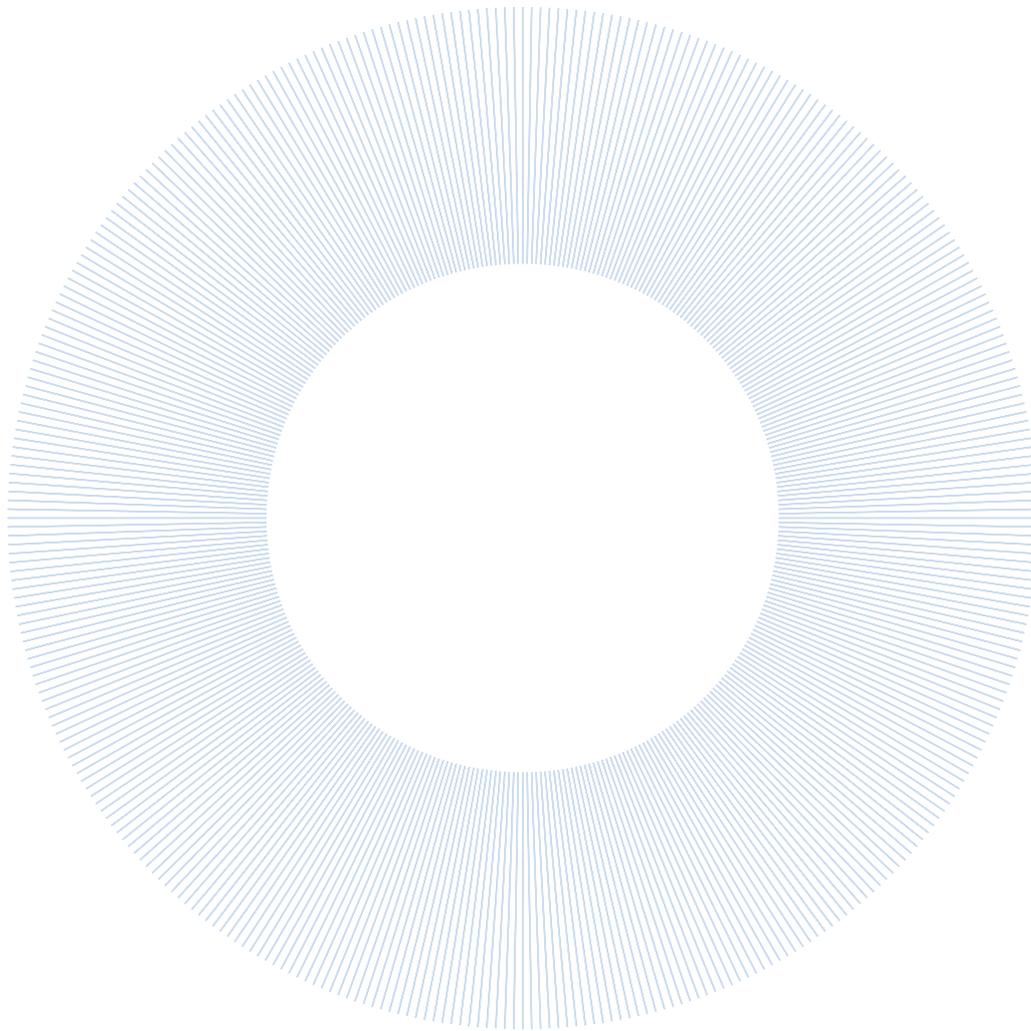


Can Novelists Predict The Future?



Andrew Crumey

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CAN NOVELISTS PREDICT THE FUTURE?

Sometimes novels make predictions about the future that turn out to be true. Are they lucky guesses, shrewd insight or a sign that creative imagination can be prophetic? Drawing on my own experience as novelist and physicist, I explore the phenomenon of literary precognition.

*Some predictions are strikingly precise: in *Gulliver's Travels* we read that Mars has two moons, though they would not be discovered until a century and a half later. The late nineteenth and early twentieth centuries saw profound meditations on the nature of time from Einstein and Proust; but before either of them, H. G. Wells was considering the possibility of time travel. Most remarkable of all, perhaps, is Poe's anticipation of Big Bang theory.*

Yet prophecy need not only refer to the future: the prophet is one who interprets and transmits divine will, and it was this aspect that E. M. Forster emphasised in his consideration of the 'prophetic' quality of fiction. Even if the novelist is not divinely inspired, he or she may be able to interpret the present and past in such a way as to point towards the future.



There are many examples of novels that have attempted to imagine the future, some with more success than others. One of the most famous is George Orwell's *1984*, which still seems prophetic to us with its vision of a totalitarian state spying on its citizens through the technologies of mass communication and entertainment. It was the novel that gave us the phrase Big Brother, and if that phrase now makes us think of a TV show rather than political oppression, then perhaps that only emphasises the importance of Orwell's message.

A curious instance of fiction anticipating fact occurred when Orwell's book was made available for download on the Amazon Kindle in 2009. Amazon subsequently realised they did not have the necessary copyright permission, and people who had already bought the e-book, or thought they had bought it, found when they synced their libraries that the title got removed from their machines, and they were refunded.

The *New York Times* relished the irony, commenting, 'In George Orwell's *1984*, government censors erase all traces of news articles embarrassing to Big Brother by sending them down an incineration chute called the "memory hole".' The article highlighted the plight of 'Justin Gawronski, a 17-year-old from the Detroit area, [who] was reading *1984* on his Kindle for a summer assignment and lost all his notes and annotations when the file vanished. "They didn't just take a book back, they stole my work," he said' (Stone, 2009).

Aldous Huxley's *Brave New World* is seen as equally prophetic in its anticipation of reproductive technology, while the novels of H. G. Wells famously predict innovations such as space flight and nuclear energy, as well as others still to be perfected, such as time travel or invisibility. But novelistic attempts to imagine the future are far older. One such book, *The Year 2440*, dates from as far back as 1771. It was written by Louis-Sébastien Mercier, and is about a person who falls asleep and wakes up in a future Paris, where he finds good government and a peaceful,

rationally organised society. In other words it is a utopian novel, with the innovative feature that instead of imagining the ideal community to be in some distant place (or literally nowhere), the utopia lies in the future, it is something towards which we are progressing.

Mercier's book was a huge bestseller (Darnton, 1996, p. 63), and inaugurated a long succession of utopian future visions. Some were written as novels: for example Edward Bellamy's *Looking Backward*, first published in 1888, and like Mercier's an enormous success. Others were serious blueprints for perfect societies, most famously the ideas of Charles Fourier, who believed there to be exactly 810 different human character types, so that his ideal community, a sort of giant hotel-cum-factory called a *phalanstère*, should have 1620 inhabitants, a male and female of each type (Beecher, 1986, p. 242). This of course would hardly be everyone's idea of a perfect world, and twentieth-century attempts to create rationally organised societies in places such as Russia and Germany made people starkly aware of the dangers of totalitarianism, and of technological progress itself. So writers like Huxley and Orwell, prophetic as they are, were coming in at the end of a long tradition; in contrast to earlier utopias they were presenting dystopias.

Even so, we are still apt, when imagining fictional futures, to see technology as the benchmark. This is the measure of progress, which is itself the measure of time. Jules Verne is remembered as a technological visionary, though the submarines and airships he imagined were really the technology of his own age, and his idea of space travel was being shot into the air from a big gun. But his novel *From the Earth to the Moon*, published in 1865, proved prophetic in one expected way. His three-man lunar expedition is launched from Florida, just as the real Apollo mission would be a century later.

Less well known nowadays is the American writer Hugo Gernsback. He is credited with having coined, or at least popularised, the term 'science fiction,' and the Hugo Awards for science fiction are named after him. His 1911 novel *Ralph 124C 41+* is a 'romance of the year 2660,' and has electric cars, video phones with universal translators, thought-powered dictation machines, and other wonders. But with its detailed technical descriptions, the novel is frankly very boring. In fact what is striking about so many utopian futures in fiction is how dull they seem. Novels need problems, disasters, things not going according to plan. They also generally need people with interesting flaws and foibles, rather than perfect machines or genius inventors. Hence we tend to remember and re-read dystopian visions rather than utopian ones. H. G. Wells's time traveller arrives in a future society that looks perfect, until he discovers the terrible Morlocks living underground.

Rather than attempt some kind of general survey, I want to focus now on a small number of novelistic predictions involving science. Our culture often imposes rather sharp boundaries between art and science, sometimes even putting them into some sort of opposition, but I hope my examples will highlight the permeability of those boundaries.

My first example comes from the third part of *Gulliver's Travels*, by Jonathan Swift, which describes the floating island of Laputa. Swift says of the Laputian astronomers:

They spend the greatest part of their lives in observing the celestial bodies, which they do by the assistance of glasses, far excelling ours in goodness. [...] This advantage has enabled them to extend their discoveries much further than our astronomers in Europe; for they have made a catalogue of ten thousand fixed stars, whereas the largest of ours do not contain above one third part of that number. They have likewise discovered two lesser stars, or satellites, which revolve about Mars[...]

[the innermost] revolves in the space of ten hours, and the [outermost] in twenty-one and a half (Swift, 1995, p. 164).

That was written in 1724, but it was not until 1877, a century and a half later, that Mars's two moons were actually discovered, by a keen-eyed American astronomer, Asaph Hall. Not only did Swift get the number of moons right, he was also reasonably close to the actual orbital periods: the innermost moon, Phobos, has a period of a little under eight hours, rather than ten, while the outer, Deimos, takes about thirty (Moore, 2000, p. 117).

How did Swift manage to make this extraordinary prediction? Sheer luck is the most obvious explanation, but in the nineteenth century an alternative was seriously considered by some people: supernatural precognition. In 1884 a Major-General A. W. Drayson, Professor at the Royal Military Academy, Woolwich, published an article called 'The Solution Of Scientific Problems By Spirits.' He wrote:

In 1858 I had as a guest in my house a lady who was a medium, and we arranged daily séances. One evening she said to me that she saw at my side a spirit who claimed to have been an astronomer during his life on Earth.

I asked this person if he was wiser at present than when he lived on Earth. 'Much wiser,' he said. I had the idea of asking this so-called spirit a question the object of which was to test his knowledge (Flammarion, 1907, p. 50).

Drayson made good use of his conduit to the other side; he asked his medium friend a number of questions, over a period of time, and in this way claimed personally to have learned of the existence of Mars's moons some 18 years prior to their discovery. Drayson does not appear to have known that Swift got there well ahead of him, but would, we can assume, have ascribed Swift's success to the same supernatural cause.

Drayson was by no means the only Victorian scientist with a penchant for spiritualism. More famous examples include Oliver Lodge, who made important advances in electromagnetic theory, and William Crookes, pioneer of vacuum tubes. When Crookes saw the eerie glow inside one of his electrified tubes he did not realise he had produced the forerunner of fluorescent lighting, X-rays or television: he thought it might provide a scientific explanation for ghosts (Warner, 2006, p. 290). So while Drayson was by no means expressing a mainstream view, nor would he have automatically been seen as a lunatic.

Predictions, of course, appear remarkable only once they have been fulfilled, in other words once we are able to make post-dictions, selecting successes and overlooking failures. In the same passage in *Gulliver's Travels*, Swift asserts that 'magnetic virtue does not extend beyond the distance of four miles,' and nobody remembers this dud prophecy, while the two Martian moons, with their reasonably accurate orbital periods, continue to tantalise.

But the plot really thickens when we find that the Martian moons were predicted in another eighteenth-century fictional work, Voltaire's *Micromégas*, published in 1752, which imagines the space voyage of a pair of extraterrestrial giants. We read:

Leaving Jupiter they traversed a space of around one hundred million leagues and encountered the planet Mars, which, as is known, is five times smaller than our own small globe; they saw two moons that attend this planet and have escaped the notice of our astronomers (Voltaire, 1752, p15).

Voltaire's fantasy owes an obvious debt to Swift: it is a sort of *Gulliver's Travels* in space, playing with relative scales and proportions to satiric effect. So Voltaire could have got the two moons directly from Swift. But we are still left wondering why these novelists should have made the prediction.

An explanation was offered by the nineteenth-century astronomer Camille Flammarion. As well as being one of the leading science popularisers of his time, Flammarion was a spiritualist, and wrote a number of books about supernatural phenomena. Like Crookes or Lodge, he believed such phenomena to be real and in need of scientific explanation. In one of his books, translated into English in 1907 as *Mysterious Psychic Forces*, he suggests the existence of unknown natural forces, or extra dimensions of space, as a way of explaining how people might be able to read minds, move objects without touching them, and so on. But in some instances Flammarion offered more prosaic explanations. Quoting Major-General Drayson's claim to have learned of the moons of Mars from a psychic medium, Flammarion points to the far earlier references in Swift and Voltaire, and he identifies the source for both of them (Flammarion, 1907, p. 55). It was the astronomer Kepler who first mooted the idea that Mars has two moons, and Kepler's argument was very simple. Earth has one moon, Jupiter was known to have four, and since Mars lies between them, it should have an intermediate number of moons, with two providing the neatest sequence, implying that Saturn would then have eight.

Swift could have learned of this from his friend Dr John Arbuthnot, a mathematician whose expertise possibly lies behind the surprisingly technical language of the Laputian episode in *Gulliver's Travels*. I abbreviated the extract previously, but what Swift actually says about the moons is as follows:

[...] the innermost is distant from the centre of the primary planet exactly three of his diameters, and the outermost, five; the former revolves in the space of ten hours, and the latter in twenty-one and a half; so that the squares of their periodical times are very near in the same proportion with the cubes of their distance from the centre of Mars[...] (Swift, 1995, p. 164).

What Swift is giving here is an illustration of Kepler's Third Law, with numbers chosen to be as simple as he – or his mathematical adviser – could make them (Gould, 1945, p. 101). Voltaire's *Micromégas* makes a similar nod to Kepler's reasoning from analogy (Voltaire, 1752, p. 15).

So there is no need for supernatural intervention or psychic forces; we have a historical explanation for what turned out to be a lucky hit, and would have been completely forgotten if Mars did not really have two moons.

What do we conclude from this episode? First, that novelists sometimes like to show off a bit of expert knowledge. Secondly, that they are not always content simply to report technical knowledge; they even want to import the appropriate technical language. Consider what comes just before the mention of the Martian moons in *Gulliver's Travels*, a description of the magnetically floating island's motion:

[Let] AB represent a line drawn across the dominions of Balnibarbi, let the line c d represent the loadstone, of which let d be the repelling end, and c the attracting end, the island being over C : let the stone be placed in position c d , with its repelling end downwards; then the island will be driven upwards obliquely towards D [...] (Swift, 1995, p. 163).

This sounds like it has come straight out of a textbook, which presumably is what Swift intended. A characteristic of novels, particularly remarked upon by the twentieth-century literary theorist Mikhail Bakhtin, is their ability to absorb different forms of language. It is hard to imagine a mathematical textbook, a car-repair manual or a cookery book containing a novel; but we could imagine novels that contain mathematics, car-repair instructions or recipes. If we think those things somehow ought not to be inside novels, then perhaps we are taking an unduly restrictive view of what novels can do.

Novels, in that respect, are universal; they can potentially contain anything that it is possible for language to express, for people to think or know. And with this in mind, let us think further about the sense in which novels can be prophetic.

We are apt to think of prophecy as meaning foretelling the future, but a prophet in the original sense is someone who interprets and transmits a message, someone gifted to receive the word of God. In purely secular terms, the prophet is an antenna picking up signals others might miss.

As a novelist, I make no claims about inspiration or revelation, but the experience of writing a novel, and I would guess of artistic creativity in general, can often feel like receiving a message from somewhere else. When writing goes well for me, it feels like reading: I want to know what will happen next, I can feel surprised, amused, saddened and generally involved with a world that is made-up by myself, yet is only gradually discovered. The experience, in other words, is rather like dreaming: we are all the authors of our own dreams, yet do not usually know in advance what will happen in them. In the case of novels, I might have some rough plan or outline, but that is like taking a map with you when you go for a walk. You are free to choose which path you will take, and do not know what you will find along the way.

Novels are like dreams, and dreams can be prophetic. According to the nineteenth-century French historian Jules Michelet, 'every epoch dreams its successor' (Benjamin, 1999a, p. 150). The future, in other words, is here already, it exists right now, though not manifestly. The future is hidden within the present and within the past.

Suppose you raid an art gallery and take a bunch of paintings. You then find yourself a Martian, or some other alien, and ask them to try and arrange the paintings in order of composition. How would anyone know that Picasso comes after Constable, or that the pre-Raphaelites were after Raphael? With only the works themselves, devoid of historical context, it would surely be impossible to put them in order. Our Martian art critic might make a guess, based, say, on the introduction of certain chemical pigments in the artists' palettes. Equally, though, the Martian might arrive at a degenerationist theory of human art, one in which the earliest artists had access to certain secret techniques that subsequent generations gradually forgot.

Actually, this was what people thought for a long time: the ancients lived in a time of youth and vigour, with everything since then a process of decline, so that the best way to be an artist was to try and imitate what the ancients had done. This notion even existed within what we now think of as science. Isaac Newton devoted considerable time to speculations about Solomon's Temple, and believed the structure would have contained a model of the solar system, embodying laws known to the ancients which nevertheless had to be rediscovered by people such as himself (White, 1999, p. 161). There are people today who think that the pyramids encode some lost, ancient knowledge of the cosmos: a belief that is itself a piece of the past continuing within our own present.

In 1927, E. M. Forster was invited to give a series of lectures in Cambridge, subsequently published as a book called *Aspects Of The Novel*. Forster imagined himself to be in a round room (Forster, 1975, p. 16), a place where all the writers of every time, famous and obscure, are at work simultaneously. Any of these writers might provide an idea, an influence, a suggestion.

Forster considered something like the thought-experiment of putting paintings in chronological order, but with writers instead. He concluded that, 'History develops, Art stands still' (p. 28). In his round room, Virginia Woolf rediscovers or reinvents what Jane Austen has already done; the techniques may differ, but not the human qualities which are eternal and unchanging.

The role of prophecy in art, as far as Forster is concerned, therefore has nothing at all to do with predicting the future. Forster says of the prophetic novelist, 'His theme is the universe, or something universal, but he is not going to 'say' anything about the universe[...]. Prophecy – in our sense – is a tone of voice' (p. 129). He finds this tone in Dostoevsky, Melville, D. H. Lawrence, Emily Brontë; it is like a certain kind of song, and it demands two qualities: 'humility and the suspension of the sense of humour' (p. 130).

That certainly characterises a particular kind of prophetic tone, but there is surely a difference between tone of delivery and the message itself. The German philosopher Walter Benjamin wrote, 'people imagine the storyteller as someone who has come from afar' (Benjamin, 1999b, p. 84). The storyteller brings something from another place, a place that might seem remote in space, or time, or both; and so we get a different sense of the prophetic, not tone but distance.

Let us consider another literary prediction, this time from an American writer named Edward Everett Hale. In 1869 he published a story called 'The Brick Moon' (Hale, 1899), about a group of people who build a great hollow sphere of bricks with the idea of shooting it into orbit using a very big flywheel. It is not supposed to carry passengers, but is accidentally launched with some people inside it. Hale's story is therefore the earliest description of a manned orbiting space-station, albeit one made of whitewashed house-bricks.

On the face of it, we would expect Hale's story to be another of those detailed accounts of hypothetical technology, explained in laborious detail, with little room left for any kind of human emotion other than wonder or, more likely, boredom. But that is not what Hale gives us. Granted, there are overlong considerations of Newtonian mechanics, and of the potential economic benefits of an artificial moon. Hale, however, gives us something more. His story is humorous, ironic. The survivors on the Brick Moon are seen through a telescope, and by holding up written messages they communicate to those they have left behind that they are getting along perfectly well. Their moon is actually just like the world below, only a bit smaller. Hale's vision is neither utopia nor dystopia, but something different, altogether more recognisable as a curiously warped kind of reality. If I try to think of something stylistically similar, I would have to suggest twentieth-century writers such as Flann O'Brien or Italo Calvino; Hale's story has the same playfulness, the same willingness to treat science not as a blueprint for the future, but as a game that can make us laugh. Not prophetic in Forster's sense, but nevertheless a story that seems 'ahead of its time,' or rather 'outside' its time.

So we have several types of prophecy. There is conscious, deliberate prediction of the future – which is hit or miss, whether you are a novelist or anyone else. There is unconscious anticipation of the future, picking up on the collective dream or Zeitgeist in which the future lies already dormant. There is the prophetic tone, and there is prophetic distance, the thought or idea that does not fit with its own time and place, but seems to come from somewhere else.

I would like to propose a writer who fits all these notions of prophecy: Edgar Allan Poe. We can start with straightforward prediction. Poe was fascinated by the idea of logical deduction and inference: in 1841 he published the short story 'The Murders In The Rue Morgue,' often considered the first detective story. In the same year, Charles Dickens began publishing, in instalments, *Barnaby Rudge*, a novel which contains a murder mystery. Poe decided to play detective and work out the entire plot before Dickens could even finish writing it. Poe published his prophecy in the Philadelphia *Saturday Evening Post* on 1 May 1841 (Quinn, 1998, p. 332).

Poe's predictions about how the novel would progress turned out to be wrong in many respects, but his main prophecy was correct. 'We say in accordance with poetical justice – and in fact it

will be seen hereafter – that Barnaby[...] is the murderer's own son' (Grubb, 1950, p. 9). Poe wrote of his predictions, 'This is clearly the design of Mr Dickens – although he himself may not at present perceive it' (Grubb, 1950, p. 10).

It has been suggested that after Poe published his massive spoiler, Dickens may have felt obliged to alter the storyline, even if he could not change the denouement – though it has also been suggested that Dickens never even read the review (Grubb, 1950, p. 11).

But there is another prophetic aspect to this episode. Barnaby Rudge has a pet raven called Grip, 'whose croakings,' Poe predicted, 'are to be frequently, appropriately, and prophetically heard in the course of the narrative' (Grubb, 1950, p. 10). Actually Grip is never given as much importance as Poe expected, but the raven did become important to Poe himself, because four years later he published his poem, 'The Raven,' which became his best-known work in his lifetime. We could conclude that Poe took his idea from *Barnaby Rudge*; but Poe himself claimed otherwise. A year after the poem, Poe published an essay called 'The Philosophy Of Composition,' claiming that the poem was written according to strict logical principles. What you must do, says Poe, is begin with the end, the intended effect, and work backwards from that. You have to begin, so to speak, with the future.

In the final years of his life Poe became increasingly preoccupied with logical deduction, not only in art but also in science. He began to study astronomy, and this led him to a theory of cosmology that he himself considered his greatest work. We can certainly call it his most prophetic.

Poe described his theory at a sparsely attended public lecture in New York in February 1848, and then in a book called *Eureka*. What Poe outlines is something we would all nowadays recognise as a sort of Big Bang. To begin with, Poe says, there was a 'primordial particle' (Poe, 2002, p. 22) which exploded, sending matter outwards. This matter cooled and condensed into the stars and planets we see today. Eventually, though, the expansion ceases, the universe collapses and compresses once more to an atom, before exploding again in an endless cycle, a cosmic breathing.

There was absolutely no evidence at that time that the universe is expanding: that did not come until 1929, by which time Einstein's general relativity had made physicists come up with their own mathematical theory of what came to be known as the Big Bang. One of the main early twentieth-century theorists, Georges Lemaitre, spoke in terms of a 'primeval atom,' just as Poe had (Lemaitre, 1950). Others considered oscillations of expansion and contraction, unaware that Poe had done so already. Perhaps most startling of all is Poe's claim in *Eureka* that 'there does exist a limitless succession of universes, more or less similar to that of which we have cognisance' (Poe, 2002, p. 75); an idea that has become increasingly favoured by physicists in recent decades.

How did Poe arrive at his theory? It is hard to say, because he offers so many lines of argumentation, some scientific, some pseudo-scientific, some mystical. The universe, says Poe, is made of matter and spirit, its expansion and contraction is the 'throb of the heart divine' (p. 103). He dedicated *Eureka* 'to those who feel rather than think,' declaring that if his book were forgotten in his own time it would nevertheless 'rise again to the life everlasting' (p. 3).

As well as its prophetic tone, *Eureka* begins with a section set in the future, in the year 2848. This vision, in which Poe settles some philosophical scores, is actually full of corny jokes and puns and is excruciating to read: it must have put off a great many people from going any

further. *Eureka* was largely forgotten, even by Poe fans. But in 1940, Poe's biographer Arthur H. Quinn decided to get an expert opinion, so he contacted Arthur Eddington, one of the greatest astrophysicists of the twentieth century. Eddington gave a sympathetic though qualified response.

Eureka is not a work of dotage or disordered mind. It is, I think, the work of a man trying to reconcile the science of his time with the more philosophical and spiritual cravings of the mind[...]. The correspondence between some of his ideas and modern views is interesting; but[...] [anyone] of independent mind – a rebel against conventionally accepted views – is likely to hit the mark sometimes[...]. I should say then that regarded as an attempt to put forward a new physical theory, *Eureka* would rightly be regarded as a crank-theory by scientists of the time[...]. But as a 'poem' on the significance of things as partially revealed in the state of science of the time, I think it showed a fine penetration' (Quinn, 1998, pp. 555-6).

Eddington thought Poe's theory of an expanding universe was like Swift's moons of Mars: a lucky hit. Yet Eddington had overlooked something. In among the spiritual speculations of *Eureka* there lies a remarkable insight, finally acknowledged and made generally known by the astronomer Edward Harrison in 1987.

Poe perceived the solution to a problem known as Olbers' Paradox (Harrison, 1987, p. 12). Suppose the universe is infinitely big, infinitely old and has stars spread randomly through it. Then wherever you look in the sky, your line of sight should end on a star (Poe, 2002, p. 73). That means the whole sky should be bright with starlight: in fact, when you do the calculation carefully, you find that because of the combined light of all those infinite stars, the whole sky ought to be as bright as the sun. So the problem was to explain why the night sky is dark, and people offered various explanations. Perhaps something is blocking the starlight, or light runs out after travelling a long way, or stars are not randomly distributed. Poe offered a different solution. The universe, he said, is not infinitely old. There are stars so far away that their light has not yet had time to reach us (Poe, 2002, p. 74). This, Poe claimed, is why the night sky is dark, and modern-day astronomers agree.

Poe's *Eureka* can be considered prophetic on every count, but for my final example I should like to consider a writer who not only predicted scientific developments, but possibly even influenced them: H. G. Wells.

The opening chapter of *The Time Machine* includes the following observation:

There are really four dimensions, three which we call the three planes of Space, and a fourth, Time (Wells, 2005, p. 4).

The idea of time as the fourth dimension is crucial to Wells's plot: he imagines that travelling along this dimension should be just as feasible as through the three dimensions of space. This is an idea we are all familiar with nowadays, even if we do not understand Einstein's theory of relativity. What is remarkable, though, is that Wells published his book in 1895, when Einstein was only 16 years old. Where did Wells get his idea from? He tells us in the novel.

[Some] philosophical people[...] have even tried to construct a Four-Dimension geometry. Professor Simon Newcomb was expounding this to the New York Mathematical Society only a month or so ago (Wells, 2005, p. 4).

Really, the idea of time as the fourth dimension predated Einstein by a long way; what looks to us now like prophecy on Wells's part was an awareness of intellectual ideas that were current in 1895, but were still in the realm of philosophical speculation: a dormant future. Simon Newcomb, the eminent scientist Wells mentions, was a well-known populariser and himself a science-fiction writer: a novel by him called *His Wisdom, the Defender*, published in 1900, imagines an inventor in the 1940s whose flying machines are able to resist the imperialist

ambitions of Germany. But Newcomb made a clear distinction between science fiction and science fact. In 1901 he wrote a magazine article saying that with existing technology and known laws of physics, it would be impossible to make a powered, heavier-than-air flying machine (Newcomb, 1901). Two years later, the Wright Brothers proved him wrong.

Another speculation that was in the air in the early 1900s was harnessing atomic energy. Many scientists thought it about as likely as time travel, and of course H. G. Wells readily took up the idea. In his novel *The World Set Free*, written in 1913, he says, 'A little while ago we thought of the atoms as we thought of bricks, as solid building material[...] and behold! These bricks are boxes, treasure boxes, boxes full of the intensest force[...]. If at a word, in one instant I could suddenly release that energy here and now it would blow us and everything about us to fragments' (Wells, 1926, p. 24). In Wells's novel the crucial breakthrough comes in 1933. Remarkably, that was the year in which it actually occurred.

What makes the prophecy even more intriguing is that the real-life physicist who played a key role in the real-world breakthrough, Leo Szilard, did so after reading Wells's book. Szilard later recalled:

In 1932 while I was still in Berlin, I read[...] *The World Set Free*[...] [It described] the liberation of atomic energy on a large scale for industrial purposes, the development of atomic bombs, and a world war[...] fought by allies of England[...] against Germany[...] [In] this war the major cities of the world are all destroyed by atomic bombs[...].

This book made a very great impression on me, but I didn't regard it as anything *but* fiction. It didn't start me thinking whether or not such things could in fact happen.

I had not been working in nuclear physics up to that time' (Szilard, 1969, p. 99).

Yet after reading Wells's book, a curious twist of fate occurred. Szilard met Otto Mandl, Wells's German rights-holder. Szilard and Mandl discussed mankind's apparently endless propensity for warfare, and Mandl said that what was needed to unify humanity was a great scientific mission: space flight. But that would require huge amounts of energy. Szilard recalled:

The only thing I could say was this: that if I came to the conclusion that this was what mankind needed, and if I wanted to contribute something to save mankind, then I would probably go into nuclear physics, because only through the liberation of atomic energy could we obtain the means which would enable man not only to leave the earth but to leave the solar system' (Szilard, 1969, p. 100).

A year later, in September 1933, Szilard was in London at a scientific conference. He says:

I read in the newspaper a speech by Lord Rutherford [the great atomic physicist], who was quoted as saying that he who talks about the liberation of atomic energy on an industrial scale is talking moonshine. This set me pondering as I was walking the streets of London, and I remember that I stopped for a red light at the intersection of Southampton Row. As the light changed to green and I crossed the street, it suddenly occurred to me that if we could find an element which is split by neutrons and which would emit two neutrons when it absorbed one neutron, such an element, if assembled in sufficiently large mass, could sustain a nuclear chain reaction[...]. [The following year] I applied for a patent which described the laws governing such a chain reaction[...]. Knowing what this would mean – and I knew it because I had read H. G. Wells – I did not want this patent to become public. The only way to keep it from becoming public was to assign it to the government (Szilard, 1969, pp. 100-1).

It would be wrong to see a direct causal path from Wells's novel to Hiroshima; but looking back on it in the 1960s, Szilard saw a narrative path, a pattern that, in retrospect, gave special

meaning and significance to events that at the time were random and insignificant: a book he happened to read, a conversation, a newspaper article, a traffic light. We can all look back on our lives in this way and see how particular events may have been turning points, though we failed to recognise it at the time.

Science is the organisation of fact, art is the organisation of experience. This insight comes to us from J. W. N Sullivan, a theoretical physicist and popular science writer of the early twentieth century, nowadays best-known for a book about Beethoven. Sullivan saw all great art as prophetic, but made the following comments with Beethoven particularly in mind:

It may be assumed that [scientific knowledge] is the only kind of knowledge possible to us, but there seems to be no good reasons for this assumption. Science, indeed, tells us a very great deal less about the universe than we have been accustomed to suppose[...]. It is true, as [I. A.] Richards insists, that the artist gives us a superior organisation of experience. But that experience includes perceptions which, although there is no place for them in the scientific scheme, need none the less be perceptions of factors in reality. Therefore a work of art may communicate knowledge. It may indeed be a 'revelation'.[...] We cannot say that art communicates knowledge, as science does[...]. But what art does do is to communicate to us an attitude[...]. Beethoven does not communicate to us his perceptions or experiences. He communicates to us the attitude based on them.[...] He lived in a universe richer than ours, in some ways better than ours and in some ways more terrible. And yet we recognise his universe and find his attitudes towards it prophetic of our own (Sullivan, 2007, pp. 21–4).

To conclude, I would say that while novelists and other artists have sometimes predicted the future with extraordinary accuracy, such predictions are really no more than a by-product of the more fundamental, prophetic, universal quality of art. Every great work, no matter how typical of the age in which it is made, nevertheless stands outside it, looking forwards, backwards, sideways. Proust said that every artist creates the posterity by which he is judged (Proust, 1992, p. 143); Borges said that every artist creates his own precursors (Borges, 1975, p. 108): opposing comments that are not contradictory, but reflect what Edgar Allan Poe might have felt, aware that his final work *Eureka* would die just as certainly as himself, but hopeful that both might enjoy some form of afterlife. We might wonder if a necessary component of all true prophecy is that those who make them are forbidden to witness their fulfilment.



Reference List

- Beecher, J. (1986) *Charles Fourier: The Visionary and His World*. Berkeley, CA: University of California Press.
- Benjamin, W. (1999a) *The Arcades Project*. Tiedemann, R. (ed.). Translated by Eiland, H. and McLaughlin, K. Cambridge, MA: Harvard University Press.
- - - . (1999b) The Storyteller. In *Illumination*. Translated by Zorn, H. London: Pimlico.
- Borges, J. L. (1975) Kafka and his Precursors. In *Other Inquisitions, 1937-1952*. Translated by Simms, R. L. C. Austin, TX: University of Texas Press, pp. 106–8.
- Darnton, R. (1996) *The Forbidden Best-Sellers of Pre-Revolutionary France*. London: HarperCollins.
- Flammarion, C. (1907) *Mysterious Psychic Forces*. Boston, MA: Small, Maynard and Co.
- Forster, E. M. (1975) *Aspects Of The Novel*. London: Penguin Books.
- Gould, S. H. (1945) Gulliver and the moons of Mars. *Journal of the History of Ideas* 6(1): 91–101.
- Grubb, G. G. (1950) The personal and literary relationships of Dickens and Poe. Part One: From 'Sketches by Boz' through 'Barnaby Rudge'. *Nineteenth-Century Fiction* 5 (1): 1–22.
- Hale, E. E. (1899) *The Brick Moon and Other Stories*. New York: Freeport.
- Harrison, E. (1987) *Darkness at Night, a Riddle of the Universe*. Cambridge, MA: Harvard University Press.
- Lemaitre, G. (1950) *The Primeval Atom: An Essay On Cosmogony*. New York: Van Nostrand.
- Moore, P. (2000) *The Data Book Of Astronomy*. Bristol: Institute of Physics Publishing.
- Newcomb, S. (1901) Is the airship coming? *McClure's Magazine* 17(5): 432–5.
- Poe, E. A. (2002) *Eureka*. London: Hesperus.
- Proust, M. (1992) *Within A Budding Grove*. Translated by Scott-Moncrieff, C. K. Madison, WI: Modern Library.
- Quinn, A. H. (1998) *Edgar Allan Poe: A Critical Biography*. Baltimore, MD: John Hopkins University Press.
- Stone, B. (2009) 'Amazon erases Orwell books from Kindle.' *New York Times* 18 July: B1.
- Sullivan, J. W. N. (2007) *Beethoven: His Spiritual Development*. London: Read Books.
- Swift, J. (1995) *Gulliver's Travels*. Fox, C. (ed.). New York: Bedford Books.

Szilard, L. (1969) Reminiscences. In Fleming, D. and Bailyn, B. (eds.) *The Intellectual Migration*. Cambridge, MA: Harvard University Press.

Voltaire (1752) *Le Micromégas*. Anonymous: London (author's translation).

Warner, M. (2006) *Phantasmagoria: Spirit Visions, Metaphors, and Media into the Twenty-First Century*. Oxford: Oxford University Press.

Wells, H. G. (1926) *The World Set Free*. London: Macmillan.

- - - . (2005) *The Time Machine*. London: Penguin Classics.

White, M. (1999) *Isaac Newton: The Last Sorcerer*. New York: Basic Books.

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Insights

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