

1 Introduction

Progress or Threat?

After visiting the New York World's Fair in 1964, Isaac Asimov – already a well-known science fiction author – wrote a prediction for the *New York Times* of what he thought would be displayed at a similar exposition in fifty years' time.¹ When the new year of 2014 was ushered in, there was a flurry of media attention focused on the accuracy (or otherwise) of Asimov's vision. We seem to be fascinated by predictions of the future and also by a retrospective evaluation of earlier generations' efforts. It's almost as though we relish a demonstration of just how wrong earlier thinkers were about what we ourselves are actually experiencing. A popular book published in 2012 collected a host of articles and images from early volumes of *Popular Mechanics* under the title *The Wonderful Future that Never Was*.² Asimov actually did pretty well, although like many at the time he predicted a rosy future for nuclear power. More seriously, he combined optimistic forecasts about the future development of technology with a more sober assessment of what life might be like in an overcrowded and increasingly resource-starved world. Others at the time worried over the destruction of civilization or even of humanity itself by a nuclear holocaust. A companion volume to the *Popular Mechanics* survey highlighted predictions about new weapons that might be developed, showing that the optimistic and pessimistic visions of a technologically-rich future have always run side by side.³

Asimov was not just a famous writer of science fiction; he was also a prolific contributor to the genre of popular science writing. In this dual role, he paralleled the efforts of an even earlier pioneer, H. G. Wells, who predicted the future in novels such as *The War in the Air* and *The Shape of Things to Come*, but also made serious efforts to alert the public to the latest scientific developments (see colour plate 1). Wells and Asimov were both fascinated by science and technology, and were convinced that together these enterprises had the potential to change the world for the better. But they were also concerned that human nature and the dysfunctional state of modern society might lead to a disastrous misuse of technology. As science fiction writers, they imagined future worlds in order to tell stories about how human beings might cope with the challenges thrown up by new machines. And as popular science writers,

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they were happy to engage in an imaginative form of an enterprise which would later be called futurology.

The term ‘futuresology’ came into use in the 1950s to denote efforts to predict the future by extrapolating social and economic trends, increasingly via the use of computers to crunch the figures. The previous generation did the same thing on an individual basis. Writers like Asimov were trying to predict how society might evolve, but they were more interested in how social trends might be created or deflected by new technologies that they saw as plausible given the state of scientific knowledge at the time. This was a ‘what if?’ approach necessitated by the fact that one could only guess which of the potentially viable inventions would actually become successful. I am going to borrow the term ‘futuresology’ to describe this project even though it is much more open-ended than the number-crunching of the global organizations that now worry about what might happen to us. Like science fiction, this kind of futuresology makes an imaginative leap to pick out which possibilities will be explored, but doesn’t set a human-interest story in the projected future. I want to argue that there is a close link between the two projects. *The Shape of Things to Come* was really this kind of futuresology thinly disguised as fiction (although the subsequent movie version has a bit more action in it).

Popular interest in these predictions derives from our fascination with their accuracy or lack of it. We still worry that Aldous Huxley may have all too perceptively anticipated current trends in the application of biological technology in his *Brave New World*. The new technological gadgets foretold by Asimov and the *Popular Science* writers arouse admiration or contempt depending on whether or not we really are using them today. But for the historian of science or of popular culture, these anticipations of the future are a valuable resource for understanding the attitudes, beliefs and expectations of a generation that was getting used to the idea that the future would not merely repeat the past because science and technology were having irreversible effects on how we live. At the most basic level, they tell of the hopes for progress and the fears that it all might go horribly wrong. At a more detailed level, they tell us just what the technically savvy writers of the time thought might be the most fruitful lines of development and what they thought the effects would be for the ordinary person. Any effort to understand the interaction of science and technology with the emergence of modern social and cultural values must take these earlier prognostications into account.

Academic interpretations of early twentieth-century attitudes to science tend to focus on the pessimists. *The Shape of Things to Come* predicted a war that would almost destroy civilization, although at this point Wells still thought that a rationally planned state would emerge when the few remaining scientists took over and began to rebuild. The later 1930s saw a plethora of novels anticipating mass destruction through bombing, poison gas and even germ warfare. *Brave*

New World suggested that if the world ever did become governed by technicians, it would become a nightmare as they moulded humanity into a herd of passive consumers. C. S. Lewis also turned to a cross between science fiction and fantasy in his trilogy parodying Wells's vision of a scientifically planned world. Many recent surveys of the period's efforts to foretell the future concentrate almost exclusively on the literary intellectuals' and novelists' efforts to convince their readers that technology would destroy them one way or another. The chapters on the early twentieth century in I. F. Clarke's *Pattern of Expectation* paint a picture of unrelieved gloom derived almost exclusively from the fiction of the time.⁴ More recently, Richard Overy's *Morbid Age* trawls through the writings of intellectuals and political thinkers to paint a similar picture of a period when almost everyone thought that a catastrophe was imminent.⁵

In 1940, George Orwell commented on the pessimistic attitude of literary intellectuals such as Huxley, noting: 'All of them are temperamentally hostile to the notion of "progress"; it is felt that progress not only doesn't happen, but *ought* not to happen.'⁶ Orwell soon became more pessimistic, but at this point he thought the literary figures of the interwar years were out of touch with what was really going on. He knew that the scientists, technical experts and designers of the period were predicting the next steps forward in a much more positive light. Huxley parodied not only Wells's plan for a technocratic world state, but also the predictions of eminent scientists such as J. B. S. Haldane, whose *Daedalus* of 1924 had offered an even more ambitious vision of how science would transform human life. When we take into account the numerous magazines such as *Popular Mechanics* promoting the technical developments that would make life easier, we come to appreciate how a focus on the work of literary figures can bias our view of how ordinary people at the time thought about the future. Popular science writers often looked to the future with optimism, and for many readers they were the most trusted guides.

So, was the early twentieth century a morbid age terrified of future wars or a streamlined era fascinated with speed and convenience? In fact, it was a complex mixture of both attitudes. In his study of the years preceding the Great War, Philip Blom notes that many of the cultural, scientific and technical innovations that galvanized society had their origins then. The title of his book, *The Vertigo Years*, encapsulates a growing sense that the world was moving into an age of rapid and unpredictable change which some found frightening, but many experienced with exhilaration. Exploring the hopes and fears generated in France, Roxanne Panchasi writes of a 'culture of anticipation'.⁷

It all depends on where you focus your attention. The situation changed decade by decade, and different social groups experienced the changes in different ways. National experiences differed too. The post-war experiences of the European nations were hugely influenced by ideologies, both of the right

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and the left, which were enthusiastic for change. Conservative social and political forces viewed the new developments with suspicion. Nor did the divisions abate with time. By the late 1930s, Europe was lurching toward war, while ‘streamlined’ America was recovering its confidence after the Great Depression.⁸ New tensions subsequently emerged in the era of the Cold War.

The image historians create depends on the material they study, and unfortunately most academics specialize in a particular period, nation, class or literary genre and present an image of the past that generalizes from their chosen area. We have thus accumulated a mass of secondary literature that presents a host of conflicting interpretations of early twentieth-century culture. It’s a bit like the story of the blind men studying an elephant – each feels a different part of the animal and thinks that his impressions tell him what the whole beast must be like. We need to recognize that there wasn’t a single coherent Western culture that responded uniformly to the prospect of scientific and technical progress. The time is ripe for a more comprehensive overview that will balance the pessimistic with the optimistic, the technophobe with the technophile, the warmonger with the industrial designer, the literary intellectual with the inventor. And the first step must be to gain a better view of just who was involved with predicting and shaping the future – and who was trying to sell the rival visions to the public.

Science Fact and Science Fiction

The evidence a historian uses may open a restricted window on what is actually a very complex situation. Literary scholars will tend to focus on novels and are most likely to prefer the highbrow literature produced by intellectuals. Students of popular culture might look to the more everyday novels – a very different genre, but one still produced mostly by authors with little experience of science and technical innovation. But if they turn to books and magazines dealing with popular science, they encounter material written by authors with real experience of science and engineering. These authors would tend to support the development of science and technology and would look forward to the next stages in the progress. Occasionally, a high-profile scientist such as Haldane would contribute to this literature, attracting newspaper headlines and arousing the fears of highbrow novelists and intellectuals.

The relationship between popular writing about science and science fiction can be quite complex and, in some cases, there is little clear distinction between the two areas. ‘Science fiction’ may be taken to include everything from the pulp magazines to the occasional ventures of literary intellectuals into the field of future dystopia. Our concern here is, of course, with efforts to imagine a future world – stories about invading aliens or colliding comets are not relevant unless new technologies are predicted to deal with them. But the

aims of those who set stories in imagined future worlds can be quite different. Literary figures and moralists usually agonized over the potential threats to traditional values, while pulp science fiction authors worked hand in glove with the enthusiasts who promoted the latest developments.

Even those readers who do not enjoy the genre as a whole will be familiar with the future worlds created by authors such as Aldous Huxley and George Orwell. They are the subjects of biographies and literary analyses, and their works are routinely reprinted with scholarly introductions.⁹ Their visions are almost all dystopias – nightmare stories set in a dehumanized world, with technological developments being depicted as the tools of regimes that control every aspect of life. Fritz Lang’s influential 1926 movie *Metropolis* depicted the workers enslaved in the bowels of a futuristic megalopolis. French intellectuals were also suspicious of the drive toward a mechanized world and frequently identified America as the source of the trend. Georges Duhamel’s *Scènes de la vie futur* of 1931 was translated as *America the Menace*. A variant on this theme is E. M. Forster’s story ‘The Machine Stops’ of 1909, in which people have willingly adopted a life of ease in mechanized cocoons.

The extent of science’s involvement in these stories varies, however. In the case of Huxley’s *Brave New World*, it is considerable, but it has been argued that Orwell’s *1984* is not a dystopia in the same vein because new technology plays only a limited role in how the state’s control is exercised.¹⁰ Orwell’s target was not the threat of new technology, but the possible emergence of totalitarian regimes that would misuse whatever was available. It is fair to say that the same concern was paramount in virtually every dystopia from Owen Gregory’s *Meccania* of 1918 through to Yevgeny Zamyatin’s *We* of 1924 to David Karp’s *One* of 1953. But for most of these authors, the power given to the state by new technology plays a greater role than it does in *1984* and they are thus of direct relevance when it comes to assessing visions of future developments.

Mainstream contributors to science fiction such as H. G. Wells, Isaac Asimov, Arthur C. Clarke and Robert Heinlein now attract a good deal of scholarly attention, although they seldom figure in the realm of literary criticism. Scholars are recognizing that as a window on popular culture, this literature is a much better guide than the highbrow novels that achieve iconic status only after they have been incorporated into the literary canon.¹¹ We also have studies on the spread of science fiction into the realm of cinema, and a study by Christopher Frayling notes how the technology imagined in the movies can actually inspire the scientist and engineers to create it.¹² There is also a mass of information and comment generated by fans, much now available via the internet.

These authors wrote ‘hard’ science fiction in which the effort to predict future technologies and their implications was a major inspiration. Their

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protagonists may engage in struggles against oppressive states (as in Wells's *Sleeper Awakes*), but they operate in a world which is very much shaped by new technologies. Asimov defined what he called 'real science fiction' as 'those stories that deal with scientific ideas and their impact in the future as written by someone knowledgeable in science'.¹³ He points to Heinlein's early stories such as 'Solution Unsatisfactory' of 1941 which imagine worlds transformed by new technologies (in this case nuclear weapons) and place their heroes in situations defined by the problems created by the technologies. Heinlein himself preferred the term 'speculative fiction' and later writers such as Brian Aldiss have protested against the focus on the impact of science and technology. But it is precisely the kind of story identified by Asimov that resonates with the more sober futurology that he (and many others) also engaged in.

Along the same lines, Arthur C. Clarke argued that '*only* readers or writers of science fiction are really competent to discuss the possibilities of the future'.¹⁴ What he meant was not that only science fiction can predict effectively, but that meaningful futurology has to involve an element of imagination. It cannot be mere extrapolation from existing trends – it has to involve choosing a conceivable technology and predicting what might happen if and when it is developed and applied. So even an account of a future world that does not include a human-interest narrative involves thinking about possibilities, but not certainties. The authors may get the details wrong when viewed in hindsight, but they tell us much about what educated people thought was at least plausible at the time. These stories are anything but utopias, but they recognize that scientific progress will continue and seek to grapple with the consequences. A partially dystopian scenario is, in any case, far more useful as a literary device than the perfect society envisaged by the real technophiles. It would be hard to set an exciting story in a utopia where everyone was genuinely happy and fulfilled all of the time.

There is also, of course, the 'pulp' science fiction of the popular magazines that began to appear from the 1920s onwards. These are usually dismissed as being of poor literary quality, and at the lowest level these stories offer only an impoverished vision of the future, even when major new technologies are imagined. Ray guns and spaceships replace six-shooters and stagecoaches, aliens replace Indians, but the stories often merely rehash the themes that would be familiar to any reader of popular westerns. There is little effort to develop a complex human story, but also little effort to think seriously about the effects that the new technical developments might have on society. Even so, the pulp fiction helps us to understand what some ordinary readers were prepared to accept as plausible visions of a future world. Just to imagine the possibility of space travel was a major imaginative leap until rockets transformed the situation in World War II. Before that, most would scoff at the prospect, but a sub-culture was building up which was more aware of the possibilities. By the time

authors such as Asimov and Heinlein entered the field around 1940, the magazines had matured into a major source of inspiration for a generation of enthusiasts.¹⁵

The emergence of popular science fiction magazines reminds us that we need to take account of ordinary readers' interests as well as those of the literary intellectuals. Students of popular culture are well aware that popular science writing flourished in the Victorian era, but are taking note of important transformations in the early twentieth century. Books and magazines were increasingly well illustrated and there was considerable interest among some sections of the public in well-presented information about the latest developments. Newspapers, too, trumpeted the achievements of aviation pioneers and inventors of all sorts. Eventually new media such as film, radio and later television became active, opening up new avenues for those involved with science to educate the public and seek to influence its attitudes.¹⁶

Magazines such as *Popular Mechanics* in America and *Armchair Science* in Britain were dedicated to the promotion of technical innovations, and by their very nature stories on such themes invited speculation about future applications and their impact. The magazines also included occasional ventures into more far-reaching futurology, the predictions sometimes featuring in their cover illustrations (see colour plate 5). There was also a constant flow of books predicting the future of science and technology. Some were written by major figures in science, such as Haldane's *Daedalus* and J. D. Bernal's *The World, the Flesh and the Devil*. There were many similar works by lesser-known figures, most of whom had at least some technical education or experience. Historians of science now take popular science seriously as a means of accessing the public's attitude toward science, and if the relevant books and magazines were routinely speculating about the future, they must have played a role in shaping attitudes along with the fictional accounts.

It would thus be a mistake to draw too sharp a line between science fiction and the kind of futurology based on extrapolating from the current state of science. The 'harder' kind of science fiction often places its protagonists in a future world whose technological hardware has been conceived using the same predictive insights as those used by futurologists. A few novels are almost hybrids between the two genres, the human-interest narrative playing a very minor role against the background in which the author tries to imagine a future society. Wells's *The Shape of Things to Come* would certainly fit into this category, and the narrative element in Olaf Stapledon's *Last and First Men* is so thin that it scarcely classifies as a novel. Some authors wrote in both categories, including Wells himself, and later figures such as Isaac Asimov and Arthur C. Clarke.¹⁷ 'Professor' A. M. Low, science consultant and later editor of *Armchair Science*, wrote futurological articles in the magazine, two books on the theme and also science fiction novels. Futurological texts were occasionally

presented in the form of a fictional account of life in the predicted future.¹⁸ The rhetoric of much futurological literature shows a remarkable similarity to that of science fiction, suggesting that the general public would regard them as parallel routes to the imagined future. Even the illustrations – including the magazine covers – look the same.

Two Cultures?

There was thus a complex of differing attitudes toward science and technology among those who sought to influence public opinion through the mass media. Writers of hard science fiction worked hand-in-hand with popular science writers to promote the hope of technical progress and explore its social implications. Literary figures were less interested in the technicalities and more fearful of the consequences. Wells pointed to the difference between the two outlooks in his ‘Discovery of the Future’ lecture of 1902, contrasting what he called the legalistic or past-regarding mentality of the majority with the creative or future-regarding approach of those who looked toward and welcomed the introduction of new technologies and new social arrangements.¹⁹

The polarization Wells was trying to identify looks remarkably like an anticipation of the ‘two cultures’ model popularized by C. P. Snow in 1959,²⁰ in which society is divided between the humanities and the sciences. The humanities have a stranglehold on government which blocks technical research and development. Snow is now a much-maligned figure, his novels dismissed as second-rate and his views on the cultural divide criticized as oversimplified and self-serving. But I have a soft spot for him, not least because he was an old boy of my own school (alongside my future father-in-law). Historians have shown that his view of the humanities’ influence was grossly exaggerated – the British Government had been investing heavily in scientific research for decades in the hope of creating high-tech weapons systems. But Snow was reflecting a view already developed by Wells, suggesting that there really was a sense among the technophiles that they were struggling against an entrenched attitude suspicious of their aspirations.²¹

Snow himself admitted that he simplified his images of the two cultures to make his point, and that his vision was more appropriate to Britain than to many other national contexts. But if we generalize the image that Wells and Snow projected, we get a useful handle on the different perspectives from which people viewed the prospect of scientific and technical progress. On the one side, we have those directly involved with scientific and technical work, and on the other, those who reflect and comment on the human situation and social issues. This division obviously misses out a huge swathe of the population whose only concern is making a living or a profit within the existing system – they are the ones whose opinions might be influenced by writing about science

or technology, either factual or fictional. There are also people active in areas such as economics and politics who hope to influence things by proposals that may not involve technical or industrial research.

The literary figures and highbrow intellectuals represented the humanities side of Snow's divide and the legalistic side of Wells's. Their views would be shared by a wider swathe of popular novelists and often by the journalists who reported and commented on social and political news. The key point is that these would be people with little or no education in the sciences and few contacts with anyone involved with scientific, technical or industrial work. For this reason, the authors of hard science fiction would have to be excluded from the group. Snow dismissed the literary intellectuals as natural Luddites who instinctively feared that the new gadgets produced by technical research would be misused either by the military or by political demagogues. The negative viewpoint of major literary works such as *Brave New World* suggests that there may be something in this characterization. But so does a whole genre of more popular stories in which scientists are depicted as lone madmen and future wars rendered horrific by new weapons.²² Journalists might be equally biased – there were few dedicated science correspondents until the middle decades of the century and the ordinary hack would write the occasional 'gee whiz' story about new technology that might promote either wonder or ridicule.

If social commentators were instinctively worried about the effects of scientific and industrial progress, Snow claimed that the scientists had the future in their bones. Their work depended on the discovery and application of new knowledge and even when well aware of potential military applications, they were supportive of technical progress. Snow tried to focus on academic science, but as a technocrat he knew that most research was now being done in government or industrial laboratories. He also ignored the amateur inventors – the archetypal lone researchers, now increasingly overtaken by 'big science', but not yet extinct. For Americans, the role model here was Thomas Edison, and pioneers such as Guglielmo Marconi and John Logie Baird showed that such figures could still play a role. These figures interacted with engineers, designers, architects, progressive industrialists and a host of men (almost always men) with significant technical expertise derived from work with industry or the military. Some politicians, often of the far right or left, also promoted the role of scientific research in the hope of national glory or social progress.

Snow conceded elsewhere that the scientists themselves were often 'gadgets' obsessed with perfecting the technique in hand, unable to see the broader implications of what they were doing.²³ They might promote the potential value of their work, but in a short-sighted way – and much of the popular futurology written by technical experts tended to envision possible

technologies without thinking through the problems they might create in practice. But the vision displayed by figures such as Haldane and Bernal suggests that, at their best, the research scientists could imagine the broader sweep of what new discoveries might achieve.

We are often told that the scientists and technical experts didn't communicate with the public because they were too busy or feared it would damage their reputation. But as I showed in my *Science for All*, this image is misleading. Large numbers of them tried their hand at popular science writing from time to time and a few developed real skills in the field and earned part of their reputation (and some of their income) from it. For every big name such as Haldane who participated, there was a host of lesser-known figures contributing regularly to science magazines and writing books in the field. A. M. Low provides a classic example of someone who combined the careers of inventor and science writer. These people interacted with the hard science fiction writers (and sometimes joined their ranks) to provide a source for the public not only of technical information, but about the prospects for future developments. Their contributions certainly did not ignore problems such as the emergence of new military technologies, but were generally enthusiastic about the future benefits that could be expected.

Historians and the Idea of Progress

We are now in a better position to address the question raised at the start of this chapter: why do scholars offer such different impressions of early twentieth-century attitudes toward the future? The answer lies in the sources from which they derive their evidence, because different sources reflect the views of different communities. The literary scholar focusing on highbrow novelists is much more likely to encounter pessimistic views about the future development of science and technology than the historian of popular science. An analysis based on political and economic journalism will not look the same as one derived from pulp science fiction. If we are to get an overview of what the reading (and listening) public was presented with by the mass media, we must take all of these sources into account and be prepared to accept that views on the future of science will form a complex and ever-changing mixture. The mix will reflect the professional background and nationality of those who write and broadcast and will change decade by decade if not year by year.

An example of how perspective can be shaped by sources can be seen in the work of two authors already identified as depicting the interwar years as a period of despair, overwhelmed by the horror of war, economic depression and oncoming totalitarianism. I. F. Clarke's *Pattern of Expectation* has a series of chapters on this period culminating in chapter 9 entitled 'From Bad to Worse'. Richard Overly drives the point home by calling his analysis of