

Memorabilia to the Moon

The formation of the Moon dates far beyond the birth of our species and directly affects the planet we inhabit. For this reason, the Moon and its connection to the Earth have intrigued human civilizations for centuries. Archaeologists believe evidence of humanity's interest in the Moon dates as far back as the Palaeolithic Era, as engraved bones and stones from this period show evidence of lunation markings (Kelly and Milone 157). Humans all over the world have developed complex mythological narratives of the night sky, have recorded the passing of time with the phases of the Moon, and have regarded the Moon as an object to be studied, interpreted, and reproduced in art. Since the Apollo 11 lunar landing in 1969, we have established a complex relationship with the Moon that has raised curiosity about what further lunar and space exploration could mean for our species. Lunar landings are once again becoming a reality as new incentives are beginning to motivate future trips to the Moon. Space tourism, the commercialization of the Moon, natural resource extraction, and the pursuit of an interplanetary existence are all becoming very real possibilities in the realm of space exploration.

This essay will explore a fast approaching, proposed lunar mission that promises individuals a unique connection to the Moon. The initiative MoonMail will allow people to send their belongings into space and onto the surface of the Moon. Astrobotic, the company offering the service, claims this will be the first commercial lunar landing ("MoonMail") and invites anyone who can afford the cost to take part. To provide some context for this unique commercial operation, I will briefly discuss past humans' strongly rooted cultural connections to the Moon as possible motivation for such commercial missions. I will then outline ongoing complications of lunar landing and ownership, as well as upcoming missions tied to the birth of Astrobotic. Lastly, I will discuss implications of sending payloads and personal mementos to the lunar surface and the significance this endeavour may hold in the history of our species and our future connection to the Moon. The Moon has been represented in the carvings, paintings, and other media of many cultures throughout human history. These representations are significant as they provide a physical record of past humans' relationship with and understandings of the Moon. They also reveal cultural practices and scientific developments of past civilizations that may have led to modern everyday uses and complex understanding of the Moon. The month, for example, is a unit of time used in our modern society that "derives naturally from the cycle of phases of the Moon" (Kelly and Milone 96). The practice of using the Moon's phases to measure time dates back more than 25,000 to 30,000 years (Kelly and Milone 96). It was discovered that the Blanchard bone, a reindeer bone excavated in 1911 in the village of Les Eyzies, is engraved with "crescent-like-markings" that seem to record the phases of the Moon over a period of time during an Ice Age (Kelly and Milone 97). The Moon also appears in the mythology of many cultures. Inspiring curiosity and wonder, it takes on different roles in the stories and legends of human civilizations.

It is evident from the preserved visual culture that the Moon has played an essential part in the life of humans all over the world. In 1969, that relationship changed. The Apollo 11 lunar landing brought humans one essential step closer to the rock that has only before been observed from afar. Since this monumental Moon landing, humans have considered the possibilities of a new relationship with the Moon that involves physical contact, a tangible connection that offers myriad opportunities. As our technologies advance and these new possibilities become realities, questions have been raised about the ownership of the Moon and who has access to it. The Outer Space Treaty was adopted by the United Nations General Assembly in 1966 and entered into force in 1976. It was established to provide the basic framework for international space law and has been ratified by 104 states as of April 2016 (Status of International Agreements 10). The treaty states that the Moon is the "province of all mankind" and that the "Moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means" (Treaty on Principles). This treaty was challenged in 1980 when an entrepreneur claimed private ownership of the Moon and began selling plots of real estate (Dunk et al. 151). As the treaty only referred to national appropriation of the Moon, it was argued, "private appropriation should be deemed allowable under the Outer Space Treaty" (Dunk et al. 152). The Moon Treaty, which entered full force in July of 1984, addresses this loophole and claims the Moon may not "become property of any State, international intergovernmental or nongovernmental organization, national organization or non-governmental entity or of any natural person" (Agreement Governing the Activities). This treaty, however, has only been ratified by 16 states, none of which are major spacefaring nations (Status of International Agreements 10). As the question of private ownership of the Moon is left unanswered, private organizations are beginning to take advantage of this ambiguity.

One project that recognizes the potential for private organizations to make their claim on the surface of the Moon is the Google Lunar XPRIZE. This competition offers a \$30 million cash reward to a privately-funded team that is able to successfully land a spacecraft on the Moon's surface, move it 500 metres, and transmit visual information back to Earth. Organized by XPRIZE and funded by Google, the competition seeks to accelerate private explorations of the Moon. The project claims the technology developed will "reduce costs and barriers to entry so that private industry can work alongside government agencies to advance lunar exploration" ("The Google Lunar XPRIZE"). The project recognizes the Moon as an "essential stepping stone to the rest of the universe" and envisions it as a training ground for further extraterrestrial exploration ("The Google Lunar XPRIZE"). They believe that private exploitation of the Moon's natural resources will help to "expand human civilization into space" ("The Google Lunar XPRIZE"). As of December 2016, five of the sixteen teams competing in the contest secured contracts to launch their spacecrafts and continue the challenge towards the final prize in 2017.

Astrobotic, a company that delivers payloads to the Moon, was one of the original sixteen teams competing in the Google Lunar XPRIZE. William Red Whittaker of Carnegie Mellon University founded the company in 2007 with the purpose of competing in the lunar landing challenge. Although the Astrobotic team did not submit a launch contract before the 2016 deadline, the company is still offering its delivery service to the Moon. Astrobotic is developing new spacecrafts capable of delivering cargo to the surface of the Moon and is "pioneering affordable planetary access that promises to spark a new era of exploration, science, tourism, resource utilization, and mining" ("Astrobotic"). The service is not only offered to governments, companies, non-profits, and universities, but it also appeals to individuals. MoonMail, the branch of the company that caters to the average citizen, was launched on December 15th, 2014 and provides those interested with small containers that will function as time capsules when sent to the Moon. They encourage people to send items such as family heirlooms, photos, and other personal mementos in the interest of "forever linking the individual with the Moon in the night sky" ("The Google Lunar XPRIZE").

The Moon is often considered a sacred object that holds a sense of permanence and mystique that has been built up over centuries. With Astrobotic's project, individuals can cling to the romantic notion of immortalization through a connection that is deeply rooted in human culture, but perhaps not fully realized until now. MoonMail designates space exploration as an activity involving the masses, in which all who participate are responsible for choosing the item that will establish their personal connection to the Moon. These idealistic notions of connecting to a land beyond our own might be what motivates commercial missions such as MoonMail, but the practical aspects of the mission may be put into question. It may seem that the MoonMail branch of this mission will accomplish nothing but the delivery of the objects, and that the objects themselves will serve no purpose on the Moon. This suggests that Astrobotic is attempting to establish a connection between individual humans and the Moon that has virtually no practical use or aim beyond the connection itself. It is worth considering not only the possible intentions of those who participate, but also the practical implications of the mission and the life of the objects once they are released.

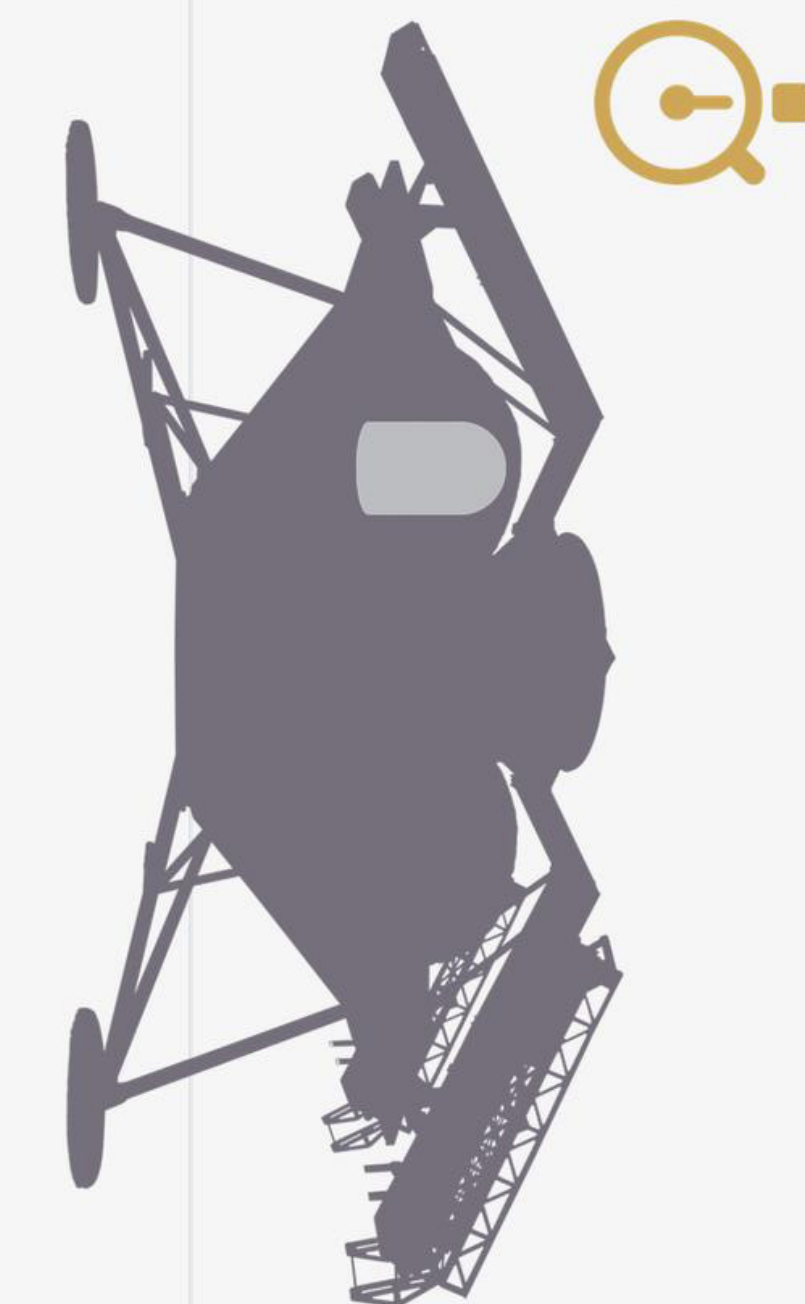
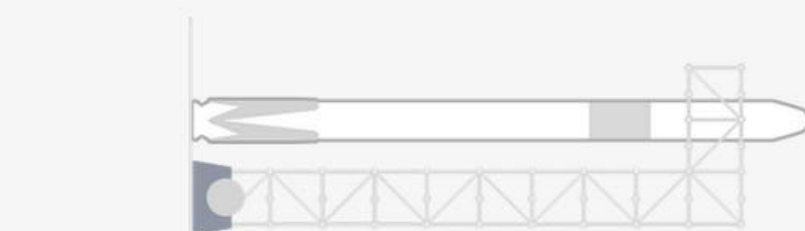
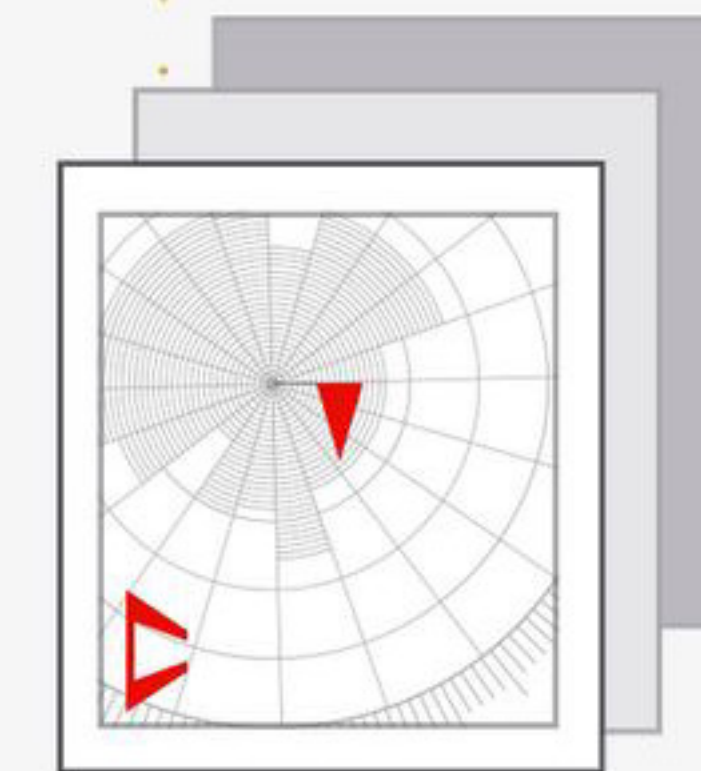
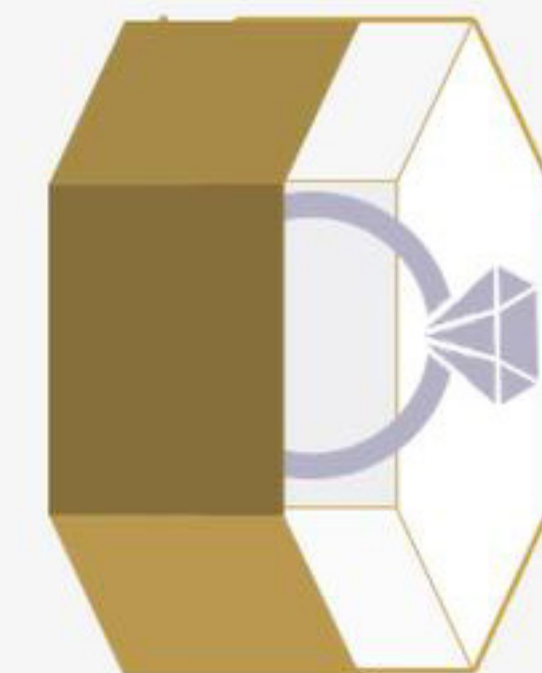
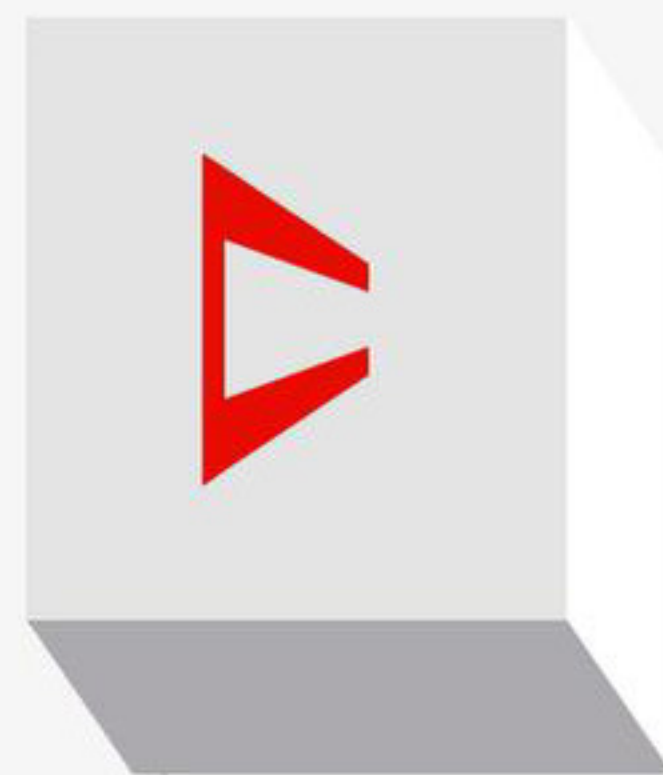
The Apollo 11 lunar landing, as well as other missions since, has sparked disputes about space debris and the future of the objects left on the Moon. A huge collection of human artefacts, ranging from the U.S. flag to bags of dirty laundry, remain in several sites on the surface of the Moon (Laursen). Although these objects may be regarded as "space junk," Beth O'Leary, an anthropologist at New Mexico State University argues otherwise. She believes "these sites are time capsules" that may one day provide archaeologists in the future with invaluable artefacts to be studied from "the modern past" (Laursen). As the exhibition *Protectorate 1: A Darker Side of the Moon* explores, the Outer Space Treaty does not prevent nations from interfering with the property left on the Moon. Nevertheless, O'Leary and her colleagues have lobbied for the sites' protection (Laursen). As a result, NASA released "non-binding guidelines" and no-fly zones were established around previously visited sites for their protection. Permanent preservation, however, may require extraterrestrial international heritage laws that protect the objects from interference by future missions (Laursen).

The MoonMail missions may also require a safeguard against vandalism and object interference on the Moon, as Astrobotic claims customers' items will remain on the Moon for "decades, if not centuries to come" ("MoonMail"). Although the company appeals to those who wish to uphold a legacy or commemorate a story, what they seek to accomplish goes beyond the individual. Much like O'Leary's view of the objects currently sitting on the Moon, Astrobotic markets the vessels they are selling as time capsules that will one day reveal a modern past to those in the future. Also similar to the items left behind by the Apollo 11 mission, items dropped on the Moon by the MoonMail spacecraft will become remnants of an important milestone in space exploration. Although the company is no longer affiliated with the Google Lunar XPRIZE, Astrobotic believes this mission will invite further space exploration just as the competition intended. The first commercial lunar landing will not only act as a time capsule that represents our era in human exploration, but it will "open the Moon to scientists, explorers, and other pioneers who will expand human activity in space" ("MoonMail"). It is the ultimate goal benefiting future exploration and advancement that might clarify the seemingly useless launching of space debris. A mission such as this may push the establishment of international space and heritage laws forward, allow the masses to participate in extraterrestrial affairs, and encourage further space exploration and human advancement.

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The Cold War Race to the Moon

As the Earth's only natural and permanent satellite, the Moon has created tension among nations who have pursued its control and raced to land on its surface. Successful lunar explorations have represented a source of achievement and are remembered as significant national events that are celebrated to this day. Lunar landings and the associated technological progress have, however, often evoked resentment from competing nations. Despite being a universal sight and *terra nullius*, the Moon has been a divisive force many times throughout history. The Cold War epitomizes this conflict, as it was an era of heightened international tensions and hostility. Capitalist US and Communist USSR competed for supremacy in space, which elevated already-hostile sentiments. This essay examines several cases of lunar achievement that occurred during the Cold War and demonstrates how these accomplishments fuelled the animosity that continues to exist between Russia and the US. I will demonstrate that the tension between the two nations' conflicting ideologies – namely, Socialism and Capitalism – was a large part of what drove the highly competitive race to the Moon. Ultimately, America's Moon efforts resulted in a boost in national morale and increased patriotism and pride, both of which were crucial for maintaining the nationalism that underpinned the Cold War. Efforts were made on both sides in the name of establishing powerful and advanced international reputations, and in some instances, this space race resulted in invaluable cosmic knowledge.

In 1957, the USSR launched the satellite Sputnik. American President Dwight Eisenhower received this unforeseen news shortly after the October launch (Mieczkowski, 12). A group of Soviet engineers had developed the small and shiny aluminum sphere whose purpose was to become Earth's first artificial satellite (Mieczkowski, 12). Despite the relative simplicity of the structure, the successful launch of Sputnik marked the beginning of the Space Age. Further, its success created a panic that quickly permeated the US, feeding a fear of any possibility of USSR superiority (Mieczkowski, 13). White House Press Secretary George Reedy recalled that the launch of Sputnik hit Americans "like a brick through a plate-glass window, shattering into tiny slivers the American illusion of technical superiority over the Soviet Union" (Mieczkowski, 13). It was described as a crisis that shook Americans and their way of life (Boyle, 373). Previously, Americans believed that the Soviet Union's primary strength was their military, but that they were weakened by their economy and technology. The launch of Sputnik, however, challenged this idea, unsettling American citizens. Further, Eisenhower did not react to this news until many days after the event, which increased the population's panic and frustration (Boyle, 375).

Soviet engineers created Sputnik to circle the Earth at high speeds and, by polishing its surface to reflect light, ensured that it would capture maximum attention. Further, Sputnik was directed to fly over the Earth's most populated areas, thus guaranteeing its visibility to as many people as possible (Mieczkowski, 12). These decisions demonstrate the Soviet's and American's preoccupation not only with furthering space technology, but also with ensuring that their nation's reputation would be enhanced. America's first sighting of Sputnik was accompanied by its beeping noise, a sound that marked the end of the US's underestimation of their counterpart's technological capabilities. By extension, they feared these same advancements could be made in the context of armaments, which would threaten America's national security during this hostile period. As such, pressure was heightened for the American government to take action (Boyle, 375). *The New York Times* published a piece titled "Are We Americans Going Soft?" and *Life* took a similar approach with the title "Soviet Satellite Sends US Into a Tizzy" (Boyle, 374). The mainstream media, the public, and even members of Eisenhower's own party called for immediate action.

Eisenhower's response to the Soviet victory was the submission of a bill to create the National Aeronautics and Space Administration (NASA) (Koman, 42). Seeking to surpass Soviet space accomplishments, one of NASA's main goals was to eventually put a man into orbit around Earth. In January 1958, the US launched the satellite Explorer 1. This accomplishment undoubtedly alleviated some of America's fear of Soviet superiority, and at the same time it also produced exceptional spatial data (Howell). According to NASA's website, Explorer 1 "carried a cosmic ray detector, which led to Explorer Principal Investigator Dr. James Van Allen's discovery of radiation belts around Earth held in place by the planet's magnetic field. The findings were later named Van Allen belts in honor of their discoverer" (Mission to Earth). From American panic, competitiveness, and ambition, significant scientific findings were made. Spatial pursuits made in the name of competition were able to garner important cosmic information that would be used for decades to come.

While the ultimate challenge would eventually become a safe Moon landing and return to Earth, the space race unfolded first through a number of different breakthroughs. These developments culminated in 1961, when Soviet cosmonaut Yuri Gagarin became the first human to travel into orbit (Koman, 43). That same year, President John F. Kennedy had just come into power, and similarly to Eisenhower, he undertook the cosmic challenge by making the promise that "this generation of Americans intends to be the world's leading spacefaring nation" (Koman, 43). Despite the creation of NASA under Eisenhower's administration, Kennedy criticised him for not doing enough for the American space program. Kennedy's focus on NASA and its progress showed Americans that he was serious about establishing and maintaining America's position as technological leader (Koman, 43). The ideological difference that drove these urges was expressed in Kennedy's 1962 Moon speech, in which he stated: "For the eyes of the world now look into space, to the Moon and to the planets beyond, and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace" (Wall). Despite the fact that the Moon is a communal sight and *terra nullius*, Kennedy's focus was not on achieving any Moon landing for the sake of scientific advancement. Rather, he sought to achieve an all-American Moon landing that would boost patriotism, thus demonstrating that the hostility prevalent during the Cold War period led to the prioritization of national reputation and morale over cosmic and scientific discoveries, which were often simply by-products of the missions.

The Moon was later deemed a "power frontier" between the US and the USSR (Fawcett, 357). In 1969, J.E.S. Fawcett discussed this concept in *The Politics of the Moon*, explaining that a power frontier is "an area of inward and outward pressures, or of struggle for control, between two power systems" (Fawcett, 357). In the context of the Cold War Space Race, the two power systems would be the US and the USSR. Fawcett explored the potential objectives of Moon flights and landings, and determined that the advantages would be "an increase in pure knowledge, the image of power, means of national defense and technological benefits, both military and nonmilitary" (Fawcett, 357). He examined each possible advantage, demonstrating the flaws with each. In a section examining the "increase in pure knowledge" motive, Fawcett pointed out that similar knowledge could be gathered without a Moon landing. He argued that the information that would be gathered would not counter-balance the cost and effort involved (Fawcett, 358). Past astronomical endeavors such as the Orbiting Astronomical Observatory 2 and the Surveyor series both collected useful Moon information without requiring a landing (Fawcett, 358). Thus, he surmised, astronomers had generally come to a consensus that a Moon landing would yield only marginal information that would not necessarily contribute to pure knowledge (Fawcett, 358). As seen with the launch of Explorer 1, cosmic efforts had already demonstrated the potential to lead to greater scientific knowledge. But according to Fawcett and others writing at the time, a Moon landing was more of a propagandistic effort than a scientific one.

Creating and maintaining a powerful international image was a recurring motive for nations pursuing a Moon landing. This is confirmed in Fawcett's quoting of 1961 Vice President Johnson, who stated: "A nation's prestige is now measured by a new yardstick – its achievements or lack thereof in space" (Fawcett, 359). This shows that nations used cosmic accomplishments to assert their power and superiority. The United Nations attempted to resolve such disputes by creating the Outer Space Treaty in 1966. One of the key clauses stated: "Outer space and celestial bodies are not subject to national appropriation by claims of sovereignty, by means of occupation, or by any other means" (United Nations). Fawcett argued that despite the fact that this clause forbids ownership, "some sort of tenure would be necessary for a Moon station" (Fawcett, 359). In Timothy Trapp's "Taking Up Space by Any Other Means", he argues that in practice, it would be difficult to implement the appropriation prohibition because it is highly up to individual interpretation (Trapp, 1691). Some may believe that this prohibition means that no nation can send an object into space at all, which would directly conflict with space exploration as a whole (Trapp, 1691). Further, there is also ambiguity with the clause: "The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes" (Fawcett, 360). The lack of specificity of the term "peaceful purposes" could perhaps reduce the treaty's credibility and effectiveness. To many, it is viewed as more of a loose suggestion than as a rigid rule set (Trapp, 1690). Thus, the Moon race did not cease, but rather grew in scope as the USSR and the US continued to work towards a Moon landing.

Finally, in 1969, the world witnessed the first ever Moon landing by American astronaut Neil Armstrong. This accomplishment, along with several others, meant that the US had finally surpassed the Soviet Union in the Space Race (Brown, 177). Trevor Brown sought to understand the reason for the US's success in "The American and Soviet Space Programs," in which he attributed the American's success to the focus of the space programs, the economic approaches of the competing states, and the level of secrecy within their scientific communities (Brown, 177). According to Brown, these factors, as well the socioeconomic systems of each country, carried over into their cosmic efforts (Brown, 178). The Soviet Union was bound by an overly secretive and highly centralized space program, which inhibited their efforts. The US prevailed and was able to accomplish goals set by Kennedy earlier in his presidency. Kennedy's Moon speech featured the lines,

We choose to go to the Moon. We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too (John F. Kennedy Moon Speech).

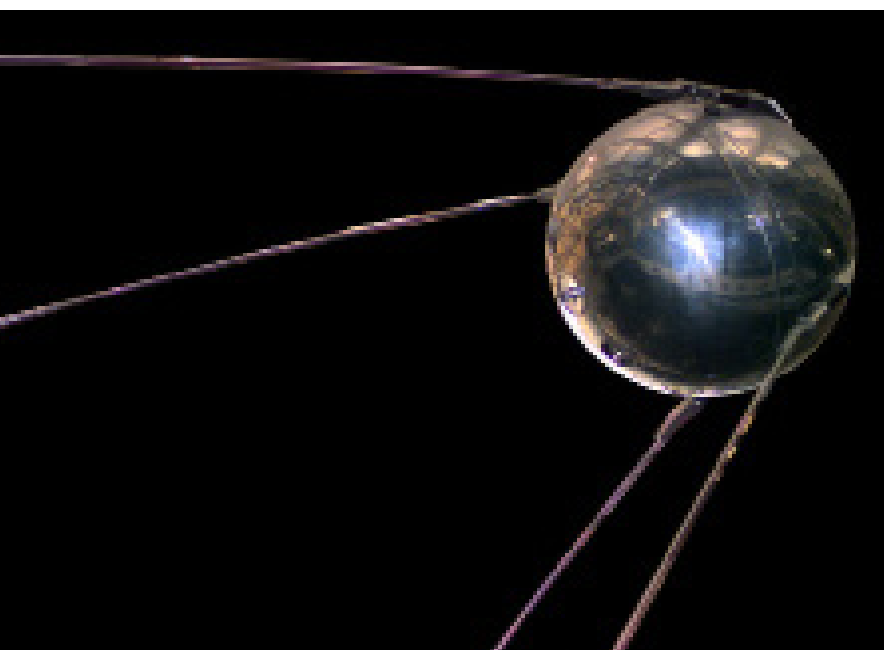
Kennedy's Moon rhetoric rallied wide support, and his decision to use the word "win" pointed to the fact that to a large extent, putting a human on the Moon was indeed a competition.

The Cold War was an era of elevated tension between the US and the USSR, so it is not surprising that the Space Race became a relentless competition between the nations. Each sought to establish dominance through cosmic endeavours; however, American hegemony prevailed. The Cold War has ended, but tension remains between the US and Russia. The Space Race now continues, but with different competitors. According to *The Economist*, Europe, Japan, India, and China all have space programmes. India's and China's motives are similar to those of the US's and USSR's during the Cold War, since they seek show off their technological advancements (*The Economist*). Competition drove the US to put the first human on the Moon, so it will be interesting to observe the outcomes of these current and future Space Races. As shown during the Cold War's Space Race, successes and failures are amplified in the context of spatial exploration. It is, however, very promising that the possibility of failure and its associated humiliation has not deterred nations from pursuing their desire to explore worlds beyond our own.

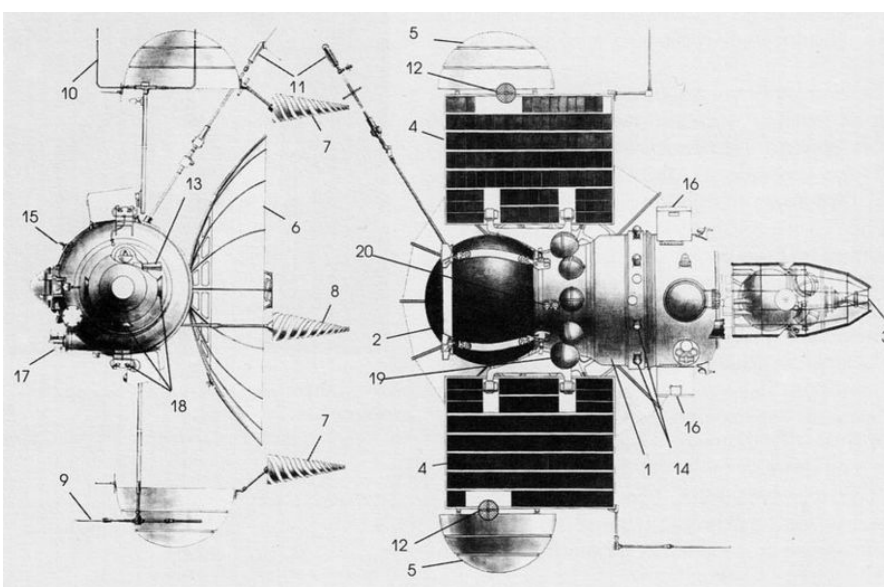
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A replica of Sputnik 1, the first artificial satellite in the world to be put into outer space; the replica is stored in the National Air and Space Museum
NASA, Public Domain



Venera 1962 (Sputnik 19, 20 and 21) spacecraft diagram
NASA, Public Domain



Sheet of four stamps showing Soviet cosmonauts, including Yuri Gagarin
Public Domain



US Astronauts, Project Mercury, 1963
NASA, Public Domain