutionary ideas throughout the intellectual world.

BACKGROUND AND EARLY CHILDHOOD

From one perspective, Freud came to the world with little in his favor. He was born in Freiberg, Moravia, a town of five thousand inhabitants situated 150 miles northeast of Vienna. His family was Jewish, and the Jews had not been treated well in the Austro-Hungarian empire. Kindly, well-intentioned, and for the most part optimistic, his father, Jakob, proved a ne'er-do-well in the mercantile world who never quite lived up to the expectations of his wife, Amalie. The young Sigismund (his given name, which he retained until early adulthood) at first lived in tiny and uncomfortable quarters; later, as Jakob's circumstances improved somewhat, the family—which now included seven children—moved to larger housing. Sigismund was surrounded by a bewildering family constellation: a father who had apparently been married twice before and was twice as old as his mother, two grown brothers who were as old as Freud's mother, a nephew who was a year younger than Sigismund, and a niece of roughly the same age.

Thanks to Freud's own writings, we now appreciate the crucial contributions of the early years to one's ultimate life course. In most respects, despite the trying conditions I have just described, Freud was blessed. As a firstborn, he received and maintained special attention from his mother, who lived until Freud was over seventy. He also had a doting nurse, who seems to have reinforced the message that Freud was somehow special. While the Jews had been subjected to marked prejudice in earlier generations, Freud grew up at a time when anti-Semitism was at least temporarily on the wane.

Perhaps most important, Freud was a very talented child, and

those around him responded to his gifts. Indeed, among our seven creators, he was probably the one with the greatest academic strengths. By any definition he was extremely intelligent. In his own words: "At the Gymnasium I was at the top of my class for seven years: I enjoyed special privileges there, and was required to pass scarcely any examination"; he graduated summa cum laude. Family members organized much of their daily regime around the talented boy's needs: He was given his own room and his own bookcases; he did not have to dine with the rest of his family but was provided with his own eating chamber; and when his sister's piano practicing annoyed him, the piano was removed from the house.

While bookish, Freud seems to have had a reasonably rounded childhood. He enjoyed being out of doors and became a good walker, swimmer, and skater. He had his share of friends, extending well beyond the large family circle. Like many other young males of the time (and of other times), he identified with the life of the soldier. Particularly attached to Hannibal, the great Carthaginian general, Freud precisely plotted out Hannibal's battles and remarked that had he himself not been Jewish (and therefore prohibited from military leadership), he would have pursued the career of a military officer. In contrast to his fascination with the military, Freud had little attachment to formal religion. But he felt himself to be strongly Jewish, was well informed on biblical and other Jewish lore, and bridled at any anti-Semitic talk or behavior.

As a talented Jewish lad in the increasingly liberated Austro-Hungarian capital, Freud was clearly headed for the professions. His father, smitten with Freud's talents ("My Sigmund's [*sic*] little toe is cleverer than my head" he once remarked), gave Freud free reign in his choice of a career. For an ambitious Jewish boy, military or political careers were unlikely, but that still left the law, science, other academic disciplines, or medicine. Freud was headed for a career in law until he heard a recitation of Johann Wolfgang von Goethe's essay "On Nature." This grand paean to the world of creation, with Nature depicted as a nurturant mother figure, catalyzed Freud to study medicine and to become a natural scientist.

FREUD'S UNIVERSAL GIFTS

In his autobiographical study, Freud said: "[I] felt no particular partiality for the position and activity of a physician in those early

years. . . . Rather I was moved by a sort of greed for knowledge." This comment is an understatement. In the eight years that passed between graduation from the gymnasium and receipt of the medical degree, Freud immersed himself spectacularly in the world of knowledge. He read extremely widely: the Bible, ancient classics, William Shakespeare in German and in English, Miguel de Cervantes, Molière, Gotthold Lessing, Johann Wolfgang von Goethe, and Friedrich von Schiller. He mastered English and French and also taught himself Spanish so that he could read Cervantes in the original. Fond of art and the theater, he attended many exhibitions and plays and commented penetratingly on what he had observed. Succumbing for a while to philosophy, he joined a society in which he read the major philosophers, translated John Stuart Mill into German, and took courses for three years with Franz Brentano, a respected philosopher at the University of Vienna with a special interest in psychological issues. And, not neglecting the area of science, he mastered the writings of Darwin as well as scientific texts by the most important scientist of the period, Hermann von Helmholtz.

A vivid sense of that exploring mind permeates Freud's letters of this period to his close friends Emil Fluss and Eduard Silberstein, and a bit later, to his fiancée, Martha Bernays. Freud comes across as a lively, enthusiastic, witty, sometimes sardonic, and highly ambitious but occasionally self-deprecatory young man. Equipped with a developed imagination, he is able to invent scenes, characters, institutions, and flights of poetic fancy; and vivid characterizations and dramatizations issue readily from his pen in several languages. He shifts from literature to art, from science to philosophy, from the personal to the professional, the political, and the worldly. Already he is the teacher—reporting what he has learned, asking pointed questions of his correspondents, and seeking to synthesize knowledge. One infers that his correspondents got the better end of the epistolary bargain.

Freud indicated in his autobiography that he was moved by a sort of curiosity directed "more towards human concerns than towards natural objects." What comes across most strikingly in his letters is a fascination with, and a surprisingly sophisticated understanding of, the foible-filled world of human beings. Freud spun out detailed, hilarious, touching paragraphs, pages, even short-story-length passages about family, friends, and strangers. In evocative prose he described an encounter with a stern professor, the dreams of an ambitious Jewish physician who marries the boss's daughter, and the suicide of a brilliant but troubled friend; he offered advice about