Overcoming Objections to Space Travel

By Gordon Arthur

Abstract

This paper addresses objections to spending money on space exploration, most recently an objection from Prince William, the grandson of Queen Elizabeth II. It explores the main objections and some responses to those objections, focusing on the work of Gonzalo Munévar, a philosopher who has written extensively on space matters. It notes the apparent lack of a basis for comparison of the cost-effectiveness of spending on space and spending on Earth, and it suggests that such an analysis would be beneficial.

Introduction

It would be surprising if those attending this gathering were not solidly in favour of space travel and exploration, including human settlement in space. However, this view clearly has not yet reached a widespread consensus, even though the Space Age began on October 4, 1957, and is therefore 64 years old. Nevertheless, there are still high-profile objectors, most recently, Prince William, grandson of Queen Elizabeth II and second in line to the throne, who suggested that it would be better to focus on saving the Earth than looking for a new planet to live on.[1] In this paper, I want to explore why this lack of consensus might be and to see if this exploration suggests more productive approaches to persuade doubters. My analysis focuses on the work of Gonzalo Munévar, a philosopher who has written extensively on space issues.

The Problem

According to Munévar,[2] there are two main types of objection to space exploration. Social critics argue that there are more pressing priorities on Earth; ideological critics argue that space exploration is an unwise extension of big science and technology. Prince William's objection is in the social critic category.

Ideological critics allege that the case for space exploration is a delusion: "it offers more growth and technology to stop the mess caused by growth and technology."[3] If we change our attitudes and stop fouling the environment, space technology will be

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[1] Jennifer Hassan, "Prince William: Let's Focus on Saving Earth, Not Exploring Space for New Planet to Live On," *Washington Post*, October 14, 2021, www.washingtonpost.com/world/2021/10/14/prince-william-earth-space-tourism-race/.

[2] Gonzalo Munévar, "A Philosopher Looks at Space Exploration," in *Evolution and the Naked Truth: A Darwinian Approach to Philosophy* (Aldershot: Ashgate, 1998), 169-79. While I agree with much of what Munévar says in this chapter, I take sharp issue with some of his assumptions, in particular his assertions that truth is defined by evolutionary success and that relativism is unavoidable. See Gonzalo Munévar, "Evolution and the Naked Truth," in *Evolution and the Naked Truth*, 3-22.

[3] Munévar, "A Philosopher Looks," 172.

unnecessary. Their concern is that while scientific approaches may save us from catastrophes in the future, they will certainly degrade the environment now and disturb the natural balance, possibly making an extinction event more likely.[4]

Similarly, social critics question the obvious payoffs of missions to Saturn, Uranus, and Pluto rather than focusing on the fields in which space technology is producing direct spin-offs.[5] Some question human endeavour in space rather than space exploration *per se*. Munévar quotes 1979 Nobel Physics Laureate Steven Weinberg's scathing critique of manned spaceflight: according to Weinberg, it has no scientific merit and putting humans in space serves no useful purpose.[6] Becky Cross suggests that some are simply skeptical about the benefits, and that it is up to the space community to convince them otherwise.[7]

The Response

There has been a wide variety of responses. Lynn Harper has pointed to the biotech benefits of labs in space, ranging from high-quality cell and tissue cultures, which are much easier to produce in microgravity than on Earth, to developments in the understanding of infectivity, aging, and agriculture.[8] Others have pointed to the advantages of satellites, which can locate resources as well as monitoring the environment and therefore saving lives by forewarning us about extreme weather. Space exploration, they argue, "contributes greatly to the reduction of human misery, the improvement of human life, and the preservation of the environment,"[9] on an ongoing basis. Between 1962 and 1976, there were repeated claims that for every dollar spent in space, there was a return of seven dollars, although this scenario clearly did not continue into the Space Shuttle period, due to the shuttle's high operating expenses. Nevertheless, proponents can point to many benefits of the space programme.

Munévar makes a philosophical case for the serendipity of scientific exploration. He begins by stating that there is a strong connection between scientific change resulting from exploration and serendipity. For example, Einstein began his career by thinking about how the universe would look if one were travelling on a light ray, a question that had no obvious practical application. However, it led him to develop the theory of

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[4] Gonzalo Munévar, "Space Exploration and Human Survival," *Space Policy* 30 (2014): 200. doi.org/10.1016/j.spacepol.2014.10.002.

[5] Munévar, "A Philosopher Looks," 172.

[6] Gonzalo Munévar, "Humankind and Outer Space," *International Journal of Technology, Knowledge & Society* 4, no. 5 (2008): 17.

[7] Becky Cross, "Sowing Inspiration for Generations of Space Adventurers," in *Beyond Earth: The Future of Humans in Space*, ed. Bob Krone, Edgar Mitchell, Langdon Morris, and Kenneth Cox (Burlington, ON: Apogee Books, 2006), 135-37.

[8] Lynn Harper, "Biotech: A Near Future Revolution from Space," in *Beyond Earth: The Future of Humans in Space*, ed. Bob Krone, Edgar Mitchell, Langdon Morris, and Kenneth Cox (Burlington, ON: Apogee Books, 2006), 99-104.

[9] Munévar, "A Philosopher Looks," 170.

relativity, which in turn led to the development of quantum theory.[10] These theories indirectly led to the development of lasers, which now have medical applications in microsurgery that could not have been foreseen at the time. Munévar argues that it would have been almost impossible for a surgeon to have developed a medical laser if it required turning the science of the day upside down. Thus, Munévar concludes, "serendipity is the natural (practically inevitable) result of change."[11]

However, there is an obvious counterexample to this: Chernobyl. Technicians there attempted to determine whether, in the event of a power failure, the slowing turbine could power the emergency equipment and the cooling system until the diesel emergency power supply came on.[12] Certain safety protocols were not followed, and this, combined with design flaws in the reactor, led to a large explosion at 01:23 local time on Saturday, April 26, 1986. It is far from clear that there were any happy accidents in the resulting carnage, or that anything useful was learned from it (with the possible exception of "don't shut down the safety systems while experimenting on nuclear reactors").

The second part of Munévar's argument is that scientific exploration leads to scientific change. This is far more straightforward than the first part. Scientific exploration leads to new knowledge and new ideas, which have new consequences, and thus refinements of theory and new applications follow. Thus, combining the two stages:

1. Scientific exploration leads to scientific change.
2. Scientific change leads [may lead] to serendipity.
   therefore:
3. Scientific exploration leads [may lead] to serendipity.

This undermines the social critics' claim that spinoffs are achievable without space exploration, as transformations in science are often prerequisites for improvements in technology (i.e., theory normally precedes application). This argument also works against the ideological objection, as we cannot avoid interacting with and transforming the Earth, as all life has done since it first emerged. The question is not whether we will do so, but how and how wisely. While wisdom is not synonymous with knowledge, and our knowledge will never be complete, we need knowledge to make wise and informed choices. Depriving ourselves of a potentially vast sum of knowledge may be depriving ourselves of the chance to act wisely, and therefore not proceeding with space exploration may be irresponsible. Space exploration may therefore be "not a false panacea but an important means to a cleaner and better future."[13]

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[10] Munévar correctly points out that Einstein never fully accepted quantum theory, at least in the form espoused by Niels Bohr and Werner Heisenberg.

[11] Munévar, "A Philosopher Looks," 176.

[12] OECD Nuclear Energy Agency, *Chernobyl: Assessment of Radiological and Health Impact. 2002 Update of Chernobyl: Ten Years On*, Chapter 1, www.oecd-nea.org/rp/chernobyl/c01.html.

[13] Munévar, "A Philosopher Looks," 179.

Another concern of the opponents of human spaceflight is the cost, and I would suspect this is largely behind Prince William's objection. Munévar calculates that we could run between 400 and 500 interplanetary missions for the cost of building the International Space Station.[14] It's undeniable that the shuttle programme and the ISS took resources away from other projects. Opponents point out that the cost of a failed unmanned mission is much lower than the cost of a failed manned mission. They also point out that machines have travelled tens of thousands of times further and gathered more knowledge than human space explorers.[15] Nevertheless, these objections are mitigated to some extent by the greatly reduced costs of more recent rockets.

However, if there are good reasons to have a permanent presence in space anyway, it would make sense to perform experiments there that might otherwise be uneconomic, and this might lead to a new flowering of science. A human presence in space allows for repairs to space telescopes (most notably, Hubble) and the construction of telescopes that are too large to launch from Earth in one piece. It allows the placement of telescopes on the far side of the Moon, which would shield them from interference from the Earth and could extend the baseline of measurements in interferometry. It allows for the mining of resources and the construction of goods in space, without the costs and complications of launching them from Earth (e.g., vibration). Thus, human settlement in space will be useful in the long term, even though the benefits may take time to appear.[16]

In response to the ideological critics, Munévar points out that disruptions to the natural balance happen all the time and will continue to happen, with or without human activity. The development of life changed the chemistry of the planet. This increased oxygen levels, changing the atmosphere and the oceans. The appearance of complex organisms and the formation of an ozone layer also disrupted the status quo.[17] Thus, the critics' alleged natural balance is an illusion. Furthermore, eventually, natural changes in the environment will make the Earth uninhabitable, whatever we do or do not do. While scientific endeavour and space exploration offer no certainty that we will gain the knowledge necessary to mitigate changes, without them, we will have no chance of doing so.[18]

Discussion

The prince's comment prompts me to raise a related question: "Would we get more benefit from spending the money we use on space to address problems on Earth?" Put into the form of a hypothesis, this might read "We would obtain more benefit from

[14] Munévar gives several examples of consequences of this, but since they are thirteen years old, I have not included them.

[15] Munévar, "Humankind and Outer Space," 20-21.

[16] Munévar, "Humankind and Outer Space," 22-23.

[17] Munévar, "Space Exploration and Human Survival," 200.

[18] Munévar, "Space Exploration and Human Survival," 200-01.

investing $x million on addressing terrestrial problems than from spending the same amount on space activities." This is a testable hypothesis, although it would be necessary to specify how one would quantify the benefits in both cases. It also prompts the logically consequent question: "Has anyone attempted this comparison?" If anyone has, there will be data we can use as evidence to support or undermine the case for space exploration, and it may be possible to develop the missing consensus as a result.

As a largely independent scholar with currently limited library access, I have not been able to do an exhaustive search on this, but the searching I have been able to do suggests that the answer is no. I did not get a single relevant hit on Academia, Google, JSTOR, ResearchGate, or WorldCat. NASA has, of course, done cost-benefit analyses of particular projects, but not, as far as I can find, comparisons between space and terrestrial alternatives. There would be risk in such an analysis, as while a finding in favour of space endeavour might make it easier to obtain funding, an unfavourable finding might make things more difficult. However, as a general rule, more evidence is preferable to less evidence.

Conclusion

This discussion notwithstanding, there is always likely to be disagreement on the relative merits of using resources in space and using them to deal with problems on Earth instead. However, to resolve this issue at least to the point of developing a consensus, more information is needed, specifically a comparative analysis of the costs and benefits of these two options, an analysis that does not currently seem to exist. Doing such an analysis would make a major contribution to answering the critics' objections.