

THE FUTURISTS

What do today's top forecasters see looming on the horizon? That simple question introduced us to the fascinating field of "futures studies"—its checkered past, muddled present, and uncertain tomorrow(s).

NOSTRA-DUMB*SS

For most of human history, professional prognosticators could only guess what the future would bring. If you sought advice from a shaman, a soothsayer, or Nostradamus, you'd hear whatever the bones or the crystal ball "told" them. It wasn't until the last few centuries that people began to look at the future from a more scientific point of view. Why? Because for most of history the world that you died in was basically the same one you were born into. Societal changes via scientific and technological advances—fire, the wheel, agriculture, metallurgy—were few and far between and could take centuries to spread around the world.

Then, in the mid-1400s, came the printing press and with it the book industry. For the first time, the world's accumulated knowledge was available to the masses. (At least to the ones who could read.) That advance ushered in the Age of Enlightenment, followed by the Industrial Revolution. All of a sudden, the modern world was taking shape...and fast!

GULLIVER'S TRAVAILS

The first futurists weren't necessarily scientists, but a keen understanding of both history and human nature helped them project what might be on the horizon. That concept is called *foresight*. "It refers to a process of visioning alternative futures through a combination of hindsight, insight, and forecasting," explains Tuomo Kuosa in his book *The Evolution of Strategic Foresight*. "(Hind)sight is about systematically understanding the past, (in)sight is about systematically understanding the true nature of the present, and (fore)sight is about systematically understanding the future."

One of the first men to display that foresight was Irish satirist Jonathan Swift. In his 1726 novel *Gulliver's Travels*, the hero travels to a strange island full of futuristic gadgets—one of them a giant "Engine" containing "Bits" that allow even "the most ignorant

Person to write Books in Philosophy, Poetry, Politicks, Law, Mathematicks, and Theology.” It’s all “linked together by slender Wires.” Swift basically described electricity, computers, and the Internet hundreds of years before they were invented.

Even more impressive, Swift wrote about “two lesser stars, or satellites, which revolve around Mars.” How did he know that Mars had two moons 150 years before they were discovered? He wasn’t psychic (as some assumed), just logical: the two planets closest to the Sun have no moons, ours has one, and it was known even then that the large outer planets have several moons. Mars, Swift concluded, would most likely have two. His foresight was spot-on.

TO THE MOON, JULES

Swift used fantastical settings to mock his world, but he wasn’t a prognosticator by trade. French writer Jules Verne, however, *did* try to predict the future. In 1828, when Verne was born, ocean voyages took months, and there were hardly any sets of railroad tracks that stretched from one town to another. Just three decades later, steam-powered ships and locomotives were taking people across oceans and continents in only a week. Knowing that the rate of change was increasing, in 1863 Verne attempted to track it in a book called *Paris in the 20th Century*. Among Verne’s predictions for the 1960s: glass skyscrapers, high-speed trains, gas-powered cars, air-conditioned houses, fax machines, and convenience stores. His publisher rejected the manuscript as being too “far-fetched.”

Verne’s next novel, *From the Earth to the Moon*, has since been hailed as a pioneering work of both science fiction and foresight. The plot: three wealthy men finance a trip to the moon. Their ship was launched from a cannon, so Verne got that part wrong, but he was close to the mark on other details—including the rocket’s escape velocity, the Florida launch site (where NASA missions would take place a century later), the three-man crew, and the splash-down in the Pacific. Even more uncanny, Verne’s moon trip cost \$5,446,675—\$12 billion in 1969 money. Cost of the actual moon mission: \$14.4 billion.

DEEP WELLS

Like Verne, British novelist H. G. Wells witnessed significant change in his lifetime. When he was born in 1866, cities were lit by

torches and oil lamps, and there were no horseless carriages or air travel. By the turn of the century, cities were being lit by gas lamps, and automobiles were steadily replacing the horse. In 1901 Wells published his groundbreaking treatise on the future, *Anticipations*. In it, he foresaw the end of the steam age and the rise of oil. He accurately predicted that the entire region from Boston to Washington, D.C., would become one long system of suburbs, cities, highways, and traffic jams. He even predicted speed limits.

Yet for all his foresight, Wells got a lot wrong: He said that airplanes were just a passing fad and that moving sidewalks would be commonplace in cities. He also predicted that the world's governments would merge into one "New Republic" ruled by scientists who would eliminate all but the white race and "establish a world state with a common language and a common rule." That future hasn't arrived.

COME TOGETHER

For the most part, however, Verne, Wells, and other early futurists worked alone. Wells realized that in order to make accurate forecasts, an incredible amount of information would be required to construct a more complete world picture. That meant bringing together scholars and scientists from disparate fields to share and compare data. So in 1932 he made an impassioned speech on the BBC, calling for "Professors of Foresight":

It seems an odd thing to me that though we have thousands of professors and hundreds of thousands of students of history working upon the records of the past, there is not a single person anywhere who makes a whole-time special job of estimating the future consequences of new inventions and new devices. There isn't a single Professor of Foresight in the world. But why shouldn't there be? Isn't foresight as important as history?

Though Wells never saw the formation of a coalition of futurists, his use of the word *foresight* helped lay the foundation for modern futures studies. The field soon came to be viewed as not just an honorable pursuit, but a necessary one. Two world wars left much of the planet in tatters, and the Cold War threatened to destroy mankind for good. Suddenly, forecasting the future became a respected science...and a bona fide fad.

For Part II, set your Flux Capacitor for page 205.

THE FUTURISTS, PART II

“The future” used to seem exciting. Has it gotten scarier? Here’s Part II of the history of prediction. (Part I is on page 68.)

THE GOLDEN AGE OF FUTURISM

TIn the 1950s, World’s Fairs showed millions of people what the “World of Tomorrow” would look like: Dad flies the family car to work while Mom activates the self-cleaning house and picks out a three-course meal (in the form of a pill) for dinner. In 1958 the TV show *Disneyland* predicted that by 2008 American highways would carry driverless cars, glow in the dark, and automatically melt ice and snow. Atomic reactors would burn tunnels through mountains in mere minutes. And of course, *The Jetsons* predicted that every future family would have a sassy robot maid.

In 1966 a futurist named Edward Cornish (who would later predict the 9/11 attacks) brought H. G. Wells’s dream of a future-oriented think tank to life when he founded the World Future Society. Billing itself as “a neutral clearinghouse of ideas on the future,” the WFS’s mission was (and still is) “to enable thinkers, political personalities, scientists, and lay-people to share an informed, serious dialogue on what the future will be like.” The society amassed thousands of members from all over the world. Senior members advised U.S. presidents (last one to be advised by the WFS: Ronald Reagan) and other world leaders, and the most famous futurists became household names. Here are a few:

- **R. Buckminster Fuller:** Fuller was an American philosopher, futurist, and architect (he invented the geodesic dome). After personal tragedy and alcoholism nearly led him to suicide in the 1920s, Fuller dedicated his life to helping mankind through scientific advancement. His boldest prediction: by the year 2000, the means would be available to end poverty and world hunger. That prediction was actually proven true in 1977 when a study conducted by the National Academy of Sciences concluded: “If there is the political will in this country and abroad...it should be possible to overcome the worst aspects of widespread hunger and malnutrition within one generation.” So why does poverty still exist? Because another one of Fuller’s predictions *didn’t* come true: “By 2000

Gag me! There are, on average, 7 food-hygiene errors in every 30-minute cooking show.

politics will simply fade away. We will not see any political parties.”

• **Isaac Asimov:** One of the 20th century’s most respected science-fiction writers, Asimov predicted in 1942 that as robotic technology advanced, so would the need to govern robots with a set of rules. In his short story “Runaround” (which became the basis for his novel *I, Robot*), Asimov outlined “Three Laws of Robotics”:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

Although robots haven’t yet become as commonplace as Asimov predicted, in the early 2000s, Japan’s Ministry of Economy, Trade, and Industry has urged manufacturers to include the Three Laws in the safety requirements for all of that country’s robots.

• **Arthur C. Clarke:** Another science-minded writer, Clarke predicted in the 1950s that there would be a global library by 2005 (it’s currently being created on the Internet) as well as a global network of satellites to transmit hundreds of TV channels and provide navigation “so no one is ever lost again.” He also envisioned a “personal transceiver, so small and compact that every man carries one.”

• **Alvin Toffler:** In his 1970 book, *Future Shock*, Toffler warned that by the year 2000, technological advances will come so fast that they’ll actually make people’s lives more complex, not easier, leading to what he called *information overload*:

Millions of ordinary, psychologically normal people will face an abrupt collision with the future, which will lead to distorted perceptions of reality, confusion, and fatigue.

Has Toffler’s prediction come true? Just consider all the passwords, remote controls, onboard navigation systems, and Internet search engines you have to deal with today. As the rate of technological advances continues to increase, predicting the future will become even more difficult. “Much like walking through a dark forest with a flashlight,” says futurist Thomas Frey, “the future only comes into focus a short distance in front of us.” That distance seems shorter than ever. And the field of futures studies finds itself at a crossroads.

For Part III, transport yourself to page 337.

A tossed coin is slightly more likely to land the way it was facing when flipped.

THE FUTURISTS, PART III

The prognosticators we introduced you to in Part II (page 205) had it easy compared to today's futurists. Here's a glimpse into the mind-bogglingly complicated field of modern futures studies.

WHAT IF...?

The scene: World War I—a small village in northern France. Private Henry Tandey of the British Army spots a German soldier; Tandey aims his rifle and prepares to shoot...but then he notices that the soldier is wounded and doesn't even have the strength to raise his weapon. Tandey hesitates—and then makes a fateful decision: he spares the enemy soldier's life.

That soldier, it turned out, was a 29-year-old lance corporal named Adolf Hitler.

What if Tandey *had* killed the man who would one day attempt to conquer Europe? Would World War II have happened? Would humans have ever created the atomic bomb or traveled into space? (Would there be an *Uncle John's Bathroom Reader*? Gasp!)

Those are the kinds of questions that today's futurists ponder all the time. (Okay, maybe not the one about Uncle John's.) Some have argued that because Hitler was only one man, his premature death couldn't have altered the timeline too significantly. Another view: it was only Adolf Hitler's unique blend of hatred and charisma that could have brought the Nazis to power. If so, his removal from history would have *drastically* altered humanity's future. Tandey's decision to spare Hitler's life was the metaphorical butterfly in what's known as the "butterfly effect."

E UNUM, PLURIBUS

The concept was originated in the 1960s by a meteorologist named Edward Lorenz, who put it like this: "The fluttering of a butterfly's wing in Rio de Janeiro, amplified by atmospheric currents, could cause a tornado in Texas two weeks later." Lorenz had that revelation while he was trying to write a computer program that could predict the weather. At one point, he decided to rerun an earlier weather scenario, but he took a shortcut and substituted a slightly rounded-down number in the program. Result: the weather scenario

Michael Jackson wanted to do a Harry Potter musical. (J. K. Rowling told him to beat it.)

that followed differed drastically from the original one. Surprised, Lorenz checked his data and saw that the number he'd rounded down—from 0.506127 to 0.506—was to blame. That miniscule change was enough to create a completely different weather pattern.

CHAOS ENSUES

Lorenz's revelation set the foundation for the field of *chaos theory*, which he defined as “when the present determines the future, but the approximate present does not approximately determine the future.” In other words, because weather is *chaotic* as opposed to *linear*, it's impossible to accurately predict exact atmospheric conditions more than a week or so out—even with today's advanced computer models. If one flap of a butterfly's wing really can affect distant weather patterns, what effects do thousands of airplanes taking off and landing every day have on the weather?

Worse, we can know that the flap of a butterfly wing will affect the future, but we don't know how—or, as Lorenz put it: “An acceptable prediction of an instantaneous state in the distant future may well be impossible.” It would be akin to witnessing Private Tandy spare Corporal Hitler's life and telling him, “Way to go, dude—you've just ensured that we're going to have a *second* world war.” No one could have known that.

SO WHERE IS MY FLYING CAR?

That could be why for every prediction that futurists like Arthur C. Clarke and Buckminster Fuller got right, they got a lot more wrong. Some examples:

- Clarke posited in his 1968 novel *2001: A Space Odyssey* that, by the turn of the twenty-first century, civilian space travel would be an everyday thing. That didn't happen.
- Those “World of Tomorrow” rides from the 1950s bear little resemblance to today's world. We still have to clean our houses and cook our meals and drive our own cars (for now). In the 1980s, the *Back to the Future* film trilogy (which used futurists as consultants) predicted that by 2015 lawyers would be outlawed and teenagers would be riding around on hoverboards. Wrong and wrong—not to mention the fact that the movie failed to foresee the proliferation of mobile phones and handheld devices. (*Star Trek* did predict those

two things, but they weren't supposed to arrive for another couple of centuries.)

- More recently, in 1999 a futurist named Watts Wacker (that's really his name) confidently announced that within two years, the United States Post Office would offer free e-mail accounts.

In fact, very few futurists foresaw that personal computers—not transportation and space travel—would come to define the new millennium. How could they have all been so wrong? “The future is uncertain,” admits Paul Saffo of California’s Institute for the Future. “And thanks to technology, that uncertainty is increasing.” Every new advance leads to more advances, so even if you can accurately predict the world that today’s technology will bring, it’s next to impossible to predict what *that* world’s new tech will bring.

TAKING A RISK

Ray Kurzweil calls this concept a “technological singularity,” a point beyond which it is impossible to predict what will happen. That will come, he says, by the year 2030. As one of today’s most renowned futurists (and director of engineering at Google), Kurzweil’s words carry weight. In the 1980s, he was one of the few to accurately predict the fall of the Soviet Union and the rise of the Internet. But he also predicted that by 2000, speech-recognition software (which his company invented) was going to replace keyboards. That hasn’t happened yet—and therein lies the modern futurists’ dilemma: no matter how many predictions they get right, every wrong one puts another chink in the armor of the entire discipline.

According to futurist Paul Saffo, “Single-scenario forecasts are useless. We don’t live in a deterministic world; the best any of us can do is postulate reasonable alternatives and warn our clients what they should keep their eyes on.” Result: today’s futurists aren’t the celebrated thinkers they once were—they’re “risk-assessment specialists” hired by companies to draw road maps of the next 10 or 20 years and help them avoid pitfalls. For example, if General Motors had been warned in the mid-1990s that rising U.S. health-care costs for retirees were going to be a factor in the company’s bankruptcy, perhaps it could have structured benefits differently and avoided the need for a government bailout a decade later.

What’s next? We predict you’ll find out on page 460.

THE FUTURISTS, PART IV

Despite the fact that the golden age of futurism is in the past (see Part III on page 337), futurists still make grand predictions. Here's what we (might) have to look forward to.

CYBORGS: In 2013 futurist Ray Kurzweil projected the next big leap forward in technology: “brain-uploading.” If he’s right, you’ll be able to transfer all of your thoughts and memories into a computer, and perhaps even get a new robotic body. “When you talk to a human in 2035,” says Kurzweil, “you’ll be talking to a combination of biological and nonbiological intelligence.” Author Zoltan Istvan calls this “transhumanism”—using science and technology to enhance and lengthen lives. He predicts that by 2100, humanity will consist of cyborgs living in harmony with intelligent machines that have solved all of the world’s environmental, poverty, and overpopulation problems.

• **ANDROIDS:** Today’s robots make cars and vacuum floors, but will they ever talk to us like people? Yes, says futurist Dick Pelletier. He predicts that by 2025, your household android will be more important than your car. “Priced from \$30,000 to \$100,000, these electronic household workers will wear skin made of soft, sensitive nanomaterials—tough, but with the gentle touch of a masseuse. They will understand and speak perfect language and perform butler, chef, and cleaning services; even carry disabled patients up stairways. People will wonder how they ever got along without them.”

• **THE GLOBAL BRAIN:** Futurist Kevin Kelly, cofounder of *Wired* magazine, forecasts that all of the world’s computers will become one sentient being. “The next stage in technological evolution is a single thinking/web/computer that is planetary in dimension,” he says. “This computer will be the largest, most complex, and most dependable machine ever built. It will also be the platform that most business will run on.” Kelly says this process has already begun; today’s Internet is the Global Brain’s “first OS” (operating system).

• **INCREASED LIFE SPANS:** According to computer scientist Aubrey de Grey, the first human being who will live for 1,000 years has already been born. De Grey isn’t just predicting this; he’s

Bolts of lightning are like fingerprints: no two are identical.

working to make it come true by attempting to identify and eliminate aging factors. De Grey's critics argue that it's not that simple... and that he's not a doctor. His response: "The only difference between my work and the work of the whole medical profession is that I think we're in striking distance of keeping people so healthy that at ninety they'll carry on waking up in the same physical state as they were at the age of thirty. What I'm after is not living to one thousand. I'm after letting people avoid death for as long as they want to." Thanks to recent advances in genetics and stem cell research, eliminating diseases and regrowing limbs and organs is no longer the stuff of science fiction.

- **"THE INTERNET OF THINGS":** Patrick Tucker, an editor at *The Futurist* magazine, forecasts that soon "big data" will not only know where everyone on Earth is—it will anticipate their needs. "Computerized sensing is being incorporated into our physical environment, creating an 'Internet of things,'" he says. "Data from RFID tags, surveillance cameras, unmanned aerial vehicles, and geo-tagged social-media posts will telegraph where we've been and where we're going. These data streams will be integrated into services, platforms, and programs that will provide a window into the lives and futures of billions of people." If you saw the 2002 movie *Minority Report*—which used futurists as consultants—you saw this in action when Detective Anderton (Tom Cruise) walks into a Gap clothing store, a scanner reads his eye, and a hologram pops up to suggest items he might want to purchase.

- **SPACE ELEVATORS:** Instead of choosing a floor when entering an elevator, you choose an orbiting ship or a space station. Arthur C. Clarke proposed the idea in 1979, and the technology to make it happen is real—at least in theory. The elevator would travel on a tether consisting of nanomaterials (such as bonded carbon atoms) that would be up to 100 times stronger than steel. Centrifugal force would keep the tether in geosynchronous orbit above Earth. A four-year study by the International Academy of Astronautics concluded that space elevators are "feasible." We might see them in this century.

- **UNIVERSAL TRANSLATOR:** In a world with more than 6,000 languages, having everyone able to understand each other would have a huge impact. The computing power required to

About 86,000 Americans go to the emergency room every year after tripping over their pets.

translate not just words, but syntax, tone, and grammar isn't quite here yet (as anyone who's tried using an Internet translator knows). But as technology continues to advance, an accurate real-time translator may not be far off. The universal translator might be part of a wearable computer (something else to look forward to) that you won't even see, but you'll hear English whenever anyone is talking to you. Later versions will be implanted in people's brains.

• **ANIMAL TRANSLATOR:** Imagine ordering your dog not to go in the neighbor's yard and have him not only understand you but be able to answer you back: "No, *you* stay!" In 2004 researchers Susan Clayton and Bruce Lloyd wrote that someday soon we may all be real-life Dr. Dolittles: "It is not difficult to see tomorrow's sophisticated computers rapidly processing complex data from animals and transmitting it in a useful form to humans via an earpiece, handheld device, or spectacle-lens display. Similarly, computers are likely to be able to translate messages from humans into stimuli that suit the cognitive style of the intended animal recipient."

• **RODENTS OF UNUSUAL SIZE:** Of course, none of these glorious futures will come to pass if some of the more dire forecasts come true and humanity gets wiped out (due to war, climate change, or an asteroid impact). If our species does become extinct, which animals will take over? Rats, according to British futurist Jan Zalasiewicz. He says that despite our efforts to control rat populations, their numbers are always rising. Their intelligence is unequaled among mammals their size, and they can adapt to almost every environment on the planet. And once all the larger animals are gone (usually the first to go in mass extinctions), the rats will increase in size, to perhaps "twenty pounds or larger," Zalasiewicz says. But like any modern futurist worth his salt, he doesn't call his theory a prediction: "It's a guess, a thought experiment."

INTO THE UNKNOWN

For the most part, all of these "guesses" are just short-term forecasts. Looking into the future is fun, but it's impossible to do it with confidence. Who knows what today's young minds will do with the technological advances of tomorrow? Their world will undoubtedly look very different from ours. As World Future Society founder Edward Cornish candidly said in 2007: "I long ago gave up being sure of anything."

Study: Overpaying for something activates the part of the brain associated with guilt and pain.