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Moon Vehicle: Reflections from an Artist-Led Children's Workshop on the Chandrayaan-1 Spacecraft's Mission to the Moon

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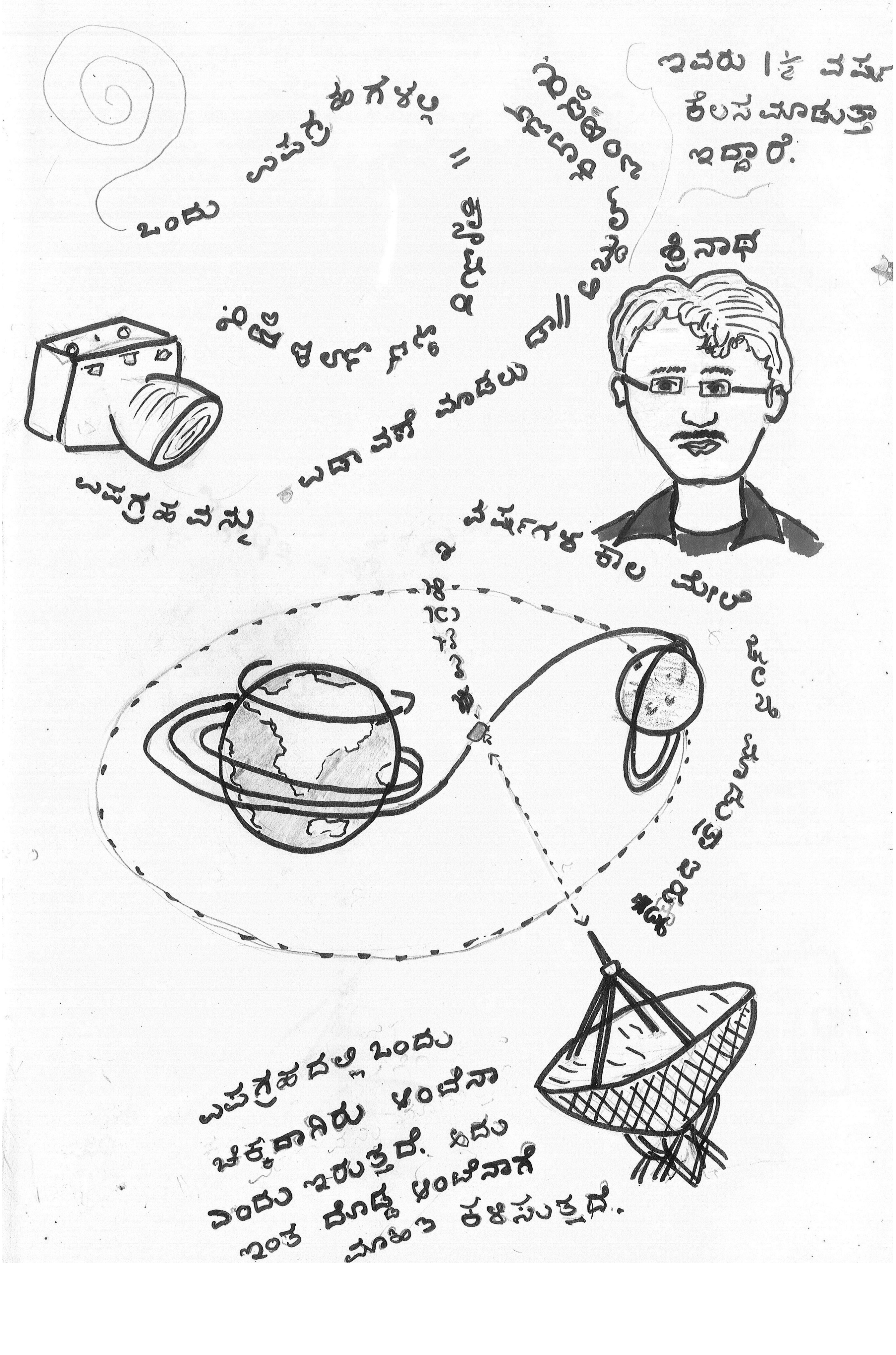
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ARTIST'S ARTICLE

Moon Vehicle: Reflections from an Artist-Led Children's Workshop on the *Chandrayaan-1* Spacecraft's Mission to the Moon

Joanna Griffin

ABSTRACT

This article reflects on the journey to the Moon of the spacecraft *Chandrayaan-1* as it was interpreted through an artist-led workshop. The workshop participants were a group of children who lived close to where *Chandrayaan* was built and some of the engineers and scientists responsible for creating the spacecraft. Insights from the workshop show how a mission to the Moon draws on both the technological and the imaginative; they also have bearing on the relative agency of these individuals to contribute to the Moon missions in ways that are personally meaningful to them.

The 2-week children's workshop that is the focus of this article was held at Drishya Learning Centre, located in one of the urban slums of Bangalore, India. The workshop was one of many events in a long-term project called Moon Vehicle, begun in March 2008, which was based out of the Centre for Experimental Media Arts (CEMA) at the Srishti School of Art, Design and Technology in Bangalore. Srishti is one of the foremost design institutions in India and has a commitment to pioneering art/science projects. The catalyst for the Moon Vehicle project was the launch from India in October 2008 of the *Chandrayaan-1* spacecraft, which is currently out of contact at an unidentified location in the vicinity of the Moon, where it was sent to collect data on terrain, minerals and the enigmatic possible presence of water. Moon Vehicle is a translation of the Sanskrit word *chandrayaan* and was conceived as a vehicle through which the cultural dimensions of the mission could find a space to be articulated. The idea for this art/science project came about during the Bangalore Space and Culture Symposium in 2007 [1]. This symposium comprised a mixed forum from the communities of the sciences and the arts, in which speakers from the Indian Space Research Organisation (ISRO) gave presentations alongside artists and theorists.

The resonant point at which to begin the story of this workshop is that of a meeting that took place in which representatives from the Space and Culture Symposium organizing committee approached ISRO to formally request that collaborations begin across their disciplines in order to celebrate the coming launch of *Chandrayaan* and its anticipated combination of cultural and scientific dimensions. Unfortunately, the response from the space agency was a resounding "no." The representatives from the art and design communities were asked to come back when ISRO needed its spacesuits designed! This rejection, of course, only added urgency to the cultural mission. It also indicated that the operating space for the Moon Vehicle project would be at the fringes of ISRO and would take shape via unofficial, informal negotiations.

A short time after these events, I began a two-year appointment as artist-in-residence at Srishti, in the role of mentor to the Moon Vehicle project. Many of the outcomes of this project were devised with students from Srishti and offered ways to share and elicit common understandings of the Moon. The use of a projection of the Moon's image via telescope onto the ground became something of a motif for the work. Looking down at the Moon instead of up at it created a poetics of inversion that opened new spaces for thinking about its image, bringing up questions of the relation between the Earth and the Moon and the treatment of each. The image on the ground naturally organized people into a circle, in which the acoustics were perfect for many kinds of sharing and storytelling to occur. The projection also made it possible to sit or stand on the Moon (Fig. 1), and this location brought with it perceptions that might not otherwise have been accessed.

In describing the workshop, which built on these sharing events, it is necessary to indicate something of the specificity of the context in which it came about. The poetic reorientation that placed the Moon on the surface of the Earth helped draw out a set of nuanced, ongoing, provisional, localized and personal relations with the Moon of the kind often lost in the grand narrative of institutionalized space technology. It is with a similar emphasis on the nuanced, localized and personal that the Moon Vehicle workshop is shared here, not as a model education project to be repeated elsewhere but rather to show what a necessary stage in finding the meaning of a techno-scientific Moon mission looked like in practice. What happened was particular to the time and place, fulfilling a need not otherwise being met. It addressed a continuum of needs, motivations and opportunities and emerged by way of a series of serendipitous, fortuitous, intended and unintended encounters. However, it also took place within a larger, historically contingent framework.

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Article Frontispiece. Drawing by Prashant-J made at the Indian Deep Space Network, Byalalu, Bangalore. (Photo © Joanna Griffin) The drawing shows the path of *Chandrayaan-1* to the Moon together with the telemetry between the spacecraft and the receiving dish at Byalalu. The scientist who explained this is depicted.

Fig. 1. The image shows one of the ways the projection of the Moon was used during the Moon Vehicle project: as a way of eliciting a personal experience of the Moon. (Photo © Joanna Griffin) During a workshop about imagination and technology, a student is explaining how she became stranded on the Moon.

CONTEXT AND IDEOLOGIES

The *Chandrayaan-1* spacecraft, the Moon Vehicle project and the model of pedagogy developed at Drishya Learning Centre correspond to the domains of spacefaring, experimental media art practice and radical education. While there are many factors that influence a course of events, some recognizable and others less so, what appeared to be the common thread that galvanized these groups at that particular time and place was a shared aspiration to transform an identity. The *Chandrayaan* mission, the Moon Vehicle intervention and Drishya's education philosophy each had an identity and a narrative to dislodge and reclaim. While *Chandrayaan*'s work was in part to dislodge the perception of India as a developing nation by showcasing spectacular technology, the art-and-culture project Moon Vehicle was intended to dislodge the now-dominant scientific narrative of the Moon with a broader critical-cultural frame; the Drishya education movement sought to dislodge stereotypical notions of what underprivileged children should or should not learn and aspire to. Each needed to unlock the energy of the other to transform a dominant narrative.

A crucial factor to understand in building the context of *Chandrayaan* is the particular notion of "science" in India. Jawaharlal Nehru, who became India's first prime minister after Independence in 1947, held a strong conviction that science had to be an integral part of nation-building, as it could be used to alleviate poverty and many other problems the nation faced at the time. As a consequence, the Indian constitution notably contains a clause stating that one of the duties of the citizen is to develop the "scientific temper." The founder of the Indian space program was Vikram Sarabhai. He and Nehru were close friends and had similar ideas. Thus a powerful tie of space technology to the transformational potential of science through nation-building is forcefully present in the collective imagination of *Chandrayaan* within India [2]. This Moon mission also holds particular significance within the story of India's 50-year satellite program. Up until *Chandrayaan*'s launch, India's highly successful space industry had focused on the Earth, on remote sensing and communication applications, in a uniquely poetic alliance between high-end technology and grassroots needs. The initial purpose of India's space program was to study the atmosphere in order to produce better information on weather patterns and so to help farming. From this, Sarabhai recognized that satellites could also be used to provide communications for villages, which at the time were extremely isolated, through satellite broadcast television, providing education and the distribution of information on farming and healthcare.

The vision expressed by Vikram Sarabhai, that space technology would be used to alleviate the immediate problems of India's people, reflected a quality of humility lacking in the competitive Space Race drama being enacted between the U.S.S.R. and U.S.A. There was a clarity and sincerity to his purpose, a rationality and logic to his proposals and above all a humanitarian vision. It is notable that he would not be drawn into the political vanity of Moon missions. He rejected any idea of Indian spacecraft going to the Moon and mistrusted what he saw as the questionable motives of such a journey, saying, "If we are to rely on historical experience, man will surely push ahead with adventures of this type backed by motives which will inevitably be mixed" [3].

In the light of this founding ideology, the mission of *Chandrayaan* marked a 180º turn in viewpoint both from the Earth and from this respectable philosophy. The hitherto altruistic ecology of the space program lost, in the case of *Chandrayaan,* a recognizable connection to the people of India. The Moon Vehicle workshop then fell bluntly into the conceptual gap and asked the awkward question of the relevance of the Moon mission to the people of India and particularly to the issue of poverty. While it is right to ask this question, it is itself a question beset with assumptions that hang on the narrow definitions of identity and presumptions of need assigned to poverty [4]. Nowhere are these assumptions about identity and need more strongly opposed and more clearly articulated than by the communities that are so labeled. The Drishya Learning Centres [5], located on illegally occupied land (slums) in several areas of the city, proceed from a robust philosophical framework that promotes self-determination. In this encounter with the space agency, Drishya helps to expose the type of relative and nuanced spaces of agency available to individuals, who are consistently factored out by the sheer scale of operation of a space program and its thinking space, however humanitarian its motives may appear.

The idea of spaces is fundamental to the Drishya philosophy. The poverty of slums leads to highly localized communities, because their occupants are literally not able to go far and because necessity creates strong local bonds and reliance. Drishya (a Sanskrit word meaning vision) prides itself on transcending location, and it may be that this physical release from place is also a means to overcome a grueling situation. The children at Drishya learn that they are

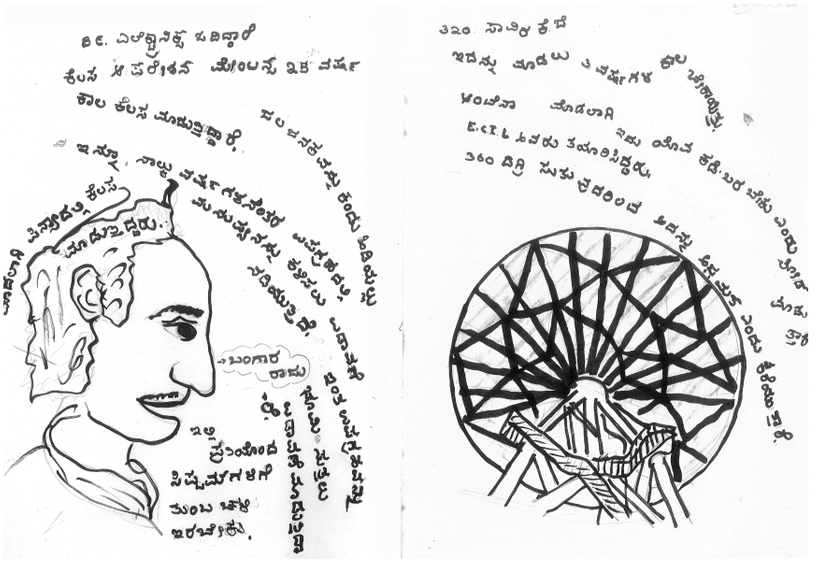


Fig. 2. Drawing by Prashant-J made at the Indian Deep Space Network at Byalalu, Bangalore, showing the back of the 32-m receiving dish and one of the operators explaining how it works. (Photo © Joanna Griffin) The writing explains that the operator has been on duty for 25 years, that they are looking for water or oxygen on the Moon and will send humans there, that the systems have to be kept extremely cold and that the antenna weighs 320,000 kg.

not geographically bound to the slum area any more than they are bound to a way of life in which they lack agency. Any kind of stereotyping is strongly opposed. Mobility within a network of learning is emphasized, such that learning takes place across locations, collaboratively, very often using the energy of artists' investigative methods to drive projects [6].

This is the context in which the workshop began, and as a consequence it appeared to have been eagerly awaited by all concerned.

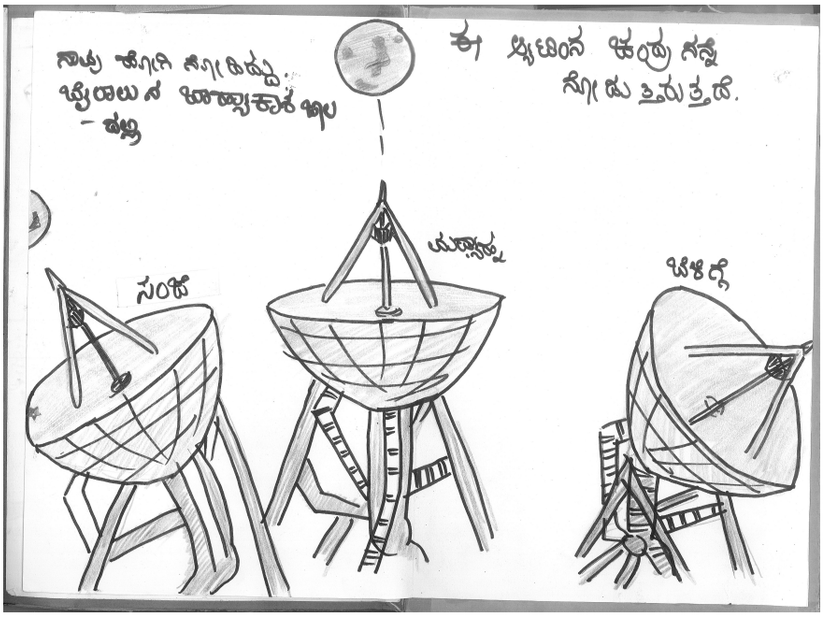
DAYS OF THE MOON

At Drishya, each day begins with a mandala, a circle on the floor made with colored sands and whatever else the children decide to value that day. Essential oils chosen for their calming attributes, incense and a prayer give focus and harmony to a short period of meditation during which the children and facilitators sit in a circle. The children will often say this is the most cherished moment of their day. It marks a disjunction from home life. It demarcates a new space, a special space for learning about the world and self.

On the first day, the workshop team—consisting of Vidya Prakash, the children's facilitator; Anitha Santhanam, a physical theater practitioner; Babita Belliappa and Alisha Panjwani, two Advanced Diploma students from Srishti specializing in language and digital media; and myself—set up questions and starting points. First was the question of how we explain things we do not understand. There are stories of the Moon—for instance, that of the Sun and Moon being angry brothers chasing each other—that explain why the Sun and the Moon follow the same path. The current science about the Moon continues to offer explanations that displace previous scientific stories into myth. To illustrate how stories emerge from the effort of trying to make sense of the world, Santhanam asked the children to work in groups and depict fabulous phenomena, for which the other children had to develop explanations. Later she asked the children to bring in an object that meant something to them and to describe the object in scientific terms ("the ring is made of gold") and in personal terms ("my grandmother gave it to me"). She said that every object has a factual side and an emotional, experiential side. The Moon, she said, is both science and culture: It can be described through science and given meaning through culture.

Moon means satellite, so the concepts we explored next were those of *satellite* and *orbit,* in order to see how the defining principles of the physics of our solar system also defined our more immediate world. Each of us took a paper plate, drew ourselves in the middle and then created a diagram of the things and people that we felt were in our metaphorical orbit. There were parents and aunts, dogs and the mandala. From that process it became clear that some things were difficult to place, because someone who meant a lot might be physically far away, and that valuing things brings them close in meaning. After this the children made a representation of the solar system on the floor. Where was *Chandrayaan*? The children knew all about *Chandrayaan.* They had watched its launch 8 months before and collected press clippings,

Fig. 3. Drawing by Prashant-D of the receiving dish at the Indian Deep Space Network following the Moon and communicating with the spacecraft *Chandrayaan-1.* (Photo © Joanna Griffin) The writing says that the antenna is pointing at the Moon in the open sky and shows its changing position on the day of the visit in the morning, at noon and in the evening.



but its link with the Moon was still a little flimsy. No one was quite sure where *Chandrayaan* was.

On the second day, we visited the ISRO Satellite Centre, where *Chandrayaan* was built. As with all space agencies, there were lengthy security checks—no cameras, no phones, no memory sticks. The group was taken to see a museum of satellites and learned that a satellite is different from a rocket. Next was a window into the "clean room," the dust-free satellite-building workshop, where engineers wear white coats, caps and face masks. Here CartoSat II was being built. It was covered in gold blankets, and one of the students asked if this were similar to the gold covering on chocolate bars that stops them from melting. It was similar. In the offices of the scientists and engineers working on X-ray instrumentation, the children were told the different theories of how the Moon was formed, that a rocket, once launched, separates into three parts called "stages" and that one day the Sun would expand due to helium depletion and swallow the nearby planets, including Earth.

After this visit to Satellite Centre, the children's facilitator Prakash bought a bagful of hospital caps and masks, like the ones worn by the clean-room engineers, so that the children could create their own "clean room" at Drishya. It was a role-playing exercise meant to ease the stark division they might have experienced the previous day when looking in on the white-coated engineers through the glass of the public viewing gallery. Wearing facemasks and caps, the children became the engineers and, with stunning recollection of the shapes, instrumentation and solar panels required for spacecraft engineering, they built their own satellites. Undaunted by the hierarchy and ritual witnessed in the ISRO "clean room," they made wry comments on these observations through objects, among which were a white-coated rocket and a mini-satellite with a button-down shirt.

The second field trip was to the Indian Deep Space Network (IDSN), the state-of-the-art tracking station built 30 km south of Bangalore at Byalalu village. In less than 3 years, ISRO problem-solved its way to creating its own deep space network. When I visited the dozen engineers who operated the facility, they seemed to me understated geniuses, deeply immersed in the language of the machines they had designed and talking in a series of acronyms. They made us feel welcome and comfortable in their half-empty buildings that eagerly anticipated India's future deep space missions.

Partly in response to the ban on photographs at ISRO, I asked the children to make drawings while they were on site. In addition they had to interview the scientists and create what I called "interview portraits." These were depictions of each person with the technology they spoke about and had built or were working with. I wanted the children to think of technology not as self-contained objects but as human enterprises: the outcome of somebody's idea, many ideas from many individuals, materialized into a spacecraft and its apparatus of rockets, antennas and computers. Spacecraft, in their intricate making, give expression to multitudes of questions about why and how we are here on Earth and what it is that surrounds us. As a foreigner, I had not been allowed into Satellite Centre, which is the most secured of ISRO's bases, and somehow the tight orchestration of the children's visit there had left no time for drawing. However, here in the open landscape, with the Moon above us in a blue sky, the children began their drawing task in earnest, and our wonderful hosts were bemused as they, as much as the technology, became the subject of the drawings (Fig. 2).

The drawings traced the children's newfound connection to the Moon and *Chandrayaan* through conversations, questions and jokes between them and the keepers of the spacecraft (Article Frontispiece). Their understanding of a pathway to the Moon from the local Satellite Centre took shape in their drawings. Now we all knew where *Chandrayaan* was, we knew where it had been made and we knew which route it had taken to find the Moon.

Perhaps the most compelling connection came at the end of our day at the Deep Space Network. We had gathered under the white receiving dish, which spanned 32 m and dominated the wide rural landscape as it followed the path of the Moon from horizon to horizon every day. The children finished their drawings in the shadow of the antenna, and we all seemed to linger; no one wanted to go home. I think we might have felt closest to the spacecraft then, seeing the Moon in the sky and the antenna pointed at and seemingly pulled along by our distant friend *Chandrayaan*. It was a gentle, pastoral scene, in which something profound was taking place—a conversation between the gargantuan dish, Chandrayaan and the Moon (Fig. 3).

TRANSFORMATIONS

After our field visits, the group set to work reconstructing our encounter with *Chandrayaan*'s Earth station. Every morning the children worked on developing stories and performances based on their encounters with ISRO. In the performances, the children began to take on the characters of the antenna (Fig. 4), the Moon, *Chandrayaan* and even the telemetry, which danced between the two. The antenna sent questions for *Chandrayaan* to ask the Moon and these were relayed back and forth, with inevitable confusions. One of the performances

Fig. 4. Rehearsal of a performance that depicts the movement of the receiving dish that was seen on a field trip to the Indian Deep Space Network, Byalalu, Bangalore. (Photo © Alisha Panjwani)

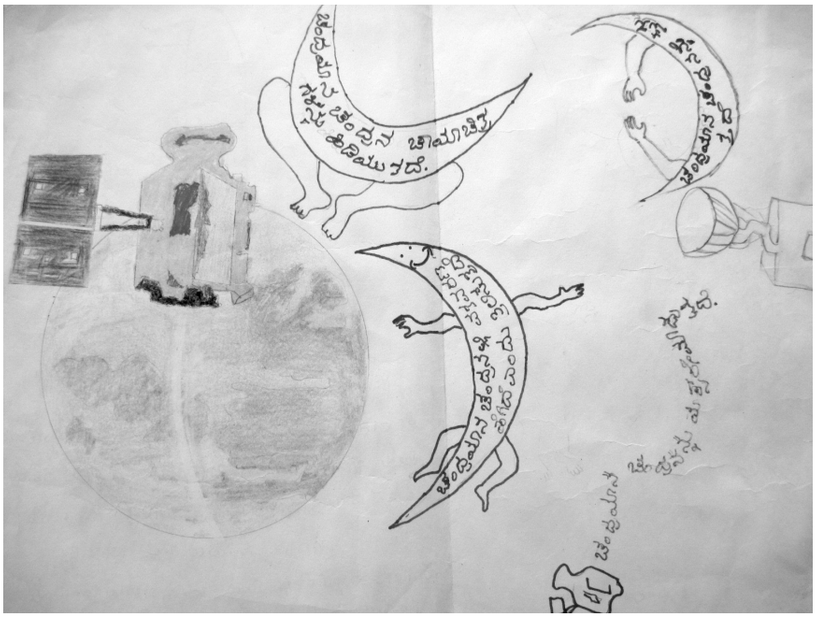


Fig. 5. Drawing by Yerlumalai that depicts, to the left, the Moon with the orbiting *Chandrayaan-1*, of the kind used in promotional material, and, on the right, dancing moons with explanations inside of the various things *Chandrayaan-1* is doing while at the Moon, such as taking pictures, looking at X-rays and orbiting. (Photo © Joanna Griffin)

made fun of the security guards, who had been unremittingly brusque with the children. Another explained the three stages of the rocket and that the satellite sits inside the tip of the rocket, which is called the nose cone. The factual narrative combined with an exquisite economy of movements in which the first two rocket stages transformed themselves into the Moon and the third into *Chandrayaan*. During the final presentations on the last day, to an audience that included scientists from the Indian Institute of Astrophysics, the most laughs came for the story of Amavasya (meaning new moon), in which the Moon acts suave and cool as orbiting satellites take its picture, but then gets tired and decides to go away for a while, which becomes the reason why the Moon appears and disappears every month. The fewest laughs were for the story of Pluto, driven out of his house by abusive parents, who then regret their ways and send a satellite to find him. Other stories told further tales of bullying, inequity and reconciliation. Away from the ISRO base and its dominating materiality, the technological objects were reused by the children in scenarios that had resonance and meaning for them. The technology began a new journey of imagination.

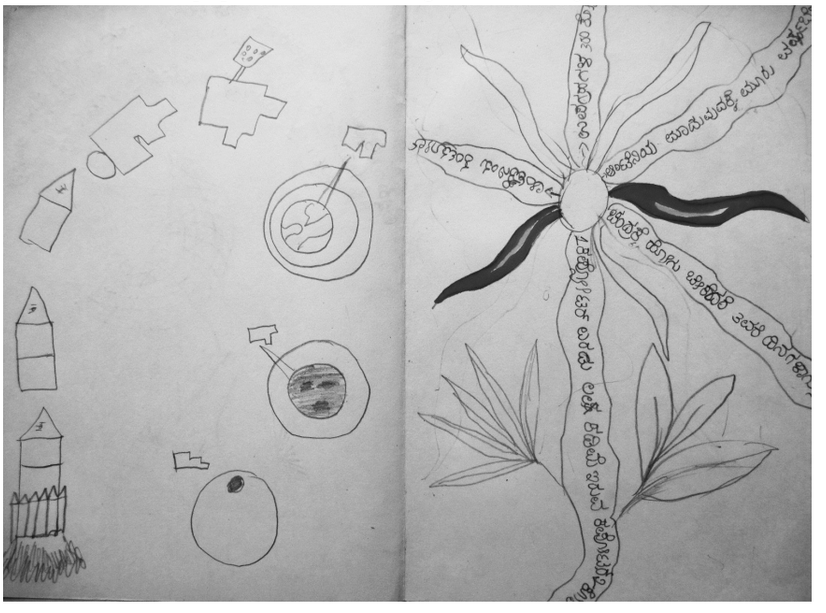
The drawings shared this embodied, theatrical method of transferring the technical rationality of the Moon mission to the nuanced subjectivity of personal experience. In Yerlumalai's drawing (Fig. 5), for instance, an image derived from an ISRO information leaflet appears next to fantastical moon creatures with arms and legs.

With a similar freedom, the clear, linear pencil sketch by Shivashakti (Fig. 6) puts the hard information of the cost of the mission (300 *crores*, a numeric unit used in India equal to 10 million), the amount of time it took to build the antenna (3 years) and the days *Chandrayaan* took to get to the Moon (3) into the petals of a huge flower, as her way of making sense, at that particular time and place, of the oddly poetic numeric facts with which *Chandrayaan* was constantly described.

These images and performances are a window into some of the unpredictable and enriching ways in which individuals construct meaning and make sense of the world. They illustrate drifts of thinking, involving remixing, association and transmutation, and help to indicate the boundless field of imaginative participation that can be generated from spacefaring activity.

These kinds of transformations of the Indian Deep Space Network and *Chandrayaan* into theater and drawing could be seen as the kind of imaginative leap of which only children are capable. However, from my conversations during the project with the Byalalu team of scientists, engineers and computer programmers, it was clear that they would also have been open to such invention, indicating that the emergence of these associations is merely contextual. What is it that prevents these translations from taking place more widely, when the potential for association is so tangibly present in the technology? Would the dream space of these artifacts, if more fully extrapolated through cultural production, have the power to induce new forms of usership or of agency? Could the spacecraft that fled the Earth and has now lost

Fig. 6. Drawing by Shivashakti showing, on the left, the rocket stages and journey to the Moon of *Chandrayaan-1* and, on the right, a huge flower with information about the mission written in the petals: The cost is 300 crores; it took 3 days to get to the Moon; and it took 3 years to build the Deep Space Network near Bangalore. (Photo © Joanna Griffin)



contact with its creators be appropriated and reshaped by attending in such ways to the imaginary?

In thinking through such questions, it should not be forgotten that the task of creating a mission to the Moon was itself a colossal act of transformation from idea to material. It could be said that engineering holds the key to a true poetics of a human relation with the Moon, containing in that relationship a vast knowledge, a complexity of materials, physics and processes that define in superb detail a tangible relation with the distant Moon. The spectacle of technology forms a conduit by which new kinds of meanings and emotional connection are made evident. It itself creates an image. The bizarre collage that constitutes the landscape of village and deep space network at Byalalu is the product of a method of scientific and technical rationality originating from an imaginary and visionary place. It is itself a kind of theater.

That *Chandrayaan* did leave Earth orbit was a historic moment for the identity of India, indicative of the completion of a certain kind of nation-building and that a certain kind of transformation had taken place. For many of the scientists, engineers, directors and team leaders I have spoken to about their roles on the *Chandrayaan* mission, it is this achievement that had the most meaning; it was from this place that the unexpectedly emotional charge of the mission would hit. *Chandrayaan*'s successful journey to the Moon released a burden of identity that, 40 years earlier, Nehru was determined would be overcome through developing the scientific temper.

Conclusion

The Moon Vehicle workshop has been used here as a mechanism for unlocking aspects of the overarching narrative of science and technology in India, which, post-Independence, has been punctuated by the idea of scientific temper. Nehru's delicate phrase, which has been hotly debated in India for decades [7], has a profound resonance on the subcontinent but is rarely heard elsewhere. It is a useful phrase that tempers the notion of science, giving latitude to contradictory experience and at the same time propelling an ongoing criticality.

One of its consequences has been this encounter between Drishya Learning Centre and the Indian space agency ISRO, using artistic practice as a medium of translation. Art practice has methods for making unfamiliar thinking become more easily apparent often through acts of inversion, such as projecting the Moon's image onto the surface of the Earth. In the encounter described in this article, the unacknowledged ways that space agencies learn from the poetics of their visiting children is just one among many insights that can begin to take form through this method of working.

The entwined relations between space technology, humans and environment revealed by way of the Moon Vehicle project shed light on aspects of the relation of space technology to the public domain that appear when the imaginary dimension of the space agency is considered. From my perspective as an artist, such relations are transmitted in the images and theater produced by the children. I suggest that attending closely to these translations reveals other criteria for thinking about the meaning of space technologies.

Acknowledgments

Much appreciation goes to the children from Drishya who participated in Moon Vehicle workshops, to the workshop team of Vidhya Prakash, Anitha Santhanam, Babita Beliappa and Alisha Panjwani and to the scientist and engineer collaborators from ISRO who gave their energies to the workshop and shared their extraordinary experiences. I would particularly like to thank Geetha Narayanan for proposing the workshop and for providing the support and vision necessary for such a project as Moon Vehicle.

The comments and advice given during the writing of the article from Martha Blassnigg, Vasanthi Das and Michael Punt, as well as from the anonymous peer reviewers, were immensely helpful.

References and Notes

Unedited references as provided by the author.

1. The Bangalore Space and Culture Symposium took place at the National Institute of Advanced Studies, Indian Institute of Science, Bangalore, India, 29 September–1 October 2007. The organizing committee included Srishti School of Art, Design and Technology; *Leonardo* journal; the National Institute for Advanced Studies; and the U.K.-based art/science agency The Arts Catalyst.

2. In 1962 the Indian National Committee for Space Research (INCOSPAR) was formed within the Department of Atomic Energy with Vikram Sarabhai as Chair. This became the Indian Space Research Organisation in 1969. The biography by Amrita Shah, *Vikram Sarabhai: A Life* (New Delhi: Penguin Viking, 2007), is a good source for understanding the person, the context and the emergence of an ideology around this technology.

3. The speech by Vikram A. Sarabhai, "Sources of Man's Knowledge," was reproduced in *Resonance* (December 2001 p. 92) and was originally delivered in 1966 as part of the National Programme of Talks, Series: "Exploration in Space."

4. Amartya Sen writes in *Development as Freedom* (Oxford: Oxford University Press, 1999) of "the terrible burden of narrowly defined identities" (p. 8) and provides an articulate framework by which human-centered values can be better accounted for in economic theory.

5. Drishya began in 2002 and is run by Anita Reddy. Its education program was developed by Geetha Narayanan, who is the Founder/Director of Srishti School of Art, Design and Technology, with her research collective Project Vision. The concepts and history of Drishya are described in "Dwaraka Drishya: An education movement empowering poor children" (2005) 19 May 2010 <www.dwarakaonline.com/Html/Drishya.htm>. See also Ref. [6].

6. The philosophy that frames Drishya can be researched further in a number of online papers and presentations by Geetha Narayanan, such as: "Crafting Change II: The Project Vision Hypothesis," presented at the Global Summit 2006: Technology Connected Futures, 17–19 October 2006, Sydney, Australia; and "A Dangerous but Powerful Idea—Counter Acceleration and Speed with Slowness and Wholeness," (2007) [Online]. A paper by Arzu Mistry, "Linking the Arts and the Environment" (2009), presented at Arts Education Conference: Contexts, Concepts and Practices in Schools, 11 and 12 December 2009, Bangalore, India, was also helpful in making explicit how artist interventions contribute to the curiosity-driven curriculum of Drishya.

7. Meera Nanda's *Prophets Facing Backwards: Postmodernism, Science, and Hindu Nationalism* (Delhi: Permanent Black, 2004) has a chapter exploring the discussions that arose particularly in the 1980s over the interpretation of the term *scientific temper*; and the anthology edited by Ashis Nandy, *Science, Hegemony and Violence: A Requiem for Modernity* (Delhi: Oxford University Press, 1988) also gives a good sense of who was critically involved and what was at stake.

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Special Section: The Images and Art of Nanotechnologies
***Guest Editor:* Kathryn D. de Ridder-Vignone**

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