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The future, just around the bend

Mar 10th 2005 From The Economist print edition

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Ray Kurzweil is an accomplished inventor, but he is best known for his wild prognostications about the future. Is he as crazy as he sounds?

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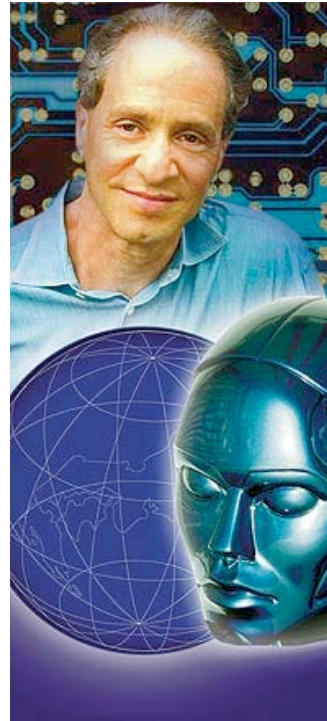
BLAME it on Tom Swift. For it was Swift, the fictional teenage genius who repeatedly saved the world with his scientific savvy, who inspired Ray Kurzweil to become the inventor, engineer and prognosticator he is today. "I started reading those books when I was about nine years old, and couldn't put them down," he says. It wasn't just the solartrons, diving seacopters and triphibian atomicars that mesmerised him; it was the way the irrepressible Swift applied his mind, and the technology it conceived, to solve human, often personal, problems. "I was smitten by the power of ideas to change the world," says Mr Kurzweil.

It is as good a way as any to explain how a shy boy growing up in a financially pinched household in Queens, New York, managed to transform himself into a restless thinker who has since founded nine businesses, written five books (with a sixth on the way), won the American National Medal of Technology and the Lemelson-MIT prize for invention and innovation, and who relentlessly preaches the gospel of accelerating technological advance that will soon strain our ability to comprehend what lies ahead.

Like his boyhood hero, Mr Kurzweil cannot seem to keep his fingers out of the future. He keeps venturing on to the bleeding edge—his critics say the lunatic fringe—of science to imagine futures where computers are as intelligent as we are, millions live in virtual reality and immortality is not only possible, but likely. It will all unfold, he says, over the next 25 years as overlapping technological revolutions in genetics, nanotechnology and robotics render the world radically different from the place it is today.

The futuristic landscapes that Mr Kurzweil paints have often been derided as outlandish. Nevertheless, he says he stands by his record. In his first book, "The Age of Intelligent Machines", published in 1990, he predicted that in just a few years a global computer network would emerge. In late 1993, the web hit the mainstream and never looked back. He also predicted that a computer would defeat a chess champion by 1999: sure enough, IBM's Deep Blue defeated Garry Kasparov in 1997. "Well," shrugs Mr Kurzweil, "I was off by a couple of years."

Making predictions, particularly about the future, is a dangerous business, of course: long-awaited technologies such as flying cars, space hotels and videophones have yet to materialise (or, in the case of videophones, they have arrived, but nobody wants to use them). But Mr Kurzweil insists he is not trying to oversell the future. He works with a team of ten people, researching big technological trends, examining them



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closely, and then methodically plotting where they will lead. "I'm an engineer," he says. "I like to measure things." And if those measurements lead somewhere improbable, so be it. He is just passing the news along. He is not outlandish; the future is.

His predictions may sound wide-eyed, but Mr Kurzweil himself is not. As he sips a cup of green tea, his calmness makes it easy to imagine the shy, solitary boy who grew up reading books and tinkering with electronic circuits. And while he relishes wandering into controversial areas where he can play the role of agent provocateur, he maintains he has arrived at his conclusions scientifically. Being an inveterate measurer, he says he has looked back not decades, but eons, and has found that the organisation of information has been accelerating at an exponential pace for millions of years.

We are just beginning to see the results of this effect now, he argues, because we have reached the "knee of the curve", where a slowly rising trend line suddenly rockets upward. That is why many of his predictions seem so implausible, he says: the notion that "exponential change is subtle" is what most futurists and scientists miss. Mr Kurzweil calls it the Law of Accelerating Returns, and it underpins most of his predictions.

"Ray takes ideas everyone accepts, and follows them to logical conclusions that almost no one accepts," says Neil Gershenfeld, a professor at the Massachusetts Institute of Technology. Admittedly, at times Mr Kurzweil goes "a bit far" for specialists versed in the limitations of a particular field, "but he does it with care, and he does his homework," says Dr Gershenfeld. "He filters out the clutter and identifies important trends with remarkable accuracy," says Ralph Merkle, director of the Georgia Tech Information Security Centre and an expert in nanotechnology. Yet while accuracy is important, Mr Kurzweil's supporters say that his most important role lies in driving home to as many people as possible the idea that radical change lies just around the corner. "He plays at a valuable boundary between working scientists and futurists, visionaries and science-fiction kooks," says Dr Gershenfeld. "It's useful to have such 'points of infinity'."

From the age of five, Mr Kurzweil says he knew he wanted to be an inventor. By the age of 12 he was building and programming computers, and as a young teenager he appeared on "I've Got a Secret", a popular American quiz show. Mr Kurzweil walked on to the stage, played a classical piano piece for the celebrity panel and then shared his secret with the host and audience: the piece he had just played was written by a computer, and he had programmed the computer that created it. By the time he was an undergraduate at the Massachusetts Institute of Technology, studying computer science under artificial-intelligence guru Marvin Minsky and creative writing with playwright Lillian Hellman, Mr Kurzweil was finding ways to profit from his programming prowess.

In 1967, he hatched an idea for computer software that would help high-school students find a college that matched their interests and skills. Students filled out a form with 200 questions, and Mr Kurzweil's program compared their answers with a database of 2m facts about 3,000 colleges, all compiled by five Harvard students he had hired as researchers. After selling the resulting company in 1968, Mr Kurzweil went on to found Kurzweil Computer Products, where he developed breakthrough optical character-recognition technology that led to the world's first reading machine. Mr Kurzweil sold that company to Xerox in 1980.

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Click to buy from Amazon.com: "Fantastic Voyage: Live Long Enough to Live Forever", by Ray Kurzweil and Terry Grosman (Amazon.co.uk); "The Age of Intelligent Machines", by Ray Kurzweil (Amazon.co.uk).

Ray Kurzweil's website has information about his work and excerpts from his first book. Kurzweil Technologies has more information about Mr Kurzweil himself and his companies. See also details about Mr Kurzweil's new book.

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"Mr Kurzweil plays at the boundary between scientists, futurists, visionaries and sci-fi kooks."

Spot the pattern

Then came Kurzweil Music Systems, the result of a collaboration with Stevie Wonder, a blind musician who was the first private customer to buy one of his reading machines. Mr Wonder contacted Mr Kurzweil after he heard about the machine in news reports, and asked if there might be some way to apply the power of computer technology to music. That led to the creation of electronic keyboards able to imitate the sound of a grand piano. Mr Kurzweil sold the company in 1990 to Young Chang of South Korea, the world's largest piano-maker.

The list goes on: Kurzweil CyberArt, Kurzweil Educational Systems, Kurzweil AI, the Medical Learning Company. All are run out of an unspectacular four-storey building in the picturesque town of Wellesley, Massachusetts, the products of Mr Kurzweil's Swift-like curiosity and enthusiasm. Mr Kurzweil's most active current venture is FatKat, which uses pattern-recognition software to spot trends and automate stockmarket transactions.

As wide-ranging as these enterprises appear, one common theme unites them: a fascination with pattern recognition, which Mr Kurzweil argues is at the heart of human intelligence. Many of his inventions—from optical character-recognition software to CyberArt's paintings to FatKat's transaction engine—attempt to imbue machines with something like human intelligence, and often blur the line between art and science. Perhaps the most unorthodox example is Ramona, a computer-generated female singer who is also Mr Kurzweil's virtual alter-ego.

Not even Tom Swift could have come up with this. At the TED (technology, entertainment, design) conference in 2001, Mr Kurzweil wanted to demonstrate how virtual reality can allow people to reinvent themselves. "That is one of the benefits of virtual reality," he says. "You don't have to be the same boring person all the time." Motion sensors tracked his movements and linked them to Ramona, whose image was projected on a large screen as Mr Kurzweil put on a show, complete with a rock band. "As I moved, Ramona moved in exactly the same way in real time, and my voice was transformed into Ramona's voice. We got a standing ovation," he says. A team from Warner Brothers saw the performance and, says Mr Kurzweil, used it as the inspiration for "S1m0ne", a movie about a Hollywood director who creates a virtual actress who takes on a life of her own.

The way Mr Kurzweil sees it, Ramona is a glimpse into the future. In ten years or so, he imagines that millions of people will spend large chunks of their time interacting in virtual worlds with other people masquerading as whoever they choose—a kind of elaborate masked ball in cyberspace that will eventually evolve into a full-blooded parallel universe. (Already, millions of people play online games, which are becoming ever more elaborate.) "We will have full-immersion virtual reality by 2010," Mr Kurzweil predicts. "The images will be written directly to your retinas from your eyeglasses or contact lenses." By the late 2020s, he expects virtual reality will be implemented using nanobots injected directly into the brain that will bypass the input from the outside world and generate the signals needed to create an alternative reality.

If all of this seems too outlandish to be believed, Mr Kurzweil doesn't care. As unnatural as these ideas may seem to others, he says they are just part of a natural evolutionary progression. Apes would have seemed impossible to the first lungfish. A civilisation of humans literally melding with their technology may seem impossible as well. But, he argues, that does not mean it will not happen.

All of which leads to the 57-year-old Mr Kurzweil's most outrageous prediction: immortality. In his new book, "Fantastic Voyage: Live Long Enough to Live Forever", he and his co-author argue, in sometimes dense scientific detail, that death no longer need be a fact of life. Current advances in medicine, they say, will lead to major breakthroughs in genetics between 2015 and 2020 that will extend life spans. Then, by the late 2020s, advances in nanotechnology will make possible truly radical life extension and rejuvenation. So to achieve immortality, people alive today merely need to survive long enough to reach the first of these breakthroughs, which will in turn enable them to benefit from the second.



Mr Kurzweil in his Wonder years

Mr Kurzweil has no time for sceptics who argue that human immortality is impossible, or that mortality is what makes life precious. "That's nonsense," he says. "What makes the human species unique is that we insist upon going beyond our limitations. We are not staying within the limits of our biology. Life expectancy was 37 in 1800, 45 in 1900 and now it's over 80. Ageing is not a graceful process and death is a great tragedy, a profound loss of knowledge, skill, experience and relationships." When asked if he expects to live forever, Mr Kurzweil answers without hesitation: "Yes. I expect I will." After all, when you have as many ideas as Tom Swift, you need all the time you can get.

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