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1
Definitions

Three definitions

The obvious place to begin a Critical History of science fiction is with a definition of its topic, but this is no easy matter. Many critics have offered definitions of SF, and the resulting critical discourse is a divergent and contested field. One particularly influential approach is that of Darko Suvin (b. 1930), who calls SF

> a literary genre or verbal construct whose necessary and sufficient conditions are the *presence and interaction of estrangement and cognition, and whose main device is an imaginative framework alternative to the author's empirical environment*. (Suvin, p. 37)

Suvin goes on, usefully, to isolate what he calls 'the novum' (plural: nova), the fictional device, artefact or premise that focuses the difference between the world the reader inhabits and the fictional world of the SF text. This novum might be something material, such as a spaceship, a time machine or a communications device; or it might be something conceptual, such as a new conception of gender or consciousness. Suvin's 'cognitive estrangement' balances radical alterity and a familiar sameness, such that 'by imagining strange worlds we come to see our own conditions of life in a new and potentially revolutionary perspective' (Parrinder, p. 4).

The critic and novelist Damien Broderick (b. 1944) has developed and refined Suvin's insights. He notes that the flowering of SF in the nineteenth and twentieth centuries reflected the great cultural, scientific and technological upheavals (he calls these 'epistemic changes') of that era, and pins down with more precise language the strategies employed by the bulk of SF texts:

> SF is that species of storytelling native to a culture undergoing the epistemic changes implicated in the rise and supersession of technical-industrial modes of production, distribution, consumption and disposal. It is marked by (i) metaphoric strategies and metonymic tactics, (ii) the foregrounding of icons and interpretive schemata from a collectively constituted generic 'mega-text'

> [*i.e. all previously published SF*] and the concomitant de-emphasis of 'fine writing' and characterisation, and (iii) certain priorities more often found in scientific and postmodern texts than in literary models: specifically, attention to the object in preference to the subject. (Broderick, p. 155; my addition)

The writer and critic Samuel Delany (b. 1942) has, on the other hand, challenged the validity of defining SF in terms of its subject matter, and suggests instead that it is 'a vast play of codic conventions' which readers can apply to texts at the level of the *sentence* as much as the level of the text. He suggests that sentences such as 'her world exploded' or 'he turned on his left side' *mean* different things, depending on whether a reader approaches them as SF or ordinary fiction. He suggests: 'most of our specific SF expectations will be organized around the question: what in the portrayed world of the story, by statement or implication, must be different from ours in order for this sentence to be normally uttered?' (Delany, pp. 27–8, 31). For Delany, in other words, SF is as much a *reading strategy* as it is anything else.

Other critics who have attempted definitions (and there have been many) have explored different approaches. Brian Stableford (b. 1948), John Clute (b. 1940) and Peter Nicholls (b. 1939), in their lengthy entry 'Definitions of SF' in Clute and Nicholls' *Encyclopedia of Science Fiction* (2nd edn., 1993) quote sixteen separate definitions, from Hugo Gernsback's in 1926 ('a charming romance intermingled with scientific fact and prophetic vision') to Norman Spinrad's more recent 'science fiction is anything published as science fiction' (Clute and Nicholls, pp. 311–14). There is among all these thinkers no single consensus on what SF is, beyond agreement that it is a form of cultural discourse (primarily literary, but latterly increasingly cinematic, televisual, comic book and gaming) that involves a world-view differentiated in one way or another from the actual world in which its readers live. The degree of differentiation (the strangeness of the novum, to use Suvin's term) varies from text to text, but more often than not involves instances of technological hardware that have become, to a degree, reified with use: the spaceship, the alien, the robot, the time-machine, and so on. The *nature* of differentiation, however, remains debated, some critics defining science fiction as that branch of 'fantastic' or 'non-realist' fiction in which difference is located within a *materialist, scientific* discourse, whether or not the science invoked is strictly consonant with science as it is understood today. This means that faster-than-light travel (impossible, according to contemporary scientific orthodoxy) is a staple of science fiction, provided that such travel is rationalised within the text through some device or technology. A tale in which a character travels from Earth to Mars simply by 'wishing' or 'imagining' it might be defined as 'fantastic' or 'magic realist' rather than strictly science-fictional. On the other hand, few SF texts adhere with complete consistency to the scientific, or pseudo-scientific, logics of their conception. It would, for example, be perverse to deny that Edgar Rice Burroughs' *A Princess of Mars* (1912) is a work of science fiction, and yet the protagonist travels from the Earth to Mars precisely by 'wishing' the journey.

Some critics are comfortable defining as SF a range of texts more normally classified as magic realist or fantastic. In part there has been a reaction to the perceived

'ghettoisation' of SF, by which the literary establishment in America and Europe dismisses texts by category, privileging so-called 'literary fiction' over so-called 'genre fiction' as if the category 'literary fiction' were anything other than a genre, and in many cases ranking 'science fiction' as especially juvenile and valueless, below 'historical fiction' and 'crime fiction' in their notional pecking order. This persistent prejudice does real harm by creating a climate in which it is harder for writers to work and gain recognition, thereby damaging literature in general. Polemic is probably out of place in a Critical History, so we can limit ourselves to observing how perniciously ridiculous these notions are, and (perhaps) humanely pitying the blinkered attitude of literary editors, reviewers and the intelligentsia literature that has been infected by them.[1]

This study has been unable to avoid the often tedious debates concerning 'definition': but my aim is to present an historically determined narrative of the genre's evolution rather than offering an apophthegmatic version of the sentence 'SF is such-and-such'. This narrative is outlined in the chapters that follow, and it sees SF as a specific – and, as it happens, dominant – version of *fantastic* (rather than *realist*) literature: texts that adduce qualia that are not to be found in the real world in order to reflect certain effects back on that world. The specificity of this fantasy is determined by the cultural and historical circumstances of the genre's birth: the Protestant Reformation, and a cultural dialectic between 'Protestant' rationalist post-Copernican science on the one hand, and 'Catholic' theology, magic and mysticism, on the other. Those texts where the latter term predominates are often called 'Fantasy'; those largely or wholly within the aegis of the former are called 'Hard SF'. In between – the majority of texts with which we will have to deal – we find 'SF' as it is broadly conceived. But it is one of the theses of this study that pretty much all the classic texts of SF articulate this fundamentally religious dialectic. In asserting this I am not saying, as some critics have done, that SF embodies 'religious myth' or secularises religious themes. SF may, of course, do either or both of these things, but this is not my argument. My argument is that the genre as a whole still bears the imprint of the cultural crisis that gave it birth, and that this crisis happened to be a European religious one. This is, I think, worth stating unambiguously at the beginning of the study, so that the reader (who may well and profitably disagree with the emphases that follow) can position herself with respect to the argument. No critical history of science fiction could be wholly consensual, and nothing I argue here will please all, or perhaps even many, critics in the field.

The remainder of this chapter will be concerned with a more detailed discussion of some key terms in the definition of SF; specifically 'science' and 'technology'.

The scientific

We need to define the term 'science' as it appears as a modifier in the phrase 'science fiction'. For some critics this is the crucial question when it comes to defining the genre. Brian Aldiss's influential argument that SF 'begins' in 1818 with Mary Shelley's *Frankenstein* (although Aldiss himself lists numerous important

ancestors) relies on the assumption that SF could not have originated any earlier than the nineteenth century precisely because it is only in the nineteenth century that 'science' as we now understand the term obtained widespread cultural currency. To quote Peter Nicholls: 'SF proper requires a consciousness of the scientific outlook … a cognitive, scientific way of viewing the world did not emerge until the 17th century, and did not percolate into society at large until the 18th (partly) and the 19th (to a large extent)' (Clute and Nicholls, pp. 567–8).

'Science' as the term is generally understood means, roughly, a discipline which seeks to understand and explain the cosmos in materialist (rather than spiritual or supernatural) terms; a deductive, experimental discourse characterised by what the German philosopher Karl Popper (1902–1994) called 'falsifiability', whereby the accumulation of empirical data can disprove but never actively prove a theory. Because this version of 'science' is instrumental, it aligns the discourse closely to technology, specifically with the enormous technological advances associated with the Industrial Revolution. This sense of 'science' may explain why nineteenth- and twentieth-century SF is so much more fascinated with items of technology than it is with less 'applied' forms of scientific discourse (mathematics, biology, geography, chemistry, psychology, geology and the like) as such. Of course, there are examples of SF that take the term in this proper sense: Abbot's *Flatland* (1884), for instance, stands at the head of a vigorous little tradition of SF based on mathematical premises. But the great majority of SF written in the nineteenth and twentieth centuries is actually 'extrapolated technology fiction'. In an earlier critical study of science fiction (published by Routledge in 2000) I was quite persuaded by the argument that only a nineteenth-century 'scientific' cultural milieu could meld the constituent generic elements (fantastic voyage, utopia, future-tale, satire, and so on) into 'science fiction' as we understand it. I have since changed my mind. To put it simply, I no longer see why a distinctively modern conception of 'science' need underlie 'science fiction', given that 'science' more broadly conceived as a non-theological mode of understanding the natural world goes back a great deal further than the nineteenth century.

Of course, *something* happened to 'science' in the Victorian age. To be precise, with the nineteenth century's conception of science comes a cultural division into arts and sciences, a perceived separation between what C. P. Snow in his influential 1959 lectures called *The Two Cultures*. Stefan Collini, in an introduction to a recent reprint of Snow's study, points out that the term 'scientist' was first proposed in 1834 along the lines of 'artist':

> the lack of a single term to describe 'students of the knowledge of the material world' had bothered meetings of the British Association for the Advancement of Science in the early 1830s, at one of which 'some ingenious gentleman proposed that, by analogy with artist, they might form scientist' (Snow, p. xii)

This is indicative of the sense, growing in culture through the mid-nineteenth century, that art and science form a binary; and with that there inevitably follows

'the economy of the binary':

> Like all binaries art and science needed to be yoked together (yet held apart) in order to accrue the strengths of their polar positions: soft versus hard, intuitive versus analytical, indicative versus deductive, visual versus logical, random versus systematic … two things seemed clear (in the mid-19th century): art occupied the domain of the creative, intervening mind, and the scientific ethos seemed to demand precisely the suppression of such impulses … (Jones and Gallison, pp. 2–3)

The drift of modern mind, informed by this cultural tradition, defines 'science' *in opposition to* 'art', such that science becomes inimical to aesthetics, a lamentable state of affairs for an art like SF which seeks precisely to explore the aesthetics of scientific premises. Taking SF out of the ghetto becomes part of the larger project of breaking down this pseudo-distinction. It seems natural to us; it is inscribed in our educational syllabuses from the earliest schooling and is reinforced by many aspects of culture. But we must bear in mind that it is a nineteenth-century cultural construction rather than a 'natural' state of affairs.

A much fuller sense of the possibilities of the genre is unlocked by taking science fiction back past the nineteenth century and exploring ways in which earlier notions of science informed fiction – to deconstruct, in other words, the logic of cultural binarism that wants to make 'science' and 'fiction' mutually exclusive terms. In fact, it can be asserted that science fiction itself, as a broad statement of aesthetic strategy, has always sought to resist the notion of 'the two cultures'. SF is the place where art and science connect. It is empirical proof that arts and science do not constitute a binary economy.

It helps, in working through the implications of this, to understand how notions of 'science' have shifted in the last century or so. Older theories of science assumed, in an unembarrassed way, that science provides systematic generalisations that explain the truth of the material world. For Bertrand Russell (1872–1970), for instance, scientific method involved a straightforward passage from observation to generalisation, although with 'a careful choice of significant facts on the one hand, and, on the other hand, various means of arriving at laws otherwise than by mere generalisation' (Russell, p. 3). That this definition depends on a rather arbitrary consensual sense of what distinguishes 'scientific generalisation' from 'mere generalisation' is one of its flaws. Another is the belief that data lead by accumulation to water-tight generalisations, or 'truths'. But this rather woolly sense of science was challenged by Popper.

Popper's insight was that science does not produce theories that 'explain' or 'determine' the world, because all scientific theorising is empirically contingent. Any theory can never be proved by observation, it can only be falsified. Observing a thousand two-legged penguins does not *prove* that penguins have two legs; on the other hand, observing a single three-legged penguin *falsifies* the theory. What follows from this is the notion that a scientific theory (for instance, 'that penguins have two legs') is not 'the truth', but rather a contingent explanation for the data

as they stand. We can think of this as the positivist definition of 'science'. The American philosopher Robert Nozick (1938–2002) neatly summarised this school of thought, which he called 'the standard model of science' in our post-Popperian culture, although he went on to challenge it on a number of grounds:

> Karl Popper presents an appealing picture of science as formulating sharp theories that are open to empirical testing and to empirical refutation. Scientific theories are not induced from the data, but are imaginative creations designed to explain the data. (Nozick, *Invariances*, p. 103)

This notion of science as 'imaginative creation' is of the greatest interest to the critic and historian of SF, since SF is itself a more thoroughgoing mode of imaginative creation allied to science. One of the most appealing consequences of Popper's position is its unstated implication that SF is *a mode of doing science* (or 'philosophy' more generally conceived) as well as a mode of doing fiction. Not all philosophers of science would find this idea acceptable. Popper himself could see no place for imaginative creation, at least in the sense of 'the innovative, ingenious imaginative leap' that is the currency of SF, in his version of 'science':

> The question of how it happens that a new idea occurs to a man—whether it is a musical theme, a dramatic conflict, or a scientific theory—may be of interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge. (Popper, *The Logic of Scientific Discovery*, p. 31)

One objection to the idea that SF might count as a genuine aspect of science as well as a branch of literature is that fiction, and other such cultural-artistic discourses (such as cinema, TV, the graphic novel and the like), operate according to aesthetic rather than logical-deductive processes. The force of this objection depends on a belief that the *process* of fiction, reading and writing, while occasionally deductive, is more frequently intuitive, metaphoric, metonymic, suggestive, psychological and imagistic. Even the hardest of Hard SF will partake of these 'soft' or aesthetic elements to some degree. But other philosophers of science have pointed out that it is a mistake to reduce 'scientific process' purely to logic. Ernest Nagel (1901–1985), for instance, stresses the importance of analogy to scientific practice: his example is 'the kinetic theory of gases' which is often theorised as if the particles acted 'like billiard balls' (Nagel, p. 110). For Nagel, analogies and hypotheses, while having obvious limitations, nevertheless 'can serve as fruitful instruments of systematic research' (p. 108). Similar modular thinking, whereby a model is constructed of a particular system, 'may be intrinsically valuable because it suggests ways of expanding the theory embedded within it' (p. 117). Many critics have seen SF as a modular system, with fictive 'worlds' modelling reality on a range of different levels, from the practical to the symbolic. Gwyneth Jones (b. 1952), SF author and critic, plausibly brings the whole of SF under the rubric of the experiment: 'the business of the [SF] writer is to set up equipment in a laboratory of the mind such that the "what if" in question is at once isolated and provided

with the nutrients it needs. This view of SF,' she adds, 'is not new to science fiction writers and critics, but it is worth restating: the essence of SF is the experiment' (Jones, p. 4).

A fuller perspective on the role of science in SF can be obtained via the work of the American philosopher Paul Feyerabend (1924–1994). His book *Against Method* (1975) is a powerful polemic against 'method' in science. The best way to do science, says Feyerabend, is anarchically – 'anarchism, whilst perhaps not the most attractive *political* philosophy, is certainly excellent medicine for the *philosophy of science*', he says. Scientific rules limit possible advances in science: 'the only principle that does not inhibit progress is: *anything goes*'. Feyerabend proposes a free-for-all proliferation of scientific theories, even though some – or perhaps many – will be kooky, mystical, daft or unpalatable. However odd these theories get, Feyerabend is sure that in their interaction better and better models will emerge, better and better science will be practised. The alternative, he says, is to propose uniformity, a situation in which the powers-that-be manipulate consensus by force. This is rather close to the situation that presently obtains in science: scientists that advocate telepathy, alien abduction, the power of crystals and the like are frozen out of the scientific community by a mix of ridicule, cold-shouldering and the financial penalties of being unable to raise funds to pursue their research. Increasingly, the only way to obtain funding is to work within the accepted frameworks. Feyerabend argues that a 'proliferation of theories is beneficial for science, while uniformity impairs its critical power. Uniformity also endangers the free development of the individual' (Feyerabend, p. 5). So, for example, conventional science was not apprised of the environmental dangers of technological advance; awareness of such issues was raised by groups outside science: 'Green' political advocates, New Age enthusiasts and cranks of all sorts. And yet such figures have been vital in broadening useful debate on global warming, the environmental impact of technology, carbon economy; all things that 'science' now takes seriously. Feyerabend says:

> Non-scientific procedures cannot be pushed aside by argument. To say: 'the procedure you used is non-scientific, therefore we cannot trust your results and cannot give you money for research' assumes that 'science' is successful and that it is successful because it uses uniform procedures. The first part of this assertion is not true, if by 'science' we mean things done by scientists – there are lots of failures also. The second part – that successes are due to uniform procedures – is not true because there are no such procedures. Scientists are like architects who build buildings of different sizes and different shapes and who can be judged only after the event, ie after they have finished their structure. It may stand up, it may fall down, nobody knows. (Feyerabend, p. 2)

Against Method is a polemic rather than a manifesto for change in science, and it is perhaps hard to see how his ideas might be put into practice (grant-awarding bodies, after all, do need *some* criteria to determine who gets research money and who doesn't, there being many more applications than money to fund them). And yet

it is the case that there does exist a space where the sort of 'science' Feyerabend is proposing already takes place; where brilliantly unorthodox thinkers bounce ideas around regardless of how strange they seem at first; in which experiments are conducted and blue-sky research undertaken. This space is called science fiction. Although he makes no mention of literature, Feyerabend's perspective includes, implicitly, the notion that SF is a crucial component of science as well as of culture. Research councils may rarely give money for the study of interstellar colonisation, time travel, extrasensory perception, mutant cactuses or virtual reality; but publishers *will* give money if the 'research' (which is to say, the novelisation) is good enough. Steven Hawking's *A Brief History of Time: from the Big Bang to Black Holes* (1988) is a dull historical account of things that have already happened in science and some cautious speculation about things for which Hawking lacks empirical data. On the other hand, Will McCarthy's novel *The Collapsium* (2000) is a riveting account of how science might be, or will be, or ought to be. McCarthy imagines black holes not as highly compressed stars, but as very heavy elementary particles. His protagonist manages to assemble these particles into the material after which the novel is named, and from that wonderful Feyerabendian scientific experiment all sorts of fascinating things follow, including but not limited to plausible faster-than-light travel.

A Feyerabendian sense of the genre 'science fiction' would be alive to the fluid possibilities of the genre in a way that the (still widespread) older notion of science as a discourse with a special relationship to 'the truth' does not. To return to Russell's 1931 book on *The Scientific Outlook* for a moment. After elaborating the many advantages of a scientific outlook, Russell moves on to propose 'scientific world government' as a radical solution to the ills of the day. This government, he says, 'will embrace all eminent men of science except a few wrong-headed and anarchical cranks' (Russell, p. 193) (a qualification which speaks to the essentially conformist and coercive nature of 'scientific discourse' as Russell understands it). This scientific government, he continues,

> will possess the sole up-to-date armaments, and will be the repository of all new secrets in the art of war. There will, therefore, be no more war, since resistance by the unscientific will be doomed to obvious failure. The society of experts will control propaganda and education. It will teach loyalty to the world government, and make nationalism high treason. The government, being an oligarchy, will instil submissiveness into the great bulk of the population, confining initiative and the habit of command to its members. (Russell, p. 193)

This distinctly unappealing picture is, although Russell does not say so, science fiction. It owes much to H. G. Wells, and looks forward to Aldous Huxley's *Brave New World*, which was published the following year ('a life of easygoing and frivolous pleasure may be provided for the manual workers …', Russell, p. 211). Russell's book, in other words, is an example of philosophy *as SF*. Russell is quite aware of the fact that in his vision 'features that everybody would consider desirable are mixed with features that are repulsive' (Russell, p. 214). Indeed, the point

of this work, for our purposes, is that it stands as an example of the extrapolation of this older, scientific logic to its ideological conclusions. This is a vision of science as oppressive dogma, a mode of social domination, which frequently finds expression in science fiction. Feyerabend's version of science, which specifically privileges the very 'cranks and anarchists' that Russell dismisses, has by far the greater potential.

The technological

According to the respected SF author and critic Theodore Sturgeon (1918–1985), 'the word "science" derives from the Latin *scientia*, which means not method or system but *knowledge*. The concept of SF as a "knowledge fiction" satisfied me completely' (Sturgeon, p. 73). Sturgeon prefers this phrase, because it allows him to include, for instance, *The Lord of the Flies* in the SF category 'because of its profound investigation of the origins of religion and secular power in a human society'. The oblique snobbery of such redefinition depends on a buried sense that conventional definitions of SF exclude 'proper' literature (*Brave New World, Nineteen Eighty-four, Gravity's Rainbow* and the like), leaving the genre with the dregs of populist, Pulp and adventure yarns – a snobbery common to many SF intellectuals and academics, and not without a rationale. But the roots of it as a prejudice are, philosophically, very revealing. And philosophy is the key context here: 'philosophy' (from the Greek, meaning 'love of wisdom') has had its turn as a word for what we nowadays call 'science', particularly as 'natural philosophy'.

The crucial distinction here is not between 'science' and 'knowledge', but between 'science' and 'technology'. These two words are often taken together, with the latter seen as a specific example of the former. According to *Chambers Dictionary of Science and Technology*, technology is 'the practice, description and terminology of any of the applied sciences which have practical value and/or industrial use' (Walker, p. 1150). But in fact this distinction uncovers a split at the very root of the discourse within which 'science fiction' (among many other things) needs to be oriented. The definition of science evoked in Walker's particular reference work ('the ordered arrangement of ascertained knowledge, including the methods by which such knowledge is extended and the criteria by which its truth is tested', Walker, p. 1021) draws out the emphasis on 'truth', 'knowledge' and 'order'. Which is to say, 'science' becomes a more or less restrictive idealist philosophical framework, restrictive (as most scientists assert) by the nature of things 'out there'. Technology, on the other hand, is the discourse of tools and machines, 'tools' being extensions of the human worker, like hammer and saws, and 'machines' being devices that stand apart from the human worker. Friedrich Engels (1820–1895) was one of the first to make this distinction between the tool and the machine, and did so by way of articulating what he saw as the nature of the Industrial Machine, which tends to 'alienate' humanity from its own labour. But, taken conceptually, we find tools and machines at the core of most science fiction: such that spaceships, robots, time-machines and virtual technology (computers and virtual realities) are the four most commonly occurring tropes of the

field: which is to say, Suvin's novum is almost always technological in form. There are nova of a more conceptual or 'scientific' nature, of course; but it is rare for these to be wholly uninvolved with technology. Ursula Le Guin's conceptual novum in *The Left Hand of Darkness* (1969) postulates an alien people without fixed gender, but her novel also includes a series of technological nova, among them the 'ansible' (a faster-than-light communications device) and a spaceship. Christopher Priest's *Inverted World* (1974) presents us with a striking 'science' fictional tale, a case of upended scientific logics, a city whose inhabitants live not (as we do) in a finite world located within an infinite universe, but in an infinite world within a finite universe. Nevertheless the narrative resolves itself back into 'technology fiction' at the end, with the apparent nature of the world revealed as a function of the particular energy technologies that power the motile city at the centre of the book.

Despite the genre's reliance on technology, and despite the many brilliant effects that machines and tools can achieve within the aesthetic framework of an SF text, there remains a certain bias. 'The novel of ideas' has traditionally been privileged over the instrumental novel of the machine, in the same way that 'real fiction' (meaning a particular sub-genre of 'mainstream, literary fiction') is privileged over science fiction by the literary establishment. It is only relatively recently, in philosophical terms, that discourses have been developed to allow us to challenge this prejudice.

One of the most influential philosophical interventions in the question of 'technology' is the 1953 essay 'The Question of Technology' by the German philosopher Martin Heidegger (1889–1976). Heidegger takes the word back to its Greek roots: 'from earliest times until Plato the word *technê* is linked to the word *epistêmê*', but from Plato and Aristotle onwards a distinction begins to be made between them (Heidegger, pp. 318–19). Επιστήμη (*epistêmê*) is the Greek word for 'knowledge' (it is the root of the English word 'epistemology'), and by extension it means 'finding things out about the universe' in an open-ended, dialectical manner; which is to say, it means 'science'. Τέχνη (*technê*), on the other hand, the root of the word 'technology', means 'a specific skill or ability', the knowledge of how to make something, and is used, by extension, to mean 'cunning devices, arts, wiles'. English has a similar complex of implication in the word 'artificial', which means both 'the work of an artificer or artist' (where 'art' has positive implication) and something suspect, *ersatz*, less-than-real. Fifth- and fourth-century BC Greek thinkers divided these two forms of 'knowledge': Plato and Aristotle reserved 'episteme' to themselves, and dismissed 'techne' as the trick of the unethical, rhetoric-rather-than-truth 'Sophists'. According to Bernard Stiegler:

> The separation is determined by a political context, one in which the philosopher accuses the Sophist of instrumentalizing the *logos* ['truth', 'knowledge', 'the underlying order of things'; *logos* also means 'the word'] as rhetoric and logography, that is, both as an instrument of power and a renunciation of knowledge … It is in the inheritance of this conflict – in which the philosophical *episteme* is pitched against the sophistic *technê*, whereby all technical knowledge

> is devalued – that the essence of technical beings in general is conceived. (Stiegler, p. 1; my gloss)

By 'instrumentalizing the *logos*', Stiegler means that the Sophists were accused of turning 'truth' into an instrument, of being amorally concerned with the means rather than ends. As this distinction is traced down the centuries of philosophical tradition, we can see that 'techne' becomes associated with an emptying out of meaning and validity. For example, Stiegler quotes Edmund Husserl's assessment that 'algebra' is the 'emptying of meaning' from 'the actually spatio-temporal idealities' of geometry, constituting 'a mere art of achieving results, through a calculating technique according to technical rules' (Husserl, *The Crisis of the Universal Sciences and Transcendental Phenomenology* (1970), quoted in Stiegler, p. 3).

Heidegger's essay challenges, and indeed overturns, this understanding of 'technics'. For him technology is not an instrument, it is a mode of knowing, 'a mode of revealing … where *alêtheia*, truth, happens' (Heidegger, p. 319). Far from seeing technology as merely the 'practice of science', Heidegger argues that science is in fact a function of technology. He means this not only in the sense that 'modern physics, as experimental, is dependent upon technical apparatus' (Heidegger, pp. 319–20), although this is of course true. He means rather, in the words of Timothy Clark, that technology 'is not the application of science. There is not theory on the one side and its practical implementation on the other. Rather science is one manifestation of the technological stance towards entities' (Clark, p. 37). Heidegger thinks that technology, from windmills to hydroelectric plants, 'enframes' the world in a certain way, allowing or shaping the ways in which we 'know' the world around us.

It may be that technology encourages us to think of the world only as what Heidegger calls 'standing-reserve', a quantity of raw material to be harnessed; and indeed it is possible to take Heidegger's essay as a statement of hostility to the increasing pace of technological change (politically conservative, Heidegger declared his preference for windmills over hydroelectric plants, and indeed felt physically sick in modern cities 'surrounded on every side by mechanization and regimented space', Clark, p. 36). But this is not what 'The Question of Technology' is saying. As a mode of knowing, of enframing, the world, technology is 'not something fundamentally new or even modern. Rather it fulfils Western Philosophy's oldest desire for knowledge of what is real' (Scharff and Dusek, p. 247). Heidegger's undoubted hostility to much modern technology was based not on the fact that it was technology as such, but rather on the peculiarly Heideggerian question of whether it is likely to make us feel 'at home' or not.

Nevertheless, it is Heidegger's insight into the way technology 'enframes' the world for humanity that makes him a crucial (though admittedly unlikely) figure to bring into a discussion of the definition of science fiction. In another essay, 'What Calls for Thinking?' (1954), Heidegger famously, perhaps notoriously, declared 'Science does not think' (Heidegger, p. 373). What he meant by this (and he conceded in the essay that 'this is a shocking statement') was that science does not 'enframe' in the way that technology does. Science fiction, on the other hand,

does think: not only in the sense of rehearsing a great many concepts, possibilities, intellectual dramas and the like, but in this deeper sense of textually enframing the world by positing the world's alternatives. We could say (to adopt Heidegger's idiom) that science does not think *except in science fiction*; but this is actually only a way of saying something simpler: that SF is actually technology fiction in this Heideggerean sense.

It seems perverse to say it, but perhaps it is Heidegger who represents the best starting-point for a thoroughgoing theorisation of 'science fiction'. Heidegger's most famous philosophical work centred not on questions of technology, but on the issue of 'Being', the ontological condition of humanity. Bernard Stiegler, in his complex ongoing theoretical study *Technics and Time*, has set out to revise Heidegger's philosophy of *Dasein*, or 'Being', to allow certain technological objects (he is a little obscure as to which precisely) access to the same authentic Being-in-the-World that characterises human beings. Heidegger distinguishes between the existence of a creature like a man (*Dasein*) and the existence of an object which we categorise solely in terms of its use (*Zuhandenheit*). Yet according to Stiegler this denigration of the 'technical object' becomes less and less tenable in a world in which the technological not only interpenetrates human life at almost every level, but in which such objects themselves move further from the sort of dumb instrumentality that characterises a spade or a pair of glasses, and closer to the thinking-machine and the self-aware object. On the other hand, no machine in the present world is truly self-aware. To speak more precisely, the place where Stiegler's technological *Dasein* actually obtains is science fiction itself. One of the key themes of SF for the last half-century has been precisely to delineate and explore the place where the technical object achieves *Dasein*, a Being-in-the-World and a Being-towards-Death. Neither a chair, a typewriter nor a thermostat can have 'authentic' Being in the sense that Heideggerans, or existential philosophers, use the word: but Asimov's robots all possess precisely this quality.

It can be argued, and with some justification, that SF has rarely followed through the possibilities that this philosophical state of affairs has afforded it: that when the 'technical' has been introduced, it has more often than not been to denigrate it. Stiegler considers the newest technologies of genetic manipulation, concluding that 'they make imaginable and possible the fabrication of a "new humanity" ':

> without having to dive into science-fiction nightmares, one can see that even their simple current applications destroy the oldest ideas that humanity has of itself – and this, at the very moment when psychoanalysis and anthropology are exhuming the constitutive dimension of these ideas, as much for the psyche as for the social body … [technology is] for the first time directly confronting the very form of this question: what is the nature of the human. (Stiegler, p. 87)

Donna Harraway is the most famous cultural critic to celebrate the possibilities of this technological reinvention of the category 'human' in terms of its diversity and possibility, as well as insisting on the increasing relevance of talking in terms of

'the inextricable weave of the organic, technical, textual, mythic, economic and political threads that make up the flesh of the world' (Harraway, in Gray, p. xii). Like Harraway, Stiegler argues that 'the human is a technical being that cannot (merely) be characterised physiologically and specifically (in the zoological sense)' (Stiegler, p. 50); although, unlike Harraway, Stiegler's emphasis is on ontology, rather than on the many technical prostheses that augment contemporary life as such. Similarly, with regard to culture and society he is adamant that 'the technical dynamic *precedes* the social dynamic and imposes itself thereupon' (Stiegler, p. 67). In both cases, it is a '*technical* fiction' rather than a 'science fiction' more generally conceived that is able to penetrate to the root of things.

Machines today are redefining the human; and yet the dominant story-thread of twentieth-century mainstream SF has been precisely how machines *return* to humanity, how their developmental trajectory brings them back into discourses of humanity. Asimov's story 'The Bicentennial Man' (1976) is a core fable in this regard. After decades of robot stories in which he used the trope of 'the robot' as a means of exploring aspects of humanity, Asimov finally wrote a story about a robot literally turning himself into a human being (his own assessment of the story is that 'of all the robot stories I ever wrote [it] is my favourite and, I think, the best', Asimov, *The Complete Robot*, p. 603). Andrew Martin begins the story as a metal creature with a positronic brain, whose being is entirely determined by the 'three laws of robotics' for which Asimov is famous. A flaw in his programming makes him creative (a flaw erased by his manufacturers in all subsequent robots), and during his lifetime he accumulates money through royalties earned on his art, enabling him first to buy his freedom, then to have the metal portions of his body replaced with organic ones, and finally to petition the Legislative Establishment to have himself legally recognised as human. Public opinion makes this impossible, despite Andrew Martin's egregious virtue, until he instructs a surgeon to make one last adjustment: 'decades ago, my positronic brain was connected to organic nerves. Now, one last operation has arranged that connection in such a way that slowly – quite slowly – the potential is being drained from my pathways' (Asimov, *The Complete Robot*, p. 680). By dying, the robot sways public opinion; on his 200th birthday he is declared human, and dies. By taking on human weakness the machine is able to take on Being-towards-Death, and this defuses human fear of the machine. We see this same archetypal narrative structure in a great deal of science fiction: the character of the android Data in *Star Trek: the Next Generation* who yearns, Pinocchio-like, to become human is never challenged in his strange desire. Robot stories can be traced back to fables in which automata are mistaken for human beings such as Hoffman's 'Der Sandmann' (1816) or J. Storer Clouston's *Button Brains* (1933), the point of such tales being the transfer from a machinic to a humanitarian ethic and logic.

The demonisation of the machine is a continuing aesthetic SF strategy: Gregory Benford's 'Ocean' series of novels, beginning with *In the Ocean of the Night* (1977), postulates a galactic conflict between organic life and a brutalising inorganic machine race. The narrative arc of the first 100 *Perry Rhodan* novels (1961–71) pit the 'peace lord of the universe' against the malign 'robot regent' of the planet

Arkon. The Star Trek franchise has returned many times to the machinic villains named 'The Borg'. The vastly popular *Matrix* films pit organic life in a massive, violent war against 'the machines'. And so on through a thousand examples, with only a few SF authors of merit positing the opposite line (Greg Egan is, perhaps, the most eminent of these).

Why this bias? In philosophical terms, the machines are seen as inherently less authentic than organic life because they fall under the rubric of *techne* rather than *episteme*; it is this rhetoric that governs the devaluing of the machinic. 'Good' means amenable to humanisation, like Asimov's saintly Bicentennial Man; 'bad' means resistant to this process. More recent SF has been bolder in deconstructing this notion, with a range of cyberpunk and other texts exploring the validities of a technological perspective, but the bulk of the genre reproduces the ancient bias.

A number of more recent theorists and philosophers have published work which provides a way out of this constrictive dilemma, but it has achieved a lesser cultural penetration than it deserves. The thought of the French philosopher Michel Serres (b. 1930) challenges the very notion that two separate cultures, such as 'art and science', actually exist. Serres' focus is always on the connections between the various discourses of science, culture and thought, and although these connections are not straightforward ('from the sciences of man to the exact sciences, or inversely, the path does not cross a homogeneous and empty space … it follows a path that is difficult to gauge') they are crucial. As he apophthegmatically puts it, 'criticism is a generalised physics' (Serres, p. xi). Neither science, art nor religion is composed of 'facts' or 'predicates'; instead they are determined by the complex dynamics of interrelations. Science fiction is the proper literature for this, and Serres has published a critical monograph on at least one SF author (*Jouvences: Sur Jules Verne*, 1974). A much more influential French thinker, Gilles Deleuze (1925–1995), published a wide range of philosophical texts attacking essentialism and revisioning reality wholly in terms of 'machines' – 'desiring machines' and machines productive of all manner of flow (interrupted by various sorts of 'interruption' machine) as a means of replacing the older atomic or 'monadic' bias of the western scientific tradition. For Deleuze this machinic rhizomatic 'becoming' is something enthusiastically to be celebrated. The opening of one of his most famous books, *L'Anti-Oedipe* ('The Anti-Oedipus', 1972, co-written with Félix Guattari) revels in the machinic cosmos of 'desiring production', the strenuously joyful functioning of desire itself:

> It is at work everywhere, functioning smoothly at times, at other times in fits and starts. It breathes, it heats, it eats. It shits and fucks. What a mistake to have ever said *the* id. Everywhere *it* is machines – real ones, not figurative ones: machines driving other machines, machines being driven by other machines, with all the necessary couplings and connections. An organ-machine is plugged into an energy-source-machine: the one produces a flow that the other interrupts. The breast is a machine that produces milk, and the mouth a machine coupled to it. (Deleuze and Guattari, p. 1)

This is the fluid ecstasy of the modern world; and which literature is better placed to apprehend it than SF?

'In real life' and 'in SF'

My own training and biases as a critic have left me suspicious of binaries, and I worry that precisely such a binary model has emerged from this chapter of definitions. Any distinguishing of 'realist' and 'science-fictional', of course, occurs under the sign of erasure, as it were; and reading texts through these notional categories happens always with a sense of the ways in which the two terms bleed into one another, the ways in which SF writers utilise realist strategies, and 'realism' itself, are always contingent on the sorts of imaginative and speculative constructions that characterise SF. The same is true of the blurred binaries 'art/science', 'romance/the novel' and 'science/technology'; in each case there is no prior term, and the interplay between the categories must be understood as fully dialectic and in process. But in this chapter I have not, I concede, quite shaken off the dust of one of these binaries, and I want to finish by acknowledging my bias. It has to do with the different understandings of the 'science' that underpins science fiction, and the sorts of fictions that result from them.

A shorthand for this binary, although not a very satisfactory one, might be 'Hard SF' versus 'Soft SF', a distinction often made by SF fans themselves. More precisely, we might say, it is the difference between the science in science fiction deriving from the rigid, Russellian notion (with correlatives of 'truth' and 'correctness'), and the science in science fiction deriving from the anarchical Feyerabendian sense of the term (with correlatives of 'imaginative intellectual play' and 'extrapolation'). My preference as a reader and writer is for the latter. However, many SF writers and fans take a particular pleasure in the correctness of the science of science fiction, 'correct' here being understood as 'not transgressing the laws of science as they are presently understood'. Gwyneth Jones asks: 'Does it matter if the science is sound? The fantasy fanciers will say no, the SF faithful will say yes.' She goes on to point out that Larry Niven's Hugo and Nebula Award-winning *Ringworld* (1970), 'one of the great, classic "engineering feat" SF novels, reached print in the first instance with terrible mistakes in its science', and that Niven, 'as free as any SF novelist alive from moral qualms about social verisimilitude or cultural relativity, acquiesced to the helpful advice he received from Dyson Sphere buffs, and obediently corrected his fantasy for later editions' (Jones, p. 16).

The shibboleth here is consistency, and one problem with its application is that fans tend to overlook substantive transgressions of scientific orthodoxy (spacecraft that can travel faster than light) while becoming agitated about minor features (the mechanism by which Niven's 'ringworld', a massive ring of habitable land circling a star, is kept precisely in its orbit). This inconsistency in applying, precisely, criteria of consistency reveals an ideological ground; for only an ideological belief in science as 'truth' can sanction the sort of misprision necessarily perpetuated by this sort of analysis. Another example: Robert Lambourne, Michael Shallis and Michael Shortland analyse various SF texts that deal with centrifugal forces. Space

habitats or spacecraft that are spun to give the illusion of gravity in a free-fall environment are a popular recourse of the SF text, in part because such centrifugal environments avoid the need for the 'pseudo-science' artificial gravity. Lambourne et al. discuss the way the Coriolis effect, created by the constant rotation, would determine life inside such an environment:

> In the short story 'Small World' (1978), by Bob Shaw, for example, a projectile is described as travelling across a cylindrical space habitat along an S-shaped trajectory. In fact, the reversal of the Coriolis force after the projectile passes the midpoint of its course and starts its descent, means that the path is C-shaped when viewed from the drum, as shown in figure 5(b). (Lambourne et al., p. 55)

The category error here is the 'in fact'. A story is not 'fact'; nor does fictional entry into one or other discourse of science render it so. Application of conventional scientific orthodoxy as a criterion of judgement for an aesthetic object is fundamentally foolish even when applied with absolute consistency; and when applied inconsistently, as it often is (swallowing the camel of faster-than-light travel but straining at the gnat of, for instance, S-shaped ballistic trajectories inside spinning environments) it combines deadness with muddle. Our choice is between a textual universe run along the oppressive lines of Russell's scientific world government, or a science fiction that plays anarchically with 'science' along the lines Feyerabend suggests. This seems to me no choice at all.

And yet there is *something* in Lambourne's 'in fact'. A personal anecdote: I sat in a cinema audience in Aberdeen when the film *Star Trek III: The Search for Spock* was first shown in that city in 1985. In the film the Federation starship *Enterprise* has been stolen by its former captain, Kirk, so that he and a few of his friends can go on an unauthorised search for his colleague Spock, who is believed dead. This crew of paunchy old geezers finds Spock's rejuvenated body on an artificially created 'Genesis' planet. But they have been followed through space by a band of marauding and violent Klingon warriors who challenge the ship to a space-duel, even though the Klingon craft is a tiny fighter and the *Enterprise* a massive starship. As it happens, because the *Enterprise* is without its usual complement of crew, it is extremely vulnerable (though the Klingons do not realise this). The Klingons fire, and with one shot they disable the *Enterprise*. At this moment in the film, with a shot on screen of the Klingon ship positioned in space directly in front of the *Enterprise*, I heard somebody behind me in the cinema stage-whispering to his companion: 'Dear me, no, of course that's a Klingon D7 pseudo-fighter; it doesn't fire disruptor bolts like that. In real life this confrontation couldn't really happen.'

'In real life.' We are familiar with the idea that films reflect 'real life' poorly. On screen the good guy always wins the girl, we see the threatened disaster averted in the nick of time, the bad guy getting his comeuppance, and in each case we are aware of the fact that in the world we actually inhabit these things do not often happen that way. But the consensus 'real life isn't like that' is usually applied to films that mimic our actual existence; the sentence 'real life is nothing like *Notting Hill* or *Die Hard* or *When Harry Met Sally*' is one form of locution. The sentence 'real

life is nothing like this scene in *Star Trek III: The Search for Spock*' is quite another, and the difference between them is instructive.

As a statement to the effect that actual life bears no resemblance to the special effects, future-world space battle of this particular film, the sentence is strictly accurate: 'in real life, the primitiveness of contemporary space technology and the non-existence of alien races means that no such space battle is possible'. But it is clear that the speaker did not mean the words in that sense. He meant 'this cinematic representation of a battle between a Federation cruiser and a Klingon pseudo-fighter does not map accurately onto the *reality* of such a battle'. What might this reality be, as far as this individual is concerned?

To answer this question is to excavate a little the cultural phenomenon of *Star Trek*, and of Fandom more generally. Fans are integral to the way contemporary SF operates: numerous fan-created magazines, websites and conventions generate much of the energy on which the continuing vitality of the genre depends. Yet the 'fan', and especially the 'science fiction fan', has a very low cultural currency today. He or she exists in a cultural climate of low-level ridicule and dismissal; thought of as obsessive cultists, unskilled at social interaction, physically unattractive and unhygienic, outsiders, nerds; to instance a cultural icon with whom many people will be familiar, the comic book store owner in *The Simpsons* cartoon series. Behind all this negative social construction (which, as with any derogatory stereotype, relates less to reality and more to prevalent ideological fascinations and anxieties) is the twofold baseline perception: that fans are '*fanatical*' (the former term, of course, derived originally from the latter) in some dangerous sense; and that fans are *passive* receptacles of consumer culture.

The American critic Henry Jenkins (b. 1958) has done more than anybody else to overturn this cultural stereotype. His breakthrough study *Textual Poachers: Television Fans and Participatory Culture* (1992), working largely with the example of *Star Trek* fans, demonstrated that fans, far from being passive, are often extremely active, both in proselytising for their favourite shows and in terms of textual production – re-appropriating material from those shows, writing their own fiction and producing their own art (often in 'slash zines', in which two favourite characters are placed in erotic congruence, their names separated by a slash: 'Kirk/Spock', for example). Jenkins shows the extent to which fans are *creative*, active participants in the textual universes of their favourite shows.[2] Jenkins' liberating analysis not only critiques the lazy stereotyping tendencies of modern society; it opens up the 'fan' as a crucial category for any analysis of SF. The important thing about fans is that they care, and they care in an active, engaged and creative way. They care (as in the example of *Star Trek III*) about consistency; about production values; about the quality and range of the texts available to them. They champion the works they admire, and often they strive directly to involve themselves in that work. Naturally, this enthusiasm can slide into cliquishness, in which schoolyard shibboleths are used to determine who is 'us' and who 'not us'. Moreover, I suspect that few people who have spent time with fans at conventions and elsewhere will disagree when I describe this sort of siege mentality, which can spill into tribal obstinacy or paranoia. But the fundamental point is that fans love

SF, and love is not an emotion to be treated lightly. Most SF authors working today (I'm tempted to say *all*) began as fans, and many continue as fans. Science fiction is a community, not an elite. Fans more often than not embody a huge, detailed and working knowledge of their genre, and can locate new texts within a framework of intertextual reference and connection with impressive facility. And the trope of 'the fan' embodies not only actual humans who follow SF, but the position of the new SF text (novel, film) in respect of the whole genre, and – as I have been arguing – in an ideal sense the relationship (active, engaged, creative) between 'SF' and science that underpins the definition of the genre this chapter has sought to sketch.

Conclusion

The three definitions of SF cited at the beginning of this chapter remain extremely useful for scholars in the field, despite the tendency of some critics to nibble away at them. This chapter has sought not to replace Suvin's, Delany's and Broderick's definitions, but to go a little deeper into some of the assumptions underlying 'science fiction' as a piece of terminology. My conclusion is that SF is better defined as 'technology fiction' provided we take 'technology' not as a synonym for 'gadgetry' but in a Heideggerean sense as a mode of 'enframing' the world, a manifestation of a fundamentally philosophical outlook. As a genre, therefore, SF textually embodies this 'enframing', taking as its 'standing reserve' not only the discourses of science and technology, but also the whole backlist of SF itself, the intertextual tradition that this study will go on to examine. To the extent that SF enters into the discourse of 'science' (as it very frequently does) the best way of theorising this is as a Feyerabendian proliferation of theories rather than a notional uniformity or 'truth'. The useful shorthand for this is 'Fortean', from the writings of the American journalist and writer Charles Fort (1874–1932). This pluralism, and range of speculative possibility, frees SF from what Heidegger saw as the danger in technological 'enframing', the way in which 'it banishes man into the kind of revealing that is an ordering. Where this ordering holds sway, it drives out every other possibility of revealing' (Heidegger, p. 332). In this philosophical sense, SF must be a disorderly technology fiction.

I should perhaps add that many readers of SF will not recognise the genre from my description here. 'Technology fiction' is most often taken as precisely the bland, gadget-driven narratives I say it should not be: 'Hard SF' either as machine or cosmological fiction – stories about spacecraft, weapons, prostheses, or about the universe as physics presently understands it, in which an iron rule of 'truth' applies. 'Soft SF', on the other hand, is given more leeway by readers. By what strange logic 'techno' fiction finds itself falling back against this untested and ultimately Platonic absolute 'truth', and 'science' fiction finds itself able to explore the imaginative possibilities of human thought untrammelled by such concerns is not immediately clear. My belief, although it is not one I hold dogmatically, is that this division is explicable in the context of the historical development of science fiction itself. As outlined in the Preface (and as elaborated in much greater detail

in the whole of this book) I take modern SF to arise at the cleavage of what I call broadly 'Catholic' and 'Protestant' fictive worldviews, a separation I date from around the turn of the seventeenth century.

I should be clear here: I am very specifically *not* saying that science fiction is exclusively a Protestant, and 'Fantasy' exclusively a Catholic, literature. There are very many great Catholic science fiction writers, and many great Protestant Fantasists, and increasingly (although only since the late twentieth century) a very great many excellent SF and Fantasy writers who come from neither cultural milieu. Rather, I am suggesting that, speaking historically, SF expresses a particular dialectic determined originally by the separation of 'Protestant' and 'Catholic' world-views (or if one prefers less sectarianly charged terms, between 'deism' and 'magical pantheism') that emerged in the seventeenth century. SF texts mediate these cultural determinants with different emphases, some more strictly materialist, some more mystical or magical. But without an understanding of the broader historical context many aspects of the tradition of SF are incomprehensible.

I think this explains why a Catholic writer like Jules Verne limits his science fiction to technological devices, where a Protestant writer like H. G. Wells expands his vision in speculative and universal directions. It seems to me (to mention three eminent Catholic writers of the genre) that the 'mystical' turn in SF, the introduction of 'magic' (as in Blish's *Black Sunday*), of God (as 'The Outsider' in Wolfe's *Long Sun* tetralogy) or of miracles (in Miller's *Canticle*) index an impulse to mark out that place where technology ends specifically *as a magic*, mystic area; the God of the Gaps of which the philosophers sometimes speak. Protestant traditions, such as produced writers like Stapledon, Heinlein or Robinson, are less respectful of the veil of the temple, and produce a different more fully scientific or knowledge fiction. In other words, I am suggesting that it is the mystical, the quasi-religious, that 'enframes' in the limiting and 'ordering' manner deplored by Heidegger: a discourse that insists upon one and only one interpretation of the cosmos.

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