With two out in the ninth inning of the 1956 World Series, the umpire Babe Pinelli, on a count of 1 and 2 against Dale Mitchell, called a strike on a pitch considered by most observers to be high and somewhat outside, thus giving Don Larsen the only perfect game in World Series history. Pinelli was reviled by many (mostly Dodger fans) for making such a call, but he never harbored any doubts as to his judgment on that fall day. Following Pinelli’s death several years ago, Stephen Jay Gould wrote a short piece in which he defended the umpire: “A batter may not take a close pitch with so much on the line. Context matters. Truth is a circumstance, not a spot.”

Gould’s defense of Pinelli shocked some readers. How could a scientist appear not to believe in truth? Wasn’t he advocating moral relativism? How do we navigate our way in the world if subjective perspective matters more than objective reality? Gould’s critics overreacted to the piece and, in doing so, missed the larger point he was trying to make, a point that permeates all of his writings. The issue is not whether there is an external universe governed by unchanging natural laws; of course there is. No matter how many times Larsen threw that ball, it eventually would hit the ground. But facts and truths are not necessarily one and the same. To Gould, we are the products of a history that is continually being reimagined; history illustrates the contingent and contextual nature of the world in which we live.

Gould is one of a number of scientists who have continued in the tradition of popularizing discoveries in their field and writing for a wider public audience. Among recent examples, one thinks of the astronomer Carl Sagan, the physicist Stephen Hawking, and the physician Lewis Thomas. Others as well—Jerome Bruner, Freeman Dyson, Jeremy Bernstein, and Oliver Sacks—have labored to translate internalist scientific developments into public questions of both philosophical and practical significance. Whatever the
problem, whether the origins of the universe, the consequence of nuclear explosion, or the battle with cancer, these writers have helped bridge the gap between laboratories, experimentation, and science on the one side and epistemology, narrative, and history on the other.

No one has been more visible, successful, or influential in this endeavor than the evolutionary biologist and historian of science, Stephen Jay Gould. Gould is a professor of geology at Harvard University. His scientific papers have appeared in such professional journals as *Science, Paleobiology*, and the *American Journal of Science*. Over the past 15 years, he has written a monthly column for *Natural History*, and many of the essays that first appeared there are collected in four published volumes. He reviews for the *New York Review of Books*, and writes more widely for such publications as *Discover, The New York Times*, and *Sports Illustrated*. He has even contributed an introduction to the most recent collection of *Far Side* cartoons by Gary Larson. To call him prolific is an understatement. He has published so much, in so many different places, on so many topics that a computer literature search using his name as author, and employing data bases specific only to the humanities and social sciences, generates a single-spaced printout that runs over 25 pages.

Gould's academic reputation was established through his fieldwork on the Bahamian land snail, *Cerion*, and his theoretical reconsiderations of the mechanisms of evolution. His popular reputation stems from an ability to make complicated scientific ideas accessible and relevant to a non-specialized audience. Anyone who reads his essay on the evolution of Mickey Mouse's image, an essay that illustrates the scientific concept of neoteny (adult retention of childlike features) and illuminates shifts in American middle-class culture (Mickey goes from mischievous prankster to saintly child), cannot help but become hooked on Gould.

Paleontologist, geologist, humanist, and critic—Gould is all of these. He is also—I am tempted to say primarily—an historian who writes elegant meditations on the history of evolutionary theory, the transmission of ideas, and the sociology of knowledge. At the core of Gould's work is a deeply historical perspective concerned with the fundamental issues of objectivity, interpretation, and causality. Discussion of these problems is hardly new, but it is noteworthy that while professional historians have been unable to capture a public audience for these theoretical questions,
Stephen Jay Gould’s Vision of History

a scientist is playing a leading role in discussing historical methodology before a general readership.

An introduction to Gould’s vision of history must begin with his perspective on what history is not. Foremost, history is not the objective reconstruction of the past, though many social scientists still hew to the belief that there is an empirical reality that can be objectively recovered. In this context, objectivity is usually juxtaposed against theory, the belief being that the objective researcher approaches his subject without theoretical assumptions. As far as Gould is concerned, nothing can be further from actual practice. In arguing for the deeply subjective and theoretical nature of the historical enterprise, Gould is not trying to perpetuate the traditional distinction between “soft” social sciences and “hard” sciences. Quite the contrary. Gould is calling upon his own colleagues in geology and paleontology to “understand, appreciate, and use the principles of historical science.” In part, this means recognizing that both disciplines are, to use the current parlance, socially constructed; both historians and scientists investigate problems and suggest solutions without shedding their political, social, and cultural skins.

Gould’s primary concern is with fellow scientists who seem unable or unwilling to accept the conditional and contextual nature of their discipline. Yet, what he has to say applies with special force to humanists generally, many of whom continue to embrace the ideal of objectivity. It is important to note that Gould is not a complete heretic when it comes to science. He does believe in natural law and scientific methodology; there are indisputable scientific laws about the physical universe. But Gould is chiefly concerned with illuminating the interpenetrations between science and society, facts and fictions, nature and history.

Gould is not the first to emphasize that science is a social product; it has been nearly thirty years since Thomas Kuhn examined The Structure of Scientific Revolutions (1962) and argued that scientists work in communities where the questions they ask and results they find are shaped by governing intellectual paradigms. One of Gould’s most influential and controversial scientific papers opens with a quote from the Nobel Laureate Peter Medawar that succinctly restates the same point: “innocent, unbiased observation is a myth.” It is astonishing how many scientists and social scientists refuse to acknowledge the validity of Medawar’s apothegm: that one perceives what one expects to see;

469
that the same sets of facts can be aligned toward dramatically different ends.

The danger of the myth of objectivity is that it transforms theories into laws and elevates preconceived viewpoints into neutral truths. As Gould points out, Darwin himself fell victim to this process, both from others, who transmuted natural selection into a universal law governing the struggle for existence, and by his own hand when, in his autobiography, he claimed to have derived his theory from the arduous and systematic collection of facts though he knew full well that “all observation must be for or against some view if it is to be of any service.”

History is not neutral; history is an act of interpretation. And no interpretation troubles Gould more than that of gradual, deterministic progress. The idea of progress is one of the most powerful biases in Western thought. Needing to reduce the jangle of experience into a moral tale, we love nothing more than to speak of gradual improvement, of things getting better, of climbing to the top. Scientists who see themselves as objective experimenters searching for breakthroughs in knowledge (darkness into light is another favorite way of expressing the idea of progress) have been especially susceptible to this view of history. In evolutionary biology, the idea of progress has installed itself through the metaphor of the ladder. According to this way of conceptualizing evolution, humans occupy the highest rung on an evolutionary ladder that descends through billions of years. Evolution, in this view, becomes a story of progress, with some species higher on the ladder, others lower.

Because we have grown so accustomed to thinking and speaking in these terms, the perniciouness of the metaphor of the ladder is not readily apparent. Transferred from the evolutionary to the social realm, ladders become justifications for racism, inequality, and oppression. So engrained was the belief that races had to be ordered in such a way that placed blacks at the bottom and whites at top, scientists in the 1920s searched Asia for fossil remains that would provide evidence to contradict the indications that all human life originated in Africa. Selected members of those races and classes slotted at the bottom of the ladder had the promise of upward mobility held out to them should they follow social rules and conventions created by those at the top. In this way, the idea of gradual, upward progress contributed to sustaining the status quo. As Gould has pointed out, the understanding of evolutionary and
historical changes in terms of gradualism and progress became commonplace in the nineteenth century, not because these perspectives expressed objective, scientific data, but because as part of a Victorian ideology these watchwords became "liberalism’s quintessential dogma against radical change."

For Gould, history refutes this moralistic tale of gradual, uniform progress. History is complex, interactive, hierarchical, and, most of all, contingent. Simplicity, uniformity, and inevitability should have no place in scientific or historical visions; certainly the pretense that these are neutral conditions must be exposed. The more accurate metaphor for capturing the variability and diversity of evolution and history is the branching tree, the ramifying bush. With its multiplicities of divergences and interactions, its nonlinearity and dense complexity, trees better represent both biological and cultural evolution. Family trees and social trees, not steps and ladders, encompass the genealogy and contingency of history.

As an historical theorist, Gould has gone further than merely to deride the illusion of objectivity and attack the ideology of progress. He has attempted to reconceptualize approaches to evolution and change over time. Gould’s theory of evolutionary change, first articulated with Niles Eldredge, offers an alternative perspective to an evolutionary pattern governed by creeping gradualism and preordained progress. Instead, Gould envisions the history of life as characterized by long periods of stasis that are suddenly and dramatically disrupted before there is a return to a new, stabilized order. In other words, punctuated equilibria. Sudden discontinuity and disruption, not gradual progress and slow ascent, characterize the tempos of historical change.

Punctuated equilibria is a theory of evolution devised to explain the histories of species. As a theorist of historical change, Gould owes an enormous debt to Hegel and Marx. Specifically, Hegel’s dialectical laws (“interpenetrating opposites,” “transformation of quantity to quality,” and “negation of negation”) speak to the ways in which revolutionary change grows out of apparent stability. Hegel’s laws, as Gould has observed, “are explicitly punctuational.” A dialectical approach, whether applied to evolutionary shifts that take place over hundreds of thousands of years or social transformations that occur within a decade, provides a “holistic vision that views change as interaction among components of complete systems, and sees the components themselves not as a priori entities, but as both products of and inputs to the system.”
Gould has identified some of the events to which the theory of punctuated equilibria can be applied. For example, recent evidence that attributes the disappearance of dinosaurs to a mass extinction caused by an asteroid striking the earth illustrates in dramatic fashion the principle of punctured stasis. Applied to the less distant past, punctuated equilibria serves as an apt description of ideological and social revolutions. Consider as well the saying quoted by Gould that a soldier's life consists of long periods of boredom interrupted by short periods of terror, or contemplate the possibility of nuclear war, and one viscerally comprehends the meaning of punctuated equilibria.

It would be an error, however, to think of punctuated equilibria only as a vision of dramatic transformation. Gould's historical perspective is as much about stability as change, as concerned with how orders are maintained as with how they are transformed, indeed, with the relationship between disruption and stability. The material and structural bases of any species (genes and environment) or society (economics and institutions) remain largely unaltered across long stretches of time. Understanding the mechanisms that perpetuate order ultimately helps us to understand how it is that orders are transformed. For students of history, this means paying close attention to the nature of power and authority in any social arrangement, to the myriad controls that keep the old order standing.

Gould's appreciation for deep structure does not in any way inhibit his passion for ideas. Among the numerous false dichotomies that permeate the Western mind, materialist versus idealist is one of the most persistent. But Gould refuses to succumb to the allure of dualisms. In his synthesis, ideas are matter, thoughts are actions. The bulk of Gould's work has been devoted to examining the formulation, expression, and transmission of ideas, from the heights of Lyell's uniformitarianism, Haeckel's ontogeny and phylogeny, and Darwin's natural selection, to, in our own time, the depths of Wilson's sociobiology and Jensen's geneticism. As a historian of ideas, Gould understands that "the use of ideas, the systematic reconstruction of a world in their light, is the stuff of intellectual revolution."

Gould's dialectical approach requires that scientists and social scientists divorce themselves from simplistic, reductionist explanations. Gould has made this point repeatedly, but never more forcefully than in a paper, co-authored with Richard Lewontin,
Stephen Jay Gould’s Vision of History

that attacks adaptationism. The reigning paradigm in evolutionary thought for the past half century, adaptationism holds that most traits can best be understood as gradually, progressively attained ideal adaptations within species. The adaptationist method is to atomize organisms into their constituent parts and then argue that each part fits optimally with the environment. Such a functionalist theory is not neutral; Gould and Lewontin have characterized it as “Panglossian,” for it seeks to assure us that “we live in the best of all possible worlds.” As a consequence, it reinforces the existing order with all of its divisions defended, even celebrated, as inevitable.

Proponents of a strictly adaptationist model, Gould and Lewontin point out, reason backwards from parts to wholes, from uses to origins. They assume that all features (chins in humans or small arms in dinosaurs, for example) evolved for some functional reason and that this reason accounts for its existence. An example offered by Gould and Lewontin drawn from cultural rather than biological evolution is the argument that Aztec cannibalism can be explained as creative adaptation to a shortage of protein. Such monocausal, reductionistic arguments are easily swallowed but are not particularly satisfying. Organisms and culture are “not collections of discrete objects” but “integrated entities.” Adaptationism may explain some evolutionary features, but non-adaptationist processes, correspondences in structure and origin but not function (homology), or differential rates of growth (allometry), help illuminate many others. The point, for Gould and Lewontin, is that evolutionists must treat integrated wholes, not amputated parts; theorists of historical change must construct models that take into account the complexity of biological and cultural systems.

Gould is not so naive or hypocritical as to pretend that his approach to evolutionary and historical change does not derive from his own world view. Gould too writes from an ideological perspective, only in his case it is not so much traditional liberalism as democratic socialism. The connection between intellectual theories and political ideologies is a close one indeed. As Gould points out, it is not accidental that in the West Darwin is hailed as an advocate of gradualism, whereas in the East he is viewed as a theorist of revolution; Western scientists emphasize conflict as the central mechanism in natural selection whereas their counterparts in the East stress the cooperative nature of species interactions. Gould’s radicalism no more invalidates his approach to evolution
than Darwin's conservatism undermines *Origin of Species* (1859). But it is likely that Gould's neo-Marxist perspective helps to explain part of the resistance to punctuated equilibria and non-adaptation among some evolutionary biologists.

Gould is but one of a number of biologists who, in the last two decades, have brought a Marxist perspective to bear on their work. (Gould serves on the advisory board of the newly founded journal *Rethinking Marxism*). In a recent volume entitled *The Dialectical Biologist* (1985), Richard Levins and Richard Lewontin elaborate on the dialectical approach. Like Gould, they argue that science is a "social process," that "the problematic of science—what questions are thought to be worth asking and what priority will be awarded them—is also strongly influenced by social and economic factors." Social ideology and social relations cannot be divorced from scientific pursuits. Theorists, Levins and Lewontin argue, must try to break free from the stranglehold of Cartesian reductionism, of examining and understanding the world through its parts rather than as a whole. The dialectical approach focuses on the complex relationships and interpenetrations between parts and wholes, organisms and environments.

For these biologists, there is no dialectical method per se; to prescribe one would be to fall into the very trap they seek to avoid. Rather, their approach is to ask questions and conceptualize events in ways that acknowledge organic holism, historical fluidity, and social power. They are concerned with the relationships between the natural and the historical, the physical and the social. Dialectical laws are not "rules derived from nature," but intellectual principles and "terms of reference." In this view, dialectics provide a way of approaching history as complex, interactive, and transformative.

Gould and Eldredge concluded their initial paper on punctuated equilibria with a plea that scientists become more sensitive to history. Scientists must recognize that ideas are culturally embedded; they must work in a present that is the product of a contingent past; they must appreciate the importance of narrative, of using words and images to tell stories that explicate change over time; they must craft multicausal explanations for historical events that are always complex, never simple. In axiomatic fashion, Gould has reiterated his message many times. The idea that "history matters," that "everything, ultimately, may be a product of history," that "history . . . may be the ground for our search to
understand cultural diversity and change," is at the core of Gould's perspective on human evolution.

For Gould, interpretation of the past serves as a foundation for action in the present. In attacking the myth of objectivity and neutrality, in undercutting the distinction between thought and action, Gould and fellow biologists have freed themselves to incorporate their moral values and social commitments into their work. Gould has applied his evolutionary and historical understanding to social questions of enormous importance. The arguments he offers are applicable to some of the most intractable problems that face us today, and the positions he takes are consistent with those held by most activists on the left. The clearest example of this is Gould's concern with the problem of equality. Nothing roils him more than the use of evolutionary theory in defense of racial and social inequality.

In *The Mismeasure of Man* (1981), Gould scrutinized the assumptions and methods of a number of scientists whose work promoted scientific racism and biological determinism over the past two centuries. The book is a deeply unsettling one for several reasons. In a society where science is largely accepted by the public as objective and empirical, Gould illustrates how the individuals he discusses allowed their ideology to shape results. Thus, Samuel George Morton's desire in the 1850s to create a ranking of races based on brain size led him *unconsciously* to tinker with the results of his measurements. Or, Cyril Burt's more explicit manufacturing of data in the 1930s and 1940s in order to support his claim that intelligence was genetically determined.

As troubling as a history marked by subjectivity and fraud is, Gould does not stop there. He will not allow us the luxury of lapsing into a mythology that suggests we have progressed from those dark, early days. The cultural context of science is as relevant today as it was in the nineteenth century. "If scientists can be honestly self-deluded," Gould writes, "then prior prejudice may be found anywhere, even in the basics of measuring bones and toting sums."

The most striking chapter in *The Mismeasure of Man* demonstrates how Alfred Binet, H.H. Goddard, and Lewis Terman, to one extent or another, developed a hereditarian theory of intelligence, indeed invented the concept of IQ, out of ideological motives and for social purposes. Numbers, Gould reminds us, "beguile and benumb." In an evanescent world, they seem real,
certain, unchanging. Yet faith in the objectivity of quantification is itself the invention of the nineteenth century, the first century to be consistently referred to by number. Numbers and their use are not benign. The obsession with calculating intelligence led directly to such practices as sterilization, institutionalization, and restriction on immigration of those suspected of being idiots or imbeciles (language employed as technical jargon earlier in this century). Long after these practices have ceased, intelligence testing persists, and the belief that intelligence can be quantified and that the number generated somehow stands for an objective, unbiased assessment, continues to play a powerful role in society.

Gould has not only attacked the idea of inherent inequalities, he has forcefully argued that the equality of all races is a biological fact, which is to say a "contingent fact of history." By this he means that all races are members of the species Homo sapiens, that all descend from a common origin in Africa some tens or hundreds of thousands of years ago, and that the genetic differences between races is minimal. Inequality is a cultural, not a biological, phenomenon.

The contingency in Gould’s motto refers to the possibility that other scenarios might have occurred. Homo sapiens is evolved from one population of one line of Australopithecus. What if another species of the genus Homo survived until today and presented us with the "dilemma of a human species truly and markedly inferior in intelligence." What, Gould asks, if Homo sapiens, rather than being such a geologically young species, evolved over millions of years and exhibited truly deep differences within the species? History matters precisely because these things did not happen; the equality of races was not predetermined, but the result of a historical process.

Despite the attempts of some to deny a common ancestral beginning in Africa, despite an obsession among scientists until recently in distinguishing racial variations, the evolutionary history of humans is characterized by unity, connection, and equality. Gould recognizes the difficulty of convincing those who seek biological justifications for inequality that the argument cuts in precisely the opposite direction. How as well to make the leap from biology to ethics, from evolutionary patterns to cultural norms? For Gould, understanding begins with the recognition that races vary minimally, that individuals differ greatly, and that any individual deserves to be treated as "a full human being in all respects."
Human unity is literally true, not merely an “idle political slogan or tenet of mushy romanticism.” “Our unities are genealogical,” Gould concludes. “We are an object of history.”

In his writings, Gould has shown repeatedly the ways in which science has found regular employment as a justification for racism and inequality. So compelling is the associative power of the word “science” with truth and empiricism, that in recent years opponents of the teaching of evolution in public schools have adopted the name “creation science” to describe their alternative vision. Gould has played a key role in opposing legislative acts that require the teaching of creationism alongside evolution. Having seen the last of the anti-evolution laws struck down by the Supreme Court in 1968, fundamentalists have adopted a pro-creation strategy. In the 1980s, they have been successful in states such as Arkansas and Louisiana in the passage of legislation requiring “equal time” in the classroom for creationism wherever evolution is taught. Only recently have the Courts ruled that these acts were unconstitutional.

In the case of *McLean v. Arkansas Board of Education* (1982), Gould testified in Federal Court against an Arkansas Act that required public schools to provide “balanced treatment to creation science and to evolution science.” As a prominent opponent of the creationist legislative strategy, Gould was also closely associated with litigation over a similar statute adopted by the Louisiana legislature. In *Edwards v. Aguillard* (1987), the Supreme Court, by a vote of 7–2, found the Louisiana statute unconstitutional, thus ending a campaign, one that dates to the infamous Scopes Trial in 1925, designed to eliminate or mitigate the teaching of evolution in the schools.

If Gould has frequently attacked the idea of science as neutral, objective, and truthful, he has also defended the core principles of science, defined as “a system of explanation that relies upon invariant natural laws,” against those who would eviscerate the entire discipline by trying to alchemize religious assertions and moral speculations into a science. As a student of history, Gould realized early that the fundamentalists’ new legislative strategy against evolution had to be taken seriously and that their arguments, however transparent to the minds of secular humanists, had to be refuted systematically.

Gould has helped demonstrate that creationism is religion, not science. By emphasizing the origins of life, relying upon supernat-
ural intervention, and insisting upon a literal interpretation of Genesis, creationism violates the cardinal tenets of a science: it ignores natural law, it is neither testable nor falsifiable, and it is dogmatic rather than explanatory. Furthermore, those beliefs of creationists that can be tested, such as the claim that the fossil record is a product of Noah's Flood or that the geological age of the earth is approximately 6,000 years, are demonstrably false. Gould is no apologist for science but, after all, he comments, it "has taught us some things with confidence."

Gould's elation over Judge William Overton's decision in McLean (Overton, who cited Gould's testimony in his decision, wrote "creation science is simply not science, . . . the purpose [of the Act] is the advancement of religion in public schools), and the majority opinion in Edwards (Brennan ruled that the Louisiana Creationism Act "violates the Establishment Clause of the First Amendment because it seeks to employ the symbolism and financial support of government to achieve a religious purpose"), has been tempered somewhat by one Supreme Court Justice's misunderstanding of evolution.

Justice Scalia, who along with Rehnquist dissented in Edwards, fundamentally misconstrues the critical distinction between creation and evolution, a distinction that illuminates why one is not a science and the other is. Gould has shown that throughout Scalia's dissent the Justice considered as part of evolutionary theory the study of life's origin. Creation and evolution are similar. Scalia suggests, because neither can account for the beginning of life. But evolutionary biologists attempt no such enterprise. Evolution merely declares that "all organisms are united by ties of genealogical descent"; theorists of evolution say nothing about the origins of organisms from inorganic elements because such a question does not properly belong in the realm of science. More than a century after Darwin, Gould is saddened that he is still compelled to testify that evolution is not a theory, it is a fact. The theoretical component of evolution concerns only the mechanisms by which descent has occurred. By comparison, creationism is an untestable theory with no data to support its claims.

That Justice Scalia either willfully or unknowingly tried to find a common ground between creationism and evolution is more than troubling to Gould. It shows that although the crusade to challenge the teaching of evolution has largely been halted, misunderstanding has not been eliminated. It allows for creationists to

478
Stephen Jay Gould's Vision of History

continue to press their assault on evolution. Only continued vigilance by teachers, scientists, and defenders of the separation of church and state, insists Gould, will lead to the ultimate extinction of creation science.

Unlike creationism, evolution teaches that there was nothing cosmically preordained or inevitable about the emergence of humans in history. On the bush of evolution, *Homo sapiens* is but a peripheral twig whose historical appearance is strikingly recent. Gould frequently quotes John McPhee's image for the shallowness of human roots. If all time on earth is represented by ones outstretched arms, "in a single stroke with a medium-grained nail file you could eradicate human history."

"One small twig" in evolutionary history is *Homo sapiens*. And yet, as a consequence of the development of consciousness, in itself "a quirky evolutionary accident," humans alone now hold the power of undoing billions of years of evolution and of possibly assuring their own extinction. This horrifying prospect has led Gould, along with dozens of other eminent scientists, to detail the biological consequences of nuclear war.

In 1983, Gould participated in a conference on the Long-Term Worldwide Biological Consequences of Nuclear War. (The following year he helped draft the Vatican Statement on Nuclear Winter.) A committee consisting of twenty scientists, including Gould, issued a report that discussed the likely consequences of a 10,000 megaton nuclear exchange: these included dramatically reduced temperatures, the disruption of photosynthesis, exposure to ionizing radiation, extensive chemical pollution, and the breakdown of temperate, tropical, and aquatic ecosystems. The scientists concluded that a nuclear war could leave no survivors in the Northern Hemisphere, and that the possibility of the extinction of *Homo sapiens* could not be ruled out.

In an arena crowded with voices, Gould has added an evolutionary perspective to the horror of contemplated extinction. If such an event occurs "consciousness may not evolve again in any other lineage during the 5 billion years or so left to our earth before the sun explodes. Through no fault of our own, and by dint of no cosmic plan or conscious purpose, we have become, by the power of a glorious evolutionary accident called intelligence, the stewards of life's continuity on earth. . . . I cannot imagine anything more vulgar, more hateful, than the prospect that a tiny twig with one peculiar power might decimate a majestic and ancient tree, whose
continuity stretches back to the dawn of earth's time, and whose trunk and branches house so many thousand prerequisites to the twig's existence."

Gould's egalitarian and democratic impulses, his historical and scientific perspectives, have also led him to comment on political and social issues in which his expertise as a biologist matters far less than his world view. As the grandson of Jewish immigrants and the son of a court stenographer who was apparently well-versed in Marxist theory, Gould must have internalized a great deal about social class and political ideology, social discrimination and irrational persecution. One finds these concerns expressed in a variety of ways, from his self-consciousness over his position at an elite university to his participation in a panel on anticommunism in American intellectual life to his adding his name to a group of international figures who condemned United States policy toward Nicaragua and Soviet policy in Afghanistan as violations of "the democratic right of every nation to self-determination."

Historical theorist and social activist, Gould is also a baseball fanatic. It should come as no surprise that, in his writings, Gould connects his interests. Baseball allows Gould to "apply" his evolutionary perspective while providing an arena that transcends the endless diversity of evolutionary biology for the heroic efforts and timeless rhythms of the playing field. In writing about baseball, Gould can discuss both the universal and the cultural, the history of life as well as as the life of the individual.

Baseball is not just a game; it is the embodiment of history and time. It is both linear and cyclical and therefore fits nicely with Gould's most recent work on time's arrow, time's cycle. The season begins in April and is measured through rapidly accumulating at bats, innings, runs, games, wins and losses until, in October, there are final standings for both individuals and teams. Through fall and winter the baseball field lies fallow (at least those that are still grass), until, with the return of spring the cycle begins again. As Gould has expressed, "baseball fulfills both our needs for arrows (to forge time into stories) and cycles (to grant stability, predictability and place)."

In Gould's hands, our understanding of baseball is refined and enhanced through the prism of evolutionary theory. With its long stretches of scoreless equality ruptured by offensive outbursts, a baseball game serves as a compact illustration of punctuated equilibrium. Statistics reveal just how momentous these sudden runs-
scoring rallies actually are. According to the *Bill James Baseball Abstract*, over 60% of the teams who go on to win any given game scored enough runs for victory in a single inning. In other words, more often than not single inning offensive displays determine the outcome of the game. It seems that punctuated equilibrium helps us to comprehend the sudden, uneven, disruptive nature of historical change whether the occasion be asteroids hitting in the Cretaceous era or runs scoring in the top of the ninth.

A baseball game exemplifies punctuated equilibrium and the decline of .400 hitters illustrates another perspective drawn from evolutionary biology—variation. Ted Williams batted .406 in 1941, the year Gould was born, and since then no one has averaged over .400 for the season. By comparison, between 1901 and 1930, the league-leading average surpassed .400 nine times. The problem, simply put by Gould, is what accounts for “the extinction of the .400 hitter.”

Many of those who have considered the dilemma of the disappearance of the .400 hitter have relied on a perspective that can best be described as a theory of declension: once upon a time there were giants and heroes and we are condemned forever to compare ourselves to them and come up wanting. For those inclined toward such a view, it becomes all the more disturbing and paradoxical to consider that, by standards of training, diet, and performance against the clock, today’s athletes are superior to those of half a century ago. To see the baseball players of the past as part of golden age involves more than just nostalgia. As Gould puts it, it “carries moral implications linked metaphorically with junk foods, nuclear bombs, and eroding environments as signs of the current decline and impending fall of Western civilization.”

As a theorist of historical change, Gould rejects declension as “naive and moral” just as he rejects progress as equally value-laden. Instead, he approaches the problem of the disappearance of the .400 hitter with a concept from evolutionary biology—the idea that “trends in extremes may result from systematic changes in amounts of variation.” As variation declines, extremes decrease; conversely, as variation expands, extremes increase.

If Gould is correct and a decline in variation helps explain a decline in extremes, then, applied to baseball, we should find not only a decline of highest average but also in lowest average. Indeed, this is precisely the case. The point difference between highest and lowest batting average compared with the general league (which
has remained surprisingly constant at about .260) has declined over time. What must be explained is not the decline of the .400 hitter, though the posing of the question in this way clearly tells us something about our own cultural prejudices, but the decline of variation in baseball.

Gould offers two interrelated explanations for the decline of variation in baseball. The first has to do with what he calls the "outer limits of human capacity." No trend goes on forever; there is always some outer limit to height, speed, life span. Gould would have us imagine a limiting wall for any performance. In baseball, the average performance has moved closer to the wall while the distance between ordinary and exceptional has decreased. Hitters who average .400 have disappeared not because players' skills have declined, but because they have improved. This leads to Gould's second explanation: "systems equilibrate as they improve."

As a consequence of repetition, standardization, and mounting precision, the game's "rough edges" have been smoothed. Better equipment, charting of pitches and hits, and positioning of fielders, to name but a few factors, have contributed to greater equilibrium in baseball and account for enough fewer hits for today's best batters to keep them from .400. One extreme in a distribution of variation in batting average, .400 hitting has disappeared as variation has declined, as the system of baseball has stabilized over time.

Baseball has become more scientific and, as with any science as far as Gould is concerned, it is subject not only to laws and statistics but fictions and perceptions as well. Final scores and home runs may be counted as objective facts, but baseball also illustrates contingency and relativity, themes that permeate Gould's approach to the historical sciences. When Gould turns his attention from the universal (cycles) and the historical (.400 hitting) to the transcendent (individuals), the connection between baseball and history becomes closer still.

If Gould has an evolutionary tree of heroes, the sturdiest branch belongs to Joe DiMaggio. In the summer of 1941 (again, the year of Gould's birth), DiMaggio did something never accomplished before or since in baseball: he hit in 56 consecutive games. Even those who know nothing of baseball somehow know of this record, and experts largely concur that DiMaggio's hitting streak is the single, greatest individual achievement in baseball history, perhaps in all of sports, not to mention a defining episode in American cultural mythology.
Stephen Jay Gould’s Vision of History

For Gould, the majesty of what DiMaggio did between May 15 and July 16, 1941 can best be understood as an assault on nothing less than science itself. We live in a world governed by evolutionary laws, by inescapable probabilities, by statistical facts. As individuals, we live in history and, even as we reshape the past and present, we succumb to a future that is both intentional design and unchanging structure. The wonder of DiMaggio’s streak is that it shattered the laws of probability. He violated the predictions of random models that dictate with uncanny accuracy how long a streak will last given a specific individual's characteristic probability based on previous performance. He smashed one history and created another. He showed that history and science were not objective, empirical, binding, or universal. History was a contest, a struggle, a constant effort on the part of the individual to understand and, if possible, to transform and transcend.

Gould’s historical vision forces us to reconceptualize the world and our place in it. His perspective knocks us off the top of an imaginary ladder while revealing that we are deeply connected to all that surrounds us. His vision removes us from the center of a natural order thought to exist solely for our benefit without robbing us of the power to transform the world we live in. His theory even brings hope without defending the status quo, for it suggests that the longer things remain the same, the more dramatic will one day be the revolutionary change.

Gould is not alone in challenging the shibboleths of Western thought. Across numerous academic departments, scholars today are reconceptualizing their subjects and trying to build bridges between disciplines. Social scientists and humanists are weaning themselves from the search for truth and are instead talking about narratives and stories; they are trying to move away from slender monographs to broad syntheses, from facts to theories, parts to wholes; not content merely to interpret, they are becoming activists and advocates, seeking ways to apply their knowledge and understanding, searching for connections and audiences. It should come as no surprise that many of these writers are baseball fans as well.

As for DiMaggio, Gould summarizes the meaning of the Yankee Clipper’s achievement this way: “This history of a species, or any natural phenomenon that requires unbroken continuity in a world of trouble, works like a batting streak. All are games of a gambler playing with a limited stake against a house of infinite resources. The gambler must eventually go bust. His aim can only
be to stick around as long as possible, to have some fun while he’s at it, and, if he happens to be a moral agent as well, to worry about staying the course with honor. The best of us will try to live by a few simple rules: do justly, love mercy, walk humbly with thy God, and never draw to an inside straight. DiMaggio’s hitting streak is the finest of legitimate legends because it embodies the essence of the battle that truly defines our lives. DiMaggio activated the greatest and most unattainable dream of all humanity, the hope and chimera of all sages and shamans: he cheated death, at least for a while.”