# 1NC

## 1

#### The value is morality:

#### Ethics begin a posteriori—that means by experience, this is an indite the of the entire way they justify their framework.

#### 1. Knowledge is based on experience – I wouldn’t know 2+2=4 without experience of objects nor the color red without some experience of color. We can’t obtain evidence of goodness without experience.

#### 2. Indifference – Even if there are apriori moral truths, I can choose to ignore them. Cognition is binding – if I put my hand on a hot stove, I can’t turn off my natural aversion to it.

#### Independently, pleasure and pain are intrinsic value and disvalue – everything else regresses – robust neuroscience.

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**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.

#### Thus, the standard is maximizing expected well-being or act hedonistic util. Prefer additionally –

#### 1] Death is bad and outweighs – a) agents can’t act if they fear for their bodily security which constrains every ethical theory, b) it destroys the subject itself – kills any ability to achieve value in ethics since life is a prerequisite which means it’s a side constraint since we can’t reach the end goal of ethics without life

#### 2] Actor spec—governments must use util because they don’t have intentions and are constantly dealing with tradeoffs—outweighs since different agents have different obligations—takes out calc indicts since they are empirically denied.

#### Extinction first –

#### 1 – Forecloses future improvement – we can never improve society because our impact is irreversible

#### 2 – Turns suffering – mass death causes suffering because people can’t get access to resources and basic necessities

## 2

#### NASAs stuck in low orbit but the space race lets it extend further. Julie 21

Alyssa Julie, 12-9-2021, "How the private space race is allowing NASA to explore new frontiers ," Global News, <https://globalnews.ca/news/8408558/how-the-private-space-race-is-allowing-nasa-to-explore-new-frontiers/>, //hzheng

In February, NASA will launch the first un-crewed test flight of its Orion spacecraft and SLS rocket as it prepares to send astronauts back to the moon. Artemis I is the first in a series of increasingly complex missions to take place over the next few years. It will be followed by a second crewed test flight and a third flight that will land astronauts on the moon’s south-pole. NASA expects that will be in 2025, at the earliest. The agency says partnerships with private companies like SpaceX will build the lunar lander to ferry astronauts to the moon’s surface, making the Artemis program possible. The private space race has allowed NASA, and agencies like it, to turn their attention from Earth’s lower orbit and start planning for future missions, like Artemis. And as the agency plans to send astronauts to new frontiers, it is encouraging private industry to establish a greater presence in lower-Earth orbit — by collaborating with the private sector on a new space station. The International Space Station is now more than 20 years old, approved for use until 2024, with a likely extension only until the end of 2028 or 2030. NASA’s office of audits released a report at the start of December detailing the “costly repairs” to the orbiting laboratory that have been needed over time. It said maintenance and system upgrades to the ISS increased to approximately $169 billion in 2020. On Dec. 3, NASA announced three U.S. Companies that would receive over $400 million in government funding to develop commercial space stations — Jeff Bezos’ Blue Origin, Nanoracks and Northrop Grumman. Misty Snopkowski, Program Executive for the commercial LEO development program at NASA, says commercial stations, like the one’s these three companies are developing, will help the agency travel deeper into space. “We’re trying to go deeper into space and we can give this very well understood environment in LEO to commercial entities — for them to start establishing that LEO economy,” she says, adding that instead of owner and operator of a new space station, NASA would be one of many customers using the orbiting laboratory. With less of its funding tied up in the International Space Station, the agency will be free to throw more cash at deep space exploration, Snopkowski says. But there is still research that needs to be done in order to make these frontier missions possible. She says the agency has approximately 200 long-term experiments, most of which study the impact of space travel on the human body. The agency needs that work to continue after the International Space Station is decommissioned. “Those types of research, human research, [have] long lead times,” she explains. Such research not only helps further NASA’s ambitions in space, it is also helps us tackle big challenges on Earth, says York University astrophysicist Jesse Rogerson. “Going to the moon and going to Mars is going to push our understanding of how to do agriculture,” he says, as an example of how research in space can help us improve conditions on Earth. “Because we can’t do a permanent settlement on the moon or Mars without ‘living off the land.’ So pushing that science to the very edge so that we can grow something on Mars would inevitably help us do better on Earth.” Canadian astronaut Jeremy Hansen, who acts as CAPCOM at the Canadian Space Agency while he awaits his first flight assignment, says his agency is also involved in discussions about a future commercial space station. In addition to freeing-up funding for future deep space travel, he says such a partnership could reveal new ways to save money on research. “The space agency, we expect, will always be doing research in orbit. But the model on how we do that could change, could create more opportunities and could allow us to do more for less money,” he says. Hansen adds that collaborating with private industry will create more opportunities for astronauts to explore space, a boon for the Canadian Space Agency, whose astronauts have had to wait years to go to space as they wait for a seat to open on a mission. One upcoming mission Canada is taking part in will be Artemis II, the crewed test of the Orion spacecraft that will eventually transport astronauts to the moon. The private space race will also create more opportunities for scientists and astronomers hoping to conduct research in space, Rogerson adds.

#### We need to get off the rock – diversification ensures isolated populations prevent extinction and bolsters tech that mitigates existential threats. Reuter 21

Timothy Reuter (Head of Aerospace and Drones, World Economic Forum), 12-9-2021, "Why the human race must become a multiplanetary species," World Economic Forum, <https://www.weforum.org/agenda/2021/12/humans-multiplanetary-species/>, //hzheng

Supporters of space exploration sometimes suggest that sending robotic probes to the remote corners of the solar system and beyond can teach us what we need to know about the universe at less cost and risk than sending people. Yet, for the safety of our descendants and to reach humanity’s full potential, we must become a multiplanetary species. Humans have a one in six chance of going extinct this century according to Oxford Philosopher Toby Ord. In his book, The Precipice: Existential Risk and the Future of Humanity, Dr Ord lays out a variety of long-tail risks that are both existential and very difficult to mitigate. These include nature-based risks like asteroids, large-scale volcanic eruptions and stellar explosions. Although we can track many of these phenomena, we do not have the technology (nor are we likely to develop it anytime soon) to prevent large eruptions or redirect large asteroids. Initial efforts to nudge space objects are just beginning. This is to say nothing of the human-created risks of nuclear war or bioweapons intentionally or unintentionally released on the public, a scenario made easier to imagine by the current pandemic. As long as humanity is grouped together on a single planet there will always be a possibility that all of us can be killed at once. It is equivalent to having everyone in a single building: there is always a risk greater than zero of a collapse or fire that kills everyone. By establishing, at first, small outposts and eventually larger scale settlements on other planets, the risk of our species being destroyed is significantly curtailed. On a more positive note, human habitation in a greater variety of settings will radically expedite science and commerce. While we currently have small-scale experimentation with manufacturing items in micro and zero gravity on the International Space Station, the potential for us to set up large-scale industry in different physics requires us to have a presence on other celestial locations. Large-scale settlements of people are hubs of innovation and human flourishing. Just think of how many more discoveries and marvels could be created by 80 billion people in the future instead of today’s 8 billion. Our current planet has a limited carrying capacity but our solar system can accommodate many more people than any single planet can. Just as cultural and geographic variety contributes to the richness of our current society, further expanding the diversity of human settings would continue to expand the creativity of our species. Space travel itself has already been an incredible inspiration to numerous scientists, engineers and artists with many people citing seeing the moon landing as one of the most formative events of their lives. The technologies we develop on our way to becoming a multiplanetary species will also benefit us here on earth. Today, satellites are used to monitor carbon and other greenhouse gas emissions to give us a better picture of the causes of global warming and promote accountability. In her first speech devoted to space, US Vice-President Kalama Harris said: “I truly believe space activity is climate action.” In a recent report, the World Economic Forum's Global Future Council on Space laid out the many ways satellite data is being used to address climate change and suggests feeding data from space-based assets into an “Earth Operations Centre” to provide a real-time picture of activities and phenomena that contribute to warming. Less well known are the many other technologies developed on our way to space but used in our daily lives. The CMOS sensor was first invented at NASA’s Jet Propulsion Laboratory in the 1990s. No one could have predicted that this technology would eventually be part of all our phones, enabling high-quality digital images and affecting everything from how we document human rights abuses to how we present ourselves to potential mates on dating apps.

## 3

#### CP Text: All private entities must give a substantial proportion of any assets appropriated in outer space toward redistribution efforts

**The ASTEROIDS act has put us on a timer, only the counterplans distribution of wealth stops corporations and nations from universalizing laissez-faire.**

Nick **LEVINE** MPhil Candidate Philosophy of Science @ Cambridge **’15** https://www.jacobinmag.com/2015/03/space-industry-extraction-levine

The privatization of the Milky Way has begun.

Last summer, the bipartisan ASTEROIDS Act was introduced in Congress. The legislation’s aim is to grant US corporations property rights over any natural resources — like the platinum-group metals used in electronics — that they extract from asteroids.

The bill took advantage of an ambiguity in the United Nations’ 1967 Outer Space Treaty. That agreement forbade nations and private organizations from claiming territory on celestial bodies, but was unclear about whether the exploitation of their natural resources would be allowed, and if so, on what terms.

The legal framework governing the economic development of outer space will have enormous effects on the distribution of wealth and income in the Milky Way and beyond. We could fight for a galactic democracy, where the proceeds of the space economy are distributed widely. Or we could accept the trickle-down astronomics anticipated by the ASTEROIDS Act, which would allow for the concentration of vast amounts of economic and political power in the hands of a few corporations and the most technologically developed nations.

Given the pressing problems of inequality and climate change on Earth, the US left has been understandably uninterested in or largely dismissive of any space pursuits. For this reason, it remains unprepared to organize around extraterrestrial economic justice. The Left’s rejection of space has effectively ceded the celestial commons to the business interests who would literally universalize laissez-faire.

Organizing around extraterrestrial politics wasn’t always treated as an escapist distraction. In the 1970s, fighting for a celestial commons was a pillar of developing countries’ struggle to create a more equitable economic order.

Starting in the 1960s, a coalition of underdeveloped nations, many recently decolonized, asserted their strength in numbers in the United Nations by forming a caucus known as the Group of 77. In the early 1970s, this bloc announced its intention to establish a “new international economic order,” which found its expression in a series of UN treaties governing international regions, like sea beds and outer space, that they hoped would spread the economic benefits of the commons more equitably, with special attention to less developed nations.

For these countries — as well as for the nervous US business interests that opposed them — their plan to “socialize the moon,” as some put it at the time, was the first step toward a more egalitarian distribution of wealth and power in human society.

It will be years before the industrialization of outer space is economically viable, if it ever is. But the legal framework that would shape that transition is being worked out now. The ASTEROIDS Act was submitted on behalf of those who would benefit most from a laissez-faire extraterrestrial system. If we leave the discussion about celestial property rights to the business interests that monopolize it now, any dream of economic democracy in outer space will go the way of jetpacks, flying cars, and the fifteen-hour workweek.

#### A focus on a usage of space is gives us the opportunity to tackle things like hunger, poverty, and water contamination—this is a net benefit the 1AC cant solve

Siegel ’17 Ethan Siegel, theoretical astrophysicist and science writer, who studies Big Bang theory. In the past he has been a professor at Lewis & Clark College, “Why Exploring Space And Investing In Research Is Non-Negotiable” Starts with a Bang Blog, Forbes.com

Around the country and around the world, there is no shortage of human suffering. Poverty, disease, violence, hurricanes, wildfire and more are constantly plaguing humanity, and even our best efforts thus far can't address all of everybody's needs. Many are looking for places to cut funding, ostensibly to divert more to humanitarian needs, and one of the first places that comes up in conversation is "extraneous" spending on unnecessary scientific research. What good is it to conduct microgravity experiments when children are starving? Why smash particles together or pursue the lowest possible temperatures when Puerto Rico is still without power? And why study the esoteric mating habits of endangered species when nuclear war threatens our planet? To put it more succinctly: With all the suffering in the world — starvation, disease, persecution, and natural disasters — why should we spend public money on an enterprise like fundamental scientific research? This is a line of thinking that's come up repeatedly throughout history. Yes, it's short-sighted, in that it fails to recognize that our greatest problems require long-term investment, and that society's greatest advances come about through hard work, research, development, and often are only realized years, decades, or generations after that investment is made. Investing in science is investing in the betterment of humanity. But that's not always an easy path to see, particularly when suffering is right in front of you. Back in early 1970, shortly after the first Apollo landing, a nun working in Zambia, Africa, Sister Mary Jucunda, wrote to NASA. She asked how they could justify spending billions on the Apollo program when children were starving to death. If one pictures these two images side-by-side, it hardly seems fair. The letter somehow made it to the desk of one of the top rocket scientists at NASA: Ernst Stuhlinger. At the time, Stuhlinger, one of the scientists brought to the United States as part of Operation Paperclip at the conclusion of World War II, was serving as the Associate Director of Science at NASA. Facing an accusation of inhumanity must have been particularly painful for someone who was still often accused of being a Nazi for his role in the German rocket program, but Stuhlinger was unshaken. He responded by writing the following letter, reprinted in its entirety, below. (It’s long, and it only contained one picture, but it’s arguably even more relevant today than it was in 1970.) Your letter was one of many which are reaching me every day, but it has touched me more deeply than all the others because it came so much from the depths of a searching mind and a compassionate heart. I will try to answer your question as best as I possibly can. First, however, I would like to express my great admiration for you, and for all your many brave sisters, because you are dedicating your lives to the noblest cause of man: help for his fellowmen who are in need. You asked in your letter how I could suggest the expenditures of billions of dollars for a voyage to Mars, at a time when many children on this earth are starving to death. I know that you do not expect an answer such as “Oh, I did not know that there are children dying from hunger, but from now on I will desist from any kind of space research until mankind has solved that problem!” In fact, I have known of famined children long before I knew that a voyage to the planet Mars is technically feasible. However, I believe, like many of my friends, that travelling to the Moon and eventually to Mars and to other planets is a venture which we should undertake now, and I even believe that this project, in the long run, will contribute more to the solution of these grave problems we are facing here on earth than many other potential projects of help which are debated and discussed year after year, and which are so extremely slow in yielding tangible results. Before trying to describe in more detail how our space program is contributing to the solution of our earthly problems, I would like to relate briefly a supposedly true story, which may help support the argument. About 400 years ago, there lived a count in a small town in Germany. He was one of the benign counts, and he gave a large part of his income to the poor in his town. This was much appreciated, because poverty was abundant during medieval times, and there were epidemics of the plague which ravaged the country frequently. One day, the count met a strange man. He had a workbench and little laboratory in his house, and he labored hard during the daytime so that he could afford a few hours every evening to work in his laboratory. He ground small lenses from pieces of glass; he mounted the lenses in tubes, and he used these gadgets to look at very small objects. The count was particularly fascinated by the tiny creatures that could be observed with the strong magnification, and which he had never seen before. He invited the man to move with his laboratory to the castle, to become a member of the count’s household, and to devote henceforth all his time to the development and perfection of his optical gadgets as a special employee of the count. The townspeople, however, became angry when they realized that the count was wasting his money, as they thought, on a stunt without purpose. “We are suffering from this plague” they said, “while he is paying that man for a useless hobby!” But the count remained firm. “I give you as much as I can afford,” he said, “but I will also support this man and his work, because I know that someday something will come out of it!” Indeed, something very good came out of this work, and also out of similar work done by others at other places: the microscope. It is well known that the microscope has contributed more than any other invention to the progress of medicine, and that the elimination of the plague and many other contagious diseases from most parts of the world is largely a result of studies which the microscope made possible. The count, by retaining some of his spending money for research and discovery, contributed far more to the relief of human suffering than he could have contributed by giving all he could possibly spare to his plague-ridden community. The situation which we are facing today is similar in many respects. The President of the United States is spending about 200 billion dollars in his yearly budget. This money goes to health, education, welfare, urban renewal, highways, transportation, foreign aid, defense, conservation, science, agriculture and many installations inside and outside the country. About 1.6 percent of this national budget was allocated to space exploration this year. The space program includes Project Apollo, and many other smaller projects in space physics, space astronomy, space biology, planetary projects, earth resources projects, and space engineering. To make this expenditure for the space program possible, the average American taxpayer with 10,000 dollars income per year is paying about 30 tax dollars for space. The rest of his income, 9,970 dollars, remains for his subsistence, his recreation, his savings, his other taxes, and all his other expenditures. You will probably ask now: “Why don’t you take 5 or 3 or 1 dollar out of the 30 space dollars which the average American taxpayer is paying, and send these dollars to the hungry children?” To answer this question, I have to explain briefly how the economy of this country works. The situation is very similar in other countries. The government consists of a number of departments (Interior, Justice, Health, Education and Welfare, Transportation, Defense, and others) and the bureaus (National Science Foundation, National Aeronautics and Space Administration, and others). All of them prepare their yearly budgets according to their assigned missions, and each of them must defend its budget against extremely severe screening by congressional committees, and against heavy pressure for economy from the Bureau of the Budget and the President. When the funds are finally appropriated by Congress, they can be spent only for the line items specified and approved in the budget. The budget of the National Aeronautics and Space Administration, naturally, can contain only items directly related to aeronautics and space. If this budget were not approved by Congress, the funds proposed for it would not be available for something else; they would simply not be levied from the taxpayer, unless one of the other budgets had obtained approval for a specific increase which would then absorb the funds not spent for space. You realize from this brief discourse that support for hungry children, or rather a support in addition to what the United States is already contributing to this very worthy cause in the form of foreign aid, can be obtained only if the appropriate department submits a budget line item for this purpose, and if this line item is then approved by Congress. You may ask now whether I personally would be in favor of such a move by our government. My answer is an emphatic yes. Indeed, I would not mind at all if my annual taxes were increased by a number of dollars for the purpose of feeding hungry children, wherever they may live. I know that all of my friends feel the same way. However, we could not bring such a program to life merely by desisting from making plans for voyages to Mars. On the contrary, I even believe that by working for the space program I can make some contribution to the relief and eventual solution of such grave problems as poverty and hunger on earth. Basic to the hunger problem are two functions: the production of food and the distribution of food. Food production by agriculture, cattle ranching, ocean fishing and other large-scale operations is efficient in some parts of the world, but drastically deficient in many others. For example, large areas of land could be utilized far better if efficient methods of watershed control, fertilizer use, weather forecasting, fertility assessment, plantation programming, field selection, planting habits, timing of cultivation, crop survey and harvest planning were applied. The best tool for the improvement of all these functions, undoubtedly, is the artificial earth satellite. Circling the globe at a high altitude, it can screen wide areas of land within a short time; it can observe and measure a large variety of factors indicating the status and condition of crops, soil, droughts, rainfall, snow cover, etc., and it can radio this information to ground stations for appropriate use. It has been estimated that even a modest system of earth satellites equipped with earth resources, sensors, working within a program for worldwide agricultural improvements, will increase the yearly crops by an equivalent of many billions of dollars. The distribution of the food to the needy is a completely different problem. The question is not so much one of shipping volume, it is one of international cooperation. The ruler of a small nation may feel very uneasy about the prospect of having large quantities of food shipped into his country by a large nation, simply because he fears that along with the food there may also be an import of influence and foreign power. Efficient relief from hunger, I am afraid, will not come before the boundaries between nations have become less divisive than they are today. I do not believe that space flight will accomplish this miracle over night. However, the space program is certainly among the most promising and powerful agents working in this direction. Let me only remind you of the recent near-tragedy of Apollo 13. When the time of the crucial reentry of the astronauts approached, the Soviet Union discontinued all Russian radio transmissions in the frequency bands used by the Apollo Project in order to avoid any possible interference, and Russian ships stationed themselves in the Pacific and the Atlantic Oceans in case an emergency rescue would become necessary. Had the astronaut capsule touched down near a Russian ship, the Russians would undoubtedly have expended as much care and effort in their rescue as if Russian cosmonauts had returned from a space trip. If Russian space travelers should ever be in a similar emergency situation, Americans would do the same without any doubt. Higher food production through survey and assessment from orbit, and better food distribution through improved international relations, are only two examples of how profoundly the space program will impact life on earth. I would like to quote two other examples: stimulation of technological development, and generation of scientific knowledge. The requirements for high precision and for extreme reliability which must be imposed upon the components of a moon-travelling spacecraft are entirely unprecedented in the history of engineering. The development of systems which meet these severe requirements has provided us a unique opportunity to find new material and methods, to invent better technical systems, to improve manufacturing procedures, to lengthen the lifetimes of instruments, and even to discover new laws of nature. All this newly acquired technical knowledge is also available for application to earth-bound technologies. Every year, about a thousand technical innovations generated in the space program find their ways into our earthly technology where they lead to better kitchen appliances and farm equipment, better sewing machines and radios, better ships and airplanes, better weather forecasting and storm warning, better communications, better medical instruments, better utensils and tools for everyday life. Presumably, you will ask now why we must develop first a life support system for our moon-travelling astronauts, before we can build a remote-reading sensor system for heart patients. The answer is simple: significant progress in the solutions of technical problems is frequently made not by a direct approach, but by first setting a goal of high challenge which offers a strong motivation for innovative work, which fires the imagination and spurs men to expend their best efforts, and which acts as a catalyst by including chains of other reactions. Spaceflight without any doubt is playing exactly this role. The voyage to Mars will certainly not be a direct source of food for the hungry. However, it will lead to so many new technologies and capabilities that the spin-offs from this project alone will be worth many times the cost of its implementation. Besides the need for new technologies, there is a continuing great need for new basic knowledge in the sciences if we wish to improve the conditions of human life on earth. We need more knowledge in physics and chemistry, in biology and physiology, and very particularly in medicine to cope with all these problems which threaten man’s life: hunger, disease, contamination of food and water, pollution of the environment. We need more young men and women who choose science as a career and we need better support for those scientists who have the talent and the determination to engage in fruitful research work. Challenging research objectives must be available, and sufficient support for research projects must be provided. Again, the space program with its wonderful opportunities to engage in truly magnificent research studies of moons and planets, of physics and astronomy, of biology and medicine is an almost ideal catalyst which induces the reaction between the motivation for scientific work, opportunities to observe exciting phenomena of nature, and material support needed to carry out the research effort. Among all the activities which are directed, controlled, and funded by the American government, the space program is certainly the most visible and probably the most debated activity, although it consumes only 1.6 percent of the total national budget, and 3 per mille [less than one-third of 1 percent] of the gross national product. As a stimulant and catalyst for the development of new technologies, and for research in the basic sciences, it is unparalleled by any other activity. In this respect, we may even say that the space program is taking over a function which for three or four thousand years has been the sad prerogative of wars. How much human suffering can be avoided if nations, instead of competing with their bomb-dropping fleets of airplanes and rockets, compete with their moon-travelling space ships! This competition is full of promise for brilliant victories, but it leaves no room for the bitter fate of the vanquished, which breeds nothing but revenge and new wars. Although our space program seems to lead us away from our earth and out toward the moon, the sun, the planets, and the stars, I believe that none of these celestial objects will find as much attention and study by space scientists as our earth. It will become a better earth, not only because of all the new technological and scientific knowledge which we will apply to the betterment of life, but also because we are developing a far deeper appreciation of our earth, of life, and of man. The photograph which I enclose with this letter shows a view of our earth as seen from Apollo 8 when it orbited the moon at Christmas, 1968. Of all the many wonderful results of the space program so far, this picture may be the most important one. It opened our eyes to the fact that our earth is a beautiful and most precious island in an unlimited void, and that there is no other place for us to live but the thin surface layer of our planet, bordered by the bleak nothingness of space. Never before did so many people recognize how limited our earth really is, and how perilous it would be to tamper with its ecological balance. Ever since this picture was first published, voices have become louder and louder warning of the grave problems that confront man in our times: pollution, hunger, poverty, urban living, food production, water control, overpopulation. It is certainly not by accident that we begin to see the tremendous tasks waiting for us at a time when the young space age has provided us the first good look at our own planet. Very fortunately though, the space age not only holds out a mirror in which we can see ourselves, it also provides us with the technologies, the challenge, the motivation, and even with the optimism to attack these tasks with confidence. What we learn in our space program, I believe, is fully supporting what Albert Schweitzer had in mind when he said: “I am looking at the future with concern, but with good hope.” My very best wishes will always be with you, and with your children. It's a very different story than the kind we normally tell one another. In our modern world, we're often looking for instant gratification, for a near-term reward or return, and for immediate improvement. But science isn't always like that. Nuclear power wasn't harnessed for decades after the idea was first proposed; the Higgs boson was only found after over 40 years had passed and billions of dollars were invested in its search; gravitational waves weren't found until a full century had passed from Einstein's theory to LIGO's discovery. Yet each of these achievements, along with countless others, have helped bring about the modern world, with billions of people enjoying a higher quality of life than ever before.

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