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Space-Age Magus

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From beginning to end, experts saw through Buckminster Fuller's ideas and theories. Why did so many people come under his spell?

Buckminster Fuller; illustration by Seth

Reviewed:

Inventor of the Future: The Visionary Life of Buckminster Fuller
by Alec Nevala-Lee
Dey Street, 655 pp., $35.00

In the fall of 1959 the Museum of Modern Art erected three strange structures by Buckminster Fuller in its outdoor garden: a hundred-foot-long "octet truss space frame" of aluminum tubes, a "tensegrity mast" thirty-six feet high, and a grand "geodesic dome"—a three-

quarters sphere assembled from greenish plastic triangles. Passersby on West 54th Street could see the skeletal geometric shapes rising over the garden wall (see illustration below).

Museum of Modern Art, New York/SCALA/Art Resource

Installation view of the exhibition 'Three Structures by Buckminster Fuller' at the Museum of Modern Art, New York City, 1959

Critics raved. "The world of tomorrow is here today," announced Ada Louise Huxtable in *The New York Times*. "Mr. Fuller's space frames and enclosures represent the greatest advance in building since the invention of the arch." She hailed the revolutionary construction methods and the geometrical breakthrough: instead of posts and beams making the rectilinear boxes "that have been the accepted basis of architecture since the beginning of shelter," the visionary Fuller used tetrahedrons and octahedrons, shapes inspired by crystals and atoms, to create "lacy frameworks of the widest versatility." These unconventional forms could grow in any direction, she said. They enabled structures lighter and stronger than any before: "The horizons opened stagger belief." (Huxtable's colleague John Canaday struck a more skeptical tone: "Frequently he has been thought of as a mildly eccentric doodler with an oversize Erector set.... 'R. Buckminster Fuller' itself sounds like a name made up by Evelyn Waugh.")

At sixty-four, Fuller was on the brink of astonishing fame. He was not actually an architect—he had neither the training nor the license. What was he? People called him a poet, a philosopher, a mathematician, an artist, an engineer, and a futurist. "A generalist known as the comprehensive designer," says Alec Nevala-Lee in *Inventor of the Future*, his new biography. Fuller defined "comprehensive designer" as "an emerging synthesis of artist, inventor, mechanic, objective economist, and evolutionary strategist." It pleased him to resist categorization; when *Time* magazine featured

him on its cover in 1964, he said, “I seem to be a verb, an evolutionary process—an integral function of the universe.” He painted himself as a defier of conventional wisdom, a man unwilling to walk in the paths laid down by others.

He was short—five foot six, he said; five foot four, says Nevala-Lee—with “a huge, bald head with white hair trimmed almost to the scalp, a large hearing aid, and black, plastic glasses that magnified his hazel eyes into soft, enormously deep pools.” In his seventies, touring campuses to deliver hypnotically aphoristic lectures with titles like “Man’s Function in the Universe,” he became a rock star of the counterculture—Theodore Roszak, the historian who gave the counterculture its name, identified Fuller as “one of the prophetical voices.” Soon after, and not coincidentally, the blooming personal-computer movement adopted him as a kind of white-haired patron saint—“the twentieth century’s Leonardo da Vinci,” said Steve Wozniak, one of Apple’s founders. Which is funny, because when Steve Jobs showed him one of their computers in 1980, Fuller dismissed it as a toy.

Various friends and acolytes wrote books about Fuller in his lifetime, but until now there has never been a thoroughgoing biography. Nevala-Lee is a novelist, a historian of science fiction, and by his account a Buckminster Fuller obsessive. Like many others, he came to Fuller by way of the *Whole Earth Catalog*, the counterculture bible first published in 1968 by Stewart Brand. Printed in large format through many editions, it featured gear and devices and philosophical nuggets to help people escape a consumer society and return to the land. “The insights of R. Buckminster Fuller are what initiated this catalog,” Brand wrote in the first issue. “Fuller has forged one of the most original personalities and functional intellects of the age.” One page presented four Fuller books and a tantalizing photograph of the structures from the MoMA show. Soon, hippies on camping trips were tying their tarpaulins to trees and calling them “geo-treesic domes.”

Fuller himself meanwhile was circling the world, enchanting the rich and famous with his paradoxical scientific mysticism. He charmed Indira Gandhi and David Rockefeller, watched the moon landing in the company of Arthur C. Clarke and Kurt Vonnegut, and somehow managed to impress Samuel Beckett (though the master of bleakness admitted to “slightly quailing at the optimism”). In 1983 Ronald Reagan awarded Fuller the Presidential Medal of Freedom.

Nevala-Lee has made use of extensive Fuller archives, which were sealed until Stanford University acquired them, sixteen years after Fuller’s death. The man he found is not the man he went looking for. Buckminster Fuller was a nonstop fabulist. He surrounded himself with a cloud of myth that glowed ever larger and brighter through his lifetime. He lied about his grades, he lied about his naval service, he lied about his failed business enterprises, and he regularly claimed

other people's ideas as his own. This doesn't bother the author as much as it should. "He had to become what others believed he was," Nevala-Lee tells us. "Fuller's writings and talks overflowed with misinformation and outright falsehoods, which he methodically built into the reality distortion field that allowed him to achieve so much in a single lifetime." The question is, what did he really achieve?

For a long time Fuller seems to have been a privileged young man lacking any particular direction. He was born in 1895 into New England's Protestant establishment—he traced his lineage back eighteen generations to England by way of the Massachusetts Bay Colony. From the day of his birth it was understood that he would attend Harvard College, as his father, grandfather, great-grandfather, and great-great-grandfather had done, and he joined the freshman class in 1913. He did poorly there, skipping classes and exams, spending his time instead in Boston bars, attending shows and picking up chorus girls, spending more money than he had, and passing bad checks. Before the end of the year, he was kicked out; later he returned and was kicked out again. (The authorized biographies spun failure into virtue: "Young and impetuous, Bucky was not, however, extremely interested in the superb formal education being provided for him"; "*Rest was the norm at Harvard:* he found the place so inert he contrived to get himself thrown out of it twice, the second time for keeps."[1]) With nothing else to do, Fuller moved to New York, where a family friend got him a job with the Armour meatpacking company. He was a beef lugger, then an assistant cashier, then an assistant salesman. Then the United States entered World War I.

Fuller's family had summered in Maine, on Bear Island in Penobscot Bay, and their boats included a forty-foot wooden motor cruiser called the *Wego*. He persuaded his mother to offer it to the Naval Reserve and went aboard as chief boatswain, along with his brother, Wolly. They called themselves the State of Maine Navy. For a while the *Wego* puttered up and down Bar Harbor and other parts of the Maine coast, looking for rumored German submarines. Nevala-Lee punctuates his account of this period with carefully researched corrections to Fuller's own later stories of heroism or ingenuity, which were plentiful. Fuller did well enough to enter the Naval Academy at Annapolis and complete a special three-month program in time to become a communications officer aboard transport ships as the war ended.

He also acquired a wife: Anne Hewlett, the eldest daughter of James Monroe Hewlett, a wealthy architect in New York. It was through his father-in-law that Fuller found himself in a new residential construction business. Housing was a moribund industry ripe for improvement: the war had left the nation with widespread shortages, and few of the advances in materials and technology that were transforming American manufacturing had been used in home building. Hewlett considered traditional masonry to be inefficient and wasteful, and he invented a system of cement-bonded fibrous blocks,

suitable for mass production—“the last word in substantial, economical, weather resisting, heat insulated, sound and vermin-proof building construction.” He named it the Stockade Building System, formed a company, and made his son-in-law president and chief salesman.

Nothing in this time hints at the “comprehensive designer” or visionary futurist Fuller was to become. For the next few years he worked hard, perfecting the manufacture of the blocks, building a factory with turntables and kilns, and expanding the company into new markets, particularly Chicago, where he took charge of operations in the Midwest. He doesn’t seem to have been happy. The business was doomed to failure: it aimed to graft a rationalized building system into a helter-skelter landscape of individual architects and building codes. The first decades of the century kick-started the economy, with streamlining and mass production—ships, airplanes, and above all cars—taking advantage of assembly lines and prefabricated parts, but mass production and home building were not an easy match.

Fuller was living separately from Anne, drinking heavily and exploring Chicago’s speakeasies and brothels. “I don’t believe business will ever go entirely smoothly,” he wrote to her. “I guess I like a certain amount of excitement in it anyway.” The growing company, desperate for funds, brought in investors and managers with whom he clashed, and in 1927 he was forced out. These dark times included the death of his first daughter from pneumonia at the age of three and led to an episode that he later described as his life’s turning point. He looked at himself and saw only “manifold ineptitudes.” “I appeared, in retrospect, a black, horrendous mess,” he said. One rainy night in November, walking alone and looking out over the black water of Lake Michigan, he decided to swim far out until he tired, sank, and drowned. Then he had what he described as a revelation: “You do not have the right to eliminate yourself; you do not belong to you. You belong to the universe.”

This story of crisis and rebirth—“this alleged visionary experience,” Nevala-Lee says—continued on another evening, on another Chicago street. “Suddenly I found myself with my feet not touching the pavement; I found myself in a sort of sparkling kind of sphere,” Fuller recalled. “And I heard a voice, such as I had never heard, ever before, saying, ‘From now on, you need never await temporal attestation to your thought. You think the truth.’” And then, “From now on, write down everything you think.” He told this story many times in many ways. In one version, in case the point isn’t clear enough, the voice says, “Bucky, you are to be a first mini-Christ on earth.”

In his diary he wrote, “After much philosophical thought while walking about, worked out theory of spheres.”

At this point, according to his official story, Fuller took a vow of silence and withdrew into himself for two years: "I didn't want to say anything, make any sounds, until I was pretty sure what those sounds meant and why I wanted to use them." This was more blarney. "If anything, after his epiphany, Fuller never stopped talking," says Nevala-Lee. Fuller also sent away to a correspondence school for a booklet titled *How to Work Wonders with Words*. Whatever else he may have been trying to invent, he was inventing a persona.

His ambition was prodigious. He conceived a business enterprise and named it Fuller Houses before he had anything but a drawing board, drafting supplies, and a new typewriter in his tiny Chicago apartment. He saw the world hurtling into a new industrial age, an age of scientific principles, that seemed to be transforming everything but the most essential of human artifacts: the home. He drew inspiration from the modernist Swiss-French architect Le Corbusier, whose manifesto had just been translated into English as *Towards a New Architecture*. "The problem of the house has not yet been stated," Fuller copied into his diary. "The house is a machine for living in." The house was not yet a machine, it seemed to Fuller; maybe it was time to treat it like a car or airplane, a shiny aerodynamic expression of science. Housing needed systems; at present, it was as if a person needing an automobile had to

> visit one of two thousand automobile designers...to pick and choose from the automobile accessory catalogs motors, fly wheels, electric wires, wheels, fenders, frame pieces, etc., and succeeded in designing an automobile somewhat after the style of some other fellow, and were then to have the design bid upon by five local garages.

No, Fuller thought. It was time for the era of industrially reproduced housing.

One of Fuller's talents was the coining of magniloquent words: *ephemeralization*; *synergetics*; *tensegrity*. First he named his new conception the 4D House; then he renamed it the Dymaxion Dwelling Machine. ("4D" was meant to evoke the fourth dimension, and "Dymaxion" combined *dynamism*, *maximum*, and, for no logical reason, *ion*.) The Dymaxion house would be hexagonal, with wedge-shaped rooms. It would hang suspended from a central mast by tension cables. In hindsight, it looks like a fantasy spaceship. To promote and explain it, he started writing a prospectus or manifesto with drawings that he titled 4D *Time Lock* and printed on a mimeograph machine at a local stationery shop. He mailed two hundred copies to potential investors as well as assorted celebrities, including Henry Ford and Bertrand Russell. He tried some New York publishers too, but they turned him down.

No Dymaxion House was ever built, and Fuller continued with the Dymaxion Car, also known as 4D Transport. From Le Corbusier he got the (correct) idea that an ovoid front would reduce air resistance, and

he designed an object something like an ice cream cone laid on its side, with two wheels in the bulging front and just one in the rear, for steering. It came with a motto: "Don't fight forces, use them." With new investors and employees, he started building prototypes. He plundered a $450 Ford automobile for its engine and parts and eventually, in 1933, when he was thirty-eight, had a working model, nineteen feet long, made of aluminum and wood with a canvas top. The Dymaxion car bore no small resemblance to the gleaming machines dreamed up by Italy's protofascist Futurists. "It wasn't designed to be just an automobile," Fuller said. "It was designed...to become an omnimedium, wingless, flying device with angularly orientable twin-jet stilts—like the jets coming out from beneath the wings of a duck." When he took it to New York on a publicity junket, it caused a sensation.

"I've just enjoyed a ride in a perfect streamline car," gushed a correspondent for *The New Yorker*. He said it resembled an enormous tadpole or a prehistoric bogy and that its rear wheel enabled "the most extraordinary turns and twists in traffic." Actually, it was a crazy contraption, unstable and unsafe. Later that year, a driver rolled it over in forty-mile-an-hour traffic, killing himself and badly injuring two passengers. Fuller kept trying, though. In 1935 he drove Amelia Earhart and First Lady Eleanor Roosevelt in Dymaxion Car #2. He had at least two more accidents, though, injuring his wife and their second daughter. The company soon folded. Later, people accepted Fuller's story that he had built the most stable car in history.

Meanwhile he kept acquiring glamorous friends—the novelist Jean Toomer, the sculptor Isamu Noguchi, the publisher Henry Luce, the composer John Cage, and L. Ron Hubbard ("a pulp author and enthusiastic sailor"). A cavalcade of the century's rich and famous wanders through Nevala-Lee's text, and every so often he just stops and lists them ("His friends from this period included..."). Fuller loved parties and had a string of affairs with young women. He met Albert Einstein soon after the physicist's arrival at the Institute for Advanced Study and eagerly mailed him a synopsis of his ideas. "In all humility," he wrote, "I state that I seem to have articulated aright the 'open-sesame' to *a comprehensive system of sublime commensurability.*" Every prominent scientist gets letters like that.

It was the geodesic dome, of course, that made Fuller really famous. "The dome is his emblem," wrote Hugh Kenner in 1973. "The dome was his breakthrough, his one solid commercial success; the validation, therefore, of his way of thinking, because success means your thinking coincides with a need." Kenner, an influential literary scholar known for his studies of Joyce, Eliot, Pound, and Beckett, became infatuated with Fuller, whom he met in 1967—"no longer the amiable fireplug of the photographs but a tiny white-haired jaunty man, rather deaf"—and wrote a rambling, mystical, discursive book about him: not a biography but a love song, or, as he put it, "a guide to

the system of coherencies he's given us for our space-age navigating." The dome, for Kenner, is an object of reverence, an abstraction as much as a reality—"incredibly light and strong; it's an intersection between materials and mind, mind diminishing reliance on matter... complex, delicate, mysterious."

In kindergarten, Fuller and his classmates made toy structures out of toothpicks and peas, and the geodesic dome was their natural descendant. As he told it, the other children made rectangular structures while he—fumbling with the small sticks because he was almost blind without glasses—made triangles. If you add three more toothpicks to a triangle to form a pyramid, you have a tetrahedron, with four triangular faces and four vertices, the first of the five regular polyhedra, known to the ancients. Unlike a cube, a tetrahedron is inherently rigid: squares and rectangles can bend at the vertices when force is applied, but the angles of a triangle are fixed.

Fuller loved tetrahedrons. Also spheres. The "theory of spheres" that came to him in his Chicago epiphany was an ersatz physics based on a vision of bubbles: "All matter in unforced state is spheroidal not cubistic, and these spheres are expanding for the life of their existence at a fixed rate." This was nonsense, but it turns out that if you assemble rods in rigid triangles and arrange them to approximate the surface of a sphere, you really have something: a lightweight structural network that distributes load without any need for supporting columns. Fuller arrived at this in 1948. First he called it the "Atomic Buckalow." Later he borrowed the word *geodesic* from geometry: a geodesic line is a segment of a great circle on a sphere, the shortest distance between any two points on the sphere's surface.

Decades earlier a German engineer, Walther Bauersfeld, had designed just such a dome, and it served as the roof of the Zeiss Planetarium in Berlin. Fuller apparently didn't know about Bauersfeld, and he patented the geodesic dome in 1954. As he spent more time lecturing to students on college campuses, the simplicity and ingenuity of his dome made it irresistible. It went viral. Students could and did build their own, using readily available materials. Fuller's first public triumph was a spectacular dome roof for the Ford Rotunda in Dearborn, Michigan, built in 1953 from 20,000 aluminum struts framing fiberglass triangles. *Life* magazine suggested that it might be resistant to atomic bombs. Actually, it leaked in the rain. (In 1962 it collapsed in a fire that broke out while workers were trying to seal leaks with tar.) For a while, though, the geodesic dome seemed unstoppable.

With loans from his wife, Fuller started yet another company, Geodesics Inc. The US military used its designs to build "radomes" enclosing radar stations in the Arctic Circle. Fuller almost persuaded Walter O'Malley, the owner of the Brooklyn Dodgers, to build an aluminum geodesic dome for a new baseball stadium, but O'Malley

moved the Dodgers to Los Angeles instead. In 1957 the Kaiser Aluminum company built a forty-nine-foot-high dome in Honolulu for a hotel auditorium. Perhaps the most famous of Fuller's domes is the Biosphere made for the 1967 Montreal Expo, two hundred feet high, which still survives as an environmental museum.

Fuller told interviewers that domes could be built on any scale, without limit; he suggested a dome over Manhattan, to save money on snow removal. Kenner said it didn't matter whether these projects were built or not:

> They are metaphors: Whole Systems, first of all. They draw together functional shelter, elusively simple laws of Nature's structuring, symmetry, medium-high math, countercultural community (or solitude, as you wish), Eskimo simplicity, utter up-to-dateness.

Ada Louise Huxtable fell for this too, when Fuller's dome rose in the MoMA garden. "Theoretically," she wrote, "we could build to the moon."

We can see now that the Fuller dome was the hula hoop of twentieth-century architecture. They were everywhere, and then they were a bit silly. Housing lots are mainly rectilinear for good reason, and circles don't use space efficiently. Fuller himself built a geodesic house—a shell of sixty plywood sections, mostly triangles, enclosing 1,400 square feet—and tried to live in it for a while. The slantwise walls frustrated Anne when she tried to hang pictures, "just sort of dangling out from the curve." Rain leaked through the seams. Neighborhood children liked to climb on the roof, and Fuller chased them away by throwing pebbles.

The joints of geodesic domes always created trouble. The problems of windows and ventilation were unsolvable. Architects like Frank Gehry and Zaha Hadid found more imaginative and free-flowing ways to break from boxy traditions. Ultimately, what gave geodesic domes their initial charm—the simple, patterned, repetitious geometry—made them boring. They're all the same.

Buckminster Fuller can be remembered as a crank and a charlatan and a prophet and a visionary. He was an American type—self-invented, overflowing with ideas and theories, eager to see the universe whole, and born to evangelize.

From beginning to end, experts saw through him. Philip Johnson said in 1932, "Bucky Fuller was no architect, and he kept pretending he was. He was annoying." Donald Coxeter, the century's preeminent geometer—Fuller dedicated a book to him—thought Fuller's efforts were amateurish: he "had overblown his stars as a mathematician" and "knew very little mathematics but was very proud of himself."[2] Still, he grew ever more skillful at finding disciples. On his lecture

tours he could speak for hours without stopping, and he mesmerized his audiences even as he baffled them. “Students find themselves tuned in to the unique Fuller wave length, with its oddly necessary word coinings and its synergetic constructions,” Calvin Tomkins wrote in an adulatory 1966 profile in *The New Yorker*. In print—and Fuller’s books are mainly edited versions of his lectures—his prose is a word salad, the same phrases and catchwords combined and recombined until the mind reels. “Physical points are energy-event aggregations,” he would say.

> When they converge beyond the critical fall-in proximity threshold, they orbit coordinatedly, as a Universe-precessed aggregate, as loose pebbles on our Earth orbit the Sun in unison, and as chips ride around on men’s shoulders.

He never stopped reminding people he was special. “Because I live in the frontiers, what happens to me usually happens to others later on,” he said.

Some of his appeal was sheer optimism. (Beckett was right.) He believed in a coming utopia. He thought no one should have to work merely to earn a living. He had a gift for slogans: “God is a verb.” “Nature never fails.” “Either war is obsolete, or men are.” “Universe is eternally regenerative.” One young listener said, “When I listen to Bucky talk, I feel I’ve got to go out and save the world. Then when I go outside, I realize I don’t know how.” Above all, Fuller offered the promise of change. He was sensitive to the currents of the time in a way that made people feel he was seeing deep forces or patterns of which they had been unaware.

In an era of ever-increasing specialization, the generalist can reconnect strands that have drifted apart. Fuller claimed as his own the study of whole systems. One of his tags was *synergy*, an old word he revived, along with *synergetics*, his coinage for the idea that the whole is greater than the sum of its parts. Another was *ephemeralization*, for the idea of doing more with less, the observation that things “get lighter and lighter by selection and refinement.” The automobile, Fuller noted, produced many times more horsepower per pound than the steam locomotive. There’s a hint of a free lunch in Fuller’s formulation—“ephemeralization trends toward an ultimate doing of *everything* with *nothing at all*”—but Nevala-Lee declares it his most enduring idea. If the collected works of William Shakespeare are published as a heavy clothbound volume one day and available as a weightless smartphone app the next, that’s ephemeralization.

Seeing the earth whole, seeing humans and their technology as part of nature, Fuller attached himself to the rise of the environmental movement and the dawn of space travel. “Spaceship Earth” became another of his catchphrases. We are all astronauts, he would say, traveling through the Universe on our tiny spherical craft. In the

Sixties, no one had yet seen the earth as it appears from outer space, until finally the moon program gave us the iconic photographs: the "blue marble," the earth from afar. The whole earth. Fuller's message was that we're all in it together:

> We have not been seeing our Spaceship Earth as an integrally-designed machine which to be persistently successful must be comprehended and serviced in total.
>
> Now there is one outstanding important fact regarding Spaceship Earth, and that is that no instruction book came with it. I think it's very significant that there is no instruction book for successfully operating our ship. In view of the infinite attention to all other details displayed by our ship, it must be taken as deliberate and purposeful that an instruction book was omitted.

So in 1969 he provided one. In *Operating Manual for Spaceship Earth* he promised "to make the world work for 100% of humanity in the shortest possible time through spontaneous cooperation"—and, in case that wasn't enough, "without ecological offense or the disadvantage of anyone." No wonder so many came under his spell.

Having diligently deconstructed Fuller's mythmaking, Nevala-Lee strains to reclaim some of the magic before it dissipates into air. Fuller "remains indispensable, both as a role model and as a cautionary tale," he concludes. "His deepest insights deserve to be part of every thinking person's life, and he embodied all the contradictions of our future." If we don't find his legacy in our architecture, maybe some of it rests in our ever more powerful technocracy, where he is still revered for having forecast a transformation from the real to the virtual, from wired to wireless, from hardware to software. Nevala-Lee compares Fuller to Steve Jobs, a design visionary, and Elon Musk—both "outsiders who disrupted established fields"—as well as Jeff Bezos, on the theory that Amazon exemplifies, and sells, ephemeralization.

The domes are mostly gone. There's one called Spaceship Earth at the Epcot theme park in Florida, in which visitors can take a sixteen-minute ride. We don't live in Fuller houses or drive Dymaxion cars, and we wouldn't want to. Even Stewart Brand has come to regret touting Fuller in the *Whole Earth Catalog*. "Domes couldn't grow or adapt," he says. "When my generation outgrew the domes, we simply left them empty, like hatchlings leaving their eggshells."

Letters:

Seth Fraden

Small Victories

December 22, 2022

James Gleick

James Gleick's most recent books are *Time Travel* and *The Information*. (November 2022)

1. Lloyd Steven Sieden, *Buckminster Fuller's Universe: An Appreciation* (1989; Basic Books, 2000), p. 19; Hugh Kenner, *Bucky: A Guided Tour of Buckminster Fuller* (Morrow, 1973), p. 30. ↩

2. Siobhan Roberts, *King of Infinite Space: Donald Coxeter, the Man Who Saved Geometry* (Walker, 2006), p. 178. ↩