Outer Space and Popular Culture: Untapped Potential for Space Education and Outreach

Dr. Annette Froehlich**, David Lindgrenb, André Siebritsc

** European Space Policy Institute (ESPI), Schwarzenbergplatz 6, Vienna, Austria, annette.froehlich@espi.or.at; German Aerospace Center (DLR); SpaceLab, Department of Electrical Engineering, University of Cape Town.
b SpaceLab, Department of Electrical Engineering, University of Cape Town, davidlindgren@outlook.com.
c European Space Policy Institute (ESPI), Schwarzenbergplatz 6, Vienna, Austria, sbrand003@myuct.ac.za; Department of Political Studies, University of Cape Town (UCT).

* Corresponding Author

ABSTRACT

While the outreach work of entities such as space agencies, museums, and non-profit organisations is invaluable to engaging with the public in the cultural sphere, it is the argument presented in this study that such outreach is continually happening on a much grander and more pervasive scale – through popular culture. Neither a single organisation nor a network of them can compete with the power of modern popular culture to engage the public with space, mainly through the visual and performing arts. It is here in the nexus between science fact, science fiction, and entertainment that the majority of the public encounters space for the first time. Examples abound, but the Cosmos series presented by Carl Sagan is a premier example demonstrating the power of popular culture to communicate space concepts to the public. Despite this, the interrelationship between space and popular culture has been underexplored in the scientific literature, particularly how space has become – and can further be – embedded in the popular culture and consciousness. Additionally, not all influences of popular culture are as sound as Cosmos. Cartoons, advertisements, music, art, video games, and many others make use of space concepts that can misrepresent space in the public mind. The hysteria accompanying the radio broadcast of The War of the Worlds is probably the best example. However, many examples abound of these same media representing space positively and meaningfully as well. Thus, with thoughtful engagement, popular culture can be, and is, leveraged to communicate good science to the public. This also extends beyond science since space themes can be used to explore various aspects of the human condition and provide a detached context for social commentary on politically sensitive issues. Moreover, the influence of space has also been expressed through popular culture by, for example, storytelling in the Global South. This study will present and discuss a range of examples with an analysis of how the space aspect figures in particular contexts. Leveraging the power of modern media and popular culture to engage the public with space in a more thoughtful way can significantly contribute to the process, critical thinking, and methodologies underlying space education and outreach events. By not engaging with popular culture in this manner, and the ways space figure in it, outreach efforts will struggle to reach the broader public.

Keywords: Popular Culture; Visual and Performing Arts; Public; Education; Outreach; Outer Space; Global South

1. Introduction

Popular culture pervades our everyday lives in contemporary society. Ranging from television, cinema, and the performing arts to music, video games, social media, and narrative storytelling, popular culture inundates our lives and is only further enabled by our increasing connectivity facilitated by modern communications technology. Advances in mobile phone technology, video and music livestreaming, and satellite-enabled internet connectivity and speed have further strengthened popular cultural influences on society, serving as catalysts for the sharing of information and culturally shared experiences. Yet despite the enormous growth witnessed in the dissemination of popular culture, its relationship with space remains understudied. This manuscript thereby explores the development of popular culture as it relates to changes in understandings and conceptualizations of outer space over time, and investigates the potential future applications of popular culture and popular media as a vehicle for educating and informing society writ-large.

Before engaging the use and presentation of space in popular culture, we must first answer the question: why do we need to conduct education and public outreach on space in the first place? It will be argued here that education and outreach need not be used to increase public understanding of space in order for the public to have more informed positions and greater decision-making over questions involving space in the
public sphere, but rather education and outreach leads to an increase in participation by all groups, including historically marginalized and underrepresented groups, in the space sector itself. Thus, space education and outreach through popular culture serves the purpose of achieving greater equity between various groups and across social cleavages (i.e. gender, race, ethnicity, sexual orientation, etc.) of those who work and participate in and benefit from the space sector. This holds particular importance for those in the Global South as majority of spacefaring powers are found in the Global North. Greater equity between the Global North and South, facilitated by increased representation of Global South and underrepresented voices made possible by a greater number of individuals attracted to the sector by popular culture, would help grow the sector even further beyond its current state. Research has demonstrated that participation by women and minority groups generally across the economy leads to greater growth and productivity. For example, the World Economic Forum (WEF) suggests that closing the gender gap between men and women in labour force participation could result in a 35 percent increase in gross domestic product (GDP) [1]. Similarly, a diverse workforce leads to economic benefits for companies, including a reduction in employee turnover costs and an increase in availability of strong candidates made possible by a larger talent pool [2]. These same benefits accrue to the space sector specifically.

As such, space education and outreach via popular culture and media wields significant potential for effecting change in the composition of the space sector as compared to traditional outlets such as space agencies, museums, and non-profit organisations. Given this, a consideration of space found in past, contemporary, and future popular media, particularly from a Global South perspective, remains important to facilitating broad and inclusive participation in and understanding of space, especially as the sector grows greater in size and importance across our society and economy. In this manuscript, space in popular culture will be considered with regard to three broad purposes this popular media serves to achieve: 1) political, 2) philosophical, and 3) educational and inspirational. The use of popular culture toward these ends makes its accessible to various audiences of different backgrounds, and allows for the versatile presentation of similar concepts and ideas across multiple mediums (cinema, books, music, video games, etc.).

While contemporary popular culture and media often seeks commercial success, this does not preclude popular culture from serving these three broad purposes. Sometimes the commercial influence overrides the storytelling of certain popular media, but often faithfulness to scientific realities, philosophically-challenging storytelling, and confrontation of difficult social questions does align with the commercial success of a popular culture piece.

## 2. Popular culture with a political purpose

There are pieces of popular culture and media that have been used to achieve political aims. These have been in the form of mass media as a tool to rally support for nationalistic pride in space programmes (such as during the Cold War between the United States and the Soviet Union), and satire comics and music and poetry to criticize space priorities coming at the expense of other social and political issues.

### 2.2 Mass media for rallying political support

Space was used as a backdrop for much of the Cold War’s geo-political competition between the United States and the Soviet Union. During this time, “Technological superiority in space became an issue of national security and national pride, the attainment of which became deeply ingrained in the general public’s minds,” [3]. This necessitated significant spending by each superpower at the time, which resulted in exponential growth in space activity during the height of the Cold War. For example, “In the year 1959, less than 30 tonnes were launched into space across the globe. In 1969, more than 500 tonnes had been launched into space,” [4]. Because of the importance of space activity in the Cold War between the two superpowers “A true and authentic scientific war [was] fought on two fronts: scientific progress on one hand and the communication of such accomplishments on the other hand,” [5]. Thus, widespread and publicly-funded popular culture pieces for a significant portion of the twentieth century featuring space originated first with political purposes and designs in mind.

Therefore, the popular culture pieces produced during this period clearly served to mobilize support for national efforts, rather than toward more altruistic aims to inspire or educate on space more broadly. The United States and Soviet Union required public support to justify their spending on space programmes, and popular culture facilitated this process of rallying the necessary support. “The USSR and the USA used mass media as a vehicle to promote public support for their respective national space programmes and the different techniques they employed, including the distribution of propaganda posters, lionizing astronauts and rocket scientists, and using pop culture to rally support from their people,” [6].

In American media, these took the forms of magazine editorials, movies, and posters. For example, Collier Magazine from 1951 to 1952 brought together leading experts, including Wernher von Braun, to discuss the possibilities of space and exploration with, at the time, an unconvinced public [7]. This resulted in
2.3 Satire and music and poetry as political criticism

Satire, appearing in the form of illustrative comics, are used frequently in popular culture to criticize space activities from a variety of perspectives, ranging from “the disparity between financial resources allocated to socio-economic development versus space related activities” to “the failure of governments to advance space activities,” [9]. These have ranged from satire criticizing American progress on the Gemini programme during the Cold War as compared to Soviet space programme advances [10], the plethora of seemingly diverse and un-ending space programme proposals during the early 2000s [11], the failure of the American space programme to live up to its past as others, such as the European Space Agency, exceed it with the new advances in space exploration [12], spending priorities shifting to space while America was still waging military operations abroad [13], and reflections on the closure of the Space Shuttle programme forcing Americans to use Russian-made Soyuz rockets to access space [14].

Similarly, music and poetry has been used to criticize space activities in some of the ways in which the above described comics have. In particular, the poem “Whitney on the Moon” by Gil Scott-Heron posed serious questions about the American space programme and its placement in American society. “It anchored the flight into the heavens, tethering it to the persistence of racial inequality, and pulling it out of the abstract, universal realm in which we like to place our technical achievements,” [15]. The poem served as a commentary on racial and economic disparities, and the advances made in space coming at the expense of investments in educational and social programmes, benefitting minority and historically marginalized groups. It posed the questions of “To which America went the moon landing? And what did it cost our nation to put whitey on the moon?” [16].

2.3 Discussion of politically-inspired, space-related popular media

While government-directed popular culture pieces prescribed and advanced a specific narrative, such as done by the American and Soviet governments during the height of the Cold War, satire and music and poetry invite contributions from alternative perspectives and help construct a more inclusive narrative about space and what it means across various groups. Politically-inspired space content serves an important purpose in democratic and inclusive societies that allows for the representation of differing attitudes and beliefs, presenting an important outlet for those not only intimately involved with the space sector but also for those who are affected by it. Politically-inspired pieces remain an important medium within popular culture to place these attitudes and beliefs, and to have them fully discussed and debated in the public sphere as global society, bridging Global North and Global South, increasingly has shared cultural experiences made possible by modern technology. This makes it difficult for controlled and government-directed pieces, and thus their narratives such as those described previously during the Cold War, to take prominence as they are displaced by the democratizing power of the Internet and global communications allowing for popular content to express a range of legitimate opinions, beliefs, and concerns about contemporary space activities.

3. Philosophical reflections within popular culture

Separate from politically-inspired popular media incorporating space themes, a number of popular culture pieces, including movies and books, address space philosophically in order to investigate questions of the human condition and to germinate ideas, discussions, and actions. Science fiction is perhaps the most expansive genre of movies and books engaging with these questions, all the while employing space as a backdrop and setting for its stories. In this way, popular culture pieces set in space allow society to discuss socially difficult and challenging issues in an environment devoid of meaning and significance as we find on Earth. The imaginative use of space in popular culture lets society to 1) examine the human condition from a philosophical perspective, and 2) generate, test, and evaluate new ideas that otherwise would not be possible using an Earth environment.

3.1 Science fiction and the human condition

Science fiction, and in particular space science fiction, relies upon the concept of ‘estrangement’ to deliver its story. It has been defined as a “genre whose necessary and sufficient conditions are the presence and interaction of estrangement and cognition, and whose main formal device is an imaginative framework alternative to the author’s empirical environment,” [17]. Therefore, science fiction is “a mirror whereby humankind confronts issues otherwise too close for comfort,” [18]. In addition to space science fiction allowing for the discussion of issues
otherwise not possible when based in a familiar (i.e. Earth) setting, it is also empowering because it allows, through science and technology, its characters (i.e. humans) to affect and influence the narrative, unlike mythical narratives that are deterministic with the narrative constructed toward knowing what the outcome will be [19]. Space science fiction movies such as 2001: A Space Odyssey, Alien, Blade Runner, Matrix, and Avatar all allowed for the investigation and discussion of social and philosophical questions, ranging from ideas challenging what it means to be human and experience humanity to uncomfortable confrontations with notions of power, exploitation, and the ‘othering’ of groups to achieve political and economic gains. These questions are indeed addressed in academic and intellectual circles; however, space science fiction as forming part of popular culture allows for them to become accessible and engaged with on a much more significant and broader level among the public. The fact that space-based science fiction films are among the most commercially successful demonstrates the level of exposure to which this particular medium brings in presenting these themes to the public.

Space science fiction also signifies the realm in which science and technology in reality intersect with ideas and concepts generated in fictional storytelling. Space science fiction allows for an understanding of our past as a society and an imagining of our future, whereby science fiction affects real-world concepts for design and development of new technologies and vice versa. Science fiction is a “creative juxtaposition of science, fiction, past, and future...these elements become fused into a possibility space that directly influences our understanding of the future, and reflections on ourselves and how we will navigate the challenges ahead.” [20]. Furthermore, space science fiction allows for the ‘willing suspension of disbelief’ in order to speculate on science, space, time, social science, and philosophy [21].

Specific examples of challenging questions posed by space science fiction in popular culture include those around identity. For example, Joss Whedon, developer of the television show Firefly, described in an interview that he wanted to “play with the notion of the frontier” and in particular the “people history stepped on – the people for whom every act is a creation of civilization” [22]. This was purposeful for this particular piece of space science fiction to question identity at the frontier as it was an American television show and “The frontier story is a symbol of American national identity,” [23]. Thus, it forcibly challenged audiences to question their understanding of the frontier, and its traditional conceptualization of where “civilization meets savagery,” [24]. This example also serves as an important invitation for those in the Global South, which has traditionally been conceived as the frontier at various times in history according to certain groups principally in the Global North. The accessibility this television show provided to general audiences to engage with such a theme likely would not be possible on a similar scale if not done through popular culture and media.

Continuing to examine other examples whereby identity is challenged in space science fiction, those popular works employing clowns, fictional characters usually set in a circus environment but which are placed in space, allow for the questioning of similar themes. “Space clowns embody the ways in which space narratives deal with the problem areas of representation, personal and cultural identity, the effect of technology on the human body, and of what is human in outer space,” [25]. Again, the use of space in popular culture via science fiction pieces allows for the telling of stories and reflections of the human condition in an environment that is devoid of significance as compared to those narratives that use places on Earth, which often carry previously held cultural and social meaning.

3.2 Popular culture envisioning alternative stories for humanity

Popular culture also uses outer space to communicate messages and alternative stories for humanity. In particular, space in popular culture creates opportunities for people to connect concepts and visions of the future with real and present-day challenges. In these forms of popular culture, such as video games and movies, fealty to contemporary understandings of space science, the environment, and law and policy can be retained while still setting a narrative in outer space. For example, films such as the live action Interstellar or the animated Wall-E attempt to adhere to present-day understandings of space, environment, and policy in order to communicate a pressing and immediate challenge facing humanity in reality – the threat of climate change and a degrading environment. Other examples of pieces in popular culture, such as the video game Civilization: Beyond Earth, adhere less faithfully to law and policy as presently conceived, but nonetheless still communicates the idea of environmental conservation as it is set up against a backdrop of humanity fleeing a degraded Earth to a new environment in space [26].

In this way, space is uniquely positioned in popular culture to communicate messages such as these and visions of humanity while still remaining grounded in contemporary realities and being accessible to a mass audience.
3.3 Discussion of space in popular culture and reflections of philosophy

One of the most prominent science communicators, Carl Sagan, understood the importance of popular culture in messaging important philosophical questions and challenges to the human condition. One of the most celebrated examples of this is Sagan’s description of Earth as the Pale Blue Dot when he reflected on the image of Earth taken by the distant Voyager 1 spacecraft [27]. Here, Sagan wrote, “There is perhaps no better demonstration of the follow of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we’ve ever known,” [28]. Combined with this space image and others, Sagan’s popular communications helped to shape, and set a standard, for subsequent science communicators on how to deploy popular culture and space to challenge, question, and urge the public to action. The Pale Blue Dot as an image widely circulated in popular media, accompanied by Sagan’s description, captures the ability of media to communicate such pressing issues challenging the human condition while deploying the backdrop of outer space to construct and share these ideas, including those on the need for positive relations between humanity and those on the environment and good stewardship.

This example, combined with those previously described across film, literature, and gaming, demonstrate the utility of space presented in popular culture to pose questions and generate discussion and, potentially, action on contemporary challenges facing humanity in reality. These, in turn, showcase how space in popular culture and media can again serve as an important touchpoint for education and outreach to the broader public for addressing issues that require inclusive perspectives and dialogue for developing and implementing solutions to these same issues.

4. Popular culture that educates and inspires

The third purpose that space in popular culture can serve is to educate and inspire, particularly among the youth. Poetry, short stories, and video games all exist as examples that have offered education and inspiration to the youth for encouraging their interest and facilitating their learning of space. These mediums within popular culture remain accessible to youth as they form part of the youth sub-culture – poems and short stories are told to children as rhymes and in the household for offering lessons on morals and good social behaviour, while video games have grown increasingly within youth spaces, including schools, as educational tools.

4.1 Poetry and short stories for inspiring youth

Poetry and short stories are important mediums through which life lessons are imparted to youth. For example, Dr. Allama Muhammad Iqbal, the national poet of Pakistan, wrote several couplets of poetry that included a space theme. These poems served as encouragement of youth for space exploration [29]. As such, Iqbal considered youth as the “representation of the nation, not only for the current nation, but also for the generations to come,” [30]. One example of his poems is “The youth to whom the stars are not out of bounds – are the ones I love indeed,” [31]. Another goes “Other worlds exist beyond the stars – more tests of devotion (love) are still to come,” [32]. Here, among other poems, Iqbal seeks to “motivates the youngsters for space exploration and strongly believes that youngsters of the nation possess the energy to gear-up the nation and can set the stage for next generations to play their role,” [33]. Given the prominence of Iqbal as the national poet of Pakistan and widely respected nature of his work across South Asia, Iqbal’s popular culture works serve as important carriers of messages and lessons to the public, and youth in particular.

Similarly, children’s songs serve as “a source of motivation to think about the option to travel to the moon and life in space,” [34]. An Urdu children’s song “Chand Pe Peryan” features the moon as an important element in the song, and does so in a way that prompts questions among children including “if humans could also go and live on the moon?” [35]. While space is used in the song to help develop the story, its main lessons are to teach children about good values and obedience [36].

In addition, African short stories convey similar messages employing outer space to help develop narratives and broader life lessons. These short stories, in particular children’s fairy tales, also serve important educational purposes for youth, and they remain easily accessible in the forms of books and oral stories that are passed through families. The fairy tale “The Baboon who went to the Moon” is an example of such a story that teaches an important lesson about how “determination leads far, even to the moon and potentially beyond,” [37].

These examples found within the Global South lend themselves as other important mediums within popular culture that speak to youth specifically. Poetry and stories invoking space generate the youth’s curiosity and offer key avenues for promoting education and outreach on space at an early age for all types of young people, including from the Global South whereby much of these poems and oral stories are shared among circles of family and friends.
4.2 Video games as tools for learning about space

Increasingly, video games are being used in classrooms as educational tools to encourage learning among youth. Video games have allowed for the public to be exposed to the “unglamorous” aspects of space, while also serving “an important educational function,” [38]. The rise of video games over the past decades has reached new heights, including in the United States alone where there was total spending of $36 billion on video games in 2017 [39]. Globally, it was anticipated in 2018 for there to be 2.3 billion gamers [40]. Many of these are youth, and thus exposure of youth to space via video games presents a tremendous reach not possible with traditional outlets associated with space education and outreach. It has been argued that video games “have been significant and influential popular culture artefacts since their inception,” [41] and as such they hold important influence over popular perceptions of space as many games engage with space themes.

Consequently, aside from their popular culture prominence and influence, video games present important educational opportunities. “Video games, when well developed, offer a powerful combination of principles that promote learning,” [42]. These follow those on: 1) the use of a simplified version of a real-world domain, 2) the encouragement of critical and active engagement and learning, 3) the promotion of a cycle through which the player can probe the game world, reflect on the outcome, form a hypothesis based on the outcome, and then re-probe the game world, and 4) the encouragement of practice on learners’ own terms [43].

Thus, combining the learning qualities video games possess with the scope of their reach among the public, and in particular the youth, video games as popular culture offer significant potential in educating and conducting outreach to the public on space when they accurately portray outer space and science principles faithfully.

4.3 Discussion of space education and inspiration for youth

The emphasis on children and youth serves as an important reminder that education and outreach efforts, if done to attract a more diverse group of participants and voices speaking on, engaging with, and working in space, remain pivotal. Contemporary adults, while remaining an important target to inform about space, are unlikely to take activist positions or change careers to work in the space sector, whereas children and youth serve as an undecided and underdetermined cohort of people who can be influenced to take an interest in and explore educational and career pursuits in space. Attracting youth at an early stage to space is an important education and outreach goal, and the popular culture mediums discussed here (poems, songs, short stories, video games) offer important avenues in achieving this given their deep, cultural ties within the Global South (referencing poetry and stories) and broad public influence (referencing the video games).

5. Conclusion

Education and outreach remain critical components of the space agenda, and if these efforts are conducted for the purpose of generating greater diversity and inclusion within the space sector between the Global North and Global South and across social cleavages then popular culture and media must serve as important tools in these initiatives. As demonstrated here, the three broad purposes of space in popular culture, namely political, philosophical, and educational and inspirational, offer various avenues in which the public can engage meaningfully with space so as to not only understand more about space, but also to be active participants in space activities and developments.

Politically connected space media invite the public and the various opinions, beliefs, and attitudes among the populace to be presented and debated and addressed in a democratic and open way, as contrasted with previous efforts to mobilize support directed toward a certain political end. Satire comics and music critical of space activities allow for the full fleshing out of issues and concerns about space and help to contextualize it among other public priorities.

Popular media in science fiction films, books, and games also invite people to engage space from a philosophical perspective, interrogating the meaning of humanity and our role so far in history and our place in the future. The commercial success of space science fiction suggests its utility in reaching a vast audience with these questions and which are made possible by the use of space in the various science fiction mediums.

Finally, space in popular culture for its educational and inspirational function, particularly with regard to its influence on the youth, cannot be understated. Social networks consisting of family and friends in the Global South sharing national pastimes, such as poetry in South Asia or oral stories in Africa, enables the introduction of outer space to youth at early ages, thereby leading to a process that sparks their curiosity and interest and hopefully their study and work in space. Alternatively, video games due to their vast popularity among the general public, and especially youth, offer another avenue in which space can be taught to and learned by game players while also introducing them to concepts grounded in accurate and contemporary understandings of outer space.

Understanding of space and diversity and inclusion of all voices, including those from the Global South, prove pivotal to the future of outer space. Depictions
of space in popular culture offer important ways in which to achieve this laudable goal.

References


[38] Siebrits, André, “Keeping the Torch Burning for ‘Good Science’ in Popular Culture: Video Games, Space, and Education,” 2020, pg. 92, Outer Space and Popular Culture: Influence and Interrelations, Southern Space Studies, Springer


