

# Chapter 2

## The Cold Equations: Extraterrestrial Liberty in Science Fiction

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**Abstract** This chapter is about explorations of extraterrestrial liberty in science fiction. Depictions of colonies beyond the Earth, either in space or on other worlds, date back at least as far as Hale's 'The Brick Moon' (1869). Many such works have explored the social and anthropological implications of off-Earth colonies, and as such have anticipated in fictional form much of the discussion elsewhere in this volume. These works of fiction, the result of more than a century's constructive speculation, serve as thought experiments on the subject. And by focussing on human characters, fiction may breathe fire into abstract theories of politics and society.

**Keywords** Science fiction • Extraterrestrial liberty • Space colonisation • Terraforming • Extraterrestrial life

### 2.1 Introduction

It would not be inaccurate to say simply that children born in space will be the first humans to be reared in cages Cockell (2008).

This chapter is about explorations of extraterrestrial liberty in science fiction (SF).

Quasi-realistic depictions of colonies beyond the Earth, either in space or on other worlds, date back at least as far as Hale's 'The Brick Moon' (1869), which described life on an Earth-orbiting space station. Stories of space colonies were written during the development of the modern genre in the 20th century by Asimov (1952), Clarke (1951), Heinlein (1966) and many others, and this continues today in works by the likes of McAuley (2008), Reynolds (2012), Robinson (2012), and the author (Baxter 2013). Many such works have explored the social and anthropological implications

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of off-Earth colonies, and as such have anticipated in fictional form much of the discussion in Cockell (2013) and elsewhere in this volume.

These works of fiction, the result of more than a century's constructive speculation, serve as thought experiments on the subject. They may serve as a source of ideas, and an examination of issues raised; SF has always been an arena for debate. And by focussing on human characters, fiction may breathe fire into abstract theories of politics and society.

It would be inaccurate to call this essay a survey of the field. Any work which seeks to depict realistically a human community away from the here and now must necessarily deal with social and other issues, however superficially. It is clear that the most relevant works for our purposes will have been written with the *intent* to deal with such issues, but the boundary is not easy to draw. General surveys of the SF field include the classic work by Aldiss (1986) and a more recent history by Roberts (2006). The online SF Encyclopaedia (Clute 2013), is a fine, free and up to date resource.

This essay will consider first issues of liberty arising from the confinement and centralisation of extraterrestrial communities, as summarised by the Cockell quote given above, led by a discussion of the classic story from which the essay's title is derived. The essay moves on to a survey of revolutions and society-building in off-Earth contexts, before closing with a brief survey of issues relevant to the further future.

## 2.2 The Cold Equations: Liberty on the Space Frontier

'The door opened and the stowaway stepped through it, smiling. "All right – I give up. Now what?" It was a girl...' Godwin, 'The Cold Equations' (Godwin 1954).

Godwin's well-known short story 'The Cold Equations' (1954) is a stark illustration of the curtailment of human freedom of choice in the constrained environment of the 'space frontier', and since its first publication it has served as a focus for debate in the SF field about the implication of such constraints.

The story first appeared in the August 1954 issue of *Astounding Science Fiction*, edited by John W. Campbell. In terms of historical context (Aldiss 1986), SF, having been pioneered in the nineteenth century with works of great quality by Verne, Wells and others, had by the 1920s become a popular literature of more questionable quality published in the so-called 'pulp' magazines, especially in the US. Campbell (1910–1971), largely through his editorship of *Astounding*, did much to improve standards of literary quality and intellectual rigour in the field, and during SF's so-called 'Golden Age' (roughly the 1940s) nurtured such talents as Asimov, Clarke, Heinlein, Sturgeon and Van Vogt. Yet Campbell himself was a conservative American, arguably a libertarian, and this could be reflected in his editorial policies. Godwin (1915–1980), meanwhile, had worked as a prospector in the harsh environment of the Mojave Desert: a frontier of its age. Many of his

works explored the theme of nature's indifference to humanity—such as 'The Cold Equations'.

As is indicated in Campbell's original preface to the story, 'The Cold Equations' is a tale of the space frontier: 'The Frontier is a strange place—and a frontier is not always easy to recognize. It may lie on the other side of a simple door marked "No admittance"—but it is always deadly dangerous.'

The story is set on an Emergency Despatch Ship (EDS). In Godwin's future, passenger-carrying starships use such vessels as a rapid response to emergencies—in this case, to deliver medical supplies to a plague-stricken planetary colony. The ships have very tight fuel and mass budgets, to the extent that the extra mass of a stowaway will imperil the mission. Yet a passenger on the starship, a girl intent on visiting a brother on the target planet, has stowed away anyhow. And from early in the story the situation is presented starkly: the girl has to be ejected, voluntarily or otherwise.

'It was the law, stated very bluntly and definitely in grim Paragraph L, Section 8, of Interstellar Regulations: "Any stowaway discovered in an EDS shall be jettisoned immediately following discovery..." There are no options, we are told; even the self-sacrifice of the pilot would result in the loss of the ship altogether. 'To [the pilot] and her brother and parents she was a sweet-faced girl in her teens; to the laws of nature she was x, the unwanted factor in a cold equation.' The girl had had no idea of the penalty: "You still haven't told me," she said. "I'm guilty, so what happens to me now? Do I pay a fine, or what?"... In a way, she could not be blamed for her ignorance of the law; she was of Earth and had not realized that the laws of the space frontier must, of necessity, be as hard and relentless as the environment that gave them birth.'

Much of the story is presented with the stowaway trying to come to terms with this death sentence. Godwin piles on the sentiment: "'Yet I remember [my brother] more for what he did the night my kitten got run over in the street. I was only 6 years old and he held me in his arms and wiped away my tears and told me not to cry..." The girl expects the pilot or his commanders to come up with some solution—and so do we readers, raised on a diet of softer-edged wish-fulfilment stories. Yet release never comes; the story stays true to its logic, and is pitiless.

In the end the girl walks voluntarily into the airlock, still baffled: "I didn't do anything to die for... I didn't do anything..."

Across six decades this brief story has remained famous, regularly anthologised and adapted for TV and radio. And yet it has also been the focus of intense debate within the SF community, especially over the last decade or so, according to critic Kincaid (2012). On the one hand some advocate the story as symbolising the core values of SF, or at least a certain kind of SF. According to scholar Gunn (2002), 'If the reader doesn't understand [the story] or appreciate its environment, then that reader isn't likely to appreciate science fiction'. Conversely Kincaid has attacked it bitterly: 'To protest that the story is sexist...is to miss the real fundamental problem... The death of the girl is directly traceable back to human agency, not to the law of the universe' (2012).

The debate is between those who argue for the virtues of frontier life—the idea that scarcity and a harsh environment is good for the individual, for society as a whole and perhaps even for the evolution of the human species—and those who argue for, if not utopian forms of stable societies, at least the protection of the vulnerable, the innocent, the weak, from nature’s harshness. It can be seen that in Godwin’s story this debate is framed in terms of an American sensibility; such was America’s commercial dominance of SF during the ‘Golden Age’ at least that American themes, such as the folk memory of the ‘frontier’ days of the western expansion of the US, were regularly translated into SF forms. But other dichotomies can be mapped onto this tension: political right versus left, for example.

Kincaid alludes to specific criticisms of Godwin’s story such as that it can be seen, retrospectively at least, as sexist, with competent men being contrasted to a foolish girl. But he identifies a deeper problem. In any situation it is not the physical environment that constrains human liberty—that provides an inviolable framework which none can escape—but human choices, laws, agency within that environment. To blur this distinction is to open oneself to an accusation of authoritarianism: *Because there is vacuum beyond that bulkhead, you must do as I say.* And ‘The Cold Equations,’ sadly, does blur that distinction. The ‘competent men’ who run the EDS system are really not terribly competent at all; any modern engineer would be appalled by the fact that the *only* deterrent to stowaways is a ‘Do Not Enter’ sign. It is not nature’s indifference that causes the girl to die, but the inadequate design and control of human systems. Because of this flaw, the story cannot bear the weight of debate that has been loaded into it.

With a sympathetic reading the story does, however, work in its own terms. If one takes the story’s inner logic at face value, one receives a chilling sense of the frontier’s pitiless rigour: in defiance of the conventions of storytelling, there will be situations beyond human control, there will be situations where not everybody can be saved. And it is this natural rigour of the extraterrestrial environment that creates boundaries to human liberty.

## 2.3 The Quintessential Cages: Long-Duration Space Missions

The narrow crack traced a high, four sided figure in the face of the rock. It was a door!  
Harrison, *Captive Universe* (1969) (p. 51).

Stories of lives spent in extraterrestrial environments for extended periods have been written by generations of SF authors. Cockell (2013) identifies the challenges to liberty in such environments as arising from perpetual confinement and a reliance on central communal technological systems, factors which encourage tyrannous regimes, and make rebellion difficult or impossible.

Perhaps the purest form of extraterrestrial ‘cage’ is the long-duration space mission, from which there is no possibility of escape. Even compared to an enclosure on Mars, say, the confinement imposed in such missions is brutally strict.

The author's own *Ark* (Baxter 2009) is about a group of around 80 young people fleeing a dying Earth of the near future, and travelling to the habitable world of a distant star, a journey that will last 37 years. There would presumably be little argument about the ethical choices made by parents giving up their children to a lifeboat of this sort, and indeed the crew candidates compete intensely for places. But little thought is given to the evolution of the crew's society once the mission is underway, and the young people have to find their own solution. One inspiration for what follows was Golding's *The Lord of the Flies* (1954).

At first, especially while contact is maintained with Earth, a military command structure persists: 'Holle, they offered me the role of commander of the trans-Jupiter phase! That's a mission in itself. Then I'll be in prime position to become captain of the interstellar phase' (p. 166).

Later, the crew's limited training encourages them to try a kind of participative democracy: 'But I don't need, and shouldn't have, the absolute authority of a captain of a ship at sea... I want to govern by consensus... If there's a dispute, we'll just talk it out as long as it takes' (pp. 260–261). However this early solution breaks down over arguments about a drastic punishment (a maiming) imposed on a crewman guilty of a crime of passion; his crewmates are not yet ready to accept such authority.

An election results in the emergence of a new leader. Wilson is as competent as the rest in terms of running the ship's systems, but he and his gang retain rule for decades through sheer physical strength, and the manipulation of the ship's internal politics. Here is the most primitive form of human society, the shadow of the chimp, re-emerging light years from Earth. But Wilson becomes bored and corrupt, and begins to prey on the crew: 'Look at me. I'm the most powerful man on the ship. Have been for 10 years... So what's in it for me? I'll tell you. Only the sweetest commodity on the ship. I'm talking about young flesh...' (p. 365).

The new generations, however, have their own issues. No preparation has been made for their raising or education, or to integrate them into the ship's overall purpose. In the resulting social vacuum they have evolved their own subculture: 'Steel looked up along the length of the hull... What she looked for was other shippers like her, shipborn, where they clustered in their little territories, marked by scratchy graffiti signatures on the walls... Nobody much older than Steel even saw any of this going on' (p. 387). Ultimately, enraged by abuse by Wilson's cadre—and fuelled by a comforting myth that perhaps the ship's confinement is not real, that the mission is a cruel Earthbound delusion—the young organise, rebel, and attempt to break out of the hull, with disastrous consequences.

In the aftermath one of the original crew, Holle, with control of the life support systems, assumes total control over the survivors, and particularly over the young. Now the ethic of the lifeboat is imposed, with room for little or no liberty. And Steel, the young leader, is sentenced to death: 'I don't want leadership... Not among the shipborn. I don't want vision, or idealism, or curiosity, or initiative. I don't want courage. All I want is obedience. It's all I can afford, until we're down on Earth III and the day comes when we can crack open the domes and let the kids just walk away. Yes, she's the best of her generation, and that's why she's such a

terrible danger. That's why Steel has to die' (p. 417). The book's essential argument is that the social design of such a mission, and particularly the challenge of managing the education and aspirations of the younger generations, is as important as the ship's technical design, if breakdowns are to be avoided.

Other explorations of the 'generation starship' trope include Heinlein's 'Universe' (1941), Aldiss's *Non-Stop* (1958), and the author's own 'Mayflower II' (2004). Many such stories span a much larger timescale than *Ark*. As the generations pass, typically the mission goals are lost or forgotten, the ship's internal society breaks down, the crew's descendants may forget they are on a ship, and ultimately even the evolution of the shipboard inhabitants may be compromised. In Aldiss's novel, on the ecological island that is the starship, the crew's descendants are dwarfed—as if the ship is ultimately crewed by the 'hobbits' of Indonesia.

Possibly one solution to the challenge of crewing a generation starship might be to reach back to the social forms of the 'traditional societies' of humanity's past on Earth (Diamond 2012): the pre-farming age when humans lived in small, relatively isolated bands, with the integration of children from birth into a limited number of social roles. Such societies may seem alien and constricting to modern-day city-dwellers, but they were clearly enduring forms, dominating for some 90 % of human history, and indeed continuing in a minority of cases today. And in their isolation and self-reliance traditional societies may be closer in their social frame to the starship future than are modern urban social groupings.

One work of SF which explicitly explores this kind of solution is Harrison's *Captive Universe* (1969)—but a significant ethical challenge is presented, for a pre-existing traditional culture is scooped up without its consent or knowledge and used to crew a starship.

For a 500-year mission to Proxima Centauri, the asteroid Eros is spun up and carved into a hollow world with an artificial sky (p. 108). People Harrison calls 'Aztecs', from isolated subsistence-farming communities in Mesoamerica, are taken on board and allowed to believe they are in a closed valley on Earth: 'The Aztecs, chosen after due consideration of all the primitive tribes of Earth. Simple people, self-sufficient people, rich in gods, poor in wealth...[living] as they did when the Spaniards first arrived hundreds and hundreds of years earlier... Taken, unchanged, and set down in this valley in a mountain in space. Unchanged in all details, for who can guarantee what gives a culture adhesion—and what, if taken away, will bring it down?' (p. 109).

And to further ensure stability, the Aztecs have been genetically engineered for low intelligence during the voyage: 'They did take genius. And they tied it down to stupidity. Dimness, Subnormality, Passivity, Prison it in slightly different ways in two different groups of people and keep them apart... Then, some day, the right day, let the two groups meet and mingle and marry... The children [will be]... genius children' (p. 110).

The story concerns a break-out by a young Aztec man, Chimal. The accidental product of a premature rule-breaking coupling between the separated communities, he is over-intelligent and restless. At last, in a scene of classic 'conceptual break-through' (a moment in a story when everything a character thinks he or she knows

about the universe is inverted), Chimal finds a way out into the machinery, through a door in a rock face (p. 51).

This book examines the ethics of removing the liberty of generations of unborn for the purpose of such a mission. Chimal himself is enraged by the truth: ‘This is no wonder—but a crime. Children...were taught superstitious nonsense and bundled off into this prison of rock to die without hope. And, even worse, to raise their children in their own imbecilic image for generation after generation of blunted, wasted lives.’ (p. 148).

The only justification is that the unpleasant choices made in this case have worked, in delivering the long cultural stability required of a generation starship.

## 2.4 Extraterrestrial Revolutions

The progressives...believe that in the long run Man has got to explore and master the material universe, or else he'll stagnate... But this sort of argument is no use with the taxpayers. Clarke *The Sands of Mars* (1951) (p. 184).

What if extraterrestrial colonies prosper and, following historical precedent, seek independence? This section looks further into the future and considers SF accounts of a quest for liberty by extraterrestrial colonists revolting against the centre. In an American-dominated genre, many have been inspired by the example of the American Revolution.

One classic example is Heinlein's novel *The Moon is a Harsh Mistress* (1966), a compelling, densely written saga of a revolution by a near-future lunar colony. It was written when Heinlein was 59 years old, at a time in his career when he allowed his personal political views to be expressed in his fiction.

In 2076 Luna City is a colony of convicts from Earth, along with some citizens freed having ended their sentences, and freeborn descendants of convicts. The book is told from the point of view of ‘Mannie’, one of the colonists, in an argot that is a compound of American English, Russian, Australian. In an economic scenario that looks unlikely to modern eyes, the colonists make a living by mining lunar water and growing wheat, which is exported—using a ‘catapult’, a mass driver—to an overpopulated Earth run by the ‘Federated Nations’, a stronger version of the UN. A Lunar Authority, under a Warden, controls the colonists' lives, including the central engineering that provides air, food and water. The Warden even controls the terms of sale of the wheat.

The colonists are confined by the Authority but are not policed internally, and Heinlein depicts a kind of natural morality arising from the very lethality of the lunar frontier: ‘Zero pressure was place for good manners. Bad-tempered straw boss didn't manage many shifts’ (p. 21); ‘Could say our customs are natural laws because are way people have to behave to stay alive’ (p. 123). The operation of this ‘natural law’ includes ad hoc citizens' tribunals with the power to impose the death penalty (Chap. 11).

A revolution fomented under the tutelage of Professor Bernado de La Paz, a well informed scholar of history—and a mouthpiece for Heinlein. The proximate cause

of the revolt is the inevitable depletion of lunar resources in a few years: 'Luna must be self-sufficient' (p. 26). With 1776 as a conscious precedent, La Paz prepares for the rebellion carefully: 'Revolution...depends on correct organisation and, above all, communication. Then, at the proper moment in history, they strike' (p. 57). The 'Loonies' are more patriotic to their homelands on Earth than to the moon, so incendiary incidents with Authority guards are stage-managed: 'Easier to get people to hate than to get them to love' (p. 87).

The rebellion itself is difficult to achieve. It is suicidal to strike against the infrastructure itself: 'The woman had been in The Rock almost all her life...yet could think of something as new-choomish as wrecking engineering controls' (p. 44). Meanwhile the Warden controls essential systems from his isolated and heavily guarded complex. In the end Heinlein resolves these problems rather easily by giving the colonists a crucial ally in 'Mike', the colony's central computer, which happens to become sentient, and decides to become an ally of the rebels. This does illustrate however the necessity, and the difficulty, of seizing control of central life-supporting functions. For instance the Warden's Complex is ultimately disabled by Mike cutting its oxygen supply.

War follows as Earth tries to regain control, illustrating a further hazard to extraterrestrial rebellion: the sheer lethality of interplanetary war (see the essay by Baxter and Crawford elsewhere in this volume). On the one hand the colonists, lacking dedicated weapons, improvise by 'throw[ing] rocks at them' (p. 80): the catapult is used to hurl massive loads of moon rocks at Earth. Uninhabited areas are targeted but collateral casualties are inevitable. It is a war of terror, with 3 million 'loonies', able to strike at will against 11 billion Earth inhabitants (p. 126). On the other hand it is easy for Earth troops to crack open even underground pressurised lunar shelters with hydrogen bombs (p. 205). In the end, as with the American War of Independence, the conflict is ended through exhaustion on both sides—and before mutual destruction is achieved—and the moon is free.

In American-dominated mid-twentieth-century SF, 1776-style rebellions of near-future space colonies against the centre were represented as something of a default, a theme picked up by authors from a surprising array of backgrounds. Typically an inner human instinct for expansion was shown to be in conflict with the centre's desire for control—or just for a return on its investment.

Even Dick wrote of war with rebellious planetary colonies. In the novel *Time Out of Joint* (1959), the protagonist Ragle Gumm is the centre of a false reality set in the year 1959, his only occupation being to solve daily newspaper puzzles. In fact the year is 1998 and the US is at war with a lunar colony. The few thousand 'lunatics', safe in their underground bunkers on the moon, terrorise Earth with random attacks: 'It worries them because they can never tell if it's a full-size transport with a full-size H-warhead, or only a little fellow. It disrupts their lives' (p. 173). Gumm has a pattern-recognition skill that enables him to predict the lunar attacks, disguised as his puzzle-solving; he is kept in '1959' because he would have chosen to go over to the moon's side as isolationist tendencies deepened. In this book at least Dick expresses a Heinleinian dream of inevitable migration: '[There was] a deep restless yearning under the surface, always there in him, throughout his



life, but not articulated. The need to travel on. To migrate... An instinct, the most primitive drive, as well as the most noble and complex... We're only pretending to mine ore on Luna. It's not a political question, or an ethical one...' (pp. 179–180).

One way for a rebellious colony to win liberty is to change the rules: to find a high-tech solution to break out of the problem of resource constraints and a dependence on Earth. One such method is explored in Asimov's 'The Martian Way' (1952). After three generations a Martian colony supports 50,000 people, but on a united Earth there is resentment at the investment required to colonise Mars, and with no significant economic return likely in the future. With the colony threatened with closure by withholding the water it needs for physical needs as well as for rocket propellant, the colonists achieve a breakout solution by importing water from Saturn's ring fragments. Asimov allows his colonists to express typical dreams of the frontier: '[On Earth my father] didn't see anything happen. Every day was like every other day, and living was just a way of passing time until he died. On Mars, it's different... If you haven't lived when things are growing all about you, you'll never understand how wonderful it feels' (pp. 34–35). And to probe the frontier is the beginning of man's cosmic destiny: 'Mars is—a ship. It's just a big ship...occupied by fifty thousand people.' (p. 28) 'Mankind will spread through the Galaxy. But...it will be Martians, not planet-bound Earthmen, who will colonize the universe' (p. 41).

Clarke's *Sands of Mars* (1951), his second novel, depicted another Martian rebellion, and another high-tech rule-changing stratagem. In the 1990s anti-Mars sentiment is growing on Earth (p. 32): 'We've sunk in millions and haven't got a penny back...' Chief Executive Warren Hadfield is conducting a 'paper war' (p. 88) with Earth, but independence will be difficult to achieve. 'I suppose you realise what I'm fighting for...[is] self-sufficiency... But there are more skilled trades back on Earth than there are people on this planet' (p. 88). A sturdy pioneer/frontier spirit is evident: 'They had a sense of fulfilment which very few could know on Earth, where all the frontiers had long ago been reached' (p. 118). The high-tech solution is Project Dawn: to ignite Phobos with a 'meson resonance reaction' (p. 187), and create an artificial sun to make Mars habitable quickly. Earth's response is rather gentlemanly: 'You shouldn't have done it, but we're rather glad you did' (p. 201).

Published more than 20 years later, Clarke's elegant *Imperial Earth* (1975), set in 2276 (and published in time for 1976, an earlier centennial of the American revolution) takes another look at the tensions of a colonised solar system, in this case focussing on colonies on Titan. The tough environment of Saturn's moon has enforced a unified society dependent on a few interlinked families: 'Everyone who had come to Titan had been selected for intelligence and ability, and knew that survival depended on cooperation' (p. 59). However Earth and its colonies are divided by simple physical constraints. After a few centuries of adaptation it is difficult for inhabitants of low-gravity worlds like Titan even to visit Earth. Lightspeed communication delays are trivial on Earth, leaving that world relatively unified; but the long delays in speaking to the colonised worlds reduce effective interpersonal contact and so reduce human unity (p. 101). There are cultural divergences too; an Earth recovering from resource depletion and eco-collapse is

reverting to a managed wilderness (Chap. 16), and people conserve the past; Washington DC is like a museum (Chap. 17). All this seems quite alien to colonial visitors.

Colonists on Titan have grown rich thanks to a 'hydrogen economy'; Titan's gravity well, shallow compared to other sources of hydrogen such as Earth and Jupiter, allows the atmospheric mining of the element which is required in large volumes to run fusion-propulsion interplanetary ships (Chaps. 2 and 3). The trade with Earth seems to be a classic example of trade between a centre and its colonies; Titan's raw material, hydrogen, is exchanged for 'expensive items' from Earth (p. 61). But this arrangement is fragile, and is threatened by a single technological revolution, based on a mini-black-hole 'Asymptotic Drive' (Chap. 15) which is much more efficient in its use of hydrogen. Ultimately Titan seeks a new destiny as a science hub, with the building of a new kind of long-wavelength radio telescope among the moons of Saturn (Chap. 35).

The most extensive and detailed modern depiction of a Martian revolution was Robinson's *Mars* trilogy (1993, 1994, 1996). These books, a saga of scientific and political advancement set against the background of the terraforming of Mars, portray an intentional reshaping of human history in the new world.

In the year 2026, the 'first hundred' colonists, all selected by UN and national agencies, land on Mars. Early investment in the colony comes from government and 'transnats', super-rich corporations. But once the colonising spreads, the lack of a proper legal framework for the exploitation of Martian resources and protection of the environment is soon evident; the only governance comes from a 'Mars treaty' based on precedents concerning outer space and Antarctica. Soon the discovery of precious metals on Mars begins a 'gold rush' (p. 324) by Earth nations and corporations, with pressure to build a space elevator to begin the large-scale extraction of Martian resources to Earth. But on Mars there is a growing reaction against Terran exploitation: 'the transnational world order is just feudalism all over again' (p. 445). Habitats, air and water mining gear, communications and other equipment are quietly set aside to support the 'revolution' to come (p. 408).

Thirty years after the first landing, Mars's first 'constitutional convention' is an attempt to renew the existing Mars treaty (p. 469). But the result is a sham, the transnats now wield effective power on Mars, and a still more massive flood of immigrants is brought to Mars.

Martian cities begin to declare independence—and in 2062, revolution is declared. Earth is unyielding; with the rebellion portrayed as the actions of a few scattered terrorists, it is declared that 'Mars is not a nation but a world resource' (p. 602) which cannot be given to a handful of Martians. The Martian rebels attempt one strike against Earth, by diverting an asteroid called Nemesis towards Earth, but this is destroyed. But it is much easier to inflict damage on the Martians: 'It was not hard to destroy Martian towns. No harder than breaking a window, or popping a balloon' (p. 558).

This battle is lost, but Robinson's revolutionary war continues. In *Green Mars* (1994), which begins in 2081 some 60 years after the first landings, resistance movements form on Mars, while Earth is weakened by a dramatic sea level rise.

At last, in *Blue Mars* (1996), whose events begin in 2127, the Martians gain their independence, and the transnats are expelled from Mars. After a constitutional convention the Martians establish a new society, which will lead the terraforming of the rest of the solar system—and the nature of that society is examined in the next section.

## 2.5 Extraterrestrial Utopias

‘For what kind of delta-v would it take to escape history, to escape an inertia that powerful, and carve a new course?’ Robinson, *Red Mars* (1993) (p. 68).

With the revolution won, what kind of society have the rebels of SF gone on to build?

Heinlein’s *The Moon is a Harsh Mistress* (1966), as discussed in Sect. 2.4, was a conscious rerun of the American Revolution set in an extraterrestrial context. The American Founding Fathers of course went on to establish the US Constitution and a federal system of government designed for expansion across the North American continent and beyond (see the essay by Crawford in this volume). What of Heinlein’s colonists?

Even as the war with Earth progresses, a constitutional convention is set up, but this is rigged by revolutionary leader La Paz’s central cell (p. 222) and is viewed sourly by the main characters. La Paz himself contributes only gnomish suggestions (p. 228): ‘Government is a dangerous servant and a terrible master... You might even consider installing the candidates who receive the least number of votes; unpopular men may be just the sort to save you from a new tyranny. I suggest one house of legislators, another [house] whose single duty is to repeal laws... Let your document be studded with things the government is forever forbidden to do. No conscript armies...no involuntary taxation...’ La Paz, speaking for Heinlein, describes himself as ‘a rational anarchist... In terms of morals there is no such thing as a “state”. Just men, individuals. Each responsible for his own acts’ (p. 62). La Paz despises government in principle, but accepts the need for some form of it in practice. ‘I think that government is an inescapable disease of human beings. But it may be possible to keep it small and starved and inoffensive’ (p. 231). In the end these suggestions are not taken up.

Even so it comes as a shock to the reader when, on the book’s final page (p. 288), Mannie the narrator, having won his rebellion, chooses to flee from one tamed frontier to the next: ‘Quite a few young cobbers have gone out to asteroids. Hear some nice places out there, not too crowded...’

Yet this seems to have been characteristic of Heinlein, who was no utopian. Many of Heinlein’s works contain an argument that the only true liberty is to be found on an expanding frontier; in the settled interior of any society such evils as excessive legislation, taxation and corruption are bound to follow. *Time Enough for Love* (1973) is set 2000 years in the future, at the other end of the expansion experiment begun with lunar colonisation in *Moon is a Harsh Mistress*. Heinlein’s

mouthpiece here is his undying pioneer Lazarus Long: ‘As a thumb rule, one can say that any time a planet starts developing cities of more than one million people, it is approaching critical mass. In a century or two it won’t be fit to live on... Migration always involves selection and improvement. Elementary’ (p. 31).

Thus, Heinlein argues, there is no worthwhile static society; the only life worth living is as part of a rapacious colonising wavefront, endlessly leaving behind worlds choked by excessive authority. Indeed in such quotes (‘selection and improvement’) Heinlein seems to venture beyond libertarian thinking into social Darwinism: he speaks of the rigour of the frontier as a positive benefit; the cleansing of the race of the weak and foolish, such as the stowaway child of ‘The Cold Equations,’ is an evolutionary price worth paying.

Heinlein was and is highly influential in SF, but his is not the only voice. Utopian visions in SF build on much older traditions of literature, dating back to Thomas More’s *Utopia* of 1516. Francis Bacon’s *New Atlantis* (1627) showed the advancement of science bringing about a utopian state. Similarly HG Wells’s *A Modern Utopia* (1905) coupled political progress with scientific advancement. A modern work set in an extraterrestrial context is Le Guin’s *The Dispossessed* (1974), which depicts a competition of anarchist and capitalist ‘utopias’ on a planet and its moon.

The most complete utopian exercise in modern SF must be Robinson’s ‘Mars’ trilogy (1993, 1994, 1996), referenced in the previous section. That Robinson regards his trilogy as a utopian exercise cannot be in doubt. A citizen of a planned community in California, he seems to have arrived at his own philosophy from a consideration of a number of influences. He said in 2002: ‘I consider my books to be a political work... There’s got to be a utopia strand, there’s gotta be positive stories. You can criticize over and over again, but it also helps to have some vision of what should happen’ (Smith 2002).

Robinson’s Martian revolution is a more complex affair than 1776, for his Martians rebel, not just against a government, but against the system of capitalist democracy itself. Once freedom is won, the subsequent constitutional debates, heavily featured in *Blue Mars* (1996), are a mixture of a reaction against Earth history—the rejection of capitalist democracy—as well as a reaction to the conditions of constraint and scarcity on Mars. The basis of the discussion is a ‘master list of fundamental individual rights’ (p. 129) such as *habeas corpus* and freedom of speech. In classic American fashion government is to be kept in check with ‘an emphasis on local semi-autonomy...many checks against majoritarian rule’ (p. 154). On the other hand an environmental court is given very strong powers.

Perhaps the most striking feature of the new constitution is an economic system intended to ‘provide for everyone in an equitable way’ (p. 64). ‘The system called capitalist democracy was not really democratic at all... So, we must change. It is time. If self-rule is a fundamental value, if simple justice is a value, then they are valuable everywhere, including in the workplace where we spend so much of our lives’ (p. 143). The fundamental solution is a rejection of corporate capitalism: ‘All economic enterprises are to be small cooperatives, owned by the workers and no one else’ (p. 144).

And the constitution contains a remarkable pledge to guarantee equal access to ‘housing, health care, food, education’ (p. 145). This pledge of universal welfare seems uncharacteristic for an American writer, but it is evidently a reaction to the conditions of a young extraterrestrial colony, with its centralised life support systems and their tyrannous implications. It is certainly a blow in favour of extraterrestrial liberty; if this guarantee can be kept (a significant caveat) then tyranny from such causes is evidently averted.

Furthermore Robinson’s vision seems a specific rejection of the frontier-scarcity ethos propounded by Heinlein and others. In Heinlein’s *The Moon is a Harsh Mistress* the idea of providing security of food, water, air and other essentials to the rebellious lunar colonists is actually raised but mockingly dismissed (1966, p. 159). Robinson however argues that humans can advance, indeed will advance better, without the forcing of struggle and scarcity.

Robinson shows us little of his Martian utopia in action. Its development will be an ongoing process: ‘The negotiations would go on for years. Like a choir in counterpoint, singing a great fugue’ (p. 746). But the great experiment evidently works, as Robinson assures us in the very last page of the trilogy (of 1,700): ‘Nowhere on this world were people killing each other, nowhere were they desperate for shelter or food, nowhere were they scared for their kids’ (p. 761).

Robinson’s Martians’ new society seems to be taking the first steps to the condition of a ‘post-scarcity economy’ (Chernomas 1984), a society in which the basics of life are guaranteed—the diametric opposite of the forcing ground of the cold-equations frontier. Such an economy is depicted in an extraterrestrial context quite explicitly in the ‘Culture’ novels of Iain Banks (1954–2013). Banks said of his universe, ‘Nothing and nobody in the Culture is exploited. It is essentially an automated civilisation in its manufacturing processes, with human labour restricted to something indistinguishable from play, or a hobby’ (1994) (*Future Histories* 2013).

But modern SF contains a more populist and perhaps more surprising utopian vision of the future:

Space: the final frontier. These are the voyages of the starship *Enterprise*. Its five-year mission: to explore strange new worlds, to seek out new life and new civilizations, to boldly go where no man has gone before.

These words or close variations have introduced *Star Trek* episodes and movies from 1966 to 2013 (Whitfield and Roddenberry 1968). They have become over-familiar perhaps, and the very use of the word ‘frontier’ gives the franchise a perhaps Heinlein-like feel. Indeed, most of the screened stories are set at the frontier of the United Federation of Planets. But what is contained within the frontier is a utopian vision, as can perhaps be judged from an imagined mirror-image of these famous sentences, indicating what the *Star Trek* future is *not*:

Space: the final unconquered terrain. These are the voyages of the warship *Fist of God*. Its five-year mission: to exploit strange new worlds, to enslave new life and convert new civilizations to the one true faith, to boldly conquer where no soldier of God has conquered before.

The creator of *Star Trek* was Gene Roddenberry (1921–1991). Toughened by experiences as a World War II combat pilot and as a police officer in Los Angeles, Roddenberry was a humanist who wished to show that humanity could better itself by its own efforts. The composition of his ships' crews consciously showed examples of racial equality, religious tolerance rather than conformity, and an acceptance of the other. Of religion Roddenberry said (Notable Names database 2013), 'People were saying that I would have a chaplain on board the *Enterprise*. I replied, "No, we don't."'.

Roddenberry's United Federation of Planets, first mentioned in the 1967 original series episode 'A Taste of Armageddon', is an expansionist federal government on the US model. As discussed by Crawford elsewhere in this volume, this model seems the best available for interplanetary governance—albeit a model that applies in the case of *Star Trek* to multiple species. The Federation's values include universal liberty, equality, justice, peace, and cooperation, as listed in the *Next Generation* episode 'The Best of Both Worlds' (1990).

Strikingly, the Federation seems to be a post-scarcity society. We are told that money is obsolete (for example in 'Star Trek IV: The Voyage Home', 1986). The economy seems to be based on 'replicator' technology, a super-advanced version of matter printing, coupled with abundant energy. In the original series episode 'Catspaw' (1967), an alien tries unsuccessfully to bribe Captain Kirk with trays of jewels. Kirk responds: 'We could manufacture a ton of these on our ship. They mean nothing to us.' As for the idea that without scarcity, without the need to work, humanity will become decadent, as a time-travelling Captain Picard explains to a 21st century woman ('Star Trek: First Contact' 1996): 'The acquisition of wealth is no longer the driving force of our lives. We work to better ourselves and the rest of humanity.' In spirit, this is much more Robinson than Heinlein.

Thus, for nearly 50 years, prime-time TV and our cinema screens have been dominated by a very utopian vision of extraterrestrial liberty, almost smuggled across by the gentle persistence of Gene Roddenberry.

## 2.6 Extraterrestrial Liberty in the Presence of the Other

I found about me the landscape, weird and lurid, of another planet... I felt...a sense of dethronement, a persuasion that I was no longer a master, but an animal among the animals, under the Martian heel. Wells, *The War of the Worlds* (1898, p. 154)

Looking still further ahead, it seems quite possible that in the course of humanity's extraterrestrial career we will encounter other life forms, perhaps even other intelligences. Such encounters will inevitably shape our moral choices, and limit our own liberty.

In a sense extraterrestrial life is already curtailing our freedom, even though at time of writing it is still only a theoretical concept. Planetary Protection Protocols, rules which govern the cleansing of spacecraft sent to other worlds and delimit human behaviour on those worlds, constrain our actions even today (COSPAR 2008).

Examining the impact on indigenous life of terraforming another world has been one way in which SF has explored our relationship with technologically inferior life forms. Depictions of terraforming in SF date back to the 1930s and Stapledon's *Last and First Men* (1930), in which Venus is terraformed by electrolysing the oceans to produce oxygen. The term 'terraforming' itself was coined by Jack Williamson in 1942–1943 in the stories collected in *Seetee Ship* (1951).

Clarke's *Sands of Mars* (1951) seems to have been the first attempt to depict the terraforming of Mars. This Mars has an interesting biota, including the 'oxyfera' or 'airweed' oxygen-producing plants, sturdy 50,000-year-old trees (p. 107), and Martians, kangaroo-like animals who live in a kind of symbiosis with the airweed. The terraforming shown is not very realistic, based on the fusion ignition of Phobos into a 'second sun', coupled with the promotion of the native airweed, to produce oxygen from the rocks. However, set in the then-near future (the 1990s) with the terraforming in the hands of a society not much advanced over our own, Clarke highlighted ethical dilemmas that have been extensively explored since.

In his standard text *Terraforming* (1995) (pp. 490ff) Fogg discusses the ethics of terraforming based on classifications including homocentrism—humans should be valued over the rest of nature—and biocentrism—all life has intrinsic worth and should be valued accordingly. These conflicting attitudes are illustrated in *Sands of Mars*. Homocentric progressives back the Mars colony, believing that 'in the long run Man has got to explore and master the material universe, or else he'll simply stagnate on his home world' (p. 184). To the homocentrics even the native Martians symbolise a trap: 'What have *they* done except survive? It's always fatal to adapt oneself to one's surroundings. The thing to do is to alter your surroundings to suit you' (p. 158).

But what about any rights of the Martians themselves? Here, in a nod to biocentrism, coupled with a progressive view of evolution, it is argued that we are not tampering with a living Mars but saving a decayed Mars, and fallen Martians: 'We've had to...bring this world to life again... There was something inspiring in the thought of regenerating not only a world, but also a race which might be older than man... If it became too warm for [the Martians], they could easily migrate north or south... Were they the degenerate survivors of a race which had achieved civilisation long ago?... In any case, it would be an extremely interesting experiment to see how far up the evolutionary ladder the Martians could climb, now that their world was blossoming again...' (p. 188). Of course a modern biologist might say that the native Martians cannot be said to have 'fallen' at all but are well-adapted to their austere environment. Clarke, however, even in this early novel, had a long perspective, and was well aware of ethical challenges: 'For it was their [the Martians'] world, not Man's... Man himself...might well be judged by his behaviour here on Mars' (pp. 199–200).

The consequences of terraforming have been further explored in Robinson's 'Mars' trilogy (1993, 1994, 1996). After the landings of the 'first hundred' colonists, the human transformation of Mars, intentional and otherwise, begins almost immediately, with large-scale excavations to construct shelters, and at first tentative but deliberate steps to terraform, such as the scattering of heat-producing windmills



and genetically engineered algae (1993, p. 219). Robinson's character Ann Clay-born voices disquiet on behalf of a 'red' conservationist movement, as a landscape billions of years old is changed even as humans first inspect it: 'Base camp is like an open pit mine, in the middle of a desert never touched since time began' (p. 190). There is a scientific loss too; when life in isolated pockets is eventually found (p. 388) it is impossible to be sure that it is not the result of terrestrial contamination. But a transformation of Mars is necessary if the colony is to achieve independence: 'we need to terraform in order to make the planet ours' (p. 205). The pace quickens when the UN governing agency approves follow-up colonisation and more terraforming efforts, which are soon large-scale, with solar-heat-collecting mirrors in orbit (p. 310), moholes to release geothermal energy (p. 318), and a massive spread of life forms. A climax to this comes with the injection of the ice of an asteroid into Mars's air through aerobraking (p. 441). Then, 30 years after the first landing, a space elevator is attached and a still more massive flood of immigrants is brought to Mars.

When revolution comes, huge damage is done to Mars itself. Each side attacks the infrastructure, and increasingly destructive blows are struck. Aquifers are cracked, releasing floods not seen since the Noachian era (p. 565). Phobos is used as a surveillance and attack station (p. 585); the rebels find a way to bring the moon crashing down to Mars (p. 610). In the end the space elevator is cut from its orbital anchor; the cable wraps around the planet in a spectacular disaster (p. 589). By the end of *Red Mars* the terraforming programme has been greatly, if roughly, accelerated. But 'every single feature of the primal Mars would melt away. Red Mars was gone' (p. 643).

Robinson himself seems to be a proponent of terraforming regardless of the cost to any undiscovered native life; later in the series he sketches the rapid terraforming of more worlds, as far out as Titan. As for Mars, he echoes Clarke's justification (Clarke 1951) that perhaps the colonists are not destroying a planet but 'saving' a fallen world. There is a search for evidence of primordial oceans on Mars, 'a model that tended to lend moral support to the terraforming project, implying as it did that they were only restoring an earlier state of things' (1993, p. 292). Terraforming, then, is a means to achieve extraterrestrial liberty but presents moral dilemmas in itself.

If, on the other hand, it emerges that the aliens we encounter are significantly *more* powerful than ourselves, the situation may become very uncomfortable for us, even if the only consequence is that moral choices are taken out of our hands. In the *Star Trek* episode 'Errand of Mercy' (1967) superior aliens called the Organians put a stop to a proposed war between Federation and Klingons. Captain Kirk protests at this curtailment to his freedom of action: "We have the right—" "To wage war, Captain? To kill millions of innocent people? To destroy life on a planetary scale? Is that what you're defending?"... "Well, Commander," Kirk says later to the Klingon leader, "I guess that takes care of the war. Obviously the Organians aren't going to let us fight." "A shame, Captain. It would have been glorious..."

An encounter with more aggressive superior aliens could be much more damaging. In Bear's novels *The Forge of God* (1987) and *Anvil of Stars* (1992),



‘The Earth is dead, murdered by self-replicating spacefaring machines. A few thousand humans have been saved by other robots, machines sent by the Benefactors to defend primitive worlds and civilisations from the depredations of planet-killing probes... The Law [is] a galactic code that governs the behaviour of civilisations. The Law demands that civilisations which make self-replicating killer machines be punished—with extinction. Humans must carry out this punishment, with the help of the Benefactors... This is how the balance is kept’ (prologue to *Anvil of Stars*). The picture is one of a galaxy of predatory and prey worlds alike cowering in silence and high-tech camouflage, awaiting pre-emptive attack or revenge strikes. And the last surviving humans, saved from Earth when still very young, have no freedom at all; their only choice is to serve as soldiers in an unending campaign of extermination. This is one of the darkest visions in SF.

## 2.7 Conclusions

‘Luna was ours’. Heinlein, *The Moon is a Harsh Mistress* (1966, p. 138).

For several decades at least, science fiction writers have explored, and readers and critics have debated, the possibilities of extraterrestrial colonisation, including implications for liberty and social development. Some tentative conclusions can be drawn.

The literature suggests that one key challenge for the long term may be the design, conscious or otherwise, of stable societies with satisfactory lives for the young in confined environments. The most extreme kinds of enclosure, and therefore probably the most tyrannous, are isolated space habitats, including spacecraft on long-duration missions: cages from which there maybe no escape possible, for generations.

With the discussion often dominated by American voices, as the SF field has been commercially, a tension is perceived between those who advocate the social and even evolutionary value of the frontier, and others who dream of utopias, perfectible societies where need and want are no longer drivers of human actions. In practical terms (and anticipating such analyses as Cockell’s 2013) the SF community has discussed the difficulties of mounting revolts in closed, heavily technologically dependent colonies—an obstacle to social change and a striving for liberty of the kind exemplified by the American Revolution and the subsequent war.

In the further future, our liberties are likely to be compromised by encounters with other life forms, perhaps even other minds than our own.

That the issues which concern this book continue to be explored in mass popular form in the SF world is exemplified by a Japanese franchise called ‘Gundam’ (Official Gundam website 2013). The Gundam are ‘mecha’, mobile fighting suits controlled by human pilots; the name is a neologism from English: ‘gun’ + ‘(free) dom’ = Gundam. This began as an animated TV series in 1979, and has since (as of 2008) become a 50 m yen franchise spanning TV, movies, manga, novels, and games. With time the saga has developed a complex future history describing the relation of Earth to breakaway solar system colonies, including an age of repressive

control by Earth, a period of devastating space war, an era in which the space colonies dominate, and a far-future era which sees an end of wars in solar system. The stories—while featuring a lot of armoured warriors in combat—explore war, pacifism, the meaning of freedom, and the evolution of humanity. This reached a certain peak in 2008 when an International Gundam Society held an academic conference on such issues as space emigration due to overpopulation, human conflict on Earth and in space, the perpetuity of fascism, and the politics of the technocrat.

As the debate initiated by this book and the seminar that inspired it goes forward, we can be confident that SF and its readership will continue to explore the relevant issues in a dynamic, creative and popular form.

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