### 1AC---Plan

#### Resolved: The Republic of Korea ought to ban the appropriation of outer space by private entities.

**Targeting private entities comparatively solves better.**

**Salter 20 (**, A., 2020. The Space Review: Outer space needs private law. [online] Thespacereview.com. Available at: <https://www.thespacereview.com/article/4015/1> [Accessed 10 January 2022] Alexander William Salter is an economics professor in the Rawls College of Business at Texas Tech University, the Comparative Economics Research Fellow at TTU’s Free Market Institute, and a Young Voices Contributor.)-rahulpenu

**Outer** **space** **needs** **private** **law**

The Cold War is back, and it’s headed into orbit. American tensions with China and Russia are escalating, especially since Russia’s suspected anti-satellite weapons test. The stakes are nothing less than a peaceful future in space. Operations in orbit and beyond require extraordinary **precision** and **certainty**. Any conflict can seriously hinder operational efficiency for both governments and businesses. Fortunately, there’s a solution that can benefit all parties: Giving **private** **law** a **major** **role** **in** ordering the **cosmos**.

Undoubtedly, space must be governed. But **governance** is **not** the same thing as **government**. The virtue of private law—a body of rules grounded on consensual practices, rather than sovereign authority—is that it can lay the foundations for future space activities, without sparking a governmental scramble to project power. Where the reach of the state ends, private governance begins. It’s worked many times on Earth, and it can work in space.

Undoubtedly, space must be governed. But governance is not the same thing as government.

To see why, we need to understand recent developments in space policy that have raised the stakes of celestial statecraft. NASA recently announced the Artemis Accords, a series of bilateral agreements to establish standards and procedures for future space missions. The Accords are intended to secure buy-in from US allies that are also spacefaring nations, with the goal of cooperating on NASA’s ambitious Artemis program to return humans to the Moon. Russia seemed like a natural partner, due to the successful collaboration with the US on the International Space Station.

Instead, there was a falling out. Russia and China view the Artemis Project and Accords as a space version of NATO: a politically motivated attempt to extend US hegemony. “Frankly speaking, we are not interested in participating in such a project,” said Dmitry Rogozin, the head of Russia’s space agency. Russia sees the US initiative as an attempt to privatize space, which in practice means celestial domination by whoever gets there first. China evidently agrees. Indeed, Rogozin spoke warmly about collaboration with the Chinese, affirming that they’re “definitely our partner.”

This is bad news, but we could **avoid** the dangers of **factionalism** if we use private law to eschew jurisdictional claim-staking in space. Preserving a neutral domain in which the spacefaring nations can interact to mutual advantage would help keep the peace. That much has been understood for over half a century. The 1967 Outer Space Treaty, still the backbone of public international space law, explicitly forbids the extension of government jurisdiction to the heavenly bodies.

Thus alleged privatization by the US, such as a 2015 law guaranteeing US nationals property rights to celestial resources, as well as a recent executive order encouraging the commercial development of space, is perceived as contrary to the spirit of the treaty. America’s space rivals are on high alert to the extension of US sovereignty into space by extralegal means.

Strictly speaking, these US initiatives are consistent with international treaty obligations. Combined with Artemis, they represent significant steps forward in humanity’s journey into space. Nevertheless, Russia and China fear there’s a political motive lurking behind these economic policies. In the interests of peace and cooperation, the US should extend an olive branch not by retreating on Artemis, but by promoting private law.

Spacefaring nations can thrive under this system of governance, but only if states don’t compete for sovereignty. For example, just look at international commerce.

Trade between nations often involves entities from different jurisdictions. If they have a commercial dispute, no national court can hear the case. But this doesn’t mean international commerce is lawless—far from it. These disputes are privately adjudicated and voluntarily enforced by the traders themselves. A private body of self-enforcing law, dating back to the High Middle Ages, evolved to meet the needs of merchants. There are even organizations, such as the International Chamber of Commerce and the International Center for Dispute Resolution, that specialize in arbitrating these conflicts.

The development of a private body of space commercial law is the best way to keep the peace in space. Unlike privatization, private law **doesn’t** **raise** **geopolitical** **red** **flags**.

Much of international commercial law can apply to space. In addition, the Permanent Court of Arbitration already offers guidelines for arbitrating space disputes. But this doesn’t mean only private entities will govern space. States still have an important role to play. For example, spacefaring nations should uphold treaty obligations by policing their nationals, making sure nobody tries to homestead a planet in a fit of hubris. This still leaves plenty of room for non-jurisdictional (and, hence, private) space activity.

The development of a private body of space commercial law is the best way to keep the peace in space. Unlike privatization, private law doesn’t raise geopolitical red flags. In these early years of Space Age 2.0, we must all work to prevent international conflict from stifling space exploration and development. Only then will humanity be free to extend its reach to the stars.

**1AC---Tensions ADV**

#### South Korea’s space industry is fueled by the private sector – tech transfers and official statements.

**Si-Soo 21** [Park Si-Soo, 9-8-2021, Park Si-soo covers space industries in South Korea, Japan and other Asian countries. Park worked at The Korea Times — South Korea's leading English language newspaper — from 2007 to 2020. He earned a master’s degree in science journalism from Korea Advanced Institute of Science and Technology and a bachelor’s degree in business from Hanyang University. "South Korea to spend $593 million on public-to-private transfer of rocket technologies," SpaceNews, <https://spacenews.com/south-korea-to-spend-593-million-on-public-to-private-transfer-of-rocket-technologies/> accessed 1/12/2022] Adam

SEOUL, South Korea – Starting next year, South Korea’s government will transfer state-owned space launch vehicle technologies to domestic aerospace companies in a move to help them penetrate an expanding global space launch market. To that end, the government will spend 687 billion won ($593 million) from 2022 through 2027, [said the Ministry of Science and ICT, Sept. 7.](https://www.msit.go.kr/bbs/view.do?sCode=user&mId=113&mPid=112&pageIndex=&bbsSeqNo=94&nttSeqNo=3180691&searchOpt=ALL&searchTxt=)

Korea Aerospace Research Institute (KARI) — a state-run space technology developer that has played a central role in developing the nation’s first domestic space launch vehicle, KSLV-2 — will be responsible for the public-to-private transfer, according to the ministry. KSLV-2, nicknamed Nuri, is a three-stage liquid-propellant rocket capable of sending a 1.5-ton satellite into low Earth orbit. The rocket is set to make its first demonstration flight in October from Naro Space Center in Goheung, the only launch site in South Korea.

The transfer will be done in a way KARI and selected companies do joint development and launch tests.

“The time has come to make a departure from state-led development of space launch vehicles toward one in which the private sector plays an expanded and more active role,” said [Yong Hong-taek, the science ministry’s vice minister,](https://english.msit.go.kr/eng/contents/cont.do?sCode=eng&mPid=19&mId=22) in the statement.

The policy reconfirms the government’s commitment to accelerating public-to-private transfer of space technologies. It comes as SpaceX and other innovative private companies play increasingly important roles in the global space industry. In the first move of this kind, since May, KARI and Korea Advanced Institute of Science and Technology (KAIST) have transferred their satellite-manufacturing technologies to a handful of major aerospace companies here.

While the science ministry didn’t  identify the companies that would benefit from the latest tech transfer, the most likely beneficiaries include [Hanwha Aerospace](https://spacenews.com/hanwha-aerospace-bets-big-on-space-business/), [Innospace](https://biz.chosun.com/industry/company/2021/08/26/B73DAPWKMBFAHCPFK2ME6NM6H4/?utm_source=naver&utm_medium=original&utm_campaign=biz), [Perigee Aerospace](https://spacenews.com/backed-by-samsung-south-korean-startup-perigee-aims-for-2020-maiden-launch/) and [Korean Air](https://spacenews.com/south-koreas-top-airline-to-develop-propellant-tank-for-smallsat-launcher/).

Hanwha is a major rocket engine developer here, which contributed to KSLV-2’s development with engine assembly and supply of key components. Innospace is a hybrid rocket startup, and Perigee is developing a methane-fueled smallsat launcher. Korea Air, South Korea’s biggest airline, is developing technologies to launch small satellites from its Boeing 747-400 cargo planes — the same way Virgin Orbit launches customers’ satellites into orbit.

**Development is rapid.**

**Whan-Woo 21** Yi Whan-Woo, 10-03-2021, "Space race heats up in Korea's private sector ," koreatimes, <https://www.koreatimes.co.kr/www/tech/2021/10/693_316355.html> //rahulpenu + Jay

Space race heats up in Korea's private sector Korean companies are capitalizing on their exclusive areas of expertise to join the private-sector space race, with Hanwha Group and Korea Aerospace Industries (KAI) specialized in satellites and rockets, LIG NEx1 in navigation systems and Korean Air in aircraft design and manufacturing. The country's private space tech industry is still in its nascent stage compared to that of the United States, which has made tangible progress as seen from commercial space flights by SpaceX, Blue Origin and Virgin Galactic. Korea spent $412 million in space research and development in 2018, according to OECD data. The U.S. topped the list with $26.3 billion, followed by France with $3.42 billion and the United Kingdom with $2.4 billion. When it comes to the level of technological development, Korea was at 60 percent of the U.S. level in 2019, while China was at 89 percent and Japan at 86 percent, according to data compiled by the U.S. National Technical Information Service (NTIS). Against this backdrop, the Korean government is lowering barriers for private companies of all sizes to enter the space tech industry. The government is also is seeking to transfer technology and knowhow on projectile development for commercial purposes. A joint decision in May to terminate U.S. guidelines that have long restricted Korea's development of missiles has allowed individual firms to develop space launch vehicles. All of these steps are apparently right on track. Morgan Stanley projects the global space industry will generate more than $1 trillion in revenue by 2040, up from $350 billion in 2018. The Ministry of Trade, Industry and Energy also sees the space tech industry as full of promise and ranks it as the second-most-lucrative business after semiconductors. "For the private sector to take the initiative in the space race, the government should recognize private companies as investment partners," said An Hyung-jun, a principal researcher at the Korea Institute of Science and Technology (KIST), a government-affiliated, multi-disciplinary research lab. The Federation of Korean Industries (**FKI), a business lobby group, suggested launching a Korean version of NASA and increasing government spending on the space industry** to help more private companies step in. Hanwha, KAI, LIG Nex1 compete for lead Hanwha Group is assessed by multiple sources as the most active when it comes to the commercial aerospace business. The conglomerate in March launched an aerospace taskforce called "Space Hub" led by Kim Dong-kwan, the corporate owner family's heir apparent and the eldest son of group chairman Kim Seung-youn. The taskforce consists of aerospace engineers from affiliates. Among the affiliates is defense and IT arm Hanwha Systems, which announced a $300 million investment in the London-based satellite communications company OneWeb in August. The investment allows Hanwha Systems to acquire an 8.8 percent stake in OneWeb that aims to establish a global internet network using a fleet of 648 low-Earth-orbit satellites by next year. The satellites will provide high-speed and low-latency internet services around the world and could power internet-of-things devices for future services. Another affiliate, Hanwha Aerospace, participated in the development of "Nuri," Korea's first domestically developed space rocket that successfully completed a first-stage engine combustion test early this year. Hanwha Aerospace also acquired a 30 percent stake in satellite manufacturer Satrec Initiative, a domestic firm known for manufacturing small and medium-size Earth observation satellites. Making satellites as small and light as possible is considered a key to their commercialization. Hanwha Aerospace is also involved in developing liquid-propellant engines for the Korea Space Launch Vehicle (KSLV) and other components like turbo pumps, valves and thrust vector control systems. KAI oversees the assembly and system integration of the Nuri rocket with roughly 270,000 parts supplied by more than 300 domestic companies. KAI signed a contract with SpaceX to develop the "No. 4" next-generation, medium-sized satellite. KAI plans to send four midsize satellites into orbit by 2025 and SpaceX rocket will carry the No. 4. The deal with SpaceX took KAI a step closer to developing and launching a 500-kilogram standard satellite platform. LIG Nex1, a defense contractor, is at the center of the $3 billion Korean Positioning System, a project aimed at building the domestic version of a global positioning system. The project is critical as Korea plans to start running autonomous flying taxis by 2035, relying on precise satellite navigation that the current GPS can't offer. If successful, Korea will join the U.S., Russia, Europe, China, India and Japan that have their own satellite networks for high-precision positioning, navigation and timing. Korean Air, the country's flag carrier, began a feasibility study in cooperation with Seoul National University to use large commercial aircraft for "air launching," the practice of releasing a rocket, missile, parasite aircraft or other aircraft payload from a mother ship or launch aircraft The study aims to figure out how to apply core technologies to the project, annual operating costs, and aircraft modification in order to develop an air-launch system with the Boeing 747-400. Air launch, which happens at an altitude of 12 kilometers, is less affected by weather conditions that often deter ground launches. It is believed to be cost-efficient, as it does not need ground construction and maintenance.

**That ensures aggressive space racing with noko.**

**Ryall 21** Julian Ryall, 10-21-2021, "South Korea space rocket test prompts fear of arms race with North," DW, <https://www.dw.com/en/south-korea-space-rocket-test-prompts-fear-of-arms-race-with-north/a-59572929> //Jay

South Korea space rocket test prompts fear of arms race with North Tensions between Seoul and Pyongyang have grown in recent months. South Korea's failed test of its first-ever homegrown rocket has prompted worries of a new arms race. A rocket is launched in a cloud of smoke and flame from a launch pad with the ocean in the background South Korea has launched a Nuri rocket from the launch pad of its Naro Space Center in Goheung, South Korea Shortly after 5 p.m. local time (0800 UTC) on Thursday, South Korea launched its first domestically produced rocket from the Naro Space Center in the northeastern county of Goheung. All three stages of the liquid-fueled Nuri rocket, which cost around 2 trillion won ($1.7 billion, €1.46 billion), worked but the rocket reportedly failed to complete the mission of delivering a test satellite into orbit. South Korean President Moon Jae-in said the rocket reached an altitude of 700 kilometers (435 miles), and that the 1.5 ton payload separated successfully. However, Moon said that "putting a dummy satellite into orbit remains an unfinished mission." Despite the test being unable to fulfill its task of putting a satellite into orbit, the launch comes as South Korea is locked into a growing rivalry with North Korea over technological advances in weaponry. South Korean President Moon Jae-in called the test an "excellent accomplishment,'' taking South Korea a step further toward a space launch program. People wait to watch the launch of the Nuri rocket, the first domestically produced space rocket in Goheung, South Korea Many South Koreans gathered to watch the launch of the country's first homegrown space rocket North Korea submarine missile test was planned, experts think South Korea's launch of the Nuri rocket has long been planned. Analysts said it was no coincidence that North Korea on Tuesday carried out what it claims was the first launch of a ballistic missile from a submerged submarine (SLBM). The test launch was conducted off the naval base on the west coast of the peninsula. It was the eighth time that the North has carried out a missile launch this year. It also coincided with the five-day Seoul International Aerospace and Defense Exhibition, where South Korean President Moon Jae-in was pictured in a flight suit and in the cockpit of a domestically produced FA-50 fighter jet. Speaking to reporters, Moon said it is imperative for South Korea to build up its defenses: "A strong defense capability is always aimed at ensuring peace." "The Republic of Korea seeks to build a smart and strong armed forces based on state-of-the-art technology," he added. North justifies military buildup Exactly one week earlier, North Korean leader Kim Jong-un attended a defense development exhibition in the North's capital Pyongyang to mark the 76th anniversary of the founding of the Workers' Party, issuing a similar justification for his own military buildup. "We must be powerful for our coming generations as well," the state-run Korea Central News Agency (KCNA) quoted Kim as saying. "That is our first and foremost task." "The military danger facing our state daily to the military tension prevailing around the Korean peninsula is different from 10 or five, even three years ago," he said. Kim blamed "the unstable situation in the region" on the United States. a new type of a submarine-launched ballistic missile (SLBM) being test-fired from waters North Korea confirmed it had tested a new type of submarine-launched ballistic missile In late September, the North tested what it claimed was an advanced new hypersonic missile. US defense analysis suggests that Pyongyang may resume underground nuclear tests or fire a long-range ballistic missile within the next year. Both would be violations of United Nations Security Council resolutions. But Pyongyang insists that its military developments are purely defensive and necessary as its enemies — primarily the US, South Korea and Japan — remain committed to overthrow of the Kim regime. Those countries deny that they are planning a regime change in North Korea. But they all point out that they cannot sit by as a nuclear-armed and deeply unpredictable neighbor continues to build out its military capabilities. South Korea tested its own submarine-launched ballistic missile recently, and is investing heavily in improved equipment on land, sea and air. Significantly, the Korean navy is pushing ahead with plans to build the nation's first aircraft carrier. Meanwhile, discussions are also underway about the possibility of developing a nuclear-powered submarine. North Korea 'careful not to cross red lines' "The North just tested its first hypersonic missile and has now launched an SLBM, so it seems that they are showing the South and the rest of the world just what they can do," said June Park, a political economist with Princeton University. "South Korea cannot just sit by and let that happen, so the Seoul defense show is a chance to demonstrate, 'we also have the ability to defend ourselves,'" she told DW. Robert Dujarric, co-director of the Institute of Contemporary Asian Studies at the Tokyo campus of Temple University, says there has been an uptick in saber-rattling after a period of relative restraint on the Korean Peninsula. But he said Pyongyang is very aware where the "red line" lies. "Ever since the armistice at the end of the Korean War in 1953, we have seen these periodic bouts of development of new weapons in the North — such as nuclear tests and then intercontinental ballistic missile launches — but the North has been very careful to not go too far, to not cross any red lines," he said. "They have caused small-scale border incidents and been provocative and made a nuisance of themselves — but they have never gone too far as they know that crossing that red line would bring down a massive US retaliation," he said. Are we seeing a new arms race on the Korean Peninsula? Just a phase? "I think we are in that cycle again, and it must be remembered that it is one thing to parade a new missile through Pyongyang or to carry out a test launch, but it's an entirely different thing to fire one of these things in an operational situation," Park explained. Unfortunately, says Park, the North's development of nuclear weapons gives the South little leeway in where to advance its own military capabilities in the years to come. South Korean people are split almost half-and-half on the question of whether or not to develop a domestic nuclear deterrent, she said. Should that happen, however, the reverberations would be felt far beyond North Korea and could arguably destabilize the entire northeast Asian region, where Russia, China and Japan are also major powers, Park explained.

**North Korea sees the South’s launches as a double standard – that emboldens the regime and increases aggression.**

**Parry 21** [Richard Lloyd Parry, Richard Lloyd Parry has lived since 1995 in Tokyo, where he is the Asia editor of The Times. He has reported from 29 countries, including Afghanistan, Iraq and North Korea, and has been named Foreign Correspondent of the Year Asia Editor, 10-21-2021, "South Korea heightens tensions with space launch," The Times, [https://www.thetimes.co.uk/article/south-korea-heightens-tensions-with-space-launch-jb8mnwwdp accessed 1/12/2022](https://www.thetimes.co.uk/article/south-korea-heightens-tensions-with-space-launch-jb8mnwwdp%20accessed%201/12/2022)] Adam

South Korea launched a domestically built rocket into space today in a breakthrough that will embolden North Korean accusations of hypocrisy. The three-stage KSLV-II Nuri entered orbit after being launched from the Naro Space Centre on a small island off the country’s southwest coast, although it failed in its final task — putting into orbit a dummy satellite. Even so, it was a welcome half-success after years of setbacks and failures. The mission is likely to be seized upon by [North Korea](https://archive.is/o/a0crs/https:/www.thetimes.co.uk/article/north-korea-demands-end-to-joint-military-exercises-amid-further-missile-tests-hgwhg3jwf) as an example of double standards. Beginning in 1998 the North fired off a series of what it called civilian rockets, which were denounced by the US and South Korea as a front for developing long-range missiles. These predictions turned out to be correct and North Korea now has an arsenal of ballistic missiles, including weapons with the range to potentially strike the mainland United States. South Korea says its programme is intended for nothing more than launching civilian satellites. It was a nervous day for South Korea. In 2010 an earlier version of the Nuri exploded two minutes after take off, and until this afternoon the failure rate for the country’s rockets was 70 per cent. The launch was postponed by an hour as engineers checked valves in the rocket — among its three million separate parts. But just after 5pm local time the Nuri lifted off smoothly into clear skies and jettisoned its first and second stages on schedule. The launch confirms South Korea as only the seventh country in the world to have developed a domestic space vehicle that can carry a payload heavier than a tonne, after China, France, India, Japan, Russia and the United States. However, Nuri failed to launch its 1.5-tonne dummy satellite of steel and aluminium, which was supposed to have been placed into a low earth orbit of 600km to 800km. “It’s very difficult for newcomers to achieve this,” President Moon said at the Space Centre after the launch. “But we achieved it, with no help from other countries.” A version of the Nuri was successfully launched in 2013, though its first stage was manufactured in Russia. There is no immediate prospect that South Korea will convert its rocket technology to military use. It already has short and medium-range ballistic missiles although it is bound by an agreement with its US ally to limit these in range to 800km. Last month South Korea joined the small group of countries able to fire ballistic missiles from a submarine. With a range of 500km, the Hyunmoo 4-4 missile fired from a 3,000-tonne Dosan Ahn Chang-ho class submarine has all of North Korea within its range. But when North Korea carried out its [own submarine missile launch](https://archive.is/o/a0crs/https:/www.thetimes.co.uk/article/north-korea-tests-unidentifed-ballistic-missile-lw5fh0t8k) this week, the South expressed its “regret” and the US condemned the action. “To criticise [North Korea] for developing and test-firing the same weapon system as the one the US possesses or is developing is a clear expression of double standards and it only excites our suspicion about the ‘authenticity’ of its statement that it does not antagonise [North Korea],” a spokesman in Pyongyang said.

#### Soko complicates the space race---sends a signal of prolif to noko and allies.

Clarke et al. 21 (, C., Lee, S. and Woolnough, M., 2021. China isn't the only nation preparing for war in space. A small neighbour flew 'under the radar'. [online] Abc.net.au. Available at: <https://www.abc.net.au/news/2021-10-22/korea-china-india-space-race-military-flex/100547832> [Accessed 12 January 2022] Carrington Clarke is the ABC's Seoul Correspondent, covering East Asia for the network. He works across digital, television and radio. He's held a range of roles at the ABC including as a reporter with ABC Investigations, the flagship current affairs television program 7.30 and as a reporter and presenter with The Business. He previously worked at SKY News as a reporter and presenter. Before making the transition to journalism he worked as an economist.)-rahulpenu

Asia is in the midst of a space race, but it's not just about exploration. It's also a military flex

The space race has never purely been about planting a nation's flag on an object in space or benign scientific discovery. It's always had a military and strategic dimension. For almost half a century, as the US and Russia competed for dominance above Earth, both superpowers spent billions exploring space weapons, like death rays fired from rocket ships. Yet while the cold war ended some 30 years ago, some fear that a new space race may be a sign the world is poised to enter another arms race too. This time, however, it won't just be limited to global superpowers. "The reality is that militarisation — and, if you like, democratisation — of space technologies, means that there are going to be more and more entrants into the area," said Brett Biddington, a space policy expert based in Canberra. "The rocket that can launch a nuclear weapon is very, very similar to the rocket that can launch a satellite to do observations for weather." Today, the pool of countries deploying huge amounts of cash to stake out their claims in the skies above is growing larger. China, India and Japan have already started to demonstrate both the ambition and technological skills necessary to be considered space powers. This week, **South** **Korea** revealed that it too wants to be taken seriously on the global stage, **refusing** **to** **be** **left** behind in the race to space. The launch of the gleaming South Korean space rocket Nuri, the first fully domestically produced space launch vehicle, was supposed to be a moment of national pride for the country. The result was mixed. The rocket launched successfully but the dummy satellite it carried didn't make it into orbit. Still, South Korean President Moon Jae-in promised a "**Korea** **space** **age**" and said his country's ambitions would not be thwarted. How South Korea 'flew under the radar' While its neighbour North Korea is more widely known for its nuclear weaponry, South Korea has been quietly working on **developing** its own **military** **capability**. In recent years, the country has increased its military spending, earmarking roughly $US85 billion ($113 billion) in funding for arms improvements between 2020 and 2024. But Dr Biddington said the launch of Nuri was a significant milestone for South Korea because "launching a launch vehicle is a really difficult thing to do". "South Korea has a long and quite distinguished space heritage. It set up its space agency in 1989," he said. "I feel like it's been flown under the radar, so to speak. "It's just quietly developed capabilities and used those capabilities without wanting to unduly upset any of its neighbours." Dr Biddington suggested the launch was also a sign that **South** **Korea** **now** wants to **assert** its **independence** not only **to** its **rivals** but also to its **allies**. "It's also a **message** **to** the neighbours of Korea, maybe **North** **Korea** especially," he said. "But also it's a comment to Japan and to China and to Russia, and even the United States that Korea has quietly and patiently developed capabilities that allow it to stand on its own two feet when it comes to its interest in outer space."

The space race and the arms race

**Nuri's** launch comes at a **time** **of** **heightened** tensions **in** the region with a full-blown arms race in action. Koreans have become accustomed to projectiles being launched from their peninsula. On Thursday, North Korea showed off its new Submarine Launched Ballistic Missile (SLBM) only a month after South Korea had shown off its own version. But it's not just confined to the peninsula, with reports this week suggesting China had tested a new 'hypersonic missile' that utilises space rocket technology to create a potentially devastating weapon. China dismissed the reports but Chang Young-keun, a missile expert at the Korea Aerospace University, said it was almost certain what China deployed was a weapon. "They definitely tested a hypersonic vehicle, not a space rocket," he said. Against such a backdrop, South Korea is not hiding that its space program has major military implications. "When we improve our civilian space technology, we also improve our military space technology," said Professor Chang. This week the country welcomed hundreds of international delegates to its major arms fair, the Aerospace and Defence Expo or ADEX. It was jam-packed with theatrics: Fighter jets manoeuvring overhead, drawing giant love hearts in the sky with their contrails as delegates below chowed down on **smoky** **Texas** **grill** and **burgers**. South Korean President Moon Jae-in made his own surprise visit to the event in the back of a fighter jet, urging the country to redouble its efforts to become a global defence leader. "The goal of building strong defence power is always to foster peace," he told the crowd.

The benefit of a space race

South Korea may not yet have its own dedicated 'Space Force' like the US, but it has made clear that **space** is **crucial** **to** its **defence**. However, there are also legitimate civilian and scientific motivations for its ambitions for a space industry. South Korea's capacity to launch its own rockets is a critical step for reaching goals like a national 6G cellular network and a sovereign radio navigation system like the American GPS. Lee Hyung-mok, who is a professor emeritus in physics and astronomy at Korea National University, said he and his fellow scientists were excited about the opportunity to use these rockets. He said they will help transport observation equipment outside the earth's atmosphere, allowing them to better understand our universe. Such a discovery doesn't come cheap and Professor Lee said he recognises that space travel can be expensive. He also said he knows that national defence is often an easier way to get the government to loosen the public purse strings. "Maybe the government decided to spend a huge amount of money because of the military importance," he said. Although competition might be spurring further investment in space, he still worries about where it might lead. "What I really hope is that instead of competing too much, it's better to collaborate," he said. "So in many areas, they try to work together." But he said within Asia, no-one is in that "mood" yet.

#### 1---Prolif

#### Continued development spurs competition, security fears, and perceived nuclearization.

Lee 21 [Jeong-Ho Lee, Bloomberg Government Reporter, SNU graduate, Kings College PHD Student 10-20-2021, "South Korea to Launch New Rocket as Arms Race Builds Across Asia," Bloomberg, <https://www.bloomberg.com/news/articles/2021-10-20/south-korea-to-launch-new-rocket-as-arms-race-builds-across-asia>] //Jay

South Korea is set to launch a home-developed Nuri rocket Thursday, showing global powers a leap in aerospace technology that can be used for both commercial and military purposes. President Moon Jae-in plans to watch the launch of the three-stage liquid-fuel rocket carrying a 1.5-ton dummy payload, which is set for liftoff at about 4 p.m. local time from the Naro Space Center on the country’s southern coast. South Korea sees the program as bolstering its competitiveness in 6G communications and helping it place more eyes in the sky as rival North Korea adds to its arsenal, including intercontinental ballistic missiles. The launch comes months after the U.S. removed limits on South Korea’s rocket development in place since the Cold War. South Korea has recently made advances in both its military missile capabilities and civilian program, playing catchup with more advanced space programs in China and Japan. While South Korea doesn’t have a nuclear arms program, support for them is higher among the public than in Japan -- another U.S. ally dependent on America for deterrence, where opposition is strong after America dropped two atomic bombs at the end of World War II. One of the top contenders for South Korea’s presidential race next March, conservative Hong Joon-pyo, told Bloomberg in September it might be time for the country to have nuclear weapons. That could add a twist to the Nuri program, which is currently for civilian use. U.S. ‘Naive’ About Kim Talks, Leading South Korea Candidate Says “If you just replace the satellite with a warhead, South Korea’s rocket becomes an ICBM,” said Cheon Seong-whun, a former security strategy secretary of South Korea’s presidential Blue House. Washington has welcomed the advances in South Korea’s space program. The Seoul government in May joined NASA’s Artemis program, which plans to return humans to the lunar surface. The 1.5-ton satellite on Nuri is expected to enter into orbit about 600 to 800 kilometers (375 to 500 miles) above the Earth. It would be a major advancement over South Korea’s two-stage Naro space vehicle built with domestic and Russian technology, which was hit by delays and two failed launches before a successful flight in 2013. South Korea has invested approximately $1.8 billion into the project since 2010, well before Moon took office in 2017. South Korea eventually plans to send a spaceship to the moon by 2030, after aiming to send a probe there for more than a decade. Just hours before Moon witnessed the test of South Korea’s new submarine-launched ballistic system last month, North Korea test-fired ballistic missiles off a train for the first time. On Tuesday, Kim Jong Un’s regime fired off its first missile from a submarine in about five years. China on Saturday sent three astronauts to its Tiangong space station, while its reported launch of a hypersonic missile into orbit has raised concerns that U.S. rivals are quickly neutralizing the Pentagon’s missile defenses even as it invests tens of billions of dollars in upgrades. As regional security concerns heat up, South Korea has been pushing to fully activate its “425 Project” of high-resolution surveillance satellites as early as next year. The program would have civilian and military applications to watch the Korean Peninsula including North Korea -- and possibly China.

**Causes East Asian war---escalation, miscalc, and cyberattacks.**

**Sukin and Dalton 21** Lauren Sukin, 10-26-2021, (Lauren Sukin is a Ph.D. candidate at Stanford University’s department of political science and a pre-doctoral fellow at the Center for International Security and Cooperation. Toby Dalton is a senior fellow at, and co-director of, the Nuclear Policy Program at the Carnegie Endowment for International Peace.)"Why South Korea Shouldn’t Build Its Own Nuclear Bombs," War on the Rocks, <https://warontherocks.com/2021/10/why-south-korea-shouldnt-build-its-own-nuclear-bombs/> //Jay

Lind and Press also point to alliance credibility challenges as a reason why South Korea should build its own nuclear weapons. They are certainly not alone in warning that U.S. nuclear credibility may be crumbling, yet there is plenty of evidence indicating the political and military foundations of the U.S.-South Korean defense relationship remain strong. Recent public opinion surveys by the Chicago Council for Global Affairs showed that 62 percent of Americans support the use of U.S. military forces to defend South Korea against a North Korean attack. This is matched by attitudes in South Korea, where the public also continues to express high levels of support for, and confidence in, the alliance. A September 2021 Asan Institute poll, for example, showed 78 percent support for maintaining or strengthening the U.S.-South Korean alliance. Proponents of a South Korean nuclear weapons program argue, however, that South Koreans are no longer confident in the United States — they point to high levels of public support for nuclear proliferation (70 percent in the recent Asan poll) and concerns that South Korea’s military alone is not sufficient to deter North Korea (72 percent, according to Asan). But deeper research paints a more nuanced picture of the credibility challenge. For example, research by Lauren Sukin found that, in 2019, 58 percent of South Korean survey respondents believed the United States would use nuclear weapons to defend South Korea from a North Korean nuclear attack. Other work shows robust U.S. public support for the nuclear security guarantee to South Korea. Scholars have similarly found that the U.S. public is willing to use nuclear weapons, including against North Korea, and even when there is a high risk of nuclear retaliation. So the claim by Lind and Press that “South Korea can’t be sure it can depend on its U.S. ally for protection” seems overblown. This is not to argue that concerns about alliance credibility have no basis. Building confidence in the alliance among the South Korean public is an ongoing challenge, made much harder in the wake of the Trump administration’s extortionate approach to alliance burden-sharing negotiations. South Koreans were also alarmed in 2017 that President Donald Trump’s “fire and fury” might result in a war they did not want. Yet, neither of these are problems are fundamentally about the reliability of U.S. promises to aid South Korea in a security crisis. Rather, they point to a need for better alliance political and military cohesion, especially coordination about contingencies involving North Korea that could escalate to use of nuclear weapons. In sum, alliance credibility problems are real but not as severe as many have suggested, and nuclear weapons are far from a clear remedy for the problems that persist. **Would Nuclear Weapons Improve South Korean Security?** Even if the alliance problems were as profound as some analysts contend — and if South Korean nuclear proliferation did not somehow make them worse — a South Korean decision to acquire nuclear weapons would not necessarily improve Seoul’s security against North Korea or China, as advocates have claimed. Indeed, a lot would depend on how North Korea and China would react to South Korean proliferation. South Korean nuclear weapons may not be especially useful politico-military tools against China. U.S. nuclear threats against China during the Korean War did not dissuade Beijing from continuing to fight. Nor has China hesitated to leverage its conventional military strength in territorial contests with nuclear-armed India. China’s ongoing modernization of its nuclear forces — whether by constructing missile silos or testing hypersonics — suggests Beijing may view the survivability and effectiveness of its arsenal as vital for deterring the United States, especially in the Taiwan Strait. Would South Korean nuclear weapons dissuade Beijing from undertaking coercive operations against Seoul? It seems unlikely. If anything, South Korean proliferation could plausibly invite more **coercive Chinese economic and military pressures** if Beijing interpreted Seoul’s nuclear arsenal as a direct challenge to its regional aspirations. Vis-à-vis China, then, South Korea could wind up counterintuitively less secure with nuclear weapons than without them. South Korean nuclear weapons could similarly make the situation with North Korea much more dangerous. Already, joint U.S.-South Korean military exercises, which Pyongyang calls “exercises for a nuclear war,” have repeatedly prompted North Korea to issue aggressive rhetoric, engage in cross-border provocations, and conduct missile tests. In the face of a South Korean nuclear weapons program, it would be unreasonable to expect North Korea to take no countervailing actions. For example, it seems likely that South Korean proliferation could cause N**orth Korea to further augment** its nuclear arsenal, posture its nuclear weapons for first use, or take greater risks to gain the upper hand in an escalating military crisis. After all, even the United States, with its far superior nuclear arsenal, has had limited success deterring or compelling North Korea. Moreover, even if South Korean nuclear weapons likely would deter large-scale violence by China or North Korea, they could make the threat of low-level conflict escalation greater than it already is today. This is especially important in the Indo-Pacific context, where the most prevalent threats and sources of crisis escalation — such as China’s overflights of contested territory or North Korea’s offensive use of **cyber** capabilities — exist far below the nuclear threshold. The “stability-instability paradox” of nuclear weapons suggests that, although mutual possession of nuclear weapons may reduce the chances of nuclear war, it may, at the same time, make conventional wars and militarized crises more likely, as well as incentivize greater risk taking at lower levels. A more moderated version of this argument suggests that nuclear weapons may not necessarily make low-level conflict more likely, but neither do they prevent it. For instance, a nuclear-armed South Korea could be emboldened to respond more aggressively to North Korean provocations with proactive deterrence or “quid pro quo plus” military operations, the inherent escalation risks of which are intended to dissuade North Korea in the first place. Facing perceived “use or lose” pressures, North Korea may be quicker to cross certain **escalation** thresholds, such as the use of long-range rocket systems, as it seeks escalation dominance. The potential for these action-reaction dynamics to spiral into a race up the escalation ladder is clear. To be certain, this potential is already present, but it seems likely to worsen if South Korea possessed nuclear weapons. Reaction times during moments of crisis would be shorter, tensions higher; **miscommunication** and misperception easier, and nuclear use more accessible. South Korean proliferation could, then, make conflict more likely at worst and fail to deter it at best.

#### East Asian war escalates and outweighs.

Tan 15 (January, Andrew Tan, Associate Professor PhD (Sydney), M Phil (Cambridge), B Soc Science (Hons) (NUS), BA (NUS) School of Social Sciences, “Security and Conflict in East Asia”, Google Books, pgs. 3-4)

The **high tensions in East Asia**, the highest since the end of the Second World War **have led to** fears of open conflict **involving the states in the region as well as extra-regional powers, in particular the USA**. By early 2013 **tensions between North Korea on the one hand, and South Korea, the USA and Japan**, on the other, had deterior**ated to their worst level since the end of the Korean War** in 1953, **sparking feats of an accidental war due to North Korea’s brinkmanship and political miscalculation** (ICC 2013a). **Tensions between the People's Republic of China and Japan were also at their highest since the end of the Second World War**, due to their dispute over the Diaoyu/Senkaku lslands (Hughes 2013). More seriously, **China, the USA and North Korea possess** nuclear weapons**, and Japan has always been regarded as a** threshold nuclear power, **as it possesses plutonium stocks generated through its power industry, ballistic missile capability and the technology to rapidly transform itself into a significant nuclear weapons power should it choose to do so** (Rublee 24110: (12-(>3). **South Korea could also be forced to** develop its own nuclear weapons **if the threat from a hostile aggressive and unpredictable North Korea continues to grow** as it develops its nuclear, chemical and biological weapons capabilities, and uses them to coerce South Korea (New York Times 2013). The impact of any regional conflict in East Asia will be significant and global. **Any conflict in this region would involve not only states in the region and US allies from further afield, but also** quickly escalate into a nuclear conflict, **given the superiority that the USA enjoys in terms of conventional warfare capabilities over North Korea, and to a diminishing degree, China**, thus **forcing them to resort to non-conventional means, such as nuclear weapons, in any major conﬂict**. Indeed, the US strategy of Air-Sea Battle, which involves attacking China’s surveillance, intelligence and command systems, are likely to be interpreted by China as attempts to disarm its nuclear strike capability and could thus lead to a quick and unwanted escalation into a nuclear conflict (Schreer 2013). Moreover, today **the centre of the global economy no longer resides in Europe or North America but in Asia, in particular, East Asia**. Indeed, **three of the key actors in the region, namely the USA, China Japan, are also the three largest economies in the world**, with South Korea ranked 15th in global terms, according to the World Bank. Any conflict in East Asia will therefore have a profound, global economic impact. Furthermore, **the fact that any conﬂict could escalate into a major war,** including nuclear war**, means that conflict in East Asia will have** global implications **as well as** uncertain consequences for the international system.

#### Nuclear war causes extinction

* Checked

PND 16. internally citing Zbigniew Brzezinski, Council of Foreign Relations and former national security adviser to President Carter, Toon and Robock’s 2012 study on nuclear winter in the Bulletin of Atomic Scientists, Gareth Evans’ International Commission on Nuclear Non-proliferation and Disarmament Report, Congressional EMP studies, studies on nuclear winter by Seth Baum of the Global Catastrophic Risk Institute and Martin Hellman of Stanford University, and U.S. and Russian former Defense Secretaries and former heads of nuclear missile forces, brief submitted to the United Nations General Assembly, Open-Ended Working Group on nuclear risks. A/AC.286/NGO/13. 05-03-2016. <http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/OEWG/2016/Documents/NGO13.pdf> //Re-cut by Elmer

Consequences human survival 12. Even if the 'other' side does NOT launch in response the smoke from 'their' burning cities (incinerated by 'us') will still make 'our' country (and the rest of the world) uninhabitable, potentially inducing global famine lasting up to decades. Toon and Robock note in ‘Self Assured Destruction’, in the Bulletin of Atomic Scientists 68/5, 2012, that: 13. “A nuclear war between Russia and the United States, even after the arsenal reductions planned under New START, could produce a nuclear winter. Hence, an attack by either side could be suicidal, resulting in self assured destruction. Even a 'small' nuclear war between India and Pakistan, with each country detonating 50 Hiroshima-size atom bombs--only about 0.03 percent of the global nuclear arsenal's explosive power--as air bursts in urban areas, could produce so much smoke that temperatures would fall below those of the Little Ice Age of the fourteenth to nineteenth centuries, shortening the growing season around the world and threatening the global food supply. Furthermore, there would be massive ozone depletion, allowing more ultraviolet radiation to reach Earth's surface. Recent studies predict that agricultural production in parts of the United States and China would decline by about **20 percent** for four years, and by 10 percent for a decade.” 14. A conflagration involving USA/NATO forces and those of Russian federation would most likely cause the deaths of most/nearly all/all humans (and severely impact/extinguish other species) as well as destroying the delicate interwoven techno-structure on which latter-day 'civilization' has come to depend. Temperatures would drop to below those of the last ice-age for up to 30 years as a result of the lofting of up to 180 million tonnes of very black soot into the stratosphere where it would remain for decades. 15. Though human ingenuity and resilience shouldn't be underestimated, human survival itself is arguably problematic, to put it mildly, under a 2000+ warhead USA/Russian federation scenario. 16. The Joint Statement on Catastrophic Humanitarian Consequences signed October 2013 by 146 governments mentioned 'Human Survival' no less than 5 times. The most recent (December 2014) one gives it a highly prominent place. Gareth Evans’ ICNND (International Commission on Nuclear Non-proliferation and Disarmament) Report made it clear that it saw the threat posed by nuclear weapons use as one that at least threatens what we now call 'civilization' and that potentially threatens human survival with an immediacy that even climate change does not, though we can see the results of climate change here and now and of course the immediate post-nuclear results for Hiroshima and Nagasaki as well.

#### Cyberattacks cause extinction.

Rees 18 (, M., 2018. On the Future: Prospects for Humanity. [online] Princeton University Press. Available at: <https://press.princeton.edu/books/hardcover/9780691180441/on-the-future> [Accessed 21 September 2021] Martin Rees is Astronomer Royal, and has been Master of Trinity College and Director of the Institute of Astronomy at Cambridge University. As a member of the UK’s House of Lords and former President of the Royal Society, he is much involved in international science and issues of technological risk. His books include Our Cosmic Habitat (Princeton), Just Six Numbers, and Our Final Hour (published in the UK as Our Final Century).)-recut rahulpenu

2.5. TRULY EXISTENTIAL RISKS? Our world increasingly depends on elaborate networks: electricity power grids, air traffic control, international finance, globally dispersed manufacturing, and so forth. Unless these networks are highly resilient, their benefits could be outweighed by catastrophic (albeit rare) breakdowns— realworld analogues of what happened in the 2008 global financial crisis. Cities would be ~~paralysed~~ [gridlocked] without electricity— the lights would go out, but that would be far from the most serious consequence. Within a few days our cities would be uninhabitable and anarchic. Air travel can spread a pandemic worldwide within days, wreaking havoc on the disorganised megacities of the developing world. And social media can spread panic and rumour, and economic contagion, literally at the speed of light. When we realise the power of biotech, robotics, cybertechnology, and AI— and, still more, their potential in the coming decades— we can’t avoid anxieties about how this empowerment could be misused. The historical record reveals episodes when ‘civilisations’ have crumbled and even been extinguished. Our world is so interconnected it’s unlikely a catastrophe could hit any region without its consequences cascading globally. For the first time, we need to contemplate a collapse— societal or ecological— that would be a truly global setback to civilisation. The setback could be temporary. On the other hand, it could be so devastating (and could have entailed so much environmental or genetic degradation) that the survivors could never regenerate a civilisation at the present level.

#### 2---Space

**NoKo Tensions in space spill over to war causes EMP, Van Allen, Nukes, turns every impact.**

**Davis 17** (, M., 2017. North Korean nukes and space war | The Strategist. [online] The Strategist. Available at: <https://www.aspistrategist.org.au/north-korean-nukes-space-war/> [Accessed 12 January 2022] Dr Malcolm Davis Senior Analyst Contact informationContact information EXPERTISE Space Policy, Space Security, Strategy & capability development, future warfare and military technology & Chinese military modernisation.)-rahulpenu

North Korean nukes and space war

North Korea’s launch of a Hwasong-12 IRBM over Japan on 28 August, a second launch on 15 September (once again overflying Japan), and its test of what is either a boosted fission weapon or an early generation thermonuclear weapon on 3 September have accelerated the rush towards a major military crisis on the Korean peninsula. One aspect of North Korea’s nuclear developments that warrants closer attention is its ability to use nuclear weapons to generate electromagnetic pulse (EMP) attacks, or threaten low-Earth orbiting satellites in space.

The testing of higher yield nuclear weapons gives North Korea the ability to attack electrical and electronic systems over a wide area. Detonating a nuclear weapon at high altitude, such as in low-Earth orbit (LEO), would generate EMP, which would fry electrical and electronic circuits over a large geographic area.

EMP isn’t new; we’ve known about it since the Cold War, as a result of high-altitude nuclear testing such as the ‘Starfish Prime’ test in 1962. The effects of that test on terrestrial electrical systems generated concerns that the Soviet Union could blanket the US or NATO with sufficient EMP to burn out critical command and control networks and disrupt Washington’s nuclear retaliatory capability in the opening stages of a nuclear first strike. Such an attack would have had an even more devastating effect on non-hardened civilian infrastructure.

Earlier this year, North Korea’s testing of ICBMs included trajectories lofted to very high altitudes, which allowed Pyongyang to test warhead re-entry survivability, and minimised the risk of US military retaliation. The tests also demonstrated North Korea’s ability to detonate a nuclear weapon at high altitudes to generate EMP. Carrying out such an attack wouldn’t require accurate guidance, or high-yield warheads that are capable of surviving the heat of atmospheric re-entry, or even ICBMs.

A 2008 EMP Commission report (PDF) found that **exo**-**atmospheric** **detonations** of nuclear weapons would directly **affect** critical civilian **infrastructure**, most notably for power generation, telecommunications and data networks, as well as robotic industrial and manufacturing infrastructure. Analysis in June of this year on 38 North suggests that North Korea is already well placed to cause substantial damage to unprotected civilian networks using such attacks. That would hold true against the US, as well as its allies such as Japan and South Korea, or even Australia.

Evidence given by Peter Vincent Pry to the 2004 EMP Commission suggested that (PDF, p. 5) North Korea, with Russian assistance, was developing a ‘super-EMP’ weapon designed to affect a broad range of electronic systems. Such a weapon could be delivered by a missile, or it could be deployed in a satellite in a manner similar to the Soviet-era Fractional Orbital Bombardment System (FOBS).

If North Korea could detonate a nuclear weapon in space, it could also undertake a ‘**Van** **Allen’** attack that would be designed to excite and **expand** the lower Van Allen **radiation** **belt** around Earth, exposing up to 803 satellites in LEO to high levels of radiation. US Defense Threat Reduction Agency analysis in 2010 suggested that satellites in LEO, which are not hardened against radiation found in higher orbits, would be vulnerable to nuclear detonations that ‘**pumped’** the intensity of the Van Allen belts. Weeks or months of cumulative damage generated by passing through the zones of radiation would **cause** those **satellites** **to** **fail**. A Van Allen attack is highly indiscriminate: any satellite passing through the excited lower belt would be damaged. US satellites would be just as defenceless as those belonging to China, Russia or other states.

Certainly satellites could be replaced, but it would take years to completely restore the lost capability. The requirement to wait until Van Allen belts returned to normal levels of radiation, limited launch capability, long production queues, and the high cost for new satellites would slow the process down. If a combined Van Allen and EMP attack was effectively carried out, the ability to re-establish space systems could be at risk if satellite production facilities were damaged. In the interim, global economic systems would fall apart as the vital communications links for stock markets collapsed.

The Trump administration is maintaining that ‘all options are on the table’ for dealing with North Korea’s growing nuclear threat. The prospects for war on the peninsula are bad enough, with massed North Korean artillery attacks on Seoul a leading concern as well as the prospect of a general North Korean offensive into South Korea. The risk of a war escalating across the nuclear threshold raises the spectre of the first use of nuclear weapons in anger since Nagasaki—against South Korea, Japan or US territory—and the possibility that **Pyongyang** could **devastate** its **opponents’** economies with EMP and destroy vital space infrastructure with Van Allen attacks. In any war, North Korea would certainly face defeat and, with it, the end of Kim Jong-un’s regime. In confronting his fate, Kim Jong-un would have everything to gain and little to lose by employing such a devastating tactic.

#### Van Allen causes extinction.

Karl **Grossman 96**, professor of journalism at the State University of New York/College of New York, ’96, "Risking the World: Nuclear Proliferation in Space," Covert Action Quarterly, Summer 1996

To say nothing of the Earth and the life on it if something goes wrong. Plutonium has long been described by scientists as the **most toxic substance known**. It is "so toxic," says Dr. Helen Caldicott, founder of Physicians for Social Responsibility, "that less than one millionth of a gram is a carcinogenic dose. One pound, if uniformly distributed, could hypothetically induce **lung cancer in every person on Earth**." (3)

In addition to the specter of radioactivity spread by an accident on launch, another, potentially more lethal, scenario is causing concern. Because Cassini does not have the propulsion power to get directly from Earth to Saturn, NASA plans a "slingshot maneuver" in which the probe will circle Venus twice and hurtle back at Earth. It will then buzz the Earth in August 1999 at 42,300 miles per hour just 312 miles above the surface. After whipping around Earth and using its gravity, Cassini would then have the velocity, says NASA, to reach Saturn. But during that Earth fly-by, if Cassini comes in too close, it could burn up in the 75 mile-high atmosphere and disperse plutonium across the planet.

Dr. Michio Kaku, professor of nuclear physics at the City University of New York, explains the catastrophic consequence of such a fly-by accident:

"[If] there is a small misfire [of Cassini's] rocket system, it will mean that [it] will penetrate into the Earth's atmosphere and the sheer friction will begin to wipe out the heat shield and it will, like a meteor, **flame into the Earth's atmosphere** ... This thing, coming into the Earth's atmosphere will vaporize, release the payload and then particles of plutonium dioxide will begin to **rain down on populated areas**, if that is where the system is going to be hitting. [Pulverized plutonium dust] will rain down on people's hair, people's clothing, get into people's bodies. And because it is not water soluble, there is a very good chance that it could be inhaled and stay within the body causing cancer over a number of decades." (4)

Indeed, NASA says in its Final Environmental Impact Statement for the Cassini Mission, that if an "inadvertent reentry occurred" during the fly-by, approximately five billion of the seven to eight billion people on Earth, "could receive 99 percent or more of the radiation exposure." (5) As for the death toll, which NASA labels "health effects," the agency says that only 2,300 deaths "could occur over a 50-year period to this exposed population" and these "latent cancer fatalities" would likely be "statistically indistinguishable from normally occurring cancer fatalities among the world population." (6)

However, after reviewing the data in the NASA report, Dr. Ernest Sternglass, professor emeritus of radiological physics at the University of Pittsburgh School of Medicine, concluded that NASA "underestimate[s] the cancer alone by about 2,000 to 4,000 times. Which means that not counting all the other causes of death--infant mortality, heart disease, immune deficiency diseases and all that--we're talking in the order of ten to twenty million extra deaths." The actual death toll, then, the physicist warned, may be as high as 30 to 40 million people. (7)

**Korean conflict would make space unusable – debris and radiation wreck the LEO.**

**Skibba 20** (, R., 2020. The Ripple Effects of a Space Skirmish. [online] The Atlantic. Available at: <https://www.theatlantic.com/technology/archive/2020/07/space-warfare-unregulated/614059/> [Accessed 12 January 2022] Ramin Skibba is a San Diego-based astrophysicist turned science writer. His work has appeared in Undark magazine, New Scientist, and Nature.)-rahulpenu

The **Ripple** **Effects** of a Space Skirmish

If a conflict breaks out between countries with weapons in orbit, it could **threaten** space **access** for everyone.

On April 22, after several failed attempts, Iran’s Islamic Revolutionary Guard Corps announced a successful launch of what it described as a military reconnaissance satellite. That satellite joined a growing list of weapons and military systems in orbit, including those from Russia (which in April tested a missile program designed to destroy satellites) and India (which launched an anti-satellite weapon in March 2019).

Experts like Brian Weeden, director of program planning at the Secure World Foundation (SWF), a nonpartisan think tank based in Broomfield, Colorado, worry that these developments—all confirmed by the newly rebranded United States Space Force—threaten to lift earthly conflicts to new heights and put all space activities, peaceful and military alike, at risk. Researchers at SWF and at the Center for Strategic and International Studies (CSIS), a nonpartisan think tank in Washington, D.C., both released reports this year on the rapidly evolving state of affairs. The reports suggest that the biggest players in space have upgraded their military abilities, including satellite-destroying weapons and technologies that disrupt spacecraft, by, for instance, blocking data collection or transmission.

Many of these technologies, if deployed, could ratchet up an **arms** **race** and even spark a skirmish in space, the SWF and CSIS researchers caution. Blowing up a single satellite scatters debris throughout the atmosphere, said Weeden, co-editor of the SWF report. Such an explosion could hurl projectiles in the paths of other spacecraft and threaten the accessibility of space for everyone.

“Those are absolutely the two best reports to be looking at to get a sense of what’s going on in the space community,” said David Burbach, a national security affairs expert at the U.S. Naval War College in Newport, Rhode Island, who was not involved in the new research.

Today, Burbach added, the world is very different compared with the Cold War era, when access to space was essentially limited to the United States and the Soviet Union. Many more countries now have space programs, including India, Iran, North Korea, France, Japan, and Israel.

Despite this expansion—and the array of new space weapons—relevant policies and regulatory bodies have remained stagnant. “What worries us in the international community is that there aren’t necessarily any guardrails for how people are going to start interfering with others’ space systems,” said Daniel Porras, a space security fellow at the United Nations Institute for Disarmament Research in Geneva. “There are **no** **rules** **of** **engagement**.”

The new reports use available evidence and intelligence to explore a range of weapons that various countries’ militaries are developing or testing—or already have operational. (Notably, CSIS’s report doesn’t include the American military.) Each nation has unique abilities and characteristics. For example, India has invested heavily in space infrastructure and capabilities, while Japan’s post–World War II space activities were limited until a recent change to its constitution. For Israel’s space program, Weeden said, little good data is available.

Potential missile attacks on military satellites “tend to get most of the attention, but that is not all that we see happening around the world,” said Todd Harrison, director of the Aerospace Security Project at CSIS and a principal author of its report, during an April 6 livestream.

For example, the thousands of everyday satellites that already circle **low**-**Earth** **orbit**, below an altitude of 1,200 miles, could potentially **suffer** **collateral** **damage**. More than half of those satellites are from the U.S.; many of the rest are from China and Russia. They provide key services like internet access, GPS signals, long-distance communications, and weather information. Any missile that smashes into a satellite—either as an attack or during a test—would disperse thousands of bits of debris. Any one of those pieces, still hurtling at orbital speeds, could take out another spacecraft and create yet more debris.

“It’s **very** **easy** **to** **pollute** space,” Burbach said. “The debris doesn’t discriminate. If you create debris, it might just as well come back and hit one of your own satellites. So I think we’re pretty unlikely to see countries actually use those capabilities.” Still, he said, “it would be worrying to see countries showing off that [they] can do it and start testing.”

When China conducted an anti-satellite missile test in 2007, it created a massive cloud of space junk that drew international condemnation. India’s engineers tried to limit debris from their recent test by conducting it at a low altitude, so that Earth’s gravity would pull the pieces down and they would burn up on descent. But some pieces were flung up to the International Space Station’s orbit. There were no collisions; as of February, only 15 trackable pieces of debris remained in orbit, said Victoria Samson, director of the Secure World Foundation’s Washington office, during the CSIS livestream in April.

A number of countries are developing new military technologies for space. France, for instance, is working on laser beams that could dazzle another country’s satellite, preventing it from taking pictures of classified targets. North Korea is studying how to jam radio frequency signals sent to or from a satellite, and Iran is devising cyberattacks that could interfere with satellite systems. Meanwhile, the big three space heavyweights—the U.S., Russia, and China—are already capable of all three approaches, according to the SWF report.

The big three have also begun to master what the reports call “rendezvous and proximity operations,” which involve using satellites as surveillance devices or weapons. A satellite could maneuver within miles of a rival’s classified satellite, snap photos of equipment, and transmit the pictures down to Earth. Or a satellite could sidle up to another and spray its counterpart’s lenses or cover its solar panels, cutting off power and rendering it useless. Russia may be ahead with this technology, having already launched a series of small “inspector satellites,” as the Russian government calls them. Last fall, according to Gen. John “Jay” Raymond, chief of space operations for the U.S. Space Force, one crept near a U.S. spy satellite, which he called a “potentially threatening behavior.”

So far, there are relatively few international policies or norms about what’s allowed in modern-day space and what’s not. The SWF report notes that an incident or misunderstanding could escalate tensions if it’s perceived as an attack.

The lack of guidance has left room for a range of activities. Weeden said that in December 2019, the Trump administration signaled its intention to strengthen the United States’ space weaponry and protect its spacecraft from possible attacks by Russia and China by transforming the Air Force Space Command into the U.S. Space Force. That shift “brought a full-time operational focus to the space domain, which was a needed change,” wrote Lieutenant Colonel Christina Hoggatt, a Space Force spokesperson, in a statement to Undark. With these forces, the Defense Department seeks to “strengthen deterrence” and improve capabilities to “defend our vital assets in space,” she wrote. This emphasis, Burbach said, likely means that the U.S. military will focus on making satellites more resilient to attack, rather than developing offensive weapons.

David A. Graham: Why the Space Force is just like Trump University

Compared with the U.S., smaller space powers have fewer satellites and therefore less to lose, the U.N.’s Porras said. He argues that tense **regional** **relationships** could be particularly **unpredictable**. For example, he said, if North Korean leaders found themselves in a standoff with South Korea and the U.S., they might launch and detonate a nuclear weapon in space; its **dangerous** **radiation** would **disable** most **satellites**.

The U.N. and other international groups—including SWF and the Outer Space Institute, a global research organization based in British Columbia—are working to avoid such scenarios. Weeden said that as long as countries don’t launch destructive space weapons near other countries’ spacecraft, conduct overtly provocative tests, or disable critical satellites, peaceful space activities should continue. For now, he points out, countries have only tested missiles on their own defunct satellites, and exercises against other nations’ spacecraft have remained nondestructive.

Existing international laws offer little guidance for modern military technology in space. While these rules—including the Partial Nuclear Test Ban Treaty of 1963 and the U.N.’s Outer Space Treaty of 1967—prohibit weapons of mass destruction in space, they don’t explicitly limit other kinds of space weapons, tests, or military space forces.

Weeden points out that space diplomats could create new guidelines by developing something like the Incidents at Sea agreement, which the U.S. and the Soviet Union signed during the Cold War to maintain safe distances between ships and avoid maneuvers in heavy traffic. But until similar rules involving space weaponry are hammered out, he said, unexpected satellite tests will inevitably fuel speculation and paranoia.

“Any time you have militaries operating near each other without a lot of transparency or clarity,” he added, “you always have the opportunity for misperceptions that could lead to something very bad.”

#### Independently, that causes Extinction.

George Dvorsky 15. Senior Staff reporter at Gizmodo. "What Would Happen If All Our Satellites Were Suddenly Destroyed?" <https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681>.

Lastly, there’s the [Kessler Syndrome](http://www.spacesafetymagazine.com/space-debris/kessler-syndrome/) to consider. This scenario was portrayed in the 2013 film Gravity. In the movie, a Russian missile strike on a defunct satellite inadvertently causes a cascading chain reaction that formed an ever-growing cloud of orbiting space debris. Anything in the cloud’s wake — including satellites, space stations, and astronauts — gets annihilated. Disturbingly, the Kessler Syndrome is a very real possibility, and the likelihood of it happening [is steadily increasing as more stuff gets thrown into space](http://io9.com/how-to-clean-up-deadly-space-junk-before-disaster-strik-1443463338). Given these grim prospects, it’s fair to ask what might happen to our civilization if any of these things happened. At the risk of gross understatement, the complete loss of our satellite fleet would instigate a tremendous disruption to our current mode of technological existence — disruptions that would be experienced in the short, medium, and long term, and across multiple [domains](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681). Compromised Communications Almost immediately we’d notice a dramatic reduction in our ability to communicate, share information, and conduct transactions. “If our communications satellites are lost, then bandwidth is also lost,” [Jonathan McDowell](http://planet4589.org/) tells io9. He’s an astrophysicists and Chandra Observatory scientist who works out of the [Harvard-Smithsonian Center for Astrophysics](http://planet4589.org/jcm/cfa-www.harvard.edu). McDowell says that, with telecommunication satellites wiped out, the burden of telecommunications would fall upon undersea cables and ground-based communication systems. But while many forms of communication would disappear in an [instant](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), others would remain. All international calls and data traffic would have to be re-routed, placing tremendous pressure on terrestrial and undersea lines. Oversaturation would stretch the capacity of these systems to the limit, preventing many calls from going through. Hundreds of millions of Internet connections would vanish, or be severely overloaded. A similar number of cell phones would be rendered useless. In remote areas, people dependent on satellite for television, Internet, and radio would practically lose all service. “Indeed, a lot of television would suddenly disappear,” says McDowell. “A sizable portion of TV comes from cable whose companies relay programming from satellites to their hubs.” It’s important to note that we actually have a precedent for a dramatic — albeit brief — disruption in com-sat capability. Back in 1998, [there was a day in which a single satellite failed and all the world’s pagers stopped working](http://articles.latimes.com/1998/may/21/news/mn-52190). Get Out Your Paper Maps We would also lose the Global Positioning System. In the years since its inception, GPS has become ubiquitous, and a surprising number of systems have become reliant on it. “Apart from the fact that everyone has forgotten to navigate without GPS in their cars, many airplanes use GPS as well,” says McDowell. Though backup systems exist, airlines use GPS to chart the most fuel-efficient and expeditious routes. Without GPS and telecomm-sats, aircraft controllers would have tremendous difficulty communicating with and routing airplanes. Airlines would have to fall back to legacy systems and procedures. Given the sheer volume of airline traffic today, accidents would be all but guaranteed. Other affected navigation systems would include those aboard cargo vessels, supply-chain management systems, and transportation hubs driven by GPS. But GPS does more than just provide positioning — it also provides for timing. Ground-based atomic clocks can perform the same function, but GPS is increasingly being used to distribute the universal time standard via satellites. Within hours of a terminated service, any distributing networks requiring tight synchronization would start to suffer from “clock drift,” leading to serious performance issues and outright service outages. Such disruptions could affect everything from the power grid through to the financial sector. In the report, “[A Day Without Space: Economic and National Security Ramifications](http://marshall.org/wp-content/uploads/2013/08/Day-without-Space-Oct-16-2008.pdf),” Ed Morris, the Executive Director of the Office of Space Commerce at the Department of Commerce, writes: If you think it is hard to get work done when your internet connection goes out at the office, imagine losing that plus your cell [phone](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), TV, radio, ATM access, [credit cards](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), and possibly even your electricity. [...] Wireless services, especially those built to [CDMA standard](http://www.protocols.com/pbook/cellular.htm), would fail to hand off calls from one cell to the next, leading to dropped connections. Computer networks would experience slowdowns as data is pushed through finite pipelines at reduced bit rates. The same would be true for major networks for communication and entertainment, since they are all IP-based today and require ultra-precise timing to ensure digital traffic reaches its destination. The lack of effective synch would hit especially hard in banking, where the timing of transactions needs to be recorded. Credit card payments and bank accounts would likely freeze, as billions of dollars could be sucked away from businesses. A financial crash is not out of the question. The Loss of Military Capability The sudden loss of satellite capability would have a profound effect on the military. The Marshall Institute puts it this way: “Space is a critical enabler to all U.S. warfare domains,” including intelligence, navigation, communications, weather prediction, and warfare. McDowell describes satellite capability as as the “backbone” of the U.S. military. And as 21st century warfare expert [Peter W. Singer](http://www.pwsinger.com/biography.html) from [New America Foundation](https://www.newamerica.org/) tells io9, “He who controls the heavens will control what happens in the battles of Earth.” Singer summarized the military consequences of losing satellites in an email to us: Today there are some 1,100 active satellites which act as the nervous system of not just our economy, but also our military. Everything from communications to GPS to intelligence all depend on it. Potential foes have noticed, which is why Russia and China have recently begun testing a new generation of anti-satellite weapons, which in turn has sparked the U.S. military to recently budget $5 billion for various space warfare systems. What would happen if we lost access to space? Well, the battles would, as one U.S. military officer put it, take us back to the “pre digital age.” Our drones, our missiles, even our ground units wouldn’t be able to operate the way we plan. It would force a rewrite of all our assumptions of 21st century high tech war. We might have a new generation of stealthy battleships...but the loss of space would mean naval battles would in many ways be like the game of Battleship, where the two sides would struggle to even find each other. Moreover, and as McDowell explains to io9, the loss of satellite capability would have a profound effect on arms control capabilities. Space systems can monitor compliance; without them, we’d be running blind. “The overarching consideration is that you wouldn’t really know what’s going on,” says McDowell. “Satellites provide for both global and local views of what’s happening. We would be less connected, less informed — and with considerably degraded situational awareness.” Compromised Weather Prediction and Climate Science One great thing satellites have done for us is improve our ability to forecast weather. Predicting a slight chance of cloudiness is all well and good, but some areas, like India, Pakistan, and Bangladesh, are dependent on such systems to predict potentially hazardous monsoons. And in the U.S., the NOAA has estimated that, during a typical hurricane season, weather satellites save as much as $3 billion in lives and property damage. There’s also the effect on science to consider. Much of what we know about climate change comes from satellites. As McDowell explains, the first couple of weeks without satellites wouldn’t make much of a difference. But over a ten-year span, the lack of satellites would preclude our ability to understand and monitor such things as the ozone layer, carbon dioxide levels, and the distribution of polar ice. Ground-based and balloon-driven systems would help, but much of the data we’re currently tracking would suddenly become much spottier. “We’re quite dependent on satellites for a global view of what’s happening on our planet — and at a time when we really, really need to know what’s happening,” says McDowell. It’s also worth pointing out that, without satellites, we also wouldn’t be able to monitor space weather, such as incoming space storms. Time to Recover With all the satellites gone, both governmental and private interests would work feverishly to restore space-based capabilities. Depending on the nature of the satellite-destroying event, it could take decades or more to get ourselves back to current operational standards. It would take a particularly long time to recover from a Carrington Event, which would zap many ground-based electronic systems as well. The U.S. military is already thinking along these lines, which is why it’s working on the ability to quickly send up emergency assets, such as small satellites parked in Low Earth Orbit (LEO). Cube satellites are increasingly favored, as an easy-to-launch, affordable, and effective solution — albeit a short-term one. The U.S. Operationally Responsive State Office is currently working on the concept of emergency replenishment and the ability to “rapidly deploy capabilities that are good enough to satisfy warfighter needs across the entire spectrum of operations, from peacetime through conflict.” As for getting full-sized, geostationary satellites back into orbit, that would prove to be a greater challenge. It can take years to built a new satellite, which typically requires a big, costly rocket to get it into space. Lastly, if a Kessler Syndrome wipes out the satellites, that would present an entirely different recovery scenario. According to McDowell, it would take a minimum of 11 years for LEO to clear itself of the debris cloud; any objects below 500 km (310 miles) would eventually fall back to Earth. Thus, we would only be able to start re-seeding LEO in a little over a decade following a Kessler event. Unfortunately, the area above 600 km (372 miles) would remain out of touch for a practically indefinite period of time; objects orbiting at that height tend to stay there for a long, long time. We’d probably lose this band for good — unless we manually removed the debris field, using clean-up satellites or other techniques. It’s worth noting that a single Kessler event could hit the LEO zone or the GEO zone (geosynchronous orbit) but realistically not both; LEO debris could never reach GEO, and vice versa — though a spent rocket in GTO (geosynchronous transfer orbit) or SSTO (supersynchronous transfer orbit) passes through or near both zones and could potentially affect either of them. The spent rockets in GTO do not stay too close to the GEO arc for long due to orbital perturbations, so a GEO Kessler event is very unlikely to be triggered by one of them. Suffice to say, we should probably take the prospect of a Kessler Syndrome more seriously, and be aware of what could happen if we’re no longer able to use these spaces.

### 1AC---Framing

#### 1---Pleasure and pain *are* intrinsic value and disvalue – everything else *regresses* – robust neuroscience.

Blum et al. 18

Kenneth Blum, 1Department of Psychiatry, Boonshoft School of Medicine, Dayton VA Medical Center, Wright State University, Dayton, OH, USA 2Department of Psychiatry, McKnight Brain Institute, University of Florida College of Medicine, Gainesville, FL, USA 3Department of Psychiatry and Behavioral Sciences, Keck Medicine University of Southern California, Los Angeles, CA, USA 4Division of Applied Clinical Research & Education, Dominion Diagnostics, LLC, North Kingstown, RI, USA 5Department of Precision Medicine, Geneus Health LLC, San Antonio, TX, USA 6Department of Addiction Research & Therapy, Nupathways Inc., Innsbrook, MO, USA 7Department of Clinical Neurology, Path Foundation, New York, NY, USA 8Division of Neuroscience-Based Addiction Therapy, The Shores Treatment & Recovery Center, Port Saint Lucie, FL, USA 9Institute of Psychology, Eötvös Loránd University, Budapest, Hungary 10Division of Addiction Research, Dominion Diagnostics, LLC. North Kingston, RI, USA 11Victory Nutrition International, Lederach, PA., USA 12National Human Genome Center at Howard University, Washington, DC., USA, Marjorie Gondré-Lewis, 12National Human Genome Center at Howard University, Washington, DC., USA 13Departments of Anatomy and Psychiatry, Howard University College of Medicine, Washington, DC US, Bruce Steinberg, 4Division of Applied Clinical Research & Education, Dominion Diagnostics, LLC, North Kingstown, RI, USA, Igor Elman, 15Department Psychiatry, Cooper University School of Medicine, Camden, NJ, USA, David Baron, 3Department of Psychiatry and Behavioral Sciences, Keck Medicine University of Southern California, Los Angeles, CA, USA, Edward J Modestino, 14Department of Psychology, Curry College, Milton, MA, USA, Rajendra D Badgaiyan, 15Department Psychiatry, Cooper University School of Medicine, Camden, NJ, USA, Mark S Gold 16Department of Psychiatry, Washington University, St. Louis, MO, USA, “Our evolved unique pleasure circuit makes humans different from apes: Reconsideration of data derived from animal studies”, U.S. Department of Veterans Affairs, 28 February 2018, accessed: 19 August 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6446569/>, R.S.

**Pleasure** is not only one of the three primary reward functions but it also **defines reward.** As homeostasis explains the functions of only a limited number of rewards, the principal reason why particular stimuli, objects, events, situations, and activities are rewarding may be due to pleasure. This applies first of all to sex and to the primary homeostatic rewards of food and liquid and extends to money, taste, beauty, social encounters and nonmaterial, internally set, and intrinsic rewards. Pleasure, as the primary effect of rewards, drives the prime reward functions of learning, approach behavior, and decision making and provides the **basis for hedonic theories** of reward function. We are attracted by most rewards and exert intense efforts to obtain them, just because they are enjoyable [10].

Pleasure is a passive reaction that derives from the experience or prediction of reward and may lead to a long-lasting state of happiness. The word happiness is difficult to define. In fact, just obtaining physical pleasure may not be enough. One key to happiness involves a network of good friends. However, it is not obvious how the higher forms of satisfaction and pleasure are related to an ice cream cone, or to your team winning a sporting event. Recent multidisciplinary research, using both humans and detailed invasive brain analysis of animals has discovered some critical ways that the brain processes pleasure [14].

Pleasure as a hallmark of reward is sufficient for defining a reward, but it may not be necessary. A reward may generate positive learning and approach behavior simply because it contains substances that are essential for body function. When we are hungry, we may eat bad and unpleasant meals. A monkey who receives hundreds of small drops of water every morning in the laboratory is unlikely to feel a rush of pleasure every time it gets the 0.1 ml. Nevertheless, with these precautions in mind, we may define any stimulus, object, event, activity, or situation that has the potential to produce pleasure as a reward. In the context of reward deficiency or for disorders of addiction, homeostasis pursues pharmacological treatments: drugs to treat drug addiction, obesity, and other compulsive behaviors. The theory of allostasis suggests broader approaches - such as re-expanding the range of possible pleasures and providing opportunities to expend effort in their pursuit. [15]. It is noteworthy, the first animal studies eliciting approach behavior by electrical brain stimulation interpreted their findings as a discovery of the brain’s pleasure centers [16] which were later partly associated with midbrain dopamine neurons [17–19] despite the notorious difficulties of identifying emotions in animals.

Evolutionary theories of pleasure: The love connection BO:D

Charles Darwin and other biological scientists that have examined the biological evolution and its basic principles found various mechanisms that steer behavior and biological development. Besides their theory on natural selection, it was particularly the sexual selection process that gained significance in the latter context over the last century, especially when it comes to the question of what makes us “what we are,” i.e., human. However, the capacity to sexually select and evolve is not at all a human accomplishment alone or a sign of our uniqueness; yet, we humans, as it seems, are ingenious in fooling ourselves and others–when we are in love or desperately search for it.

It is well established that modern biological theory conjectures that **organisms are** the **result of evolutionary competition.** In fact, Richard Dawkins stresses gene survival and propagation as the basic mechanism of life [20]. Only genes that lead to the fittest phenotype will make it. It is noteworthy that the phenotype is selected based on behavior that maximizes gene propagation. To do so, the phenotype must survive and generate offspring, and be better at it than its competitors. Thus, the ultimate, distal function of rewards is to increase evolutionary fitness by ensuring the survival of the organism and reproduction. It is agreed that learning, approach, economic decisions, and positive emotions are the proximal functions through which phenotypes obtain other necessary nutrients for survival, mating, and care for offspring.

Behavioral reward functions have evolved to help individuals to survive and propagate their genes. Apparently, people need to live well and long enough to reproduce. Most would agree that homo-sapiens do so by ingesting the substances that make their bodies function properly. For this reason, foods and drinks are rewards. Additional rewards, including those used for economic exchanges, ensure sufficient palatable food and drink supply. Mating and gene propagation is supported by powerful sexual attraction. Additional properties, like body form, augment the chance to mate and nourish and defend offspring and are therefore also rewards. Care for offspring until they can reproduce themselves helps gene propagation and is rewarding; otherwise, many believe mating is useless. According to David E Comings, as any small edge will ultimately result in evolutionary advantage [21], additional reward mechanisms like novelty seeking and exploration widen the spectrum of available rewards and thus enhance the chance for survival, reproduction, and ultimate gene propagation. These functions may help us to obtain the benefits of distant rewards that are determined by our own interests and not immediately available in the environment. Thus the distal reward function in gene propagation and evolutionary fitness defines the proximal reward functions that we see in everyday behavior. That is why foods, drinks, mates, and offspring are rewarding.

There have been theories linking pleasure as a required component of health benefits salutogenesis, (salugenesis). In essence, under these terms, pleasure is described as a state or feeling of happiness and satisfaction resulting from an experience that one enjoys. Regarding pleasure, it is a double-edged sword, on the one hand, it promotes positive feelings (like mindfulness) and even better cognition, possibly through the release of dopamine [22]. But on the other hand, pleasure simultaneously encourages addiction and other negative behaviors, i.e., motivational toxicity. It is a complex neurobiological phenomenon, relying on reward circuitry or limbic activity. It is important to realize that through the “Brain Reward Cascade” (BRC) endorphin and endogenous morphinergic mechanisms may play a role [23]. While natural rewards are essential for survival and appetitive motivation leading to beneficial biological behaviors like eating, sex, and reproduction, crucial social interactions seem to further facilitate the positive effects exerted by pleasurable experiences. Indeed, experimentation with addictive drugs is capable of directly acting on reward pathways and causing deterioration of these systems promoting hypodopaminergia [24]. Most would agree that pleasurable activities can stimulate personal growth and may help to induce healthy behavioral changes, including stress management [25]. The work of Esch and Stefano [26] concerning the link between compassion and love implicate the brain reward system, and pleasure induction suggests that social contact in general, i.e., love, attachment, and compassion, can be highly effective in stress reduction, survival, and overall health.

Understanding the role of neurotransmission and pleasurable states both positive and negative have been adequately studied over many decades [26–37], but comparative anatomical and neurobiological function between animals and homo sapiens appear to be required and seem to be in an infancy stage.

Finding happiness is different between apes and humans

As stated earlier in this expert opinion one key to happiness involves a network of good friends [38]. However, it is not entirely clear exactly how the higher forms of satisfaction and pleasure are related to a sugar rush, winning a sports event or even sky diving, all of which augment dopamine release at the reward brain site. Recent multidisciplinary research, using both humans and detailed invasive brain analysis of animals has discovered some critical ways that the brain processes pleasure.

Remarkably, there are pathways for ordinary liking and pleasure, which are limited in scope as described above in this commentary. However, there are **many brain regions**, often termed hot and cold spots, that significantly **modulate** (increase or decrease) our **pleasure or** even produce **the opposite** of pleasure— that is disgust and fear [39]. One specific region of the nucleus accumbens is organized like a computer keyboard, with particular stimulus triggers in rows— producing an increase and decrease of pleasure and disgust. Moreover, the cortex has unique roles in the cognitive evaluation of our feelings of pleasure [40]. Importantly, the interplay of these multiple triggers and the higher brain centers in the prefrontal cortex are very intricate and are just being uncovered.

Desire and reward centers

It is surprising that many different sources of pleasure activate the same circuits between the mesocorticolimbic regions (Figure 1). Reward and desire are two aspects pleasure induction and have a very widespread, large circuit. Some part of this circuit distinguishes between desire and dread. The so-called pleasure circuitry called “REWARD” involves a well-known dopamine pathway in the mesolimbic system that can influence both pleasure and motivation.

In simplest terms, the well-established mesolimbic system is a dopamine circuit for reward. It starts in the ventral tegmental area (VTA) of the midbrain and travels to the nucleus accumbens (Figure 2). It is the cornerstone target to all addictions. The VTA is encompassed with neurons using glutamate, GABA, and dopamine. The nucleus accumbens (NAc) is located within the ventral striatum and is divided into two sub-regions—the motor and limbic regions associated with its core and shell, respectively. The NAc has spiny neurons that receive dopamine from the VTA and glutamate (a dopamine driver) from the hippocampus, amygdala and medial prefrontal cortex. Subsequently, the NAc projects GABA signals to an area termed the ventral pallidum (VP). The region is a relay station in the limbic loop of the basal ganglia, critical for motivation, behavior, emotions and the “Feel Good” response. This defined system of the brain is involved in all addictions –substance, and non –substance related. In 1995, our laboratory coined the term “Reward Deficiency Syndrome” (RDS) to describe genetic and epigenetic induced hypodopaminergia in the “Brain Reward Cascade” that contribute to addiction and compulsive behaviors [3,6,41].

Furthermore, ordinary “liking” of something, or pure pleasure, is represented by small regions mainly in the limbic system (old reptilian part of the brain). These may be part of larger neural circuits. In Latin, hedus is the term for “sweet”; and in Greek, hodone is the term for “pleasure.” Thus, the word Hedonic is now referring to various subcomponents of pleasure: some associated with purely sensory and others with more complex emotions involving morals, aesthetics, and social interactions. The capacity to have pleasure is part of being healthy and may even extend life, especially if linked to optimism as a dopaminergic response [42].

Psychiatric illness often includes symptoms of an abnormal inability to experience pleasure, referred to as anhedonia. A negative feeling state is called dysphoria, which can consist of many emotions such as pain, depression, anxiety, fear, and disgust. Previously many scientists used animal research to uncover the complex mechanisms of pleasure, liking, motivation and even emotions like panic and fear, as discussed above [43]. However, as a significant amount of related research about the specific brain regions of pleasure/reward circuitry has been derived from invasive studies of animals, these cannot be directly compared with subjective states experienced by humans.

In an attempt to resolve the controversy regarding the causal contributions of mesolimbic dopamine systems to reward, we have previously evaluated the three-main competing explanatory categories: “liking,” “learning,” and “wanting” [3]. That is, dopamine may mediate (a) liking: the hedonic impact of reward, (b) learning: learned predictions about rewarding effects, or (c) wanting: the pursuit of rewards by attributing incentive salience to reward-related stimuli [44]. We have evaluated these hypotheses, especially as they relate to the RDS, and we find that the incentive salience or “wanting” hypothesis of dopaminergic functioning is supported by a majority of the scientific evidence. Various neuroimaging studies have shown that anticipated behaviors such as sex and gaming, delicious foods and drugs of abuse all affect brain regions associated with reward networks, and may not be unidirectional. Drugs of abuse enhance dopamine signaling which sensitizes mesolimbic brain mechanisms that apparently evolved explicitly to attribute incentive salience to various rewards [45].

Addictive substances are voluntarily self-administered, and they enhance (directly or indirectly) dopaminergic synaptic function in the NAc. This activation of the brain reward networks (producing the ecstatic “high” that users seek). Although these circuits were initially thought to encode a set point of hedonic tone, it is now being considered to be far more complicated in function, also encoding attention, reward expectancy, disconfirmation of reward expectancy, and incentive motivation [46]. The argument about addiction as a disease may be confused with a predisposition to substance and nonsubstance rewards relative to the extreme effect of drugs of abuse on brain neurochemistry. The former sets up an individual to be at high risk through both genetic polymorphisms in reward genes as well as harmful epigenetic insult. Some Psychologists, even with all the data, still infer that addiction is not a disease [47]. Elevated stress levels, together with polymorphisms (genetic variations) of various dopaminergic genes and the genes related to other neurotransmitters (and their genetic variants), and may have an additive effect on vulnerability to various addictions [48]. In this regard, Vanyukov, et al. [48] suggested based on review that whereas the gateway hypothesis does not specify mechanistic connections between “stages,” and does not extend to the risks for addictions the concept of common liability to addictions may be more parsimonious. The latter theory is grounded in genetic theory and supported by data identifying common sources of variation in the risk for specific addictions (e.g., RDS). This commonality has identifiable neurobiological substrate and plausible evolutionary explanations.

Over many years the controversy of dopamine involvement in especially “pleasure” has led to confusion concerning separating motivation from actual pleasure (wanting versus liking) [49]. We take the position that animal studies cannot provide real clinical information as described by self-reports in humans. As mentioned earlier and in the abstract, on November 23rd, 2017, evidence for our concerns was discovered [50]

In essence, although nonhuman primate brains are similar to our own, the disparity between other primates and those of human cognitive abilities tells us that surface similarity is not the whole story. Sousa et al. [50] small case found various differentially expressed genes, to associate with pleasure related systems. Furthermore, the dopaminergic interneurons located in the human neocortex were absent from the neocortex of nonhuman African apes. Such differences in neuronal transcriptional programs may underlie a variety of neurodevelopmental disorders.

In simpler terms, the system controls the production of dopamine, a chemical messenger that plays a significant role in pleasure and rewards. The senior author, Dr. Nenad Sestan from Yale, stated: “Humans have evolved a dopamine system that is different than the one in chimpanzees.” This may explain why the behavior of humans is so unique from that of non-human primates, even though our brains are so surprisingly similar, Sestan said: “It might also shed light on why people are vulnerable to mental disorders such as autism (possibly even addiction).” Remarkably, this research finding emerged from an extensive, multicenter collaboration to compare the brains across several species. These researchers examined 247 specimens of neural tissue from six humans, five chimpanzees, and five macaque monkeys. Moreover, these investigators analyzed which genes were turned on or off in 16 regions of the brain. While the differences among species were subtle, **there was** a **remarkable contrast in** the **neocortices**, specifically in an area of the brain that is much more developed in humans than in chimpanzees. In fact, these researchers found that a gene called tyrosine hydroxylase (TH) for the enzyme, responsible for the production of dopamine, was expressed in the neocortex of humans, but not chimpanzees. As discussed earlier, dopamine is best known for its essential role within the brain’s reward system; the very system that responds to everything from sex, to gambling, to food, and to addictive drugs. However, dopamine also assists in regulating emotional responses, memory, and movement. Notably, abnormal dopamine levels have been linked to disorders including Parkinson’s, schizophrenia and spectrum disorders such as autism and addiction or RDS.

Nora Volkow, the director of NIDA, pointed out that one alluring possibility is that the neurotransmitter dopamine plays a substantial role in humans’ ability to pursue various rewards that are perhaps months or even years away in the future. This same idea has been suggested by Dr. Robert Sapolsky, a professor of biology and neurology at Stanford University. Dr. Sapolsky cited evidence that dopamine levels rise dramatically in humans when we anticipate potential rewards that are uncertain and even far off in our futures, such as retirement or even the possible alterlife. This may explain what often motivates people to work for things that have no apparent short-term benefit [51]. In similar work, Volkow and Bale [52] proposed a model in which dopamine can favor NOW processes through phasic signaling in reward circuits or LATER processes through tonic signaling in control circuits. Specifically, they suggest that through its modulation of the orbitofrontal cortex, which processes salience attribution, dopamine also enables shilting from NOW to LATER, while its modulation of the insula, which processes interoceptive information, influences the probability of selecting NOW versus LATER actions based on an individual’s physiological state. This hypothesis further supports the concept that disruptions along these circuits contribute to diverse pathologies, including obesity and addiction or RDS.

#### 2---Reducing existential risks is the top priority in any coherent moral theory

Plummer 15 (Theron, Philosophy @St. Andrews http://blog.practicalethics.ox.ac.uk/2015/05/moral-agreement-on-saving-the-world/)

There appears to be lot of disagreement in moral philosophy. Whether these many apparent disagreements are deep and irresolvable, I believe there is at least one thing it is reasonable to agree on right now, whatever general moral view we adopt: that it is very important to reduce the risk that all intelligent beings on this planet are eliminated by an enormous catastrophe, such as a nuclear war. How we might in fact try to reduce such existential risks is discussed elsewhere. My claim here is only that we – whether we’re consequentialists, deontologists, or virtue ethicists – should all agree that we should try to save the world. According to consequentialism, we should maximize the good, where this is taken to be the goodness, from an impartial perspective, of outcomes. Clearly one thing that makes an outcome good is that the people in it are doing well. There is little disagreement here. If the happiness or well-being of possible future people is just as important as that of people who already exist, and if they would have good lives, it is not hard to see how reducing existential risk is easily the most important thing in the whole world. This is for the familiar reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. There are so many possible future people that reducing existential risk is arguably the most important thing in the world, even if the well-being of these possible people were given only 0.001% as much weight as that of existing people. Even on a wholly person-affecting view – according to which there’s nothing (apart from effects on existing people) to be said in favor of creating happy people – the case for reducing existential risk is very strong. As noted in this seminal paper, this case is strengthened by the fact that there’s a good chance that many existing people will, with the aid of life-extension technology, live very long and very high quality lives. You might think what I have just argued applies to consequentialists only. There is a tendency to assume that, if an argument appeals to consequentialist considerations (the goodness of outcomes), it is irrelevant to non-consequentialists. But that is a huge mistake. Non-consequentialism is the view that there’s more that determines rightness than the goodness of consequences or outcomes; it is not the view that the latter don’t matter. Even John Rawls wrote, “All ethical doctrines worth our attention take consequences into account in judging rightness. One which did not would simply be irrational, crazy.” Minimally plausible versions of deontology and virtue ethics must be concerned in part with promoting the good, from an impartial point of view. They’d thus imply very strong reasons to reduce existential risk, at least when this doesn’t significantly involve doing harm to others or damaging one’s character. What’s even more surprising, perhaps, is that even if our own good (or that of those near and dear to us) has much greater weight than goodness from the impartial “point of view of the universe,” indeed even if the latter is entirely morally irrelevant, we may nonetheless have very strong reasons to reduce existential risk. Even egoism, the view that each agent should maximize her own good, might imply strong reasons to reduce existential risk. It will depend, among other things, on what one’s own good consists in. If well-being consisted in pleasure only, it is somewhat harder to argue that egoism would imply strong reasons to reduce existential risk – perhaps we could argue that one would maximize her expected hedonic well-being by funding life extension technology or by having herself cryogenically frozen at the time of her bodily death as well as giving money to reduce existential risk (so that there is a world for her to live in!). I am not sure, however, how strong the reasons to do this would be. But views which imply that, if I don’t care about other people, I have no or very little reason to help them are not even minimally plausible views (in addition to hedonistic egoism, I here have in mind views that imply that one has no reason to perform an act unless one actually desires to do that act). To be minimally plausible, egoism will need to be paired with a more sophisticated account of well-being. To see this, it is enough to consider, as Plato did, the possibility of a ring of invisibility – suppose that, while wearing it, Ayn could derive some pleasure by helping the poor, but instead could derive just a bit more by severely harming them. Hedonistic egoism would absurdly imply she should do the latter. To avoid this implication, egoists would need to build something like the meaningfulness of a life into well-being, in some robust way, where this would to a significant extent be a function of other-regarding concerns (see chapter 12 of this classic intro to ethics). But once these elements are included, we can (roughly, as above) argue that this sort of egoism will imply strong reasons to reduce existential risk. Add to all of this Samuel Scheffler’s recent intriguing arguments (quick podcast version available here) that most of what makes our lives go well would be undermined if there were no future generations of intelligent persons. On his view, my life would contain vastly less well-being if (say) a year after my death the world came to an end. So obviously if Scheffler were right I’d have very strong reason to reduce existential risk. We should also take into account moral uncertainty. What is it reasonable for one to do, when one is uncertain not (only) about the empirical facts, but also about the moral facts? I’ve just argued that there’s agreement among minimally plausible ethical views that we have strong reason to reduce existential risk – not only consequentialists, but also deontologists, virtue ethicists, and sophisticated egoists should agree. But even those (hedonistic egoists) who disagree should have a significant level of confidence that they are mistaken, and that one of the above views is correct. Even if they were 90% sure that their view is the correct one (and 10% sure that one of these other ones is correct), they would have pretty strong reason, from the standpoint of moral uncertainty, to reduce existential risk. Perhaps most disturbingly still, even if we are only 1% sure that the well-being of possible future people matters, it is at least arguable that, from the standpoint of moral uncertainty, reducing existential risk is the most important thing in the world. Again, this is largely for the reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. (For more on this and other related issues, see this excellent dissertation). Of course, it is uncertain whether these untold trillions would, in general, have good lives. It’s possible they’ll be miserable. It is enough for my claim that there is moral agreement in the relevant sense if, at least given certain empirical claims about what future lives would most likely be like, all minimally plausible moral views would converge on the conclusion that we should try to save the world. While there are some non-crazy views that place significantly greater moral weight on avoiding suffering than on promoting happiness, for reasons others have offered (and for independent reasons I won’t get into here unless requested to), they nonetheless seem to be fairly implausible views. And even if things did not go well for our ancestors, I am optimistic that they will overall go fantastically well for our descendants, if we allow them to. I suspect that most of us alive today – at least those of us not suffering from extreme illness or poverty – have lives that are well worth living, and that things will continue to improve. Derek Parfit, whose work has emphasized future generations as well as agreement in ethics, described our situation clearly and accurately: “We live during the hinge of history. Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast. We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period. Our descendants could, if necessary, go elsewhere, spreading through this galaxy…. Our descendants might, I believe, make the further future very good. But that good future may also depend in part on us. If our selfish recklessness ends human history, we would be acting very wrongly.” (From chapter 36 of On What Matters)

#### 3---Actor specificity

#### A] Aggregation – every policy benefits some and harms others, which also means side constraints freeze action.

#### B] No act-omission distinction – choosing to omit is an act itself – governments decide not to act which means being presented with the aff creates a choice between two actions, neither of which is an omission

#### C] No intent-foresight distinction – If we foresee a consequence, then it becomes part of our deliberation

#### which makes it intrinsic to our action since we intend it to happen