

AMERICAN GENESIS: A CENTURY OF INVENTION AND TECHNOLOGICAL ENTHUSIASM

(THOMAS P. HUGHES)

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American Genesis is a cultural history of the grand century of American technology, from 1870 to 1970. Thomas Hughes published his book in 1989, when Americans believed that the grandeur of American technological achievement had matured into something less flashy, yet more durable and equally pregnant with accomplishment. Hughes linked a valedictory history of early inventors with a narrative of those inventions becoming embedded in vastly greater systems, which appeared to offer continued technological progress. But 1989 was a long time ago, and as it has turned out, we have been left with the worst of both worlds. We lack new and beneficial world-changing technologies, and the massive systems, supercharged by the internet, dominate and dehumanize our lives in ways previously unimaginable. It may not be American Terminus, yet, but finding a new path is necessary to recapture the now-cobwebbed spirit of enthusiastic achievement this book chronicles.

Americans, we can all agree, don't look forward to the future like we used to. This is encapsulated, I think, in Peter Thiel's famous lament, "We wanted flying cars, and we got 140 characters." To what future technological advances can the average American look forward? A slightly higher resolution television? A bigger mobile phone? I doubt if the average American could quickly name a single dramatic invention that he actually anticipates will ever happen. Perhaps if given a little time to think, he might name fusion energy or life extension, but that proves my point, since neither of those things is actually going to happen. Nor will artificial intelligence, as I have argued repeatedly. All gamechanging technologies we are told are imminent never arrive, from superconductivity to stem cells. Not to mention that a great many common basic technologies, such as washing machines, automobiles, and dishwashers, have actually gotten worse due to insane government mandates that cripple their use. The future is here, and it's both stupid and stagnant. We don't like to say that out loud, but it's true. Reading this book is like reading any book about the vanished worlds of the

past, just with more grim sense of loss, because it was not so long ago the future seemed so different.

Hughes divides the century of American technological genesis into two periods. The first, from roughly 1870 to 1920, was “the golden era of the independent inventors.” The second, to 1970, was the age of industrial systems, in which inventors mostly became cogs in systems of unprecedented size and complexity. In the first half of his book, Hughes studies twelve independent inventors (though others make guest appearances), comparing and contrasting their accomplishments and approaches, while situating them all in their era. Most of these men are famous: Thomas Edison, Nikola Tesla, Alexander Graham Bell, the Wright brothers. A few are more obscure, but in Hughes’s telling, at least as important, especially Elmer Sperry, whose focus on feedback control systems enabled the ultimate switch to individual inventors becoming less relevant than the systems created as a result of their efforts.

The author does an excellent job of sketching the actual process of invention, which varied among industries and inventors, but had many core similarities. “[W]e need to recall that invention is rarely if ever an act, but usually a process involving the conceptualization, probably visualization, of various means to an end or of solutions to a problem; the embodiment of those in models; and subsequent experimentation with the models to discover how well the means fulfill the end in mind.” Hughes objects to the hagiographical myth of the solitary inventor creating by endless trial-and-error. All successful independent inventors had assistants and combined empirical approaches with those derived from scientific theory, and empirical did not mean just throwing random ideas at the wall, but rather to “hypothesize and experiment in the absence of theory.” Most relied on outside funding, with the friction and hassle that involved, though some were professional inventors and others invented while holding a day job. Among many examples, Hughes narrates how Sperry developed the gyrostabilizer for ships. Given that he had no money or connections to test using actual ships, with the assistance of model builders he built a stylized model, the core of which was a pendulum simulating ship movement. Then he experimented on rowboats, and eventually was able, with the data he had, to interest the Navy, who funded further experimentation and implementation.

It is not hagiography to recognize that these twelve men made much of the modern world. That others offered support of various kinds does not change this basic fact. As with almost any task to which a team is set, in any context, one person is the person who matters; the others are fungible. This is a truth unpalatable to some, and unfashionable. Even more unpalatable and unfashionable is another truth—every important new invention in this book was made by a straight white man under the age of forty, the only exceptions being that a few of the inventors were somewhat productive until they reached age fifty. It is not a coincidence that they were men and young. It may be a coincidence that they were straight (though maybe not), and certainly, given the strictures of the time, it is not reasonable to draw any conclusions about race.

Why young men should have accomplished essentially every important dramatic advance, both technological and cultural, in human history is not entirely clear to me. Some chalk it up to evolutionary pressures; young men are driven to achieve in order to obtain the best mates. Maybe, though that seems a bit too pat, but it gets at a truth, which is that young men have the drive, or drives, that old men, and women, simply don't, and that is certainly largely biological. Some point out that the statistical spread in talents among men, in intelligence and other brilliance, is higher than among women, which necessarily means that the extremes, high and low, are dominated by men. That's probably part of it, as well, and there may be other causes too.

Oh, sure, you can find occasional exceptions, in that a few older men and a few women have contributed spectacular human creative advances. Though, offhand, I can't think of any. Can you? Real advances, I mean, not modest accomplishments recast as spectacular because of who made them. (If you say "Marie Curie," you may be right, though you may also be wrong, but you are showing my basic claim is correct. It is like saying "Meryl Streep" when asked to name an accomplished actress. The inevitability of the name to show the claim belies both the claim's accuracy and the purposes for which it is made.) Those who claim that the facts are a mere mirage, resulting from supposed discrimination against the old and women, have the burden of proof, which I suspect is insurmountable, as shown by that nobody bothers to try. Whatever the reason for their success, the only way to change that young men are the key to societal advancement is to persecute

young men so that zero accomplishments are made, a task the Left has eagerly undertaken—one reason why the future is stupid and stagnant.

As to age specifically, Hughes makes clear, with Edison being the best example but all his inventors showing the same traits to some degree, as radically successful inventors age they no longer come up with brilliant ideas. Instead, they believe their own press, and they either run down blind alleys in a vain attempt to duplicate their youthful achievements or turn their focus to larger applications of their inventions, what in Hughes's terms is "system building." They exhibit closed-mindedness combined with overconfidence, not a winning combination. This is merely one empirical example of why laws forbidding discrimination against the old are stupid, because nearly all discrimination against the old is wholly rational, and laws forbidding such rational discrimination are pure rent-seeking by old people trying to take for themselves the fruits of the productivity of the young.

Anyway, from his long discussion of individual inventors, though he returns to them again and again, Hughes turns to thoughts on how inventions led to systems. Hughes's thesis is that "Large systems—energy, production, communication, and transportation—compose the essence of modern technology." Radical inventions result in the creation of new systems, he says, while modest, if still significant, inventions improve existing systems. The incentives that mold behavior vary depending on the position of each person with respect to systems; an existing system, for example, is unlikely to fund an inventor promising radical inventions. And such an inventor will have little interest in working on mere improvements within a system; Sperry, for example, was explicit that improving "a machine six or seven percent" was not his focus, which was instead improving something "four or five hundred percent." Thus, as systems grow and become dominant, as they did after 1920, radical inventions by individuals tend to decline.

After World War I, organizations like Bell Labs (ably covered by Jon Gertner in *The Idea Factory*) come to the fore, both organizing the process of invention and slotting those inventions into new systems. Key to the American development of systems were Fordism and Taylorism—the former a system of economies of scale embodied in vertically integrated manufacturing schemes; the latter a scientific method to turn workers into fungible units that made a system run ever more efficiently. Hughes

discusses both Henry Ford and Frederick Winslow Taylor at length, including the Ford system of manufacturing in all its manifestations (with interesting side departures into work on improving the refining of petroleum, since the predictions were that the world's petroleum would disappear by 1935, yet another example of settled science being wrong). Both Fordism and Taylorism fit with the Progressive mania for rule by supposed experts, a disease that affected all sectors of society, and which was coupled with calls for "economic democracy," which as Hughes points out, meant mass consumption, nothing more, and nothing less, the ultimate result of which we see today. Fordism and Taylorism were the birth of neoliberalism, mass consumerism, and the loss of worker autonomy.

Hughes spends a great deal of time on the international craze, including in postwar Germany and Russia under the Bolsheviks, for Fordism and Taylorism. The Germans thought it would help them rebuild; Lenin thought it would help Russia become modern (ignoring that Russia, until the war and Bolshevism, was already modernizing at a huge pace) and, more importantly, that it fitted with the supposedly scientific nature of Marxism. Hughes covers Magnitogorsk, for example, at some length, although he here and elsewhere is somewhat credulous about claimed Soviet accomplishments, not surprising since he wrote before the fall of the Soviet Union. Fordism and Taylorism were also influential in the rise of odious modernist architecture, which under those such as Walter Gropius and Le Corbusier had unbelievably destructive effects, made possible in part by falsely tying ugly architecture to a supposed technological imperative. This is a topic Hughes discusses in interesting detail, although it feels like a departure from the rest of the book. As it happens, by coincidence I also just finished James Stevens Curl's new book, *Making Dystopia*, which is on exactly this topic, so I will shortly have much more to say on modernist architecture, none of its positive.

It is interesting that this book was written at the height of American fears of Japanese dominance, and there are several references to that fear. China, by contrast, appears only twice. Once, in a reference to the United States Navy receiving international scorn for not developing its own innovations, but rather following "a Chinese plan of copying," from Britain, France, and Germany. That shows that some things have not changed. Others have—the second reference is that "an American

engineer visiting China about [1925] thought the principle difference between the two countries were that in the United States everything and everyone was in motion." I visited Shanghai a few years ago, and I can confirm this difference, except that it has inverted completely in the past hundred years. Visit an American town and you can see lots of people doing nothing; not in China.

Hughes also talks of many systems, including the electric generation and distribution system of Samuel Insull, the Tennessee Valley Authority, and the Manhattan Project. Most of the drama is provided by conflicts among bureaucrats running the projects, many revolving around which massive system to build to achieve the ultimate, politically chosen, objective. Interwoven with the history of systems are discussions of cultural critiques of technology. These begin with mostly positive portrayals that, as the century passed, turned largely against the dehumanizing and atomizing effects of technology, in particular of the new systems. Men such as Thorstein Veblen and Lewis Mumford started with a positive view and ended with a negative view. Finally, Hughes tries to tie the so-called counterculture to a reaction against the weight of technological systems, which put man behind and beneath the system itself. Mumford shows up again, reversing his earlier views, along with Jacques Ellul, and Alvin Toffler, for his then-current prediction in *The Third Wave* that a holistic, more fragmented approach to implementing technology was just around the corner, which, as Hughes points out, is very similar to predictions made by Henry Ford in the 1920s.

Hughes is generally an even writer, but at this end, he gets preachy, which is a little annoying. He calls Jonathan Schell's agitprop book *The Fate of the Earth* "profound"; a more accurate judgment was Michael Kinsley's: "The silliest book ever taken seriously by serious people." More problematic is his unreasoned and emotional aversion to nuclear power; he refers, for example, to the accident at Three-Mile Island as a "catastrophe" and to "the horrendous destructiveness of nuclear energy." What he can mean by that, given that nobody has ever died in the United States due to nuclear power, I have no idea, but I do know (although this is something Hughes does not address, given the era of his book) that anyone who demands instant action against climate change and does not simultaneously demand massive immediate investment in nuclear

power is not a serious person, or, more likely, is the combination of liar and grifter that most global warming alarmists are.

But Hughes's attacks on nuclear power are not random; they are part of his attempts to call for a path forward that is no longer dominated by the systems. He suggests that more nuclear incidents could lead to a permanent erosion in "large, centralized, hierarchically controlled systems," something he desires. From the vantage point of 1989, systems were not disappearing, though they were changing. Hughes notes the rise of Silicon Valley (then a small fraction of what it is now), and concludes "The most likely cause of a displacement of large, centrally controlled systems would seem to be a confluence of contingency, catastrophe, and conversion that would break the technological momentum and socially construct a new style of technology that would not be coupled with mass production of private consumer and of military goods." From this would flow systems designed for smaller scale delivery of goods, and a "postmodern era." Well, we've "socially constructed" a new style of technology, in the form of modern social media and the internet, but it sure hasn't decoupled us from mass consumerism, or from domination by systems. I'm not sure what Hughes means by "contingency," but "conversion" isn't happening, so my money is on catastrophe if we're going to get to the human-centered postmodern era—although I think one can combine technology and human-centeredness, with the right type of state and society. No points for guessing if we have it now.

What of forward progress in technology itself? I am, of course, a big fan of space exploration and exploitation, which in many ways is merely a subset of general significant technological advancement, without which the conquest of Space is impossible. There are many that believe that innovation has ground to a halt. Or, more accurately, that other than incremental innovation has ground to a halt. As Robert Gordon noted a few years back in *The Rise and Fall of American Growth*, and others have also pointed out, there is a great deal of evidence that major advancements have slowed down considerably, as measured by patents and other objective measures. I submit it is worse than it appears, since such objective measures tend to not capture that truly new inventions have almost totally disappeared.

If technology has slowed, why? Hughes never addresses why America's century of technological grandeur ended, or why he selected

1970 as the terminus, instead of, say, 1980. Everyone seems to agree, though, that 1970 was the time that America turned off the path. Maybe it simply is that, as the Traveling Wilburys sang, "There ain't no more opportunity here; everything's been done." But probably not. Two major changes to society took place around 1970. First, the social destruction wrought by the New Left had, by that time, infected the ruling classes, replacing the old ethic of achievement with a focus on individual and group liberation from supposed oppression, and demands for unearned handouts. (It is not a coincidence that the Age Discrimination in Employment Act, that supreme act of stupidity, was passed in 1967.) Second, massive federal (and state) government regulation of all aspects of society came into existence. Productivity increases, a number that can be measured, declined rapidly, and have never recovered. And everyone seems to agree that real technological breakthroughs largely ceased. True, computer power increased—but without increasing productivity, or innovation, rather increasing consumerism and amusement.

Beyond dragging America through molasses, those same forces of destruction had deeper, though harder to measure, effects, in that over time they altered the incentives for those critical, few individuals who have the talent to drive American technology, and thereby reallocated talent to unproductive endeavors. In the century of *American Genesis*, honor and prestige accrued to those young men who made sacrifices and drove themselves to achieve. After 1970, that was no longer true. Honor and prestige accrues not much at all, and when it does, it accrues to wealth derived either from satisfying consumer desires or from being a transaction cost, such as a finance drone, a management consultant, or a lawyer helping clients navigate regulations. This is no way to align the incentives of society and the talented.

All this implies that getting back on the path to true advancement requires, as a first step, upsetting the apple cart in ways that are wholly incompatible with the attitude of most Americans today. Even more than a political system reboot, though, re-creating the enthusiasm of the century ending in 1970 seems like something that cannot be done by plan, but must arise organically—probably, as Hughes suggests, after catastrophe. Short of that, we are unlikely to see true technological progress restart. One step back, so we can take two steps, or more, forward.