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Today Everyone Talks About AI, I encountered it 60 years ago.

A lifetime of innovation.

TONY LUONG/THE NEW YORK TIMES

Ray Kurzweil, 76 and a native New Yorker — made his first invention in 1963. A machine that created musical pieces. A photo from the time, with his reading machine capable of reading text aloud.

di **Riccardo Staglianò**

TODAY, no one is surprised anymore if artificial intelligence (AI) creates a song in the style of the musician you want. In 1963 — the year of Surfin' USA by the Beach Boys — it was a novelty bordering on magic.

But it was in that year Ray Kurzweil — a pianist and son of an artist — created a computer program of this kind. By analyzing pieces by famous composers — it was able to produce other songs in the same vein.

It was the 1st in a series of inventions. The most significant of those, in my view, was optical character recognition. A device that could recognize + digitize text from a printed page.

This would go on to become the basis for a reading machine that, once it decoded the words, would have them spoken by a synthesized voice — also a Kurzweil brainchild. And so, at least as far as printed text was concerned, blind people re-gained their sight.

If in a single working life, if someone stopped at this miracle, it would already be a result worthy of the highest respect. But Kurzweil went on inventing — music synthesizers, flatbed scanners — and building the future.

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The coming singularity.

He ended-up cementing his name to the concept of the "singularity" — which warrants a quick etymological explanation. In math, a singularity is the point at which — after a function has grown larger + larger — it becomes infinite. In physics, it's that "place" in black holes where gravity becomes so strong that it crushes everything inside them.

As far as tech is concerned, finally, it indicates the moment when artificial intelligence (AI) — improves itself more + more. It becomes so powerful that it surpasses human intelligence. With unpredictable consequences for humanity, — for better or for worse. It's always a point of no return.

Over his career, Kurzweil has received the National Medal of Technology + Innovation, the highest honor in its field, from fmr. US President Bill Clinton. He served as a director of engineering at Google.

Living forever.

Since he firmly believes that even death is merely a problem awaiting a solution — he identifies as a trans-humanist.

In practical terms, this means he swallows 100 pills a day. At 76 years-old, he still looks in great shape. He's busier than ever, so we had to interview him over e-mail about his 2024 book The Singularity is Nearer. The Italian edition is titled: *la Singolarità è Più Vicina. It's published by Apogeo.*

the INTERVIEW.

question ::
I used to be among those who — when faced with the notion of a possible date for the singularity — would shrug it off. But the formidable acceleration of generative AI has led me to re-consider. How about you — today do you feel vindicated by history?

Ray Kurzweil ::
Having worked in AI for 61 years — longer than anyone else alive — it's gratifying to see AI at the center of global conversation. I started monitoring computing power in 1983.

That was when I discovered that information tech was advancing exponentially. A well-known chart tracks the amount of computing power you can buy for one dollar, adjusted for inflation. Despite world wars + economic depressions — it's grown on a logarithmic scale from 1939 to today.

Back then, the first computer performed 0.000007 calculations per second / per dollar. Today, Nvidia's latest B200 chip does 500 billion. That's an increase of 75 trillion times the amount of computing you get for the same amount of money.

question ::
What follows from that?

Ray Kurzweil ::
Starting from that observation, in 1999 I predicted in my book — the Age of Spiritual Machines — that computers would achieve human-level intelligence by 2029. A forecast met with great skepticism + alarm. Stanford Univ. held a conference to debate it, and 80% of experts then thought it would take 100 years. Today, the scientific consensus aligns with my prediction. Some say it might happen sooner. Yes, it's rather gratifying.

question ;:
Computers could match us in 2029, then surpass us in 2045. Why haven't you updated these dates since you first suggested them 19 years ago?

Ray Kurzweil ::
Because between those 2 dates, we'll see the full bloom of the bio-tech revolution. In other words, nano-tech will allow us to connect our brains to the cloud, expand our intelligence a million-fold, and unlock new levels of consciousness that today are unimaginable. That's when we'll reach the singularity.

question ::
What do you think will be the consequences of this overtaking?

Ray Kurzweil ::
It won't be an overtaking. AI is not an alien invasion from Mars. It comes from within us and will reflect our humanity. AI is a tool we're building to extend our brains, just as we once built tools to extend our muscles so we could construct roads and bridges.

We're building AI so we can merge with it and find solutions to humanity's great challenges. Energy, for instance. The Earth receives enough solar energy to meet more than 10,000 times our needs.

Over the past 10 years, we've used super-computing to discover

LOS ANGELES TIMES VIA GETTY IMAGES

La giornalista Deborah Vankin del *Los Angeles Times* prova un **massaggio robotico** al Paul Wellness Studio

materials for solar cells + energy storage. Consequently, the amount of energy derived from renewable sources —

solar, wind, geo-thermal, wave energy, and bio-fuels — doubles every 4 years.

If we look only at solar, the growth rate is even higher. It's doubled every 28 months since 1983. Meanwhile, the exponential advances in AI are significantly reducing production costs.

For example, solar cells since 1975 have become 99.7% cheaper in terms of cost per watt. We're seeing similar progress in every sector: medicine, manufacturing, agriculture.

question ::

How should we prepare for the post-singularity?

Ray Kurzweil ::

By developing an AI in line with our values and used for good, not evil. We have a moral imperative to fulfill AI's promise — while also managing its potential dangers. This means letting it progress,

La copertina di ***La Singolarità è più vicina*** *quando l'umanità si unisce all'AI* (Apogeo, 416 pagine, 25 euro) di **Ray Kurzweil** con prefazione di David Orban

but protecting our social institutions + ethical ideals. Those values have greatly reduced violence in recent centuries. In business — as AI masters all human skills — value will shift from individual skills to entrepreneurship, creativity, and adaptability. To thrive in the future, we must re-think old business models. And create new ones that don't yet exist. It will take courage.

question ::

In your book, you suggest many jobs will disappear. Could you tell us which ones?

Ray Kurzweil ::

AI will take over many job categories. This will happen as its capabilities

grow exponentially. One of the first sectors to be affected is transportation — both individual + commercial.

We'll rely on self-driving vehicles. In manufacturing, robots will become increasingly able to perform complex tasks, leading to greater automation in plants + production lines.

AI-powered chatbots are already widespread in customer service, as well as data entry and processing. I wouldn't advise starting a career in computer software programming now — because large language models (LLMs) can already generate software code based on simple instructions.

question ::
Yet you still see the glass half-full, right?

Ray Kurzweil ::
While AI will indeed cause job losses, it will also create new ones. Jobs have always changed over time. In the early 19th century, over 80% of the US workforce was employed in agriculture.

By 2023, that number had fallen to less than 1.4% because of tech advances. Despite this drastic drop, the overall US workforce has continued to grow. In 1900, it made up 38% of the population; by 2023, it had risen to over 49%.

That growth is due to the creation of new jobs in emerging sectors, primarily tech. For example, In 1990, web-related jobs, mobile app development, data analysis, and online merchandising didn't exist. Today, they're major sources of employment. Essentially, the future's jobs won't look like today's. Right now, we have more jobs than we've ever had. The average US personal income is 10 times what it was 100 years ago — in today's dollars.

question ::
Economist Daron Acemoglu — recent Nobel Prize winner — says that whether AI replaces humans or only boosts their productivity, depends on our decisions. Do you agree?

Ray Kurzweil ::
As I said, I don't think we're in competition with AI for survival. AI will amplify our intelligence and all human abilities. Including creativity, compassion, and understanding the world.

Those who adapt + pursue their passions will thrive. And going forward, the line between humans and AI will blur until it becomes impossible to distinguish the two.

question ::
Still, there's the question of economic survival. Do you think a basic income is the solution?

Ray Kurzweil ::
The total number of bits transmitted has effectively doubled every year. Put differently, it's a 50% annual deflationary trend, underpinning every aspect of our tech.

It's thus a powerful deflationary force that will significantly push down the cost of everything.

As AI pervades every sector, the true value of products will be the information they contain. In essence, the innovation behind them — from the creative ideas to the lines of code controlling how they're manufactured.

question ::
We already have some examples of this trend…

Ray Kurzweil ::
Just look at how the music industry has transformed from physical records to audio files. The cost of copying an audio file is nearly zero. It's the data it contains that determines its value.

Another example: though you can buy a smart-phone that's twice as good as the one from 2 years ago at half the price — economists don't factor in that added value.

As AI spreads across every sector, we'll see the same cost decreases in everything we value — clothing, housing, food, and energy. As a result, the cost of meeting our basic needs will drop dramatically.

There will be an open-source market for printed clothing, housing, and food created with the help of AI. By the early 2030s, providing for your family's basic needs will become relatively easy. Within a decade, it will be inexpensive to live at a level we'd consider luxurious today.

question ::
That sounds rather optimistic. Fast fashion, for one, has existed for years but hasn't reduced inequality at all.

Ray Kurzweil ::
I know it sounds utopian, but we've already done something similar. Imagine the effect on our hunter-gatherer ancestors if they walked into a modern super-market. They wouldn't believe their eyes.

As we enter an age of abundance, the traditional model of employment will be disrupted. We'll need to find new ways to ensure economic security for all. In the decade starting in the 2030s, Universal Basic Income could provide a safety net, guaranteeing that everyone has the means to survive + thrive in this new world.

question ::
What do you mean by "extending the neocortex into the cloud?

Ray Kurzweil ::
Current brain-computer interface tech like Neuralink and Synchron are still in their infancy. A key challenge is bandwidth. At the moment, Neuralink doesn't have the bandwidth needed to fully realize its potential.

The company aims to solve this problem in the 2030s using nano-robots that will allow non-invasive communication between the brain + the cloud. At that point, brain-computer interfaces will rely on nanobots — microscopic robots able to travel through the bloodstream and interact with individual neurons. This will allow for a high-bandwidth, non-invasive connection between our neo-cortex and additional digital neurons housed in the cloud.

question ::
So, an augmented brain ...

Ray Kurzweil ::
Our intelligence will no longer be constrained by the size of our skulls. It will be free to grow exponentially. Eentually a million-fold,
expanding far beyond our current limits.

Imagine having your smart-phone inside your brain. If you ask a question, your brain will be able to query the cloud for an answer — like you do now on your mobile phone. But it'll be instantaneous. With nothing to type, and you won't even realize it's been done.

The answer will appear in your mind as if it were part of you. Some people balk at the idea now, but they're the same ones who once thought they'd never use a smart-phone. And today they never leave home without it.

question ::
Recently, Anthropic's founder said AI will double our lifespan. Do you — as someone close to the trans-humanist movement — share that enthusiasm?

Ray Kurzweil ::
One of AI's most profound short-term transformations is in medicine. Early in the COVID pandemic, the pharma company Moderna used a series of AI tools to help design + optimize its mRNA sequences. And discovered its successful vaccine formula in just 2 days.

However, AI will soon allow for more intensive bio-simulation, rapidly testing billions of possible molecular sequences to re-program our biology — keeping it safe from all diseases.

Throughout our history up to 2022, scientists had determined the shapes of about 190,000 proteins. Then the Google company DeepMind launched its AlphaFold 2 software. It discovered over 200 million protein structures in just 1 year. That's almost all known proteins — not only in humans but across nature. These data were made freely available, marking a profound leap in medicine.

question ::
That has already been surpassed, right?

Ray Kurzweil ::
Yes, because in May 2024 DeepMind by Google released the software program AlphaFold 3. It can predict the shapes of DNA, RNA, and other molecules. A few weeks ago, they announced AlphaProteo. It's an AI system capable of creating entirely new proteins designed from scratch.

question ::
And that's just the beginning ...

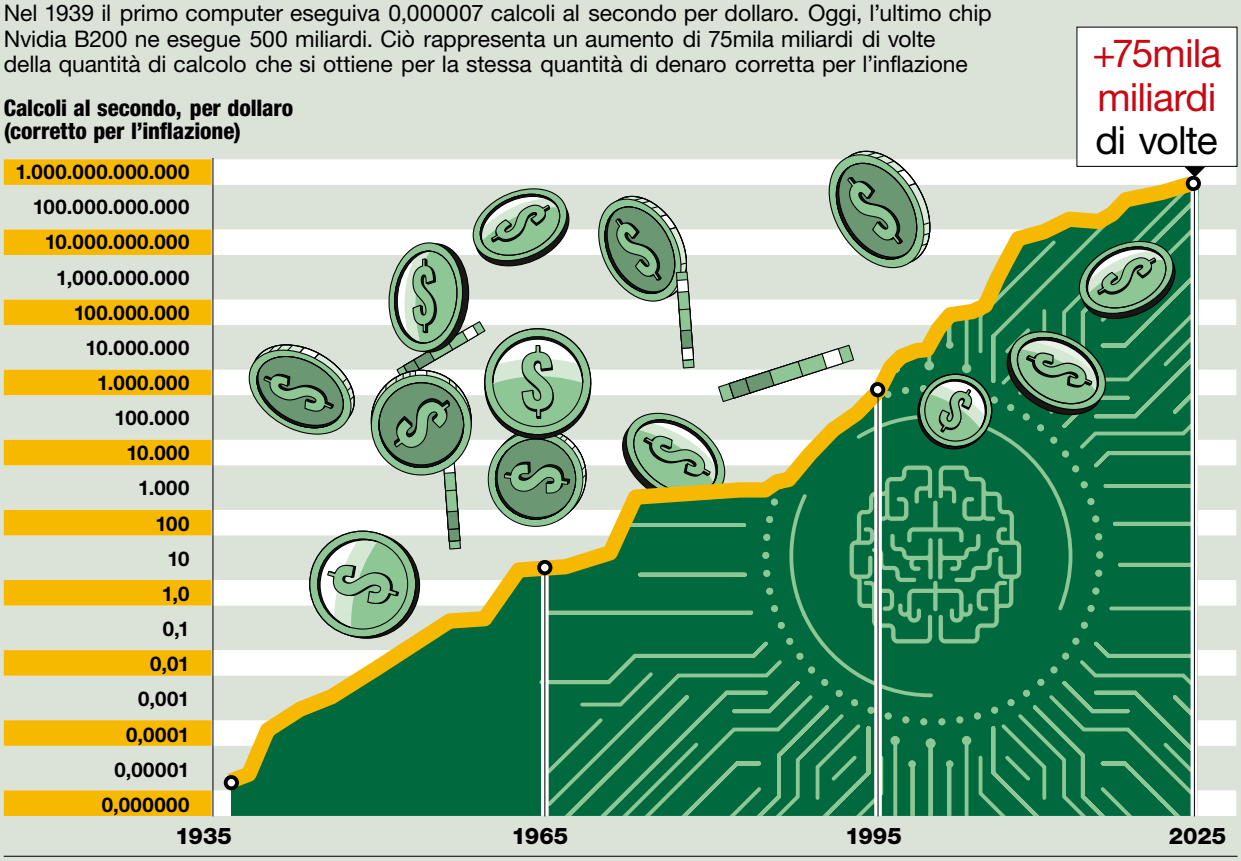
Ray Kurzweil ::
As computing power grows exponentially, we will simulate organelles, cells, tissues, organs, and eventually the entire body. Instead of risky, expensive, and slow trials, we'll be able to simulate trials digitally — 1,000 times faster and more precisely tailored to each individual.

Most people don't realize human clinical trials are statistically very under-powered. They're good at finding the right drug for the average person, but that doesn't mean the drug is right for you.

100,000 Americans a year die from reactions to drugs that the studies

CALCOLO & DOLLARO, UNA FOLLE CORSA

Nel 1939 il primo computer eseguiva 0,000007 calcoli al secondo per dollaro. Oggi, l'ultimo chip Nvidia B200 ne esegue 500 miliardi. Ciò rappresenta un aumento di 75mila miliardi di volte della quantità di calcolo che si ottiene per la stessa quantità di denaro corretta per l'inflazione



INFOGRAFICA PAULA SIMONETTI

declared were harmless. Digital clinical trials will test all the parameters, billions of them, to create medicines tailored to each individual patient.

Once we reach artificial general intelligence (AGI) by the end of this decade, medical progress will accelerate enough that, if you're diligent, you're likely to reach Longevity Escape Velocity.

That is when you gain, in one year of life, an entire year of life thanks to scientific progress. A threshold beyond which you'll effectively rejuvenate, in terms of health.

question ::

Doesn't it seem strange to you that the main warnings about the "existential risks" of AI come from the people — Musk, Altman, Hinton — who created it? Are they sincere or is it an extreme form of marketing?

Ray Kurzweil ::

Tech has always been a double-edged sword. The same drone that delivers medicine to an inaccessible hospital — can also carry an explosive to blow-up that hospital.

But does that mean we should stop using the drone to deliver medicine? AI is no different, the threats are real and should be treated seriously. Again, we need to develop AI that's aligned with our values and used for good.

What worries me is the proliferation of smaller large language midels (LLMs) — developed by individuals or groups without adequate controls. These could fall into the wrong hands and be used maliciously.

That's why I'm a strong supporter of initiatives like the Asilomar AI Principles — a set of guidelines for ethical development of artificial intelligence (AI). I was involved in the development of those principles — they're essential to ensure that AI continues to benefit humanity.

Riccardo Staglianò