

# Institute of Futurology

knowing our future

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## ProgBlog

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“The Promise of Foreknowledge”

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It's incredible to think that my car, which is parked in the garage, is, in reality, moving. That's because our world is a 4D space-time continuum and things move through time, as shown by the ageing process, even when they are at rest in space. The parked car is travelling through time. It's undergoing change. It's getting older and rustier. A person who is asleep and motionless in bed is also moving. Not only is this person moving through time, but the space-time world as a whole is always travelling at incredible speeds in our expanding universe. Nothing that exists is ever at rest in space-time, even when they appear to be stationary.

It's also incredible that as we travel faster and faster through space we literally age less because time slows down for objects, including people, going at speed. To add to all this intrigue, a person sleeping at the top of a bunk bed will age faster than the one on the bottom bunk.<sup>1</sup> Then there is the world-famous twins paradox to further delight the imagination. This is a thought experiment in which one twin is imagined to travel in a high-speed rocket close to the speed of light for several years. When this space-travelling twin returns to earth, she will have become a younger person than the earth-bound twin: “If one twin goes to a star 3 light years away in a super rocket that travels at 3/5ths the speed of light, the journeys out and back take 5 years in the frame of the earth....but the twin on the rocket will age only 4 years on the outward journey, and another 4 years on the return journey. When she gets back home, she will be 2 years younger than her stay-at-home sister, who has aged the full 10 years.”<sup>2</sup> This example shows decisively that the nature of time is altered by spatial factors like speed.

All of this is not science fiction. These peculiarities are all based on laws of physics. And physics often turns ordinary life on its head, showing us what a mysterious and weird world we are privileged to live in.

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<sup>1</sup> “...suppose that identical twins spend the night in bunk beds. One sleeps a meter above the other. The next morning, the twin who slept in the top bunk is a few trillionths of a second older...Close to a black hole, clocks run far slower than in empty space. Near the event horizon, the effective surface of the black hole, clocks come almost to a complete stop.” Adams & Laughlin *The Five Ages of the Universe* (1999) 116.

<sup>2</sup> Mermin *It's About Time - Understanding Einstein's Relativity* (2005) 123.

Einstein discovered the space-time continuum, an integral part of his theory of special relativity, in 1905. His theory has been proven over and over since then, including in the calculations of modern GPS systems which must take into account the time dilations of relativity to be accurate.<sup>3</sup>

Science, in my view, has been leading the way for the past century in understanding not just time but the nature of reality. It has the very best methods for producing knowledge.

It was Einstein who first inspired me to question the conventional wisdom in the international futurist community that the future is unknowable. And what I have just shared with you about space-time may prove to be the key to understanding what the future really is.

You may be wondering what space-time has got to do with the future. The reasoning goes like this. The future is a phase of time. Time is united with space in space-time. Therefore the future should be understood as part of evolving space-time. Time is the spouse and soul mate of space.

Not only is time united with space, it's also continuous. It does not break up. There are no material dividing lines between past, present and future. All things exist, change and evolve in space-time. The future is not disconnected from the past or present. It is simply the emergence of space-time in its continuous, never-ending evolution.

Furthermore, physics has mapped out the laws of nature (space) in great detail. It even has a master equation called the Standard Model of Particle Physics which specifies how every particle in the universe interacts with every other particle, no less.<sup>4</sup> If time and space are interlocked in one continuum, why can space be modelled so effectively and extensively by science but not the behaviour of time? We already study the behaviour of past-time through the social science called history. Other social sciences like sociology and economics have shown how socio-economic development can follow cyclical patterns over time. Why should future-time be beyond the reach of science, hidden behind some medieval veil of impenetrable mystery?

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<sup>3</sup> The increasingly popular GPS systems people use in their cars today could not function accurately without taking into account the effects of relativity: "The satellite navigation system in your car, for example, is designed to account for the fact that time ticks at a different rate on the orbiting satellites than it does on the ground.... The GPS satellite system is ubiquitous...and its successful functioning depends on the accuracy of Einstein's theories." (Cox & Forshaw *why does E=mc<sup>2</sup>?* (2009) 4; 235.) The reason for these different rates of time is that gravity is weaker for clocks on satellites so these clocks speed up at a rate of 45 microseconds each day. The satellites move at high speeds and we know Einstein proved that clocks tick at a slower rate at higher speeds. If these two opposite effects are added, there is a net speeding up to 38 microseconds per day. Any failure to factor in these dilating and contracting effects on time would lead to a breakdown of GPS systems. This is a practical and easily understood vindication of Einstein's theory.

<sup>4</sup> Cox & Forshaw *why does E=mc<sup>2</sup>?* (2009) 4; 175.

On the contrary, the evolutionary nature of space-time, with its 13.7 billion year history, speaks of a great continuity of the world, wide open to modelling. Time is the cosmic evolutionary medium. Science shows everything is evolving, including the universe. The space-time we see around us at any given time is itself an evolving entity. It is a living product of past-evolution in a way analogous to a child being a living product of its parents. Present-time is like a bridge between past-time which has vanished, leaving traces, and future-time which fulfils the evolutionary process. The momentum of evolutionary time constantly spills over into the future like waves on a shore. This invites humans to be proactive, better aligned to the nature of time, harnessing its evolutionary momentum.

And herein lies the promise of gaining foreknowledge. We can model and watch the space-time world-in-the-making of the future because there is a deep structure of lawfulness evident in nature, symbolised by the Standard Model of Particle Physics. Why exclude time from the scientific study of our space-time world? It makes no sense.

It's not as if there is no foreknowledge already in existence. The grandfather of a modern study of the future, Marquis de Condorcet (1743-1794), accurately predicted the rise of equal rights for women just under a century before this came to pass.<sup>5</sup> A French mathematician, philosopher and political scientist, Condorcet concluded his study of the history of humanity's intellectual and moral development with a chapter on the future progress of mankind as he foresaw it. British suffragette Mary Wollstonecraft published *Vindication of the Rights of Women* in 1792, but the first country to grant women suffrage in national elections was New Zealand in 1893, just under a century after the posthumous publication of Condorcet's treatise on progress. In addition to predicting the rise of women's rights several decades before it happened, Condorcet also foresaw the coming of an extensive economic globalisation process,<sup>6</sup> which was fulfilled following the massive wave of globalisation from 1945 onwards after Bretton Woods.

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<sup>5</sup> In this penetrating look into the far future, he wrote, with unconcealed passion: "Among those causes of human improvement that are of the most importance to the general welfare, must be included, the total annihilation of the prejudices which have established between the sexes an inequality of rights, fatal to even to the party which it favours... And here we may observe, how much the abolition of the usages authorised by this prejudice, and of the laws it has dictated, would tend to augment the happiness of families..." De Caritat (de Condorcet) *Outlines of an historical view of the progress of the human mind* (1795) 355-6.

<sup>6</sup> "The moment knowledge shall have arrived at a certain pitch in a great number of nations at once, the moment it shall have penetrated the whole mass of a great people, [a] whole language shall have become universal, and the whole commercial intercourse shall embrace the whole extent of the globe." De Caritat (de Condorcet) *Outlines of an historical view of the progress of the human mind* (1795) 14-15.

Importantly, Condorcet was convinced that there were laws of social development analogous to natural laws: “The only foundation of faith in the natural sciences is the principle, that the general laws...which regulate the phenomenon of the universe, are regular and constant; and why should this principle, applicable to the other operations of nature, be less true when applied to the development of the intellectual and moral faculties of man?”<sup>7</sup>

One of these social laws, he argued, was that universal access to knowledge would engender political equality and freedom. In particular, Condorcet argued that a self-reinforcing, or virtuous, cycle would emerge whereby education becomes more widespread in society, leading to more equal wealth distribution through higher levels of social equality, which, in turn, would continue to widen the spread of knowledge. Liberty and knowledge, in other words, would mutually reinforce one another in the process of social development.

In 1798 Thomas Malthus (1766-1834) correctly predicted the rise of famine due to over-population in the modern era. In *An Essay on the Principle of Population* published in 1798 he argued that population always grows at a much faster rate than food production. There have, indeed, been a series of modern famines from the Great Irish Famine of 1846–1851 to the mass starvation that took place in North Korea in 1990s.

In 1865, British economist and logician W. Stanley Jevons predicted the decline of British global supremacy due to depletion of its domestic coal resources, a forecast fulfilled after steep decline in production of coal after 1925.

In 1901, H. G. Wells forecast the revolutionary motorisation of society in twentieth century, and today we still live in this world which began to materialise with the debut of Ford’s Model T in 1908.

In 1933, Winston Churchill predicted the outbreak of Second World War due to German rearmament which came true in 1939.

In 1956, American geologist M. King Hubbert accurately forecast that US oil production would peak in the early 1970s and global production would follow at the turn of the century.

In 1969, astrophysicist J. Richard Gott predicted the downfall of the Berlin Wall in a time span averaging 20 years, which came true in 1989.

These were all great predictions based on sound logic but in general the discipline of futures studies has tended to see the future as unknowable. The reason is a lack of understanding of time as well as an understandable pessimism about human progress following the wars of the 20<sup>th</sup> century.

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<sup>7</sup> De Caritat (de Condorcet) *Outlines of an historical view of the progress of the human mind* (1795) 316.

After reading up on Einstein and Stephen Hawking on the nature of time, I became convinced that the future is much more knowable and predictable than previously thought because:

- ✓ Time is part of continuous evolutionary space-time which we understand well
- ✓ Causation produces predictable effects
- ✓ The methods of induction and deduction, combined with probability theory, may be successfully applied to the acquisition of foreknowledge
- ✓ Patterns of social reality have been discovered and modelled by social scientists in sociology, history and economics

In conclusion, a promising time lies ahead at the inter-disciplinary level for social knowledge and foreknowledge. The future is the next frontier of scientific knowledge – there is nothing stopping the development of a science of the future other than intellectual stubbornness.

A science of the future would help to reduce the risks of the constant socio-economic crises we see around us on the news and drastically improve human forecasting, planning and strategic thinking. Let's forge ahead and see what happens.