### FW

#### The resolution is a question of policy by a government. Making decisions as policymakers in the real world mandates consequentialism for three reasons. First, a state has to be able to take actions in the real world. Since deontology gives us no way to mediate between conflicting duties, then holding governments to that standard is non-sense. Second, a state has finite resources, which means that it must weigh possible gains against harms and use cost benefit analysis to arrive at the best option. Deontology prevents us from doing this by forcing governments to follow universal constraints. Third, the realities of the international realm mandate states have no absolute obligations on them. Kocs[[1]](#footnote-1)

To neorealists, the most fundamental characteristic of the international system is that it is an anarchy-a realm in which multiple independent actors, rather than a single central authority, control the principal instruments of military coercion. Neorealists view anarchy [produces] as producing far-reaching consequences for the behavior of states. Because states under anarchy decide for themselves whether and when to use force, they argue, the fact of anarchy means that states are continuously insecure. Each state must allow for the possibility that other states may use their military capabilities to damage or destroy it (Waltz, 1979:102; Grieco, 1990:28-29; Art and Jervis, 1992:2). The international realm thus resembles a Hobbesian state of nature, where each state's survival depends on its own efforts. Given anarchy, states[and] must base their strategic behavior on thecapabilities**,** nottheintentions**,** of other states. They must begin from the assumption that other states' capabilities may someday be used against them. Neorealists deny that an anarchic international system can produce security for all states simultaneously. Since states may decide to use force at any time, the measures each state takes to reinforce its own security are precisely those that endanger others (Waltz, 1979:64). This being the case, states are driven to expand their own capabilitiesin the system while trying to limit the relative gains of other states (Mearsheimer, 1990: 12; Zakaria, 1992: 194).

#### Real world decision making is the best standard of evaluation. This comes before any other standard or voter. Strait and Wallace[[2]](#footnote-2) further

The ability to make decisions deriving fromdiscussions, argumentation or debate, isthe key skill. It is the one thing every single one of us will do every day of our lives besides breathing. Decision-making transcends all boundaries between categories of learning like“policy education” and “kritik education,” it makes irrelevant considerations of whether we will eventually be policymakers, and it transcends questions of what substantive content a debate round should contain. The implication for this analysis is that the critical thinking and argumentative skills offered by real-world decision-making are comparatively greater than any educational disadvantage weighed against them.It is the skills we learn, not the content of our arguments, that can best improve all of our lives.While policy comparison skills are going to be learned through debate in one way or another, those skills are useless if they are not grounded in the kind of logic actually used to make decisions.

#### People aren’t objective and rational moral agents because their morals can be controlled by magnets. David outlines an MIT scientists study.[[3]](#footnote-3)

Scientists have discovered a real-life 'moral compass' in the brain that controls how we judge other people's behaviour. The region, which lies just behind the right ear, becomes more active when we think about other people's misdemeanours or good works. In an extraordinary experiment, researchers were able to use powerful magnets to disrupt this area of the brain and make people temporarily less moral. The study highlights how our sense of right and wrong [are] isn't just based on upbringing, religion or philosophy - but by the biology of our brains.Dr Liane Young, who led the study, said: 'You think of morality as being a really high-level behaviour. To be able to apply a magnetic field to a specific brain region and change people's moral judgements is really astonishing.' The moral compass lies in a part of the braincalled the right temporo-parietal junction. It [that] lies near the surface of the brain, just behind the right ear. The researchers at [MIT’s] the Massachusetts Institute of Technology used a non-invasive technique called transcranial magnetic stimulation to disrupt the area of the brain. The technique generates a magnetic field on a small part of the skull which creates weak electric currents in the brain. These currents interfere with nearby brain cells and prevent them from firing normally. In thefirstexperiment**,** 12 volunteers were exposed to the magnetic field for 25 minutes before they were given a series of 'moral maze' style scenarios. For each of the 192 scenarios, they were asked to make a judgement about the character's actions on a scale of 1 for 'absolutely forbidden' to 7 for 'absolutely permissible'. In the second experiment, the magnetic field was applied to their heads at the time they were asked to weigh up the behaviour of the characters in the scenario. In both experiments, the magnetic field made the volunteers less moral.

### Mining / Accidents Advantage

**Private space mining coming now**

**Gilbert ’21:** Alex Gilbert is a complex systems researcher and a PhD student in space resources at the Colorado School of Mines. “Mining in Space is Coming”. Milken Institute Review. April 6th, 2021. https://www.milkenreview.org/articles/mining-in-space-is-coming

Space exploration is back. after decades of disappointment, a combination of better technology, falling costs and a rush of competitive energy from the private sector has put space travel front and center. indeed, many analysts (even some with their feet on the ground) believe that commercial developments in the space industry may be on the cusp of starting the largest resource rush in history: mining on the Moon, Mars and asteroids. While this may sound fantastical, some baby steps toward the goal have already been taken. Last year, NASA awarded contracts to four companies to extract small amounts of lunar regolith by 2024, effectively beginning the [era of commercial space mining](https://payneinstitute.mines.edu/wp-content/uploads/sites/149/2020/09/Payne-Institute-Commentary-The-Era-of-Commercial-Space-Mining-Begins.pdf). Whether this proves to be the dawn of a gigantic adjunct to mining on earth — and more immediately, a key to unlocking cost-effective space travel — will turn on the answers to a host of questions ranging from what resources can be efficiently. As every fan of science fiction knows, the resources of the solar system appear virtually unlimited compared to those on Earth. There are whole other planets, dozens of moons, thousands of massive asteroids and millions of small ones that doubtless contain humungous quantities of materials that are scarce and very valuable (back on Earth). Visionaries including Jeff **Bezos** [**imagine heavy industry moving to space**](https://www.fastcompany.com/90347364/jeff-bezos-wants-to-save-earth-by-moving-industry-to-space) and Earth becoming a residential area. However, as entrepreneurs look to harness the riches beyond the atmosphere, access to space resources remains tangled in the realities of economics and governance. Start with the fact that space belongs to no country, complicating traditional methods of resource allocation, property rights and trade. With limited demand for materials in space itself and the need for huge amounts of energy to return materials to Earth, creating a viable industry will turn on major advances in technology, finance and business models. That said, there’s no grass growing under potential pioneers’ feet. Potential economic, scientific and even security benefits underlie an emerging [geopolitical competition](https://nationalinterest.org/feature/geostrategic-importance-outer-space-resources-154746) to pursue space mining. The United States is rapidly emerging as a front-runner, in part due to its ambitious Artemis Program to lead a multinational consortium back to the Moon. But it is also a leader in creating a legal infrastructure for mineral exploitation. The United States has adopted the world’s first spaceresources law, recognizing the property rights of private companies and individuals to materials gathered in space. However, the United States is hardly alone. Luxembourg and the United Arab Emirates (you read those right) are racing to codify space-resources laws of their own, hoping to attract investment to their entrepot nations with business-friendly legal frameworks. China reportedly views space-resource development as a national priority, part of a strategy to challenge U.S. economic and security primacy in space. Meanwhile, Russia, Japan, India and the European Space Agency all harbor space-mining ambitions of their own. Governing these emerging interests is an outdated treaty framework from the Cold War. Sooner rather than later, we’ll need [new agreements](https://issues.org/new-policies-needed-to-advance-space-mining/) to facilitate private investment and ensure international cooperation. What’s Out There Back up for a moment. For the record, space is already being heavily exploited, because space resources include non-material assets such as orbital locations and abundant sunlight that enable satellites to provide services to Earth. Indeed, satellite-based telecommunications and global positioning systems have become indispensable infrastructure underpinning the modern economy. Mining space for materials, of course, is another matter. In the past several decades, planetary science has confirmed what has long been suspected: celestial bodies are potential sources for dozens of natural materials that, in the right time and place, are incredibly valuable. Of these, water may be the most attractive in the near-term, because — with assistance from solar energy or nuclear fission — H2O can be split into hydrogen and oxygen to make rocket propellant, [facilitating in-space refueling](https://www.theverge.com/2018/8/23/17769034/nasa-moon-lunar-water-ice-mining-propellant-depots). So-called “rare earth” metals are also potential targets of asteroid miners intending to service Earth markets. Consisting of 17 elements, including lanthanum, neodymium, and yttrium, these critical materials (most of which are today mined in China at great environmental cost) are required for electronics. And they loom as bottlenecks in making the transition from fossil fuels to renewables backed up by battery storage. The Moon is a prime [space mining target](https://theconversation.com/mining-the-moon-110744). Boosted by NASA’s mining solicitation, it is likely the first location for commercial mining. The Moon has several advantages. It is relatively close, requiring a journey of only several days by rocket and creating communication lags of only a couple seconds — a delay small enough to allow remote operation of robots from Earth. Its low gravity implies that relatively little energy expenditure will be needed to deliver mined resources to Earth orbit. Science Photo Library/Alamy Stock Photo The Moon may look parched — and by comparison to Earth, it is. But recent probes have confirmed substantial amounts of water ice lurking in [permanently shadowed craters](http://lroc.sese.asu.edu/posts/1105) at the lunar poles. Further, it seems that solar winds have implanted significant deposits of helium-3 (a light stable isotope of helium) across the equatorial regions of the Moon. Helium-3 is a potential fuel source for secondand third-generation fusion reactors that one hopes will be in service later in the century. The isotope is packed with energy (admittedly hard to unleash in a controlled manner) that might augment sunlight as a source of clean, safe energy on Earth or to power fast spaceships in this century. Between its water and helium-3 deposits, the Moon could be the resource stepping-stone for further solar system exploration. Asteroids are another near-term [mining target](https://foreignpolicy.com/2016/04/28/the-asteroid-miners-guide-to-the-galaxy-space-race-mining-asteroids-planetary-research-deep-space-industries/). There are all sorts of space rocks hurtling through the solar system, with varying amounts of water, rare earth metals and other materials on board. The asteroid belt between the orbits of Mars and Jupiter contains most of them, many of which are greater than a kilometer in diameter. Although the potential water and mineral wealth of the asteroid belt is vast, the long distance from Earth and requisite travel times and energy consumption rule them out as targets in the near term. Wannabe asteroid miners will thus be looking at smaller near-Earth asteroids. While they are much further away than the Moon, many of them could be reached using less energy — and some are even small enough to make it technically possible to tow them to Earth orbit for mining. Space mining may be essential to crewed [exploration missions to Mars](https://www.sciencedirect.com/science/article/abs/pii/S0032063319301618). Given the distance and relatively high gravity of Mars (twice that of the Moon), extraction and export of minerals to Earth seems highly unlikely. Rather, most resource extraction on Mars will focus on providing materials to supply exploration missions, refuel spacecraft and enable settlement. Technology Is the Difference The prospects for space mining are being driven by technological advances across the space industry. The rise of reusable rocket components and the now-widespread use of off-the-shelf parts are lowering both [launch and operations costs](https://aerospace.csis.org/data/space-launch-to-low-earth-orbit-how-much-does-it-cost/). Once limited to government contract missions and the delivery of telecom satellites to orbit, private firms are now emerging as leaders in developing “[NewSpace](https://www.sciencedirect.com/science/article/pii/S0094576519313451" \t "_blank)” activities — a catch-all term for endeavors including orbital tourism, orbital manufacturing and mini-satellites providing specialized services. The space sector, with a market capitalization of $400 billion, could grow to [as much as $1 trillion](https://milkeninstitute.org/videos/infinity-and-beyond-business-space) by 2040 as private investment soars. But despite the high-profile commercial advances, governments still call the shots on the leading edge of space resource technologies. The United States extracted the first extraterrestrial materials in space from the Moon during the Apollo missions, followed by the Soviet Union’s recoveries from crewless Luna missions. President Biden recently borrowed one of the Apollo lunar rocks for display in the Oval Office, highlighting the awe that deep space can still summon. For the time being, scientific samples remain the goal of mining. Last October, NASA’s OSIRIS-REx mission — [due to return to Earth in 2023](https://www.nasa.gov/press-release/nasa-s-osiris-rex-mission-plans-for-may-asteroid-departure) — collected a small amount of material from the asteroid Bennu. In December, Japan returned a sample of the asteroid Ryugu with the [Hayabusa2 spacecraft](https://www.technologyreview.com/2020/12/02/1012890/japan-jaxa-sample-return-mission-hayabusa2-ryugu/). And several weeks later, China’s Chang’e 5 mission returned the first lunar samples since the 1970s. ESA/ Cover Images Sample collection is accelerating, with recent missions targeting Mars. Japan is planning to visit the two moons of Mars and extract a [sample from one](http://mmx.isas.jaxa.jp/en/#:~:text=The%20Martian%20Moons%20eXploration%20(MMX,launch%20in%20the%20mid-2020s.&text=It%20will%20then%20move%20into,sample%20from%20the%20moon's%20surface.). NASA’s robotic Perseverance rover will collect and cache drilled samples on Mars that could later be returned to Earth. Perseverance also carries gear for the unique MOXIE experiment on Mars — an attempt to produce oxygen on the planet with technologies that could eventually extract oxygen for astronauts to breath and refuel spacecraft. To be viable, commercial space mining will, of course, have to operate at a much larger scale than the scientific digs. Whereas all samples collected to date consist of less than one ton of material, a single space mining operation would have to be able to manage hundreds or thousands of tons. Stripped to the basics, the stages of a space mining operation resemble those of terrestrial mining, with prospecting followed by extraction, processing and distribution to users. But the unique conditions of outer space environments make this progression far more daunting. Most space mining targets have little or no atmosphere and experience extreme temperature swings between shade and sunlight. Radiation, from both the sun and cosmic sources, permeates the space environment and threatens electronics — not to mention human health. The most basic technologies needed for space mining are as simple as shovels and drills. But water and other materials that are volatile will have to be extracted using more exotic techniques. The list of challenges goes on. Launching to space is a stressful process, and equipment must survive high acceleration and acoustic forces. Due to orbital mechanics and the immense energies required to navigate large distances, all space missions are limited to minimal payloads. Missions in deep space operate in microgravity — a challenge when mining an asteroid — or reduced gravity on the Moon or Mars. Even the surfaces of celestial bodies pose a challenge to mining machinery, since they consist of unconsolidated rocky materials called regolith instead of more familiar soil. The most basic technologies needed for space mining are as simple as shovels and drills. But water and other materials that are volatile can be extracted using more exotic techniques: on the Moon, [thermal mining](https://www.liebertpub.com/doi/full/10.1089/space.2019.0002) would sublimate ice directly to vapor and trap it in a tent. One of the space mining startups, Transastra, proposes a [similar method](https://www.thespaceresource.com/news/2019/6/transastra-mini-bee) on a far grander scale for small asteroids, trapping the volatile resource in a bag surrounding the whole body. Remember, too, that after space resources are gathered, a supply chain must deliver the material to customers. If you’re curious about the details, check out a 2018 report, [Commercial Lunar Propellant Architecture](https://isruinfo.com/public/docs/Commercial%20Lunar%20Propellant%20Architecture.pdf), which describes a mining cycle to extract water on the Moon, convert it to fuel and deliver it to customer spacecraft. Before committing billions to the real thing, public and private investors will need to spend millions testing plans in environments that resemble the conditions of outer space. Regolith simulants, vacuum chambers, computer modeling and other aerospace testing equipment are all needed to verify mining technologies can work in space. Beyond space technologies, advances in other sectors could aid space mining missions. Among them: additive manufacturing (3D printing) to support base construction, [AI to run robots](https://theconversation.com/five-ways-artificial-intelligence-can-help-space-exploration-153664) and even nuclear power reactors to provide large amounts of energy. The Economics of Mining the Cosmos Claims about the economic value of space mining are often nine parts hyperbole. Newspaper headlines point to asteroids like [16 Psyche, a 226-kilometer-diameter rock](https://solarsystem.nasa.gov/asteroids-comets-and-meteors/asteroids/16-psyche/in-depth/) whose iron and nickel resources are estimated to be worth $10 quintillion dollars at current commodity prices (100,000 times the size of the Earth’s GDP). But setting aside the blarney, there really is gold (water? helium-3? praseodymium?) in them thar hills. Neil DeGrasse Tyson famously predicted that the world’s first trillionaire will be a space miner. Great minds seem to agree: many of the major private players in space (a group that includes Jeff Bezos, Elon Musk and Richard Branson) are billionaires prepared to risk a whole lot of money to add a few more zeros to their net worth. That said, a common joke in this new industry (as in many others) is that the best way to become a millionaire in space is to start as a billionaire. Even with recent commercial advances, the cost of putting a payload into space remains very high, and the elasticity of demand for space-mined resources is uncertain. A chicken-egg problem underlies all NewSpace activities, but especially mining: without space miners supplying materials, there will be no customers. But without customers, there is no incentive to mine. James Vaughan Even NASA’s solicitation for four companies to extract lunar regolith on the Moon and sell samples to the agency underscores the nascent nature of mining: NASA is paying no more than $15,000 for a half-kilo, a fraction of a fraction of the cost of such a mission. Large asteroid valuations, like that of 16 Psyche, also do not reflect market realities, since delivering large quantities of expensive commodities like platinum or gold would crash market prices. Markets for such metals are small on a mass basis, and it is [not clear](https://link.springer.com/article/10.1007/s13563-020-00231-6) that Earth markets provide sufficient demand to support enough space mining to Second Quarter 2021 55 justify the fixed costs of production. In broad terms, the uses of space resources can be broken into two categories: return to Earth or use in space. Early startups, like Planetary Resources and Deep Space Industries, focused on mining metals with the goal of selling them back on Earth. However, the market uncertainty was [a major factor in the decline of](https://www.technologyreview.com/2019/06/26/134510/asteroid-mining-bubble-burst-history/) both industry leaders. In the long term, production in space to supply Earth could drive massive growth in the space industry — but not with commodities competing with terrestrial production. Rather, Earth markets are likely to be most receptive to the exotic: specialized materials and alloys manufactured in microgravity conditions, large-satellite services such as [space-based solar power](https://www.globalpolicyjournal.com/blog/21/10/2019/emerging-competition-space-solar-power), or unique products like helium-3. The latter two are particularly promising, as they could provide large contributions to global decarbonization after 2050. In the near term, what’s found in space will stay in space. The support of crewed and robotic exploration with on-site resource utilization — plausibly, on the Moon in the 2020s and [Mars in the 2030s](https://www.sciencedirect.com/science/article/abs/pii/S0032063319301618) — has the greatest promise to jumpstart space mining. Construction of Moon bases from local materials could greatly reduce mass requirements. If water-derived propellant is developed at a competitive price, it could find a ready market in spacecraft heading from low-earth orbit to geosynchronous orbit or deep space. Of course, questions about the economic value of space resources assume that property rights are well-defined and assured. Space law on property rights is developing quickly. But many questions remain, exacerbating economic uncertainties. Aspects of the accords exclude major space players like Russia, China and India. They provide for “safety zones” around mining sites, raising fears about exclusion of other countries from prime locations. You’re Stepping On My Regolith As human industrial activity spreads into the high frontier, disputes over ownership and governance follow. Outer space is beyond the territorial jurisdiction of any nation, meaning [international law is the basis for space law and space-resources law](https://www.hoganlovells.com/~/media/hogan-lovells/pdf/2018/the_development_of_natural_resouces_in_outer_space_august_2018.pdf). The primary governing treaty for international space law, the [Outer Space Treaty of 1967](https://history.nasa.gov/1967treaty.html), prohibits appropriation of celestial bodies, such as the Moon or asteroids, by individual nations. Whether space mining is allowed under the treaty remains highly contentious. Drafted at the height of the Cold War to head off an arms race in space and a “land” rush, the Outer Space Treaty did not envision the private and commercial ventures of today. The non-appropriation clause prevents nations from claiming celestial bodies by planting a flag or by occupying an area. However, it does not clearly prohibit owning and using resources once they are extracted from a celestial body. Indeed, other parts of the treaty imply that such use is allowed. Past and ongoing missions by the United States, the Soviet Union, Japan and China to acquire scientific samples have never been seriously challenged as violating the treaty. A second international treaty that would explicitly establish global governance of commercial space mining, the [Moon Agreement](https://www.spacelegalissues.com/the-1979-moon-agreement/), has been broadly rejected by most countries — and all countries with the means and motive to mine in space. The United States has long held that the Outer Space Treaty permits commercial resource extraction. It is taking a leading role in establishing space mining as allowed under both national and international law. Recognizing the ambitions of Planetary Resources and Deep Space Industries (two startups with big plans), in 2015 Congress passed and President Obama signed [the world’s first national space-resources law](https://www.liebertpub.com/doi/10.1089/space.2017.0008). The law recognized the rights of U.S. residents to own materials gathered in outer space, but does not claim U.S. or private ownership of celestial bodies. Although now guaranteeing property rights, the United States has yet to establish a clear regulatory system to authorize such missions. The Trump administration built on these early activities by including space mining as part of its broader prioritization of space exploration, and specifically by supporting a plan to return astronauts to the Moon with the Artemis Program. An [April 2020 Executive Order](https://aerospace.org/sites/default/files/2020-04/EO%2013914%20Space%20Resources%206Apr20.pdf) reiterated the U.S. commitment to space-resources-development property rights, repeated the U.S. rejection of the Moon Agreement and solicited international cooperation. Other administration activities bolstered the foundation for space mining, including national policies on planetary protection and [space nuclear power](https://aerospace.org/sites/default/files/2020-12/Space%20Policy%20Directive%206%20-%20Nuke%20Power%20&%20Propulsion%2016Dec20.pdf). Other nations are following the U.S. lead in developing space-resources law and policy. As noted earlier, Luxembourg has passed a space mining law of its own, [prioritizing space resources](https://space-agency.public.lu/en/space-resources/the-initiative.html) and forming partnerships with space agencies worldwide. The United Arab Emirates is moving toward a similar law, as the country looks to space as part of the oil-drenched state’s modernization plans. As Japan continues scientific sampling missions, its government is currently [considering a space mining law](https://www.japantimes.co.jp/news/2020/11/06/national/science-health/japan-bill-space-samples/) of its own. The nature of China’s space ambitions isn’t easy to decipher, but [space mining and lunar exploration](https://www.thecairoreview.com/wp-content/uploads/2019/05/cr33-global-forum.pdf) are clearly part of the strategy. Indeed, many U.S. advocates of space mining point to Chinese ambitions as a reason for the United States to get out ahead of the pack of liberal democracies with space capabilities. The ungoverned nature of outer space and lack of national ownership plainly create the possibility of conflict. Even if companies have rights to own a resource when they extract it, they do not necessarily have rights to a resource while it remains in place. If two companies from different nations want to mine the same area, both technically have the right to do so. “First come, first serve” may work for one nation’s activities, but nothing prevents ventures from another country building adjacent mines, with attendant economic and operational risks. The international nature of space exacerbates the lack of ownership, as disputes between companies from separate countries become a matter of international relations. To begin addressing these challenges, the United States negotiated the Artemis Accords in 2020, a multilateral agreement to guide near-term lunar exploration. Signatories of the accords include many U.S. space partners: the United Kingdom, Luxembourg, UAE, Australia, Canada, Japan, Italy and Ukraine. Much of the accords are natural extensions of the Outer Space Treaty and are a welcome development. For example, one provision provides for interoperability between different nations’ space technologies. But other aspects of the accords are problematic. They currently exclude major space players like Russia, China and India. They provide for “safety zones” around mining sites, which raises fears about exclusion of other countries from prime locations and de facto national appropriation. The number one environmental threat to crew and satellite safety in low-earth orbit is not the harsh conditions of outer space but rather [space debris](https://www.nature.com/articles/d41586-018-06170-1) from decades of lightly regulated space activities. Beyond questions of resource governance, environmental problems are emerging due to NewSpace activities. The number one environmental threat to crew and satellite safety in low-earth orbit is not the harsh conditions of outer space, but rather [space debris](https://www.nature.com/articles/d41586-018-06170-1) from decades of lightly regulated space activities. A growing population of space junk and the rise of satellite mega-constellations, like SpaceX’s Starlink, are increasingly crowding orbits and threatening collisions. Mega-constellations are also negatively impacting astronomy by adding light pollution. Lunar pollution may not be far behind. Here’s another headache in the making. In 2019, the non-profit Arch Mission Foundation [smuggled a cargo of tardigrades](https://www.thespacereview.com/article/3783/1) — tiny animals that can survive extreme environments — to the Moon without regulatory approval, raising planetary protection concerns among astrobiologists. These early space environmental issues, and [their lack of clear policy resolution](https://spacenews.com/viasat-asks-fcc-to-perform-environmental-review-of-starlink/), are early harbingers of environmental disputes in outer space. The environmental impacts of space mining activities remain speculative, but they could undermine the safety of crewed and robotic missions. The Apollo missions revealed that landing or launching from the Moon can spew large amounts of lunar regolith long distances, perhaps even into lunar orbit. Regolith is coarse and, without a lunar atmosphere to slow it down or break it up, ejected regolith could damage distant spacecraft. Mining activities themselves could similarly cause regolith dust issues. More broadly, mining activities could [cause contamination](https://www.nature.com/articles/d41586-020-03262-9) of local areas of interest, impacting scientific value. With proposals to conduct space mining with bacteria, the tardigrade incident raises questions about how commercial activities might complicate the search for life or even threaten fragile extraterrestrial systems with human-delivered invasive species. Solutions are emerging. In December 2020, the U.S. took a leading role with Congress’ passage of the “[One Small Step to Protect Human Heritage in Space Act](https://spacepolicyonline.com/news/president-signs-law-protecting-lunar-heritage-sites/).” The bill provides initial protections to Apollo and lunar heritage sites, a framework for future environmental and social protections. The Century of Space Mining? Although uncertainties remain high, sooner or later space mining promises to greatly accelerate space exploration and bolster terrestrial economies. While industrial activities in space may well cause conflict with scientific priorities, the infrastructure created in its development could serve science with orbital refueling, reduced mission costs, space manufacturing and, more generally, deeper knowledge of how to operate in space environments. There will no doubt be plenty of slips twixt cup and lip. But while, just a few decades ago, it was easy to dismiss the idea of space industry in general and space mining in particular as the stuff of science fiction, the worm has definitely turned. Today, it is pretty clear that space mining — along with its attendant exploration and industrialization — is coming soon.

**Risk of dangerous accidents involved in commercial space activity is super high**

**Oduntan ’16:** Gbenga Oduntan. “SpaceX explosion shows why we must slow down private space exploration until we rewrite law”. The Conversation. September 12th, 2016. <https://theconversation.com/spacex-explosion-shows-why-we-must-slow-down-private-space-exploration-until-we-rewrite-law-65019>.

While there is an **international space law** that sets out a general framework for the conduct of all space activities – including those by private firms – most of it was developed decades ago, before the rise of commercial space exploration. It is in fact not entirely clear how much regulation of space activities by private companies currently exists – particularly in relation to the liability for accidents. The ultimate blame for the Falcon 9 crash will only emerge after [full investigations](http://www.wsj.com/articles/spacex-leads-probe-into-falcon-9-rocket-explosion-1473376404) are complete. But if the fault does lie with SpaceX, there are reputational consequences and insurance costs for future launches for the company will likely shoot up. Government space programmes like NASA and the European Space Agency are certainly not immune from catastrophic accidents. If NASA was a car driver, its licence likely would have been revoked on account of the number of tragic explosions. In five of the worst NASA accidents since 1967, [17 brave astronauts have lost their lives](http://www.telegraph.co.uk/news/science/space/11194485/Five-worst-accidents-in-Nasas-history.html) and several experimental rockets, space vehicles, satellites and space shuttles have been lost. But the sharp increase in private space exploration makes it important to reconsider how the legal landscape has changed. When space accidents do happen, the rules that govern them are contained in a confusing patchwork of agreements and treaties. If an accident occurs on Earth, the liability will depend on national rules, such as the general principle of international law that holds corporate companies responsible for damages. But the Outer Space Treaty (1962) says that a state launching a probe or satellite shall be absolutely liable to pay compensation for damage – even when an accident happens on the surface of the Earth. It can, however, be unclear whether the accident happened in airspace, meaning national aviation laws can apply, or in fact in outer space. Thus, it is becoming increasingly important to determine the exact boundary between airspace and outer space territory. This is important to work out as lawyers will always try to exploit unclear frontiers. Even in cases where it is clear that space law applies to an accident involving a private company, liability is still a tricky issue. According to space law, the state where the launch takes place and which registered the space object is ultimately responsible. But a private company can be registered in a different state to the launch country, creating a lot of confusion. A solution could be to say that the state registering a certain space probe should be liable. This state would then be free to compel the company to pay damages. A rise in serious accidents? It is only a [matter of time](https://fas.org/ota/reports/9033.pdf) time before we see more than just launch explosions. The risk of serious space accidents will increase as the number of space objects in orbit extends into thousands. The advent of private activities will also exacerbate the problem of space debris, perhaps as private commercial use of the seas has polluted international maritime spaces. The collision of [the satellites Iridium 33 and Kosmos 2251](http://www.thespacereview.com/article/2023/1) over Siberia in 2009 is a clear example of what may become a common occurrence. Then there are the 100 to 150 tonnes of man-made space objects [that re-enter Earth’s atmosphere annually](https://theconversation.com/russian-spacecraft-falling-to-earth-poses-no-danger-we-have-survived-bigger-objects-41015). Lots of these simply burn up, but some do manage to cause damage to private property. Again, it’s only a matter of time before the first human life or limb is lost to this kind of incident. Launches of rockets and payloads are fraught with danger and quite frequently go wrong. But launch accidents appear to affect different countries in different ways. The costs involved in engaging in space station activities are mind boggling and crippling to struggling economies. Increasingly, developing states rely on commercial launchers. But if a private company launches an object that subsequently causes damage in space, the poor state will be liable. And even in those cases where the launch fails due to misfortune or the mistakes of the private launcher, such companies could still escape paying for the launch accident, as such firms often have water-tight exclusion clauses that protect them from liabilities. The bill again goes to the poor state. This is especially likely when it is a [Western company working for a developing country](http://heinonline.org/HOL/LandingPage?handle=hein.journals/dubulj29&div=16&id=&page=). China on the other hand [agreed to pay](http://www.spaceflightnow.com/news/n1112/19longmarch/) for a lost satellite it had launched for Nigeria. It is therefore essential that any developing state protects itself to the fullest against unsuccessful operations caused by negligent and/or accidental failures. There are also serious issues around the safety of astronauts, who [have the legal right](http://www.unoosa.org/favicon.ico) to a safe existence when in outer space. But it is unclear whether this law does – or should – extend to private astronauts. Also, a launching state currently must be notified regarding incidents involving astronauts on international missions – and it is required to assist and contribute substantially to search and rescue operations. Can a private company really supply the enormous sums or other resources that may be needed? Will the home state of the private company be willing to pay? Again, the law isn’t clear. With the increase in private participation in space experimentation and perhaps even mineral mining, the provisions governing civil liability over mishaps arising from the operations of a space station are likely to become one of the most contested areas of space law. What if a module or component part fails to function on a space station? In the absence of multilateral rules on this point, a patchwork of legal rules is gradually maintained through MOUs (Memorandum of Understanding) and other national laws such as the US Commercial Space Launchings Act (CSLA) of 1978. How will private companies fit into these as they possibly become partners? Liberalism and the private entrepreneurial spirit do have their place in outer space. But there must be carefully designed limits. The treaties and legal regime of space law has not been adequately amended to account for the rise of private space exploration. For humanity’s sake, private space exploration may have to proceed more slowly until these important issues are sorted.

**Space mining puts earth at risk – magnifies geopolitical tensions and creates dangerous debris**

**Skibba ’18:** Ramin Skibba. “Mining in Space could lead to conflicts on Earth”. Nautilus. May 2nd, 2018. <https://nautil.us/blog/-mining-in-space-could-lead-to-conflicts-on-earth>.

Space mining is no longer science fiction. By the 2020s, Planetary Resources and Deep Space Industries—for-profit space-mining companies cooperating with NASA—will be sending out swarms of tiny satellites to assess the composition of hurtling hunks of cosmic debris, identify the most lucrative ones, and harvest them. They’ve already developed prototype spacecraft to do the job. Some people—like Massachusetts Institute of Technology planetary scientist Sara Seager, former NASA deputy administrator Lori Garver, and science writer Phil Plait—argue that, to continue advancing as a space-faring species, we need to embrace this commercial space mining industry, and perhaps even facilitate it, too. But should we? This question concerns me, as both an astrophysicist and a space enthusiast. Before becoming a science communicator, I worked for 15 years [researching](http://cass.ucsd.edu/~rskibba/work/Publications.html) the evolution of galaxies, the properties of dark matter, and the expansion of the universe. From that perspective, the distance from us to the asteroid belt is actually rather small, so the question of whether to mine it, and in what way, hits close to home. The [Space Act of 2015](https://www.congress.gov/bill/114th-congress/house-bill/2262) authorizes the U.S. president “to facilitate the commercial exploration and utilization of space resources to meet national needs.” It’s an exciting prospect, to be sure, but also a troubling one. For one thing, it appears to violate international law, according to [Congressional testimony](https://www.congress.gov/congressional-report/114th-congress/house-report/153/1) by Joanne Gabrynowicz, a space law expert at the University of Mississippi. Before NASA’s moon landing, the United States—along with other United Nations Security Council members and many other countries—signed the 1967 Outer Space Treaty. “Outer space, including the moon and other celestial bodies,” it states, “is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” The 1979 Moon Agreement went further, declaring outer space to be the “common heritage of mankind” and explicitly forbidding any state or organization from annexing (non-Earth) natural resources in the solar system. Major space-faring nations are not among the 16 countries party to the treaty, but they should arguably come to some equitable agreement, since international competition over natural resources in space may very well transform into conflict. Take platinum-group metals. Mining companies have found about 100,000 metric tons of the stuff in deposits worldwide, mostly in South Africa and Russia, amounting to $10 billion worth of production per year, according to the U.S. Geological Survey. These supplies should last several decades if demand for them doesn’t rise dramatically. (According to Bloomberg, [supply for platinum-group metals is constrained while demand is increasing](http://www.bloomberg.com/news/articles/2015-03-06/brighter-platinum-future-as-auto-sales-cut-reserves-commodities).) Palladium, for example, valued for its conductive properties and chemical stability, is used in hundreds of millions of electronic devices sold annually for electrodes and connector platings, but it’s relatively scarce on Earth. A single giant, platinum-rich asteroid could contain as much platinum-group metals as all reserves on Earth, the Google-backed Planetary Resources claims. That’s a massive bounty. As Planetary Resources and other U.S. and foreign companies scramble for control over these valuable space minerals, competing “land grabs” by armed satellites may come next. Platinum-group metals in space may serve the same role as oil has on Earth, threatening to extend geopolitical struggles into astropolitical ones, something Trump is keen on preparing for. Yesterday he said he’s seriously weighing the idea of a [“Space Force”](https://www.cnn.com/2018/05/01/politics/trump-space-force-us-military/index.html) military branch. Trump holds a toy astronaut.Photograph by Saul Loeb / AFP / Getty Images NASA’s increasing collaboration with space mining companies could distort and divert efforts previously focused on space exploration. Moreover, the technology that might enable this free-for-all—versatile “nanosatellites,” no larger than a loaf of bread—is relatively [inexpensive](http://www.nasa.gov/press-release/nasa-opens-new-cubesat-opportunities-for-low-cost-space-exploration). While reporting for a story about these tiny satellites, also known as CubeSats, I came across some missions applicable to mining asteroids. In November, NASA will launch a satellite for a mission called [Near-Earth Asteroid Scout](http://www.jpl.nasa.gov/cubesat/missions/neascout.php), for example. It will deploy a solar sail, propel itself with sunlight, and journey to the asteroid belt, where it will scope out a particular asteroid and analyze its properties. NASA has also awarded grants to [Planetary Resources](http://www.planetaryresources.com/#home-intro) to advance the designs of spectral imagers and propulsion systems for CubeSats, and other missions will develop the satellites’ abilities to communicate and network with each other. NASA also awarded [Deep Space Industries](https://deepspaceindustries.com/) contracts to assess commercial approaches for NASA’s asteroid goals, which may involve hosting DSI’s asteroid-prospecting equipment on its missions. Like all forms of mining, it will be dangerous. If space-mining activities break up asteroids, the resulting debris could be hazardous for satellites, other spacecraft, and astronauts nearby. On the other hand, in a best-case scenario, space mining could be environmentally safe, capture only necessary minerals and water, and, in the more distant future even lead to the construction of a far-flung space station led by NASA and other space agencies, orbiting 200 million miles from Earth and serving as both a mining depot and a pit-stop for passing spacecraft. But it’s not clear that a pact between the commercial space mining industry and NASA would align with the public’s interest. NASA’s increasing collaboration with space mining companies could distort and divert efforts previously focused on space exploration and basic research, and discourage public interest and engagement in astronomy. For example, Seager advocated for space mining at a science writing conference I attended in 2015. She’s part of a motley group of advisors for Planetary Resources, including the movie director James Cameron, a lawyer for a prominent Washington D.C. firm, and Dante Lauretta, another astronomer whom I respect. Seager seems to believe that encouraging private space mining will lead to more investments and technological innovation that would enable more scientific research. In a 2012 [interview](http://www.theatlantic.com/technology/archive/2012/05/robots-platinum-and-tiny-space-telescopes-the-pitch-for-mining-asteroids/256523/) with The Atlantic, for instance, she said, “The bottom line is that NASA is not working the best that it could for space science right now, and so in order for people like me to succeed with my own research goals, the commercial space industry needs to be able to succeed independently of government contracts.” But if the U.S. and U.S.-based companies lay claim to the richest and most easily accessible prospecting sites, not allowing other companies and nations to share in the wealth, economic and political relations could be damaged. That’s why this seems to be a dangerous path for space explorers. Once you’re on board with the commercial space industry, then you as a researcher must accept, if not support, everything that comes with it. Seager and a few other researchers may be willing to take this risk, but what about the rest of the space science community? Moreover, to succeed, these businesses will seek profitable missions, while science, exploration, and discovery—goals that stimulate public interest—will inevitably have lower priority. (Other commercial spaceflight companies, like Elon Musk’s SpaceX, do generate public interest, but they’re not directly involved in mining asteroids.) NASA may have its shortcomings, but at least its missions and research goals answer to the public. It’s not exactly a welcome thought to imagine more and more of our presence and activity in space being ceded, with NASA’s help, to private industry. What should happen instead? Commercial space mining and science would both be served well by decoupling from each other. We should treat outer space like we do Antarctica. That icy landscape is humankind’s common heritage, where we encourage scientific investigations and conservation and forbid territorial claims. If some organizations want to mine asteroids, then we should take the time to develop and establish an international framework to regulate it properly. Space-mining is an exciting opportunity to articulate our species’ role in our little galactic fragment. But it’s not just about sustainably managing limited or dwindling resources. It’s about our interactions with the nature beyond our humble world. We should explore the solar system as its steward without repeating our economically rapacious past.

### C1 – Private Space Efforts Divert from Problems at Home

#### The space race's flawed obsession with growth inevitably reproduces the harms of environmental destruction and inequality, destroying value to life. Dreams of leaving this blue planet are merely a dangerous form of escapism meant to avoid dealing with the reality of issues on Earth

**Jackson ’21:** Tim Jackson. “Billionaire Space Race: the ultimate symbol of capitalism’s flawed obsession with growth”. The Conversation. July 20th, 2021. https://theconversation.com/billionaire-space-race-the-ultimate-symbol-of-capitalisms-flawed-obsession-with-growth-164511

Mars ain’t the kind of place to raise your kids, laments the Rocket Man in Elton John’s timeless classic. In fact, it’s cold as hell. But that doesn’t seem to worry a new generation of space entrepreneurs intent on colonising the “final frontier” as fast as possible. Don’t get me wrong. I’m no sullen technophobe. As lockdown projects go, Nasa’s landing of the [Perseverance rover](https://theconversation.com/as-the-perseverance-rover-lands-on-mars-theres-a-lot-we-already-know-about-the-red-planet-from-meteorites-found-on-earth-155459) on the surface of the red planet earlier this year was a hell of a blast. Watching it reminded me that I once led a high school debate defending the motion: this house believes that humanity should reach for the stars. It must have been around the time that Caspar Weinberger was trying to persuade President Nixon [not to cancel](https://www.wired.com/2013/09/ending-apollo-1968/) the Apollo space programme. My brothers and I had watched the monochrome triumph of the [Apollo 11 landing](https://www.nasa.gov/mission_pages/apollo/apollo11.html) avidly in 1969. We’d witnessed the near disaster of [Apollo 13](https://www.nasa.gov/mission_pages/apollo/missions/apollo13.html) – immortalised in a 1995 Hollywood [film](https://www.theguardian.com/film/2014/apr/17/apollo-13-tom-hanks-space-ron-howard) – when Jim Lovell (played by Tom Hanks) and two rookie astronauts narrowly escaped with their lives by using the Lunar Module as an emergency life raft. We knew it was exciting up there. I remember later going to see Apollo 13 (the film) with a friend who wasn’t born when the mission itself took place. “What did you think?” I asked as we came out of the cinema. “It was OK,” said my friend. “Just not very believable.” But we kids were glued to our black-and-white TV sets the entire week of the original mission. We watched in horror as CO₂ levels rose in the Lunar Module. We endured the endless blackout as the returning astronauts plunged perilously back to Earth. We held our breath with the rest of the world as the expected four minutes stretched to five and hope began to fade. It was a full six minutes before the camera finally came into focus on the command module’s parachutes – safely deployed above the Pacific Ocean. We felt the endorphin rush. We knew it was believable. That was 1970. This is now. And here I am again on the edge of another sofa, in the lingering uncertainty of the time of COVID-19, waiting for signs of arrival from another re-entry blackout on another barren rock, devoid of breathable atmosphere, 200 million miles away. And when the Perseverance Rover finally touches down on the surface of Mars: that same exhilaration. That same endorphin rush. Quite difficult to witness the jubilation behind the masks at Nasa’s mission control without feeling a glimmer of vicarious joy. Hope, even. But Nasa’s clever science experiment is just the tip of an expansionary iceberg. A teaser, if you will, for an ambitious dream that is being driven faster and faster by huge commercial interests. A curious twist in a debate that has been raging now for almost half a century. Ever since 1972, when a team of MIT scientists published a massively influential report on the [Limits to Growth](https://www.clubofrome.org/publication/the-limits-to-growth/), [economists have been fighting](https://science.sciencemag.org/content/366/6468/950) about whether it’s possible for the economy to expand forever. Those who believe it can, appeal to the [power of technology](https://andrewmcafee.org/more-from-less/overivew) to “decouple” economic activity from its effects on the planet. Those (like me) who believe it can’t point to the [limited evidence for decoupling](https://www.researchgate.net/publication/332500379_Is_Green_Growth_Possible) at anything like the pace that’s needed to avoid a climate emergency or prevent a catastrophic decline in biodiversity. The growth debate often hangs on the power you attribute to technology to save us. Usually it’s the technophiles arguing for infinite growth on a finite planet – sometimes putting their hopes in speculative technologies such as [direct air capture](https://theconversation.com/new-co-capture-technology-is-not-the-magic-bullet-against-climate-change-115413) or dangerous ones like nuclear power. And usually it’s the sceptics arguing for a [post-growth economy](http://www.timjackson.org.uk/postgrowth). But the simple division between technophiles and technophobes has never been particularly helpful. Very few growth sceptics reject technology completely. No one at all is asking humanity to return to the cave. My own research teams at the University of Surrey have been [exploring the vital role](https://www.cusp.ac.uk/team/team/t_jackson/) of sustainable technology in transforming the economy for almost three decades now. But we’ve also shown how the dynamics of capitalism – in particular its relentless pursuit of [productivity growth](https://www.nytimes.com/2012/05/27/opinion/sunday/lets-be-less-productive.html) – continually push society towards materialistic goals, and undermine those parts of the economy such as [care, craft and creativity](http://www.timjackson.org.uk/pwg), which are essential to our quality of life. And now suddenly, along comes a group of self-confessed technology lovers finally admitting that the planet is too small for us. Yes, you were right, they imply: the Earth cannot sustain infinite growth. That’s why we have to expand into space. Wait. What just happened? Did somebody move the goalposts? Something is wrong. Maybe it’s me. One thing I know for sure. I’m no longer the same kid I was – the one from the debating society. This house believes that humanity should grow the fuck up. Before it spends [trillions of dollars](https://www.sciencefocus.com/space/top-10-what-are-the-top-10-most-expensive-space-missions/) littering its [techno-junk](https://www.esa.int/Safety_Security/Space_Debris/The_cost_of_space_debris#:%7E:text=Space%20debris%20is%20expensive%2C%20and%20will%20become%20even%20more%20so&text=For%20satellites%20in%20geostationary%20orbit,higher%20than%205%E2%80%9310%25.) around the solar system, this house believes that humanity should pay a little more attention to what’s happening right here and now. On this planet. Perhaps ironically, it was from space that we saw it first. In October 1957, the Soviets sent an unmanned orbital satellite called [Sputnik](https://www.nasa.gov/multimedia/imagegallery/image_feature_924.html) into space. It was one of those odd moments in history (like the coronavirus) that dramatically reshapes our social world. Sputnik kicked off the space race, intensified the arms race and heightened the cold war. It was a huge blow to US self-esteem not to be the first nation to reach space and it was the jolt it used to kickstart the Apollo Moon shot. No one likes coming second. Least of all the most powerful people on the planet. But Sputnik also signalled the beginning of a new relationship between humanity and its earthly home. As the political philosopher [Hannah Arendt](https://plato.stanford.edu/entries/arendt/) remarked in the prologue to her 1958 masterpiece, [The Human Condition](https://www.google.co.uk/books/edition/The_Human_Condition/bGlwDwAAQBAJ), going into space allowed us to grasp our planetary predicament for the first time in history. It was a reminder that “the Earth is the quintessence of the human condition”. And nature itself, “for all we know, may be unique in providing human beings with a habitat in which they can move and breathe without effort and without artifice”. Fair point. And nothing we’ve learned in the intervening years has changed that prognosis. Mars may be the most habitable planet in the solar system, outside our own. But it’s still a very far cry from the beauty of home – whose fragility we only truly learned to appreciate fully from the images sent back to us from space. Nature photographer Galen Rowell once called William Anders’ iconic photo [Earthrise](https://www.nasa.gov/centers/johnson/home/earthrise.html) – taken from the Apollo 8 module in lunar orbit – “the most influential environmental photograph ever taken”. Earthrise brought home to us, in one astonishing image, the stark reality that this shining orb was – and still is – humanity’s best chance for anything that might meaningfully be called the “good life”. Its beauty is our beauty. Its fragility is our fragility. And its peril is our peril. In the very same year that Arendt published The Human Condition, a Shell executive named Charles Jones presented [a paper](http://www.climatefiles.com/trade-group/american-petroleum-institute/1958-air-pollution-research-program-smoke-fumes/) to the fossil fuel industry’s trade group, the American Petroleum Institute, warning of the impact of carbon emissions from fossil fuel combustion on the atmosphere. It was early evidence of climate change. It was also evidence, according to lawsuits [now being filed](https://www.theguardian.com/environment/ng-interactive/2021/jun/30/climate-crimes-fossil-fuels-cities-states-interactive) by cities and states in the US, that companies like Shell knew it was happening more than 60 years ago – three decades before James Hansen’s [scientific testimony](https://grist.org/article/james-hansens-legacy-scientists-reflect-on-climate-change-in-1988-2018-and-2048/) to Congress in 1988 brought global warming to public attention. And they did nothing about it. Worse, argue plaintiffs like the [state of Delaware](https://eu.delawareonline.com/story/news/2020/09/10/delaware-sues-exxon-chevron-and-bp-role-climate-change/3457202001/), they lied over and again to cover up this “inconvenient truth”. Why such a thing could happen is now clear. Evidence of their impact was a direct threat to the profits of some of the most powerful corporations on the planet. Profit is the bedrock of capitalism. And as I argue in [my new book](http://www.timjackson.org.uk/postgrowth), we have allowed capitalism to trump everything: work, life, hope – even good governance. The most enlightened governments in the world have turned a blind eye to the need for urgent action. Now we’re on the verge of being too late to fix it. Achieving net zero by 2050 is [no longer enough](https://theconversation.com/2050-is-too-late-we-must-drastically-cut-emissions-much-sooner-121512). We need much more, much faster to avoid ending up in an unliveable [hothouse](https://theconversation.com/hothouse-earth-our-planet-has-been-here-before-heres-what-it-looked-like-101413). Even as I write, [record-breaking temperatures](https://www.nytimes.com/2021/07/10/us/west-heat-wave-death-valley.html), 10-20℃ above the seasonal average, have forced citizens on the west coast of North America into [underground shelters](https://www.telegraph.co.uk/news/2021/07/01/portland-heatwave-like-microwave-hairdryer-blowing/) to avoid the searing heat. [Wildfires](https://news.sky.com/story/us-wildfires-firefighters-grapple-with-raging-blazes-as-temperatures-soar-to-54c-in-californias-baking-death-valley-12354197) are raging in California’s Death Valley, where temperatures have reached an astonishing 54℃. On the storm-struck east coast, [flood waters](https://www.theguardian.com/us-news/2021/jul/09/new-york-city-storm-flooding-climate-change) have inundated the New York subway system. Thousands remain homeless and hundreds are still missing, meanwhile, as [historic flooding](https://news.sky.com/story/germany-and-belgium-floods-rescuers-search-for-hundreds-of-missing-as-more-than-120-die-in-historic-disaster-12357532) across central Europe has left almost 200 people dead. In the face of the blindingly obvious, even recalcitrant presidents and politicians are at last beginning to acknowledge the scale of the peril in which our relentless pursuit of economic growth has placed the planet. And in principle they still have time to do something about it. As I and many colleagues have argued, the pandemic offers us a unique opportunity to fashion [a different kind of economy](https://www.eesc.europa.eu/en/news-media/press-releases/economy-environment-and-peoples-well-being-must-go-hand-hand-post-covid-eu). The 26th Conference of the Parties to the UN Climate Change Convention ([COP26](https://ukcop26.org/)) in Glasgow in November 2021 could well be the place to do that. Whether that happens or not will depend as much on vision as it does on science. And on our courage to confront the inequalities of power that led us to this point. It will also depend on us going back to first principles and asking ourselves: how exactly should we aim to live in the only habitable world in the known universe? What is the nature of the good life available to us here? What can prosperity [possibly mean](http://www.cusp.ac.uk/) for a promiscuous species on a finite planet? The question is almost as old as the hills. But the contemporary answer to it is paralysingly narrow. Cast in the garb of late capitalism, prosperity has been captured by the ideology of “growth at all costs”: an insistence that more is always better. Despite [overwhelming evidence](https://www.youtube.com/watch?v=2Jq23mSDh9U) that relentless expansion is undermining nature and driving us towards a devastating climate emergency, the “[fairytales of eternal growth](https://www.youtube.com/watch?v=TMrtLsQbaok)” still reign supreme. Zero gravity It’s an ironic twist in the tale of the debate society kid I used to be that I’ve spent most of my professional life confronting those fairytales of growth. Don’t ask me how that happened. By accident mostly. I toyed with the idea of studying astrophysics. But I ended up studying Maths at Cambridge, where I confess to being baffled by the complexity of it all, until I realised that even math is just a trick. Quite literally a formula. Believe in it and you can travel to the stars and back. In your mind, at least. And there I was wandering around in zero G, when I woke up one day (in April 1986) to find that the Number four reactor at the Chernobyl nuclear power plant in Ukraine had suffered a catastrophic meltdown. I suddenly realised that the very same skills I’d spent my life developing were leading humanity not towards the stars but away from the paradise we already inhabit. So yes. I changed my mind. The next day I walked into the Greenpeace office in London and asked what I could do to help. They set me working on the [economics of renewable energy](https://www.elsevier.com/books/renewable-energy/jackson/978-1-4832-5695-5) I became, accidentally, an economist. (Economics needs more accidental economists.) And that’s when it began to dawn on me that learning how to live well on this fragile planet is far more important than dreaming about the next one. Mine is bigger than yours Not so the space race billionaires. A handful of unbelievably powerful men, whose wealth has [exploded](https://www.forbes.com/sites/chasewithorn/2021/04/30/american-billionaires-have-gotten-12-trillion-richer-during-the-pandemic/) massively throughout the pandemic, are now busy trying to persuade us that the future lies not here on Earth but out there among the stars. Tesla founder and serial entrepreneur, Elon Musk is one of these new rocket men. “Those who attack space,” he [tweeted](https://twitter.com/elonmusk/status/1414782972474048516) recently, “maybe don’t realise that space represents hope for so many people”. That may be true of course in a world where huge inequalities of wealth and privilege strip hope from the lives of billions of people. But, as the spouse of a Nasa flight controller pointed out, it obscures the [extraordinary demands](https://www.salon.com/2021/07/07/no-billionaires-wont-escape-to-space-while-the-world-burns/?fbclid=IwAR3Hzv3TGOuflDjlSatFJQN0_nastGp1MCqP-AOU0PJrUQWtHIMxNcP-BEM) of escaping from Mother Earth, in terms of energy materials, people and time. Undeterred, the rocket men gaze starward. If resources are the problem, then space must be the answer. Amazon founder Jeff Bezos is pretty explicit about his own expansionary vision. “We can have a trillion humans in the solar system,” [he once declared](https://www.nbcnews.com/mach/science/jeff-bezos-foresees-trillion-people-living-millions-space-colonies-here-ncna1006036). “Which means we’d have a thousand Mozarts and a thousand Einsteins. This would be an incredible civilisation.” Bezos and Musk have spent their lockdown contesting the top two places on the Forbes [rich list](https://www.forbes.com/billionaires/). They’ve also been playing “mine is bigger than yours” in their own private space race for a couple of decades now. Bezos’s personal wealth [almost doubled](https://inequality.org/great-divide/updates-billionaire-pandemic/) during the course of a pandemic that destroyed the lives and livelihoods of millions. He’s now stepping down to spend more time on Blue Origin, the company he hopes will deliver vast human colonies across the solar system. The [declared aim](https://www.spacex.com/mission/) of Musk’s rival company, SpaceX, is “to make humanity multiplanetary”. Just like [Kim Stanley Robinson](https://www.newyorker.com/books/page-turner/our-greatest-political-novelist)’s science fiction [trilogy](https://space.nss.org/book-review-red-mars/) back in the 1990s, Musk aims to establish a [permanent human colony](https://www.cnet.com/news/elon-musk-drops-details-for-spacexs-million-person-mars-mega-colony/) on Mars. To get there, he reasons, we need very big rockets – or, in the original terminology of SpaceX, Big Fucking Rockets ([BFRs](https://techcrunch.com/2018/09/19/18-new-details-about-elon-musks-redesigned-moon-bound-big-fing-rocket/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAJd2kjzq4ZnY7YFIEcz1ZTmBPm7MmuQ_2wfNs9erxRMlo4qDio6p9lDkDY7I00A3KvMN5ZKZkkkxZB_ldqttJgYIGM2a4zE5NLSWLYRZMI11-1xbvn31Q6uJBOOn11q5oVbllHCYDhH3ygdBFbWUXOu2H2tXqDsVhtsvMKEe5s_w)) – eventually capable of transporting scores of people and hundreds of tonnes of equipment millions of miles across the solar system. The BFRs have now given way to a series of (more sedately named) Starships. And to prove his green credentials Musk desperately wants these [starships](https://www.spacex.com/vehicles/starship/) to be reusable. So much so that SpaceX conspired to blow up four consecutive Starship prototypes in quick succession during the first four months of 2021 trying unsuccessfully to re-land them. Move fast and break things is the Silicon Valley motto of course. But eventually you’ve got to bring the goods home. [Starship SN15](https://www.aljazeera.com/economy/2021/5/6/the-starship-has-landed-spacex-nails-reusable-craft-touchdown) finally achieved that on May 5 – three weeks after SpaceX had landed a massive [US$2.9 billion](https://www.nytimes.com/2021/04/16/science/spacex-moon-nasa.html) contract from Nasa, nudging Blue Origin into the space race shadows. Not wanting to be outdone, Bezos came up with what he must have hoped was the ultimate comeback. When Blue Origin’s [New Shepard](https://www.blueorigin.com/new-shepard/) rocket – which is also reusable – made its first manned space flight on July 20, he and his brother Mark would be two of the first few passengers on board. Wow, Jeff! Kudos man! Now you really show us your cojones! Nobody likes coming second. Least of all the most powerful people on the planet. But sometimes you get no choice. Out of the blue, without so much as a by-your-leave, Virgin boss, Richard Branson swooped in to steal everyone’s thunder. On July 11, nine days before Bezos’s big day, Branson became the first ever billionaire to [launch himself into space](https://theconversation.com/virgin-galactic-space-tourism-takes-off-with-bransons-inaugural-flight-164142). And for a cool US$250,000, he promised us, you too can be one of Virgin Galactic’s 600 or so breathless customers, waiting to enjoy three or four weightless minutes gazing back in rapture at the planet you’ve left behind. Apparently, Musk has [already signed up](https://www.theverge.com/2021/7/12/22573850/elon-musk-richard-branson-spaceplane-virgin-galactic). Bezos doesn’t need to. He’s made his own [virgin space flight](https://www.space.com/news/live/blue-origin-jeff-bezos-launch-updates) now. Prosperity as health The space rhetoric of the super-rich betrays a mentality that may once have served humanity well. Some would say it’s a quintessential feature of capitalism. Innovation upon innovation. A driving ambition to expand and explore. A primal urge to escape our origins and reach for the next horizon. Space travel is a natural extension of our [obsession with economic growth](https://www.newyorker.com/magazine/2020/02/10/can-we-have-prosperity-without-growth). It’s the crowning jewel of capitalism. Further and faster is its frontier creed. I’ve spent much of my professional life as a critic of that creed, not just for environmental reasons but on social grounds as well. The seven years I spent as economics commissioner on the UK’s [Sustainable Development Commission](http://www.sd-commission.org.uk/) and my subsequent research at the [Centre for the Understanding of Sustainable Prosperity](http://www.cusp.ac.uk/) revealed something fundamental about our aspirations for the good life. Something that has been underlined by the experience of the pandemic. Prosperity is as much about health as it is about wealth. Ask people what matters most in their lives and the chances are that this will come out somewhere near the top of the list. Health for themselves. Health for their friends and their families. Health too – sometimes – for the fragile planet on which we live and on whose health we ourselves depend. There’s something fascinating in this idea. Because it confronts the obsession with growth head on. As Aristotle pointed out in [Nicomachean Ethics](http://classics.mit.edu/Aristotle/nicomachaen.html) (a book named after his physician father), the good life is not a relentless search for more, but a continual process of finding a “virtuous” balance between too little and too much. Population health provides an obvious example of this idea. Too little food and we’re struggling with diseases of malnutrition. Too much and we’re tipped into the “diseases of affluence” that [now kill more people](https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight) than under-nutrition does. Good health depends on us finding and nurturing this balance. This task is always tricky of course, even at the individual level. Just think about the challenge of keeping your exercise, your diet and your appetites in line with the outcome of a healthy body weight. But as [I’ve argued](https://www.timjackson.org.uk/postgrowth), living inside a system that has its sights continually focused on more makes the task near impossible. Obesity has tripled since 1975. Almost two-fifths of adults over 18 are overweight. Capitalism not only fails to recognise the point where balance lies. It has absolutely no idea how to stop when it gets there. You’d think our brush with mortality through the pandemic would have brought some of this home to us. You’d think it would give us pause for thought about what really matters to us: the kind of world we want for our children; the kind of society we want to live in. And for many people it has. In a survey carried out during lockdown in the UK, [85% of respondents](https://www.thersa.org/press/releases/2019/brits-see-cleaner-air-stronger-social-bonds-and-changing-food-habits-amid-lockdown) found something in their changed conditions they felt worth keeping and fewer than 10% wanted a complete return to normal. When life and health are at stake, the ungodly scramble for wealth and status feels less and less attractive. Even the lure of technology pales. Family, conviviality and a sense of purpose come to the fore. These are the things that many people found they lacked most throughout the pandemic. But their importance in our lives was not a COVID accident: they are the most fundamental elements of a sustainable prosperity. The denial of death Something even more surprising has [emerged](https://timjackson.org.uk/consumerism-theodicy/) during my three decades of research. Behind consumer capitalism, behind the frontier mentality, beyond the urge to expand forever lies a deep-seated and pervasive anxiety. What does day two look like, Bezos once [asked a crowd](https://www.youtube.com/watch?v=fTwXS2H_iJo&ab_channel=AmazonNews) of the faithful, referring to his famous maxim about the need to innovate. “Day two is stasis, followed by irrelevance, followed by excruciatingly painful decline, followed by death,” he said. “And that. Is why. It is always. Day one!” His audience loved it. Musk plays out his own inner demons just as disarmingly. “I’m not trying to be anyone’s saviour,” [he once told](https://www.ted.com/talks/elon_musk_the_future_we_re_building_and_boring/transcript?language=en) TED’s head curator, Chris Anderton. “I’m just trying to think about the future – and not be sad.” Again, the applause was deafening. A well-trained therapist could have a field day with all of this. Take that miraculous day a few weeks after the Perseverance rover started sending home the most amazing selfies in the universe, when the Ingenuity helicopter made its [virgin flight](https://www.youtube.com/watch?v=kQMTo0KuN5M) in the wafer thin atmosphere of Mars. It was the kind of outcome that could have intelligence agencies drooling over far less benign uses of the technology. But there was also something pretty existential going on. The faint whispering of the Martian wind, relayed faithfully across the solar system, doesn’t just confirm the possibilities for aerial flight on an alien planet. It’s grist to the mill of an essential belief that human beings are endlessly creative and fiendishly clever. Our visceral response to these momentary triumphs speaks to a branch of psychology called [terror management theory](https://www.psychologytoday.com/gb/basics/terror-management-theory) drawn from the work of cultural anthropologist Ernest Becker. It was explored in particular in his astonishing 1973 book [The Denial of Death](https://www.google.co.uk/books/edition/The_Denial_of_Death/jyqGDwAAQBAJ). In it, Becker argues that modern society has lost its way, precisely because we’ve become terrified of confronting the inevitability of our own demise. Terror management theory tells us that, when mortality becomes “salient”, instead of addressing the underlying fear, we turn for comfort to the things which make us feel good. Capitalism itself is a massive comfort blanket, designed to help us never confront the mortality that awaits us all. So too are the dreams of the rocket men. Beyond lockdown When Sputnik kickstarted the first “space race” six decades ago, a US newspaper headline called it “one step toward [our] escape from imprisonment to the Earth”. Arendt read those words with astonishment. She saw there a deep-seated “[rebellion against human existence](https://www.google.co.uk/books/edition/The_Human_Condition/bGlwDwAAQBAJ?hl=en&gbpv=1&dq=hannah%20arendt%20%27rebellion%20against%20human%20existence%27&pg=PA2&printsec=frontcover&bsq=hannah%20arendt%20%27rebellion%20against%20human%20existence%27)”. It isn’t just the pandemic that locks us down, the implication is. It’s the entire human condition. The anxiety we feel is nothing new. The choice between confronting our fears and running away from them has always been a profound one. It’s exactly the choice we’re facing now. As vaccine roll-out brings a glimmer of light at the end of COVID-19, the temptation to rush into wild escapism is massive. But for all its glamour, the “final frontier” is at best an amusement and at worst a fatal distraction from the urgent task of rebuilding a society ravaged by social injustice, climate change and a loss of faith in the future. With most of us still reeling from what the World Health Organisation has called a [shadow pandemic](https://theconversation.com/domestic-abuse-and-mental-ill-health-twin-shadow-pandemics-stalk-the-second-wave-148412) in mental health, any kind of escape plan at all looks remarkably like paradise. And emigrating to Mars is one hell of an escape plan. Let’s dream of some “final frontier” by all means. But let’s focus our minds too on some quintessentially earthly priorities. Affordable healthcare. Decent homes for the poorest in society. A solid education for our kids. Reversing the decades-long precarity in the livelihoods of the frontline workers – the ones who saved our lives. Regenerating the devastating loss of the natural world. Replacing a frenetic consumerism with an economy of care and relationship and meaning. Never have these things made so much sense to so many. Never has there been a better time to turn them into a reality. Not just for the handful of billionaires dreaming of unbridled wealth on the red planet, but for the eight billion mere mortals living out their far less brazen dreams on the blue one.

**Billionaire-backed space exploration is a colonial fantasy – continuing to pursue it will guarantee catastrophe for humanity**

**Marx ’20:** Paris Marx. “Billionaire Space Colonialism is a Dead End”. Tribune. December 22nd, 2020. <https://tribunemag.co.uk/2020/12/billionaire-space-colonialism-is-a-dead-end-for-humanity>.

The world is in the grips of a global pandemic that has altered the daily lives of billions and killed more than 1.7 million people. You might think that that would refocus our attentions on ensuring the health and wellness of people around the globe, but as [billionaires’ fortunes have soared](https://tribunemag.co.uk/2020/08/the-pandemic-profiteers), some of their number have kept their focus trained on the stars. On 9 December, SpaceX [launched](https://www.independent.co.uk/life-style/gadgets-and-tech/elon-musk-starship-spacex-texas-b1769275.html) its Starship SN8, a prototype of the spaceship it hopes will one day perform regular trips between Earth and Mars. The test flight ended in flames, but that didn’t stop space enthusiasts from declaring it a success — an important milestone in CEO Elon Musk’s ultimate plan to colonise the red planet. Earlier in the month, after receiving the Axel Springer Award in Berlin (since border restrictions don’t stop billionaires), Musk [explained](https://www.independent.co.uk/life-style/gadgets-and-tech/elon-musk-spacex-mars-date-starship-b1764979.html) that he expected SpaceX to send a spacecraft to Mars in 2022, followed by humans in 2024 or 2026. Those timelines should be taken with a large pinch of salt, given Musk previously said he [planned](https://www.theguardian.com/technology/2016/apr/27/elon-musk-space-x-mars-mission-tesla) to send an unmanned spacecraft to Mars in 2018, but that doesn’t mean there aren’t bigger problems for this vision of humanity’s future. The Sci-Fi Space Fantasy Many of the space capitalists who champion space colonisation do so because they were inspired by [science](https://pando.com/2020/11/09/tech-ceos-should-stop-using-science-fiction-as-a-blueprint-for-humanitys-future-in-space/) [fiction](https://www.npr.org/2015/12/13/459392474/no-warp-drives-no-transporters-science-fiction-authors-get-real). There are countless creatives who inform their visions, but one whose work is frequently cited is author Kim Stanley Robinson, who has published several well-researched novels that imagine various scenarios for human life in space. After all that research into the science of space travel and settlement, though, Robinson has little time for the colonisation visions being advanced by billionaires like Musk and Amazon CEO Jeff Bezos. In 2016, he [compared](https://www.bloomberg.com/news/articles/2016-10-17/why-elon-musk-s-mars-vision-needs-some-real-imagination) Musk’s plan for Mars colonisation to ‘the 1920s science-fiction cliché of the boy who builds a rocket to the moon in his back yard.’ More recently, in a conversation with Jacobin, he [declared](https://www.jacobinmag.com/2020/10/kim-stanley-robinson-ministry-future-science-fiction) that the capitalist visions for space colonisation ‘are fantasies, and billionaire fantasy trips are not going anywhere.’ He called asteroid and Helium-3 mining ‘bullshit’, and even acknowledged his own role when explaining ‘There is no profit in space. It’s just a fantasy of our culture right now, because everybody’s been convinced by science fiction writers, and they’re not paying attention to the numbers game.’ But that fantasy hasn’t only gripped billionaires who have effectively unlimited money to throw after their passion projects. Governments increasingly buy in, too, thereby constructing a barrier to addressing the bigger challenges that humanity actually faces in this moment. State-Monopoly Capitalism in Space On 30 May, while the pandemic was raging and Black Lives Matter protesters were marching in streets around the United States, President Donald Trump joined Elon Musk in Florida to celebrate a dual milestone: one, the first time astronauts had been launched from US soil since NASA stopped using its Space Shuttle; and two, the first time a private company had launched a crewed spacecraft. As Trump [declared](https://jacobinmag.com/2020/06/spacex-elon-musk-jeff-bezos-capitalism) that ‘a new age of American ambition has now begun’, he further fused Musk’s vision for space exploration to his white nationalist movement to ‘Make America Great Again’, and to the larger effort of projecting American power in an increasingly multipolar world. Even before Trump started the Space Force and [signed an executive order](https://www.space.com/trump-moon-mining-space-resources-executive-order.html) to promote space mining, President Barack Obama had begun the process of [privatising space exploration](https://www.jacobinmag.com/2017/02/mars-elon-musk-space-exploration-nasa-colonization) and adopting [the vision for an American trip to Mars](https://www.cnn.com/2016/10/11/opinions/america-will-take-giant-leap-to-mars-barack-obama/index.html) — and it’s sure to continue under President Joe Biden. These moves must be placed in their historical contexts. As Dr. Gabrielle Cornish explained in the Washington Post, the Cold War space race was [justified](https://www.washingtonpost.com/outlook/2019/07/22/how-imperialism-shaped-race-moon/) by its presentation as ‘a utopian dream to domestic, civilian audiences, framing it through art, music and pop culture as a romantic escape or glorious future’; the real goal was the projection of military and economic power by competing countries. We see this pattern repeated today. The billionaires driving the modern space race sell it as essential to the future of humanity, either to maintain capitalist ‘[growth and dynamism](https://jacobinmag.com/2019/12/jeff-bezos-the-expanse-space-fantasy-sci-fi-syfy/)’ or to give humanity a second home in the event of climate apocalypse. The latter is a suggestion that Robinson considers ‘wrong, in both a practical and a moral sense’, because ‘it’s very likely that we require the conditions here on earth for our long-term health’. Indeed, if humans actually lived on Mars [they’d probably get cancer](https://www.scientificamerican.com/article/martian-astronaut-would-get-cancer-if-mission-were-real-author-says1/). It doesn’t really matter, though, because these justifications only exist to obscure the real incentives behind these projects: increasing American power beyond our home planet, extending capitalist property relations to other celestial bodies, and enabling US corporations to exploit extraterrestrial resources for the mutual benefit of those capitalists and the state — assuming the economics even work. Salon senior editor Keith Spencer [compared](https://www.salon.com/2017/10/08/against-mars-a-lago-why-spacexs-mars-colonization-plan-should-terrify-you/) the ambitions of SpaceX to the history of the East India Company, which ruled colonised areas for the benefit of its shareholders, and in this way it could also be seen as another example of the [state-monopoly capitalism](https://tribunemag.co.uk/2020/06/the-era-of-state-monopoly-capitalism) observed by Tribune’s Grace Blakeley. These private space companies, despite being funded in part through billionaires’ fortunes, are still [highly dependent](https://www.theverge.com/2019/6/18/18683455/nasa-space-angels-contracts-government-investment-spacex-air-force) on public subsidies and contracts – which is why getting the state to buy into their vision is so important. There might not be people to colonise in space, but the consequences go beyond capitalist enclosure. Since 1967, the Outer Space Treaty has recognised that space is a global commons, where ‘national appropriation by claim of sovereignty, by means of use or occupation, or by any other means’ is prohibited. Haris Durani [explained](https://www.thenation.com/article/archive/apollo-space-lunar-rockets-colonialism/) in the Nation that while this agreement is often seen as a compromise between the United States and Soviet Union, it’s better to understand it as a product of decolonisation which sought to ensure that ‘all states would collectively govern extraterritorial domains’, instead of allowing major powers to deplete resources because of their technological superiority. The spirit of that agreement is already being breached by the efforts of powerful states to create a legal foundation for the plunder of space resources. Instead of powerful countries enclosing these resources for the benefit of their people, though—which would be bad enough—present trajectory suggests that the riches will be captured by billionaires, whose wealth allows them to ignore the problems of the rest of humanity while directing vast attention and resources away from much more pressing issues. Refocusing on Real Problems Between the climate crisis, various accelerating social crises, and the ongoing pandemic, humanity faces immense challenges that must be tackled in the coming decade. State power will be required to direct resources into building a sustainable economy, reconstructing the crumbling social infrastructure, and ensuring a good standard of living for all — but billionaires have no stake in any of those projects. Space colonisation will do nothing to address these crises, regardless of the promises of billionaires and luxury communists alike. When they talk about how asteroid mining will bring great wealth to be shared with all or to [power](https://jalopnik.com/demand-for-electric-cars-may-be-just-what-we-need-to-ge-1820041245) the green technologies that are heralded as climate solutions free of sacrifice for Western consumers, they’re simply distracting us from the difficult work that must be done if we’re to truly address the social and environmental challenges of our time. We already know that emissions need to be cut in half by 2030. **That means our societies need to be radically overhauled long before asteroid mining becomes feasible — if it ever does**. Green capitalists like Musk are happy to sell us a [false future](https://tribunemag.co.uk/2020/10/we-cant-stop-climate-change-without-class-war) of electric cars and solar-powered suburbia that allow them to profit in the short-term because they can simply [seal themselves off](https://jacobinmag.com/2020/01/elon-musk-climate-apocalypse-tesla-spacex) from the rest of the population when the effects of a warming climate accelerate. The capitalist logic of infinite growth that’s driving the desire for space colonisation is the same one that’s created the very problems we so desperately need to solve in the first place, and doubling down on it would be a terrible mistake. We should be particularly wary of aligning ourselves with a coalition that includes billionaires and right-wing politicians who make explicit comparisons to past colonisation projects, too: Ted Cruz, for example, has [promoted](https://theoutline.com/post/5809/the-racist-language-of-space-exploration) space as ‘as vast and promising a frontier as the New World was some centuries ago’. That’s not to say that humanity should turn away from the stars. We should continue funding space science, but the expansion of capitalism into space and the exploitation of extraterrestrial resources do not serve those goals. Justifying space colonisation through the need for a second planet is a self-fulfilling prophecy created by people who have little regard for the lives and wellbeing of the global working class — as the pandemic has demonstrated. Capitalism is driving billionaires toward space as it drives the rest of us toward extinction. They must be stopped before it is too late.

1. Stephen A Kocs, Professor at College of the Holy Cross, International Studies Quarterly 38.4, p. 535-556 1994] [↑](#footnote-ref-1)
2. The scope of negative fiat and the logic of decisionmaking. L. Paul Strait and Brett Wallace [↑](#footnote-ref-2)
3. Scientists discover moral compass in the brain which can be controlled by magnets By [DAVID DERBYSHIRE](http://www.dailymail.co.uk/home/search.html?s=y&authornamef=David+Derbyshire) Last updated at 11:52 AM on 30th March 2010  
    <http://www.dailymail.co.uk/sciencetech/article-1262074/Scientists-discover-moral-compass-brain-controlled-magnets.html#ixzz0k35wGt1z> [↑](#footnote-ref-3)