

VIEWPOINT: LOOK BEFORE TAKING ANOTHER LEAP FOR MANKIND—ETHICAL AND SOCIAL CONSIDERATIONS IN REBUILDING SOCIETY IN SPACE

PATRICK LIN

The Nanoethics Group

Commercial space travel is looking more like a real possibility than science fiction, but tied to that ambition we may be held back by the gravity of emerging ethical dilemmas. This viewpoint article surveys a range of social, economic, and political questions, and critically evaluates reasons why we should explore space. The usual ethical issues related to environmental and safety concerns are just the beginning, as there are other interesting questions, such as: what would be a fair process for commercializing or claiming property in space; how likely would a separatist movement be among space settlements who want to be free and independent states; and are reasons to explore space, like for adventure, wanderlust, or “backing up the biosphere,” good enough to justify our exploration of space? The point here that we should explore space; and if we are to move forward with our journey, which may be unstoppable anyway, then we should seriously consider these issues. At the least, this would give the public more confidence—amid questions of misplaced priorities and wasteful spending, along with an increased focus on ethics in science—that we are looking ahead before we take another leap for mankind.

Introduction

Not since Neil Armstrong set foot on the Moon in 1969 has there been such excitement about space exploration. The excitement of today is because for the first time, the private individual has a real

A previous version of this paper was presented at the International Space Development Conference, Los Angeles, California, May 6, 2006. With research interests centered in technology and ethics, Dr. Patrick Lin is the director for The Nanoethics Group, a non-partisan organization that studies the ethical and societal impact of nanotechnology. He is also a post-doctoral associate at Dartmouth College and an adjunct faculty member at Western Michigan University.

Address correspondence to Patrick Lin, The Nanoethics Group, USA. E-mail: patrick@nanoethics.org

chance to reach for the stars. Space travel will soon no longer be just for an elite group of highly-educated and disciplined astronauts; instead, the possibility of commercial space travel is just over our horizon. But lost in all this excitement, is a crescendo of ethical dilemmas building up that may hinder our adventures, if not considered early in our journey.

Our efforts to introduce everyday individuals into space are aggressive, with private individuals and corporations unwilling to wait for the government to open the doors. As the first step in space tourism, the X-Prize offered a \$10 million bounty that fueled unprecedented competition to make the first, repeatable privately-financed space flight. Sir Richard Branson's Virgin Galactic plans to offer commercial space travel by 2008. Besides plans for "space elevators," developments in nanotechnology, for example, already gives us new, lighter materials—and later promises more powerful energy sources and computing capabilities—that can enable more efficient and farther-reaching launches than the suborbital ones planned with Virgin Galactic.

So with the growing possibility of commercial space travel, we appear to truly be on the cusp of a new frontier. But what does that imply? Space has been long called "the final frontier," but have we taken the time to consider what our responsibilities are as "frontiersmen?" Are there any ethical and social considerations we should consider beforehand? Let us briefly compare this new era of space exploration to other instances of charting new frontiers to see why space ethics is a critical area of discussion.

Learning From History

Going back a few centuries to colonial America, our history lessons seemed to have glossed over the fierce ethical debate that had surrounded English colonialism, which focused on the moral permissibility of settling on lands already occupied by the indigenous people of America or Amerindians. It was not at all obvious that colonialism was an unproblematic practice, and in fact, it seemed to be such an intractable and important ethical dilemma that it inspired some of the most notable thinking in political philosophy. For instance, John Locke's influential *Second Treatise of Government*, which explained the origins of private property and civil government, is now believed to be a defense of English colonialism,

establishing a legitimate mechanism to claim property in lands that are already occupied, though not “owned” by Amerindians as they were believed to be nomadic and only wandered across the land rather than have ownership in it.¹

The difference between colonialism and space exploration, of course, is that we do not run immediately into the problem of displacing or interfering with pre-existing inhabitants of whatever space bodies we explore next, since no such “alien” life-form has yet to be established. And given Fermi’s Paradox, this may be a problem we need not tackle in the near future. Rather, the point here is if we are taking another giant leap into the space frontier, our position is not too different from that of colonialists, as we have the unique opportunity to start a new world, but in doing so, there may be important ethical and social issues we should consider first.

Our last “New World” proved to hold many conflicts and challenges—from territorial disputes with other nations to the chaos of the Wild West to current population-related issues—that may similarly arise in the context of space exploration. But now, we have the benefit of hindsight and another unique opportunity to identify and defuse those potential landmines before we step on them. It has not been easy getting from a loose collection of American colonies to where we are now, and we might expect similar trials on our road to space settlements as well.

Other relevant lessons from history may include our recent development of cyberspace, or the Internet frontier. Without planning ahead for related intellectual property issues as well as online sales tax, Internet crimes, and other areas, the rush into cyberspace has been messy at best. Domain names represent a frenzied and frustrating land-grab of sorts that go to the first person to claim it, rather than to the most deserving person or organization with an established interest or trademark associated with the name, notwithstanding legal action against domain-name “squatters.” The usual free-market principles do not even apply here. If they had, domain names might have been auctioned off to the highest bidder. So it is unclear what our guiding philosophy or strategy is in developing cyberspace, and the absence of an overarching strategy is a likely contributor to our current problems in the Internet Age.

We might also draw an analogy between developing outer space to, say, developing Antarctica. If that frozen land were to somehow become available for commercial exploration and

settlements, what kind of social planning and ethical considerations would we discuss then, and are we applying the same forethought to space development, and if not, why not? We would not rush to develop the South Pole without a well-thought plan, so the same reasonable precaution would seem to apply to settling space.

To be sure, much has already been said about certain issues in space ethics, which we will quickly survey in the next section, but there are also new “big picture” worries that have not received much or any attention. Addressing these issues would at least give the public more confidence that governments, scientists, and astronauts are thinking ahead in our collective interests, rather than barreling forward with little regard or public discussion of important consequences. To illustrate, the area of biotechnology created an entirely new discipline of bioethics, and what seems to be occurring now to an extent with nanotechnology are a number of controversies surrounding environmental, health, and safety risks, and more distant concerns related to privacy, human enhancement, global security, and other areas.

Familiar Issues in Space Ethics

The prospect of increased space travel brings with it a host of ethical questions, including: environmental conservation, competing priorities, safety risks, and non-proliferation of military technology. These are somewhat familiar questions, and though they will not be the focus of this article, we will discuss them briefly here for the sake of completeness.

One of the first and natural reactions of many is to ask: should we be encouraging private space exploration, given what we have done to our own planet? What is to prevent problems on Earth from following us into outer space, if we have not evolved the attitudes, and ethics, which have contributed to those problems? As examples, an over-developed sense of nationalism may again lead to war with other humans in space, and ignoring the cumulative effects of small acts may again lead to such things as the over-commercialization of space and space pollution. Have we learned enough about ourselves and our history to avoid the same mistakes as we have made on Earth?

Preserving the pristine, unspoiled expanses of space is a recurring theme, much as it is important to preserve wetlands,

rainforests, and other natural wonders here on Earth. We have already littered the orbital environment in space with floating debris that we need to track so that spacecraft and satellites navigate around, not to mention abandoned equipment on the Moon and Mars. So what safeguards are in place to ensure we do not exacerbate this problem, especially if we propose to increase space traffic? Furthermore, are we prepared to risk accidents in space from the technologies we might use, such as nuclear power?

Another common concern is for the safety of our pioneering astronauts. Should we send people to other planets when robots might do the job just as well but more safely and less expensively? Peter Diamandis, Chairman of the X-Prize Foundation, argued in his United States (U.S.) congressional testimony, that “our country was founded by adventurous people who lost their lives in crossing the Atlantic, the Mississippi River, the Rocky Mountains, and beyond. Immigrants who have come to America risked everything to make the journey, even to this day. So it is practically *un-American* to shy away from these risks. But with today’s regulations, the Wright Brothers might never have had been allowed to take off on their flimsy, bicycle-powered flying contraption.”² Even if safety is not a key ethical concern for astronauts, space adventurers, or tourists who have consented to the risks, what about any children that are born in or taken to space who cannot give legal consent?

Political critics of human spaceflight and exploration have also asked whether we should be redirecting our significant investments in these areas—much of it funded by taxpayers—to solve more pressing problems on Earth, such as helping economic development in depressed areas, alleviating poverty and hunger, providing access to clean and affordable water and energy, and addressing other issues including human rights violations. There are also political and legal worries about the further militarization of space, given a history of weaponizing new technologies and carrying old conflicts over into new lands here on Earth.

Broader Issues in Space Ethics

If the environmental, safety, and other concerns previously discussed are near-term issues in space ethics, there are also mid-term and far-term questions that we should consider, most notably related to the economic, political, and social impact of space

exploration and settlements. Many of these questions are familiar in philosophy, but this section will help make their relevance to human space exploration more clear.

Property Rights and Economics

If space will be commercialized, then property claims—by governments, corporations, individuals, or all three—will need to be made in order to operate business ventures without interference from others. Just as a patent provides an inventor with the protection needed to invest the time, money, and hard work required in the first place, a company may be less willing to invest hundreds of millions or billions of dollars to, say, build time-share condos on the Moon without having clear rights to that property. At any rate, it seems to be in our nature, and in our rational self-interest many times, to acquire or want things to be ours and ours alone, so these issues will naturally arise.

Notwithstanding the United Nations (UN) treaties related to outer space that preserve space as a commons, what would be a fair process for claiming property in space, without which we risk a free-for-all, chaotic land-grab? Note that lawsuits, however weak they may be, have already been filed on Earth to lay claim to such things as asteroids,³ so the idea of dividing up property in space may not be so far-fetched.

First of all, we need to understand what it means to own space in common with others. Is our relationship with space one of “positive community of ownership,” in that we each own an equal share in space and its contents? If so, several other questions are relevant. To illustrate the point, imagine if there were only seven people alive on Earth and only seven other planets in our solar system: do we then each get our own planet or only 1/7th of each planet? And how do we account for future people—must we factor in their legacy before we can claim our shares (e.g., now I can claim only a 1/1000th share of Mars in order to leave enough land for others who might exist in my lifetime)?

On the other hand, if our relationship to space is one of “negative community of ownership,” then no one has a prima facie claim to the property in question; no one owns anything yet, or we share the common starting point of owning no part of space. This raises the question of how it is possible to gain ownership

of unowned objects. Some of the mechanisms or processes by which we can legitimately acquire property might include laboring upon the object (e.g., shaping clay into a bowl) or improving it (e.g., cultivating a field for crops), but why should that be enough to give us property rights—why not other methods?

The issue here is to justify the property-giving process in a way that explains why other processes do not lead to property rights, such as simply pointing at an unclaimed asteroid and say “that is mine” or roping off a section of the Moon in order to claim it. If only labor and/or improvement are enough for property rights, what is so special about it such that an object then becomes ours? And what is the extent of our property rights—are we permitted to destroy what we own, like to irradiate our land, or freely transfer all our rights to an individual person or company who might then own the entire Moon?

Of course, we might simply extend our existing rules of property to govern space as well, assuming all states involved endorse a free-market system. But in uncharted territory, such as with cyberspace, our most obvious options seem to be limited to first-come, first-served and to the highest bidder, which we have seen lead to the inefficient and disorderly Internet “gold rush.” And because how we formulate property rights sets the tone for whatever economic model is adopted—a high-bid process would naturally foster capitalism—this has great implications on how markets and transactions would proceed in space.

If entering space marks our opportunity to start over again, then it seems that unfettered capitalism should no longer be a sacred cow and should be subject to critical evaluation along with other competing economic models. For instance, a purely free-market economy, while efficient at allocating scarce resources and inspiring innovation, is not so much concerned with need or merit, so a hybrid model may be desired.

Justice and Government

At the risk of cynicism, if we were to truly apply Earth rules to space, then the ultimate, albeit morally problematic, litmus test for claiming property may be about one’s ability to physically defend the property. Without a police force in space, it may first start with individuals or corporations defending their parcel against

competitors in turf battles, despite any prevailing laws on Earth. But while “right through might” may perfectly describe frontier justice, one would hope that we have evolved beyond that.

Even among enlightened people, there will inevitably be property-rights disputes in space, just as there is on *terra firma* between reasonable parties, so we will need a regulatory or administrative body that has jurisdiction over those lands, in addition to an enforcement agency. It will not be enough that we govern from Earth—we will need a local organization to maintain law and order in real-time, as well as to more efficiently administer public policy, urban planning, and other matters. Again, these concerns point to our new era in space exploration as a true opportunity to start over from scratch, bringing with it new responsibility to architect a blueprint for society in space.

But no matter who leads this government—whether it is the U.N., U.S., or other states ruling over their respective claims—once moons or planets can be terraformed and their human inhabitants become self-sufficient, what incentive do people there have to continue under this rule? Perhaps, they no longer want to be Earth’s socioscientific experiment or newest vacation spot. Why should humans on Mars think of themselves as an extension of any state today, if they can form, and defend, their own government and start from a clean slate?

Think again about colonial America: even without oppressive policies and taxes from King George III, there was no compelling reason to remain a territory of England. For all practical purposes, America was already a different nation and culture from England, given the vast distance between them. And looking at the state of affairs in today’s world, where separatist movements are pushing for independence for their own countries, it seems that it is in human nature to want to break free. This trend is not confined to Asia, Eastern Europe, or other developing states as it also occurs in North America where many in Quebec continue to push for independence from Canada.

Why Explore Space?

Despite the ethical, political, and economic challenges in exploring and settling space, there are good reasons for the endeavor. Wanderlust, or the compelling need to explore or travel to new places,

is in our DNA – that is simply what humans do. Call it the indefatigable, and arguably incorrigible, “human spirit” to push our physical, intellectual, and creative boundaries. In this section, however, we will take a critical look at these reasons to explore new worlds, since finding a moral imperative or justification for such a venture in the first place must be a fundamental part of space ethics.

Sir Richard Branson explained on his Virgin Galactic website: “We hope to create thousands of astronauts over the next few years and bring alive their dream of seeing the majestic beauty of our planet from above, the stars in all their glory and the amazing sensations of weightlessness and space flight. The development will also allow every country in the world to have their own astronauts rather than the privileged few.”⁴ But is the desire for adventure or tourism reason enough to open up virgin territories, such as space, to private individuals? After all, we do not allow unrestricted travel to Antarctica or settlements in Yellowstone National Park for the same reasons; adventure or tourism are not sufficient justifications to build time-share condos there.

Perhaps the difference between space and Antarctica or protected parks is that there may be much more to discover in space, including possibly the origins of Earth and the universe. This then changes our reason for space travel to be more about the sake of knowledge, and if that is the case, it is unclear how commercialization of space furthers that goal, in contrast to exploration by only trained scientists. Social dynamics may be an interesting area of investigation—such as how people self-organize and live in an isolated environment, or how basic government might arise—but these seem to be experiments we can already conduct on Earth.

If not for adventure or knowledge, there are other, more pragmatic reasons to consider. For example, notable scientists, like the late Carl Sagan and Stephen Hawking, discuss “backing up the biosphere” in case our world becomes uninhabitable. Of course, if that ever happened, it may be our own fault, given our weapons of mass destruction, freely-distributed recipes for the 1918 killer virus, predicted misapplications of biotechnology and nanotechnology, and other possible man-made catastrophes. So is it a good enough reason to inhabit another planet, because we want a “do-over” if we destroy our own? And if so, again, what are we doing to ensure that we do not make the same mistakes and lay waste to another biosphere? If we have put ourselves in a position where we

need a back-up plan, it is unclear how settling space will improve our self-destructive tendencies until we address those root issues.

Less metaphysically, does having a safety net, such as a back-up planet, make it more likely that we take more chances and treat our home planet less carefully? This would seem to be consistent with human behavior: as risks decrease, we are more likely to engage in that activity. However, an argument might be made that people who engage in possibly catastrophic acts are not the kind of people worried about our future and would proceed ahead regardless of a back-up biosphere. Further, perhaps having a “Plan B” does make sense, if we think that a natural apocalypse may occur, such as an asteroid collision.

Another related reason for space development is that inhabiting other planets is the “social release valve” we need to alleviate overcrowding and diminishing resources here on our home planet. But is this an argument for space exploration, or for population control and more intelligent use of our natural resources? Once again, if we need to escape our own planet for societal, political, or economic reasons, what is our plan for doing it right on another planet, or will we be bringing the same baggage into space to create more of the same?

Another reason, and one that is perhaps too straightforward, was recently articulated by Elon Musk, co-founder of PayPal and founder of SpaceX: “My goal is to make humans the first interplanetary species.”⁵ Although similar remarks have been made elsewhere, by Stephen Hawking, Carl Sagan, and Robert Zubrin to name a few, Musk is actually in a unique position to realize this goal, so it is important to look at his particular motivations. Musk’s reason seems to speak either to our biological drive to propagate our own genetic lines, which incidentally serves to continue the species, or to a more narcissistic desire to literally take over that which is within our reach. Either case should give us pause: what are the ethics of introducing new species to environments where they are not normally found, and is the fact that we can send the average citizen into space and extend the human species on other planets or moons reason enough to do it?

And why humans—would we have a moral issue with populating the Moon with monkeys or dandelions instead? This may seem to be a ridiculous question, until we recognize various compelling arguments in philosophy that there is nothing intrinsically

special about being human or that some animals should have the same moral status as people do.⁶ At any rate, without invoking God or some metaphysical right, it is very difficult to explain why human interests are more valuable than non-human interests, making our space quest seem much less noble and much more selfish.

Even if a more defensible reason is that space exploration pushes human limits, that drive to break past existing boundaries surely must be subject to reasonable limitations. For instance, we are able to clone human beings, yet we refrain from that practice for ethical reasons. We are physically able to build homes inside national parks and other uninhabited areas, but we refrain from doing so, at least to comply with laws designed to preserve that environment.

One possible reply to this series of interrogations might be the following: instead of formulating a positive reason to explore or develop space, the burden of proof should be placed on opponents who believe we should not boldly go forward into space; they should give us compelling reasons not to. On the other hand, this seems to be an intellectually inadequate answer, and perhaps the burden of proof should fall on both sides.

If we truly believe that space exploration is so obviously unproblematic in a moral sense, then we should be able to defend that claim. The strongest defense may be to argue that we have a presumptive right to explore space and interact with the cosmos as we see fit, particularly if (1) there is no one else in the universe to object, (2) no one else to harm, and (3) plenty of room for everybody. If this is a reasonable line to take, then our focus should be on understanding the origin and nature of that right as well as any responsibilities tied to that right. Of course, if there are other beings in the universe to object or harm, then the task of justifying space development, which brings us closer to encroaching on their domain, may become more complicated.

Based on the “Big Bang” theory, the origin of that right may be found somewhere in the fact that we, homo sapiens, came from the stars in the first place. The atoms that make up our bodies—as well as everything else around us—are the exact same atoms that originated from the singular point that gave birth to the Big Bang. If that is the case, and we view ourselves in the simplest materialistic terms, then why should we be denied the right to travel back

from where we came? We already covered the distance, so exploring outer space does not really cover new territory; we have been there, or so that argument might go.

And at any rate, it may be an exaggeration to say that there are serious opponents to space exploration or development. It seems to be more the case that there are many concerns surrounding our space efforts, and these may very well be solvable concerns. But until they are fully investigated and taken seriously by the space community, the public perception might be that our exuberant rush into space comes at the expense of these concerns.

Conclusion

If space development is just on our horizon, there looks to be enough questions to require forethought and advance planning related to the social, political, and economic landscape of space living, in addition to the usual near-term issues in space ethics. If this is our chance for a fresh start, then we should be deliberate and careful with our actions, thinking through as many of the unintended consequences as possible. We already have centuries of philosophical, political, and economic theories in our stockpile; now is the time evaluate them once again, and finally turn theory into action.

One reasonable starting point would be to consider space development through political thinker John Rawls' Original Position in which we formulate policy under a "veil of ignorance" or pretend that we do not know any facts about ourselves, including who we are, what economic class we belong to, what nationality we are, and so on.⁷ With our personal identity stripped away, the rules we set up would be fair, since we know that any biases we build in, such as rules that disadvantage minorities, religions, economic classes, or others, may backfire and disadvantage ourselves, if we turn out to be a member of those groups. Under Rawls' veil of ignorance, you may be just as likely to be a poor farmer in the heartland of America, or a Buddhist in Japan, or a wealthy businessman in Germany, or an AIDS patient in South Africa, or an amputee in Iraq. Applying the veil of ignorance to rules in space helps ensure that the processes we set up are fair and consider the interests of all people, including protecting the worst-off people from an even worse and uncaring fate.

What we probably do not want to happen is to rush into orbit and the settlement of space without a “big picture” strategy that would allow individuals, corporations, or governments to make-up a plan as they go along, whether it is to camp on, erect billboards on, or lay claim to other planets, untethered by orderly processes and safeguards. Had we given that kind of forethought to administering the Internet, we might not have had cyber-squatters camping out on domain names, disgruntled teens writing virus programs that exploit gaps in the technology, unscrupulous companies clogging our e-mail in-boxes with spam, or any number of issues related to intellectual property, privacy, security, and other key areas.

History gives us plenty of other examples where we have introduced new technologies or crossed barriers without giving forethought to our actions, which then caused problems that we could have avoided. We do not even need to look at the most obvious cases, such as splitting the atom. The automobile enabled us to more easily and quickly travel greater distances, but it also created pollution, urban sprawl, pressure on natural resources, and other problems—things we could have addressed much earlier. Nanotechnology, as another example, promises to give us great benefits, but it also holds great potential for misuse and raises ethical questions related to health, privacy, human enhancement, military, economics, and more.

We should move ahead with space exploration or nanotechnology, and at the same time, pay attention to possible harms and conflicts, and develop plans to mitigate those scenarios, if nothing else for the sake of public confidence and because it is the right thing to do. Whether space ethics or nanoethics, some people will always be afraid of these questions. They may see these issues as “hype” or annoying roadblocks to moving science and business ahead. If we have learned anything from history—as recently as Enron and WorldCom’s implosion, or even biotech’s public relations fiasco with the use of genetically-modified foods—ethics must go hand-in-hand with technology and business, no matter where we find ourselves in this universe.

Notes

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2. Prepared Statement by Peter Diamandis at a House Science Committee Hearing on NASA Aerospace Prizes, 16 July 2004.
3. *Gregory W. Nemitz v. United States* (2004) U.S. District Court, District of Nevada, CV-N-03-0599-HDM (RAM).
4. Why Fly Into Space?, (available at <<http://www.virgingalactic.com/en/why.asp>> accessed 14 April 2006).
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6. Peter Singer, *Practical Ethics* (Cambridge, UK: Cambridge University Press, 1979).
7. John Rawls, *A Theory of Justice* (Cambridge, MA: Harvard University Press, 1971).