

# Futurology: How a group of visionaries predicted today's world a century ago

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We need more blue-sky thinking. Credit: Yolanda Sun/Unsplash

From shamanic ritual to horoscopes, humans have always tried to predict the future. Today, trusting predictions and prophecies has become part of daily life. From the weather forecast to the time the sat-nav says we will reach our destination, our lives are built around futuristic fictions.

Of course, while we may sometimes feel betrayed by our local meteorologist, trusting their foresight is a lot more rational than putting



the same stock in a TV psychic. This shift toward more evidence-based guesswork came about in the 20th century: futurologists began to see what prediction looked like when based on a scientific understanding of the world, rather than the traditional bases of prophecy (religion, magic, or dream). Genetic modification, space stations, wind power, artificial wombs, video phones, wireless internet, and cyborgs were all foreseen by "futurologists" from the 1920s and 1930s. Such visions seemed like science fiction when first published.

They all appeared in the brilliant and innovative "To-Day and To-Morrow" books from the 1920s, which signal the beginning of our modern conception of futurology, in which prophecy gives way to scientific forecasting. This series of over 100 books provided humanity—and science fiction—with key insights and inspiration. I've been immersed in them for the last few years while writing <u>the first book</u> about these fascinating works—and have found that these pioneering futurologists have a lot to teach us.

In their early responses to the technologies emerging then—aircraft, radio, recording, robotics, television—the writers grasped how those innovations were changing our sense of who we are. And they often gave startlingly canny previews of what was coming next, as in the case of Archibald Low, who in his 1924 book Wireless Possibilities, predicted the mobile phone: "In a few years time we shall be able to chat to our friends in an airplane and in the streets with the help of a pocket wireless set."

My immersion in these historic visions of the future has also shown me that looking at this collection of sparkling projections can teach us a lot about current prediction attempts, which today are dominated by methodologies claiming scientific rigor, such as "horizon scanning", "scenario planning" and "anticipatory governance". Unlike the corporate, bland way in which most of this professional future gazing takes place



within government, think-tanks and corporations, the scientists, writers, and experts who wrote these books produced very individual visions.

They were committed to thinking about the future on a scientific basis. But they were also free to imagine futures that would exist for other reasons than corporate or governmental advantage. The resulting books are sometimes fanciful, but their fancy occasionally gets them further than today's more cautious and methodical projections.

## **Forecasting future discoveries**

Take J B S Haldane, the brilliant mathematical geneticist, whose book <u>Daedalus; or: Science and the Future</u> inspired the whole series in 1923. It ranges widely across the sciences, trying to imagine what remained to be done in each.





We need more blue-sky thinking. Credit: Yolanda Sun/Unsplash



Haldane thought the main work in physics had been done with the Theory of Relativity and the development of quantum mechanics. The main tasks left seemed to him to be the delivery of better engineering: faster travel and better communications.

Chemistry, too, he saw as likely to be concerned more with practical applications, such as inventing new flavors or developing synthetic food, rather than making theoretical advances. He also realized that alternatives would be needed to fossil fuels and predicted the use of wind power. Most of his predictions have been fulfilled (though we're still waiting eagerly for those new flavors, which have to be better than salted caramel).

It's chastening, though, how much even such a clear-sighted and ingenious scientist missed, especially in the future of theoretical physics. He doubted nuclear power would be viable. He couldn't know about future discoveries of new particles leading to radical changes to the model of the atom. Nor, in astronomy, could he see the theoretical prediction of black holes, the theory of the big bang or the discovery of gravitational waves.

But, at the dawn of modern genetics, he saw that biology held some of the most exciting possibilities for future science. He foresaw genetic modification, arguing that: "We can already alter animal species to an enormous extent, and it seems only a question of time before we shall be able to apply the same principles to our own." If this sounds like Haldane supported eugenics, it's important to note that <u>he was vocally opposed</u> to forced sterilization, and didn't subscribe to the overtly racist and ableist eugenics movement that was en vogue in America and Germany at the time.

But the development that caught the eye of so many readers was what Haldane called "ectogenesis"—his term for growing embryos outside the



body, in artificial wombs. Many of the other contributors took up the idea, as did other thinkers—the most notable being Haldane's close friend Aldous Huxley, who was to use it in <u>Brave New World</u>, with its human "hatcheries" cloning the citizens and workers of the future. It was also Haldane who coined the word "clone."

Ectogenesis still seems like science fiction. But the reality is getting closer. It was announced in May 2016 that human embryos had been successfully grown in an "artificial womb" for 13 days—just one day short of the legal limit, which prompting an inevitable ethical row. And in April 2017 an artificial womb designed to nurture premature human babies was successfully trialled on sheep. So even that prediction of Haldane's may well be realized soon, perhaps within a century after it was made. Although artificial wombs will probably be used, at first, as a prosthesis to cope with medical emergencies, before they become routine options, on a par with cesareans or surrogacy.

Science, then, was not just science for these writers. It had social and political consequences, as does prediction. Many of the contributors of this series were social progressives, in sexual as well as political matters. Haldane looked forward to the doctor taking over from the priest and science separating sexual pleasure from reproduction. In ectogenesis, he foresaw that women could be relieved of the pain and inconvenience of bearing children. As such, the idea could be seen as a feminist thought experiment—though some feminists might now see it as a male attempt to control women's bodies.

What this reveals is how shrewd these writers were about the controversies and social proclivities of the age. At a time when too many thinkers were seduced by the pseudoscience of eugenics, Haldane was scathing about it. He had better ideas about how humanity might want to transform itself.





The first cultured hamburger, 2013. Credit: World Economic Forum, CC BY

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## Alternate futures

Some of To-Day and To-Morrow's predictions of technological



developments are impressively accurate, such as video phones, space travel to the moon, robotics and air attacks on capital cities. But others are charmingly inaccurate.

Oliver Stewart's 1927 volume, <u>Aeolus or: The Future of the Flying</u> <u>Machine</u>, argued that British craftsmanship would triumph over American mass production. He was excited by autogiros—small aircraft with a propeller for thrust and a freewheeling rotor on top, for which there was a craze at the time. He thought travelers would use those for short-haul flights, transferring for long-haul to flying boats—passenger planes with boat-like bodies that could take off from, and land on, the sea. Flying boats certainly had their vogue for glamorous voyages across the ocean, but disappeared as airliners became bigger and longer range and as more airports were built.

The To-Day and To-Morrow series, like all futurology, is full of such parallel universes. Paths history could well have taken, but didn't. In the rousing 1925 feminist volume <u>Hypatia or: Woman and knowledge</u>, Bertrand Russell's wife Dora proposed that women should be paid for household work. Unfortunately, this has not come to pass either.

The film critic Ernest Betts, meanwhile, writes in 1928's <u>Heraclitus; or</u> <u>The Future of films</u> that "the film of a hundred years hence, if it is true to itself, will still be silent, but it will be saying more than ever." His timing was terrible, as the first "talkie," <u>The Jazz Singer</u>, had just come out. But Betts's vision of film's distinctiveness and integrity—the expressive possibilities open to it when it brackets off sound—and of its potential as a universal human language, cutting across different linguistic cultures, remains admirable.

The difficulty with future thinking is to guess which of the forking paths leads to our real future. In most of the books, moments of surprisingly accurate prediction are tangled up with false prophecies. This isn't to say



that the accuracy is just a matter of chance. Take another of the most dazzling examples, <u>The World, the Flesh and the Devil</u> by the scientist J D Bernal, one of the great pioneers of molecular biology. This has influenced science fiction writers, including Arthur C Clarke, <u>who called</u> <u>it</u> "the most brilliant attempt at scientific prediction ever made."

Bernal sees science as enabling us to transcend limits. He doesn't think we should settle for the status quo if we can imagine something better. He imagines humans needing to explore other worlds and to get them there he imagines the construction of huge life-supporting space stations called biospheres, now named after him as "<u>Bernal spheres</u>". Imagine the international space station, scaled up to small planet or asteroid size.

#### Brain in a vat

When Bernal turns to the flesh, things get rather stranger. A lot of the To-Day and To-Morrow writers were interested in how we use technologies as prosthesis, to extend our faculties and abilities through machines. But Bernal takes it much further. First, he thinks about mortality—or more specifically—about the limit of our lifespan. He wonders what science might be able to do to extend it.

In most deaths the person dies because the body fails. So what if the brain could be transferred to a machine host, which could keep it, and therefore the thinking person, alive much longer?

Bernal's thought experiment develops the first elaboration of what philosophers now call the "brain in a vat" hypothesis. Except they're usually concerned with questions of perception and illusion (if my brain in a vat was sent electrical signals identical to the ones sent by my legs, would I think I was walking? Would I be able to tell the difference?). But Bernal has more pragmatic ends in view. Not only would his Daleklike machines be able to extend our brain life, they'd be able to extend



our capabilities. They would give us stronger limbs and better senses.

Bernal wasn't the first to postulate what we'd now call the cyborg. It had already appeared in pulp science fiction a couple of years earlier—talking, believe it or not, about ectogenesis.

But it's where Bernal takes the idea next that is so interesting. Like Haldane's, his book is one of the founding texts of transhumanism—the idea that humanity should improve its species. He envisions a small sense organ for detecting wireless frequencies, eyes for infra-red, ultra-violet and X-rays, ears for supersonics, detectors of high and low temperatures, of electrical potential and current.

With that wireless sense Bernal imagined how humanity could be in touch with others, regardless of distance. Even fellow humans across the galaxy in their biospheres could be within reach. And, like several of the series' authors, he imagines such interconnection as augmenting human intelligence, of producing what science fiction writers have called a <u>hive mind</u>, or what Haldane calls a "super-brain."

It's not AI exactly because its components are natural: individual human brains. And in some ways, coming from Marxist intellectuals like Haldane and Bernal, what they're imagining is a particular realization of solidarity. Workers of the world uniting, mentally. Bernal even speculates that if your thoughts could be broadcast direct to other minds in this way, then they would continue to exist even after the individual brain that thought them had died. And so would offer a form of immortality guaranteed by science instead of religion.





The Dornier Do X was the largest, heaviest, and most powerful flying boat in the world when it was produced by the Dornier company in Germany in 1929. Credit: <u>Wikipedia</u>, <u>CC BY</u>

#### **Blind spots**

But from a modern point of view what's more interesting is how Bernal effectively imagined the world wide web, more than 60 years before its invention by Tim Berners Lee. What neither Bernal, nor any of the To-Day and To-Morrow contributors could imagine, though, was the computers needed to run it—even though they were only about 15 years away when he was writing. And it is these computers that have so ramped up and transformed these early attempts at futurology into the industry it is today.



How can we account for this computer-shaped hole at the center of so many of these prophecies? It was partly that mechanical or "analogue" computers such as punched card machines and anti-aircraft gun "predictors" (which helped gunners aim at rapidly moving targets) had become so good at calculation and information retrieval. So good, in fact, that to the inventor and To-day and To-morrow author H Stafford Hatfield what was needed next was what he called "the mechanical brain ".

So these thinkers could see that some form of artificial intelligence was required. But even though electronics were developing rapidly, in radios and even televisions, it didn't yet seem obvious—it didn't even seem to occur to people—that if you wanted to make something that functioned more like a brain it would need to be electronic, rather than mechanical or chemical. But that was exactly the moment when <u>neurological</u> <u>experiments by Edgar Adrian</u> and others in Cambridge were beginning to show that what made the human brain tick was actually the electrical impulses that powered the nervous system.

Just 12 years later, in 1940—before the development of the first digital computer, Colossus at Bletchley Park—it was possible for Haldane (again) to see that what he called "Machines that Think" were beginning to appear, combining electrical and mechanical technologies. In some ways our situation is comparable, as we sit poised just before the next great digital disruption: AI.

Bernal's book is a fascinating example of just how far extended future thinking can go. Further than actual science, or science fiction, or philosophy or anything else. But it also shows where it reaches its limits. If we can understand why the To-Day and To-Morrow authors were able to predict biospheres, mobile phones and <u>special effects</u>, but not the computer, the crisis in obesity, or the resurgence of religious fundamentalisms, then maybe we can learn about the blind spots in our



own forward vision and horizon scanning.

Beyond the simple wows and comedic effects of these hits and misses, we need more than ever to learn from these past examples about the potential and dangers of future thinking. We would do well to look closely at what might helps us to be better futurologists, as well as at what might be blocking our vision.

### Yesterday and today

The pairing of scientific knowledge and imagination in these books created something unique—a series of hypotheticals somewhat lodged between futurology and science fiction. It is this sense of hopeful imagination that I think urgently needs to be injected back into today's predictions.

Because computers have transformed contemporary futurology in major ways: especially in terms of where and how it is carried out. As I have mentioned, computer modeling of the future mainly happens in businesses or organizations. Banks and other financial companies want to anticipate shifts in the markets. Retailers need to be aware of trends. Governments need to understand demographic shifts and military threats. Universities want to drill down into the data of these or other fields to try to understand and theorize what is happening.

To do this kind of complex forecasting well, you have to be a fairly large corporation or organization with adequate resources. The bigger the data, the hungrier the exercise becomes for computing power. You need access to expensive equipment, specialist programmers and technicians. Information that citizens freely offer to companies such as Facebook or Amazon is sold on to other companies for their market research—as many were shocked to discover in the Cambridge Analytica scandal.



The main techniques which today's governments and industries use to try to prepare for or predict the future—horizon scanning and scenario planning—are all well and good. They may help us nip wars and financial crashes in the bud—though rather obviously, they don't always get it right either. But as a model for thinking about the future more generally, or for thinking about other aspects of the future, such methods are profoundly reductive.

They're all about maintaining the status quo, about risk aversion. Any interesting ideas or innovative speculations that are about anything other than risk avoidance are likely to get pushed aside. The group nature of think-tanks and foresight teams also has a leveling down effect. Future thinking by committee has a tendency to come out in bureaucratese: bland, impersonal, insipid. The opposite of science fiction.

Which is perhaps why science fiction needs to put its imagination in hyperdrive: to boldly go where the civil servants and corporate apparatchiks are too timid to venture. To imagine something different. Some science fiction is profoundly challenging in the sheer otherness of its imagined worlds.

That was the effect of 2001 or Solaris, with their imagining of other forms of intelligence, as humans adapt to life in space. Kim Stanley Robinson takes both ideas further in <u>his novel 2312</u>, imagining humans with implanted quantum computers and different colony cultures as people find ways of living on other planets, building mobile cities to keep out of the sun's heat on Mercury, or terraforming planets, even hollowing out asteroids to create new ecologies as art works.

When we compare To-Day and To-Morrow with the kinds of futurology on offer nowadays, what's most striking is how much more optimistic most of the writers were. Even those like Haldane and <u>Vera Brittain</u> (she wrote a superb volume about women's rights in 1929) who had witnessed



the horrors of modern technological war, saw technology as being the solution rather than the problem.

Imagined futures nowadays are more likely to be shadowed by risk, by anxieties about catastrophes, whether natural (asteroid collision, megatsunami) or man-made (climate change and pollution). The damage industrial capitalism has inflicted on the planet has made technology seem like the enemy now. Certainly, until anyone has any better ideas, and tests them, reducing carbon emissions, energy waste, pollution, and industrial growth seem like our best bet.

## **Imagining positive change**

The only thing that looks likely to convince us to change our ways is the dawning conviction that we have left it too late. That even if we cut emissions to zero now, global warming has almost certainly passed the tipping point and will <u>continue to rise to catastrophic levels</u> regardless of what we do to try to stop it.

That realization is beginning to generate new ideas about technological solutions—ways of extracting carbon from the atmosphere or of artificially reducing sunlight over the polar ice caps. Such proposals are controversial, attacked as encouragements to carry on with Anthropocene vandalism and expect someone else to clear up our mess.

But they might also show that we are at an impasse in future thinking, and are in danger of losing the ability to imagine positive change. That too is where comparison with earlier attempts to predict the future might be able to help us. They could show us how different societies in different periods have different orientations towards the past or the future.

Where the modernism of the 1920s and 30s was very much oriented



towards the future, we are more obsessed with the past, with nostalgia. Ironically, the very digital technology that came with such a futuristic promise is increasingly used in the service of heritage and the archive. Cinematic special effects are more likely to deliver feudal warriors and dragons, rather than rockets and robots.

But if today's futurologists could get back in touch with the imaginative energies of their predecessors, perhaps they would be better equipped to devise a future we could live with.

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