two systems, using a philosophical problem called the trolley dilemma, which asks whether it is right to put one person in the path of a runaway tram to save the lives of several more. Most people believe it is wrong to stop the trolley by pushing a man onto the tracks. But most think it is right to flick a switch that diverts the car from a track on which it hits five people onto one where it hits only one.

This seems like an instinctive manifestation of the doctrine of double effect — the philosophical principle that holds that using people as a means to an end is worse than harming them as collateral damage. Greene's experiments, however, seem to show that we think that flicking a switch is more ethical than pushing a person not because of any moral distinction, but because it is socially useful to recoil from physical violence that might provoke retaliation or ostracism.

In place of moral absolutes, Greene carries a flag for utilitarianism. This pragmatic philosophy, developed in the eighteenth and nineteenth centuries by Jeremy Bentham and John Stuart Mill, argues that, to quote Bentham, "it is the greatest happiness of the greatest number that is the measure of right and wrong". The brain's slow moral system, Greene says, naturally arrives at utilitarian decisions, and the philosophy's universality and impartiality transcend faster 'tribal' thinking.

As a science writer who touches on issues beyond science, Greene should be cherished for pursuing his questions wherever they take him and for having the interdisciplinary skills to do so. *Moral Tribes* is clever and absorbing. But although Greene makes a persuasive case for utilitarianism as a means for individuals to live a good life, there is a politics-shaped hole in his suggestion that it might offer a cure for social divides.

It is difficult, for example, to imagine pro-lifers being swayed by Greene's utilitarian argument for the legality of abortion — as the satirist Jonathan Swift remarked, you cannot reason a man out of something that he was not reasoned into. It seems that those who succeed in harnessing a group's tribal instincts tend to defeat those who aim to rise above them. Policy-makers could benefit from reading Greene's book, but anyone with an election to win might be better off with Bloom's focus on morality's automatic weaponry. ■

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SPACE SCIENCE

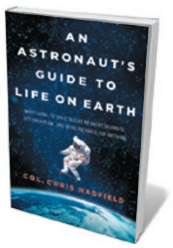
Zero-gravity hero

John Gilbey is gripped by the memoir of Chris Hadfield, a former International Space Station commander.

The third-brightest object in Earth's night sky is the International Space Station (ISS), according to NASA. The station's cultural impact on humanity has perhaps been less brilliant — until this year. From March to May, the tenure of Chris Hadfield as commander of ISS Expedition 35 sparked a worldwide surge of interest in daily life in space.

Hadfield, the first Canadian to walk in space, charmed hundreds of thousands of followers as he tweeted stunning images of Earth rolling beneath him and the gripping and sometimes bizarre minutiae of his day-to-day schedule. (Take this tweet from 8 May: "Yesterday was so cool: as we tested our Soyuz thrusters we could hear and feel them firing, and how they shook and flexed the whole Station.") He even managed an inspired zero-gravity rendering of the Bowie classic *Space Oddity*, complete with guitar. Hadfield brought us a new connectivity with, and understanding of, the work of the ISS crews.

An Astronaut's Guide to Life on Earth describes cogently the core skills that twenty-first-century astronauts need to master — from the unsavoury task of mending the zero-gravity toilet to the challenge of running complex science experiments in orbit. It is clear from the detailed descriptions that working in space remains an enormously complex and routinely dangerous career — Hadfield knew well all seven members of the lost *Columbia* shuttle crew.



An Astronaut's Guide to Life on Earth: What Going to Space Taught Me About Ingenuity, Determination, and Being Prepared For Anything
CHRIS HADFIELD
Little, Brown: 2013.

Equally compelling is his analysis of the key behaviours required of the aspiring astronaut. The right person fits in with the human and technical environment with the least disruption; a true team member can embed their own skills and expertise in the single entity that is the ISS crew. Only in this way, Hadfield urges, can the apparently trivial and minor everyday faults of such a massively complex system be prevented from escalating into major, life-threatening incidents.

Chris Hadfield prepares for a mission in 2012.

Hadfield's description of his time on the ISS — and the long, complex pathway that took him there — is detailed, frequently technical, amusingly pragmatic and often self-deprecating. The narrative is far from linear — the highlights and weird events pour out in a torrent, leaving you wishing desperately that you had travelled with him.

An Astronaut's Guide to Life on Earth is an impressive memoir of Hadfield's part in developing a permanent home for humanity in Earth's orbit. As the title suggests, the book has many important lessons for those of us destined to remain Earthbound — and especially for those seeking to build a new openness for science and technology through public engagement. Every secondary school student should be given a copy: in terms of inspiration, motivation and a sense of belief in the future of humanity in space, this book ranks alongside the accounts published by the *Apollo 11* astronauts. I can think of no higher praise. ■

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VICTOR ZELENTSOV/NASA