

Don't we need more scientific literature on the impact of science television documentaries, science and science-fiction films in India?

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ABSTRACT

In the recent past, there has been an increase in the number of science television documentaries, science films, and science fiction movies produced in India. However, scholarly research on these media products is still limited. The scientific literatures already available are largely based on mainstream science fiction films which attempt to make concepts in science and technology popular by focusing more on their 'thought experiment' potential to appeal to the audience, rather than letting the audience appreciate the essential scientific concept in their stories. On the other hand, when science documentaries reconstruct a science reality, the script and production decisions are made primarily based on intensive research into the theme which takes precedence over compromising the scientific content for the sake of popular appeal. While the audience does not have much to be concerned about these implicit differences, it is for film scholars and science filmmakers to take note of the accurate presentation of science concepts in television documentaries and science films as against the treatment of the same in fiction fantasy, science-fiction films, comedy, drama, thriller, action and adventure that foregrounds science aimed at entertainment.

This study reviews five literature sources that explore communication through science films. The study not only establishes the urgent need for assessing the growth of science films, science fiction movies, scientific documentaries and television programmes in the Indian context that are based on valid scientific concepts and conveys accurate, positive and educational messages but also its cinematic treatment that supports effective science communication through films.

Keywords: Documentaries, Feature film India, Science Fiction, Science films, Television programmes

Introduction

To help science and scientific temperament get integrated into India's socio-culturally and economically diverse fabric, science communication research today, more than ever, needs to find its own uniquely crafted filmic ways reflecting the contemporary concerns to deliver verified scientific facts as well as the current scientific information to the public at large. Moreover, it is even more difficult to augment scientific literacy in a country where superstition often clouds rationality. Again, merely acquisition of scientific literacy does not always qualify a person to have a scientific temper (Rautela and Chawdhury, 2016).

Many government and non-governmental organisations are involved in science communication promotion activities. Institutions and organisations are also engaged in coordinating among various educational centres to take science to the public. Laboratories, museums and media centres have worked to communicate science (Patairiya, 2003). The task of reaching out with messages of science through print medium is faced with the hard fact of around 266 million people in India who can't read and write, and around 12 million children in India who are yet to get enrolled in schools (UNESCO, 2017-18). The degree of literacy in India being around 74.4 percent (NSO, 2017-2018) makes books, magazines and newspapers not accessible to the other 26.6 percent of the people in India. Considering India's huge population, it is acknowledged as a leading concern.

Though radio broadcasts reach India's remote corners, they are often ineffective in explaining complex scientific and technological concepts. Moreover, for historical reasons, English has become the language of science in India, which also comes in the way to explain scientific terms, especially in regional languages (Priyadarshini, 2014).

Though science shows, outreach and demonstration activities have proved to be an effective medium for science communication, it is, however, not always possible to engage in carrying out such large-scale activities on a regular and sustained basis. Until the time science communication activities become a

part of routine life activities, expecting people to think and act scientifically would remain a far cry. Additionally, time and financial constraints combined with the limited number of field-practising science communicators in India have had an adverse impact on the frequency of conducting activities related to science and technology communication in the hinterland of India, where it is needed the most. Film-centric science communication in the far corners of India's vast hinterland with people attending science film screenings does not even dimly appear on the horizon.

Visual communication of verified information to television viewers based on evidential reasoning has assumed significance with the proliferation of digital media. Striking a judicious balance between the cinematic treatment and the scientific information presented in science films could lead to better reception of science messages by the audience who would want to get new insights into a science reality while they get entertained in the process of viewing. The practice of science film production draws its strength from a variety of departments of pre-production, production and post-production that ranges from objective research, artful storytelling, narrative scripting, audio and video engineering, animation graphics and media design, all of which are suitably weighed to balance with the academic theme of science being dealt with in a particular media product or film. The intensification of this collaborative aspect of science communication needs urgent attention to make science reach wider while striking a balance between scientific authenticity and the art of visual storytelling.

Though there is an enhancement in science communication through increased numbers of films produced, not much scholarly research in India has investigated either the impact of science communication through films or looked deeper into the ways of validating its scientific authenticity. Research articles appearing in scholarly journals on the impact of art and craft employed for promoting science communication through films aimed at inculcating scientific temper in India have also not taken note of the difference the use of modern production technologies has made to some of the recently released films that have science as its central theme and which have become

popular of late in the public domain including video streaming platforms. Here, the examples include 'Rocket Boys' which has scientists Homi Bhabha and Vikram Sarabhai and their work at its core and the film titled 'Rocketry: The Nambi Effect' on the former ISRO (Indian Space Research Organisation) scientist Nambi Narayan as well as the recently released film 'A Holy Conspiracy' which is a dramatized story about teaching Darwin's theory of Evolution.

Since India has over 15 constitutionally recognised languages, film production centres located in various regions of the country accordingly cater to the target population. Yet, while producing media products, a bias for some of the theories borrowed from the West gets easily reflected. Though the scope for research in science communication through film is vast, those who have studied science films produced in India have not gone beyond literacy aspects (Nagraj, 2013).

Though there are many articles and stories all over the internet in Assamese, Bengali, Hindi, Malayalam, Tamil and Telugu that explain the science behind various science-fiction movies, they merely summa rise the script of the films and dwell on the looks, make-up and personal life stories of the cast and hardly validate the impact of communication of scientific messages.

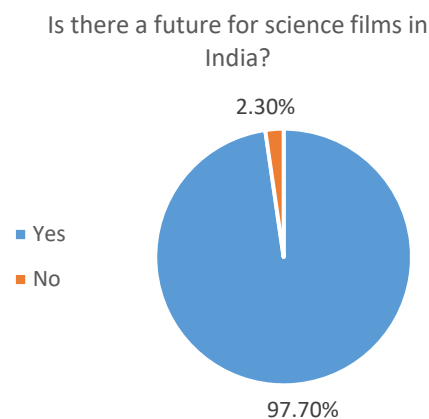
This paper aims to review the selected scholarly literature that explores the impact of communication through films based on scientific themes in the context of India. Only five papers serve the purpose of the present review, clearly establishing the insufficiency of scholarly research undertaken to examine the role of science television documentaries, science films and science-fiction movies in India.

Results & Discussion

"Over the last three decades, the community of science documentary producers has gradually increased" (Raza,2011). Even a remotely similar increase in the scholarly study of the work produced by science documentary makers has hardly been undertaken. This study, therefore, was able to compare the data presented in the five research literatures based on the theme of communication through science films. The articles and the papers are as follows:

- a. Science Film-making for Science Communication — A Study of Filmmakers’ Perspectives in India by Nimish Kapoor and Shambhu Nath Singh.
- b. User-Experience and Science-Fiction in Chinese, Indian, and Japanese Films by Aaron Marcus.
- c. Science Popularisation Activities in Assamese by Dinesh Chandra Goswami.
- d. A look at S&T Awareness — Enhancements in India by Chandra Mohan Nautiyal.
- e. Science and Scientists: Portrayals in Tamil Cinema by Rajan Kurai Krishnan

While the research article titled ‘Science Film-making for Science Communication — A Study of Filmmakers’ Perspectives’ analysed the data on science filmmakers, whereas the research article titled ‘User-Experience and Science-Fiction in Chinese, Indian, and Japanese Films’ analysed the data on science-fiction films. The article ‘Science Film-making for Science Communication – A Study of Filmmakers’ Perspective in India’, revealed that 97.70% of filmmakers think there is a future for science films in India which was based on the survey conducted through close-ended and open-ended questionnaire that involved 210 filmmakers out of which 130 filmmakers (62%) responded.



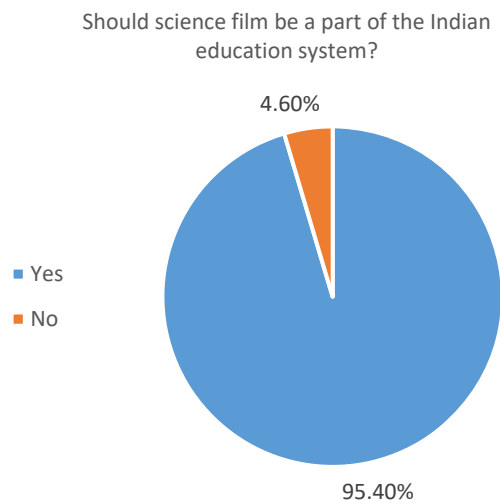
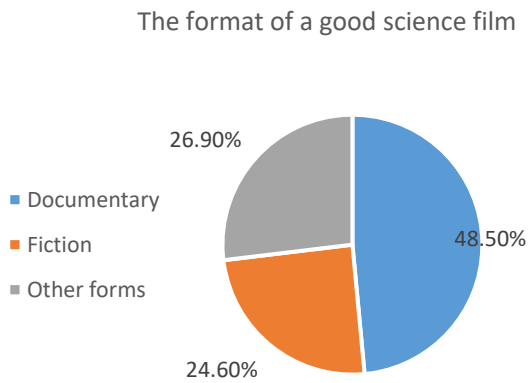


Figure 1: Questions to science filmmaker-1 (data from Kapoor and Nath, 2019)



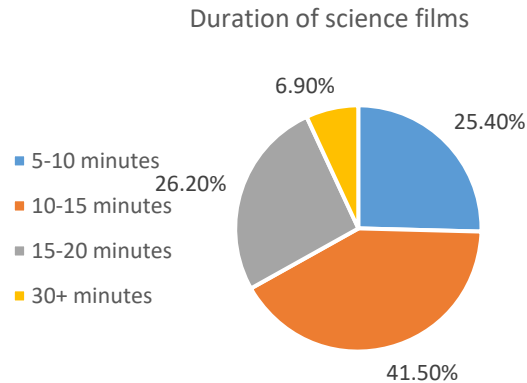


Figure 2: Questions to filmmaker-2 (data from Kapoor and Nath, 2019)

The study initiated by (Kapoor and Nath, 2019) mentioned in the research article ‘Science Film-making for Science Communication – A Study of Filmmakers’ Perspective in India’, showed that 48% of filmmakers believed documentaries to be a good format for science films, 24.60% of filmmakers preferred a science-fiction format. The study also indicated that while 41.50% of filmmakers preferred the film duration to be between 10 and 15 minutes, 26.20% of filmmakers believed 15-20 minutes to be a good duration. The 5-10 minutes duration was preferred by 25.40% of filmmakers.

The analysis of Bollywood-produced science-fiction films obtained from the research article titled ‘User-Experience and Science-Fiction in Chinese, Indian, and Japanese Films’ indicated that, unlike documentaries, Bollywood movies are highly popular because of the star cast and being screened in specially designed Cineplexes (Marcus, 2013). Moreover, their high production budgets do not even remotely compare with shoe-string funds the science filmmakers have access to in India who have to either depend on their own funds or hope for state or institutional support. The tenders floated by the Government institutions for the production of science films not allocating enough funds to create and maintain high production values is a regular lament. Given the circumstances, state-sponsored science channels could be the only possible way to get a bigger audience for science films in India (Priyadarshini, 2014).

The significant point the paper 'User-Experience and Science-Fiction in Chinese, Indian, and Japanese Films' established was the fact of 22 national languages making the production team dub the films and/or provide subtitles in multiple languages for India's own domestic market (Marcus, 2013). Many of the popular films in other genres were produced in languages other than Hindi, which were subsequently dubbed in Hindi and other national languages. This was possible because of the high budget and publicity, unlike science documentaries and non-feature films. The other point raised by the article was about Bollywood films which employ music and dance, unlike western science-fiction movies. This particular manner of Bollywood treatment was made to hybrid with the films produced outside the mainstream popular Hindi cinema with only a spattering of scientific content to attract the same audience as targeted by Bollywood. Science films as perceived in the popular imagination are based on scientific facts and principles and are supposed to be treated in a manner that is entertaining as well. However, in the considered opinion of the first author of this review article, the sooner the 'popular imagination' perception changed, the better it would be for the larger social acceptance of films based on themes of science. A study investigating the grounds to establish the point of view could be the matter for a future scholarly article on the subject.

The research article 'User-Experience and Science-Fiction in Chinese, Indian, and Japanese Films' also mentioned the science-fiction movies of India including the Tamil-American science-fiction film *Kaadu* (The Jungle) produced in 1952 based on the invasion of a woolly mammoth; *Kalai Arasi*, a 1963 Tamil science-fiction comedy film where aliens kidnap a girl and the hero rescues her; *Karutha Rathrika*, a Malayalam science-fiction film of 1967, the story of which is based on a split-personality and *The Alien* (unproduced film), an Indian American science-fiction film produced in the late 1960s directed by Satyajit Ray and co-produced with Columbia Pictures. The plot of *The Alien* revolved around a spaceship and an alien, Mr Ang who lands in a pond in rural Bengal. The research article also mentions the 1987 Malayalam movie, *Jaithra Yaathra* based on the invention of a scientist that makes

him invisible; the Bollywood movie, *Mr India* produced in 1987, featuring a superhero who is capable of making himself invisible; the 2004 Bollywood film, *Rudraksh*, an action-adventure film; 1991 Telugu movie, *Aditya 369*, the story of which involved a time-machine made by a scientist; *Koi..Mil Gaya*, a 2003 Bollywood science-fiction film based on an alien; 2006 Bollywood science-fiction film, *Krrish*; 2007 Malayalam science-fiction thriller; 2008 Tamil science-fiction movie, *Dasavathaaram*, which featured a virus that threatens the life on Earth; *Bharathan Effect*, a 2007 science-fiction-film based on an inventor who created a small gadget which can fly without fuel using the concept of antigravity; 2008 Bollywood film, *Love Story 2050*; *Enthiran/Robot* of 2012 featured a scientist who created a unique robot and *Action Replay* of 2010, an Indian sci-fi comedy-romance film.

Most of the films mentioned above merely qualify to be considered science films. They are based primarily on drama, comedy, adventure, romance or action genres. The films have used only a little science and focused largely on science-fiction to get a larger audience for their films, probably to offset the production cost through ticket sales.

Goswami (2007) in his research article 'Science Popularisation Activities in Assamese' mentioned some of the classic science television programmes in India. It included the first black and white popular science programme '*Vigyan Patrika*' telecast by the state television Doordarshan's National Channel from 1971 to 1975; *Turning Point* of 1991 telecast by several regional Doordarshan channels as well as its national network, and the live experiment-based programme, *Quest*, a collaborative production of National Council of Science Museums (NCSM) and Calcutta Doordarshan also telecast by Doordarshan. This research article also mentioned the popular programmes '*Bharat Ki Chhap*' and '*Vigyan ki Batein*' produced by the National Council for Science and Technology Communication (NCSTC), Government of India. All of these TV programmes were quite effective in communicating science to the general public. Since in the nineties not many families owned television sets, people used to gather around the TV to watch these shows, be it in a tea stall, a shop or in friendly

homes. This explains the popularity and the impact of these science television programmes.

The paper 'Science Popularisation Activities in Assamese' also recorded the efficacy, seriousness and dedication of many private television channels like 'National Geographic', 'Animal Planet', and the 'Discovery' in communicating science. The study mentioned that the emergence of private science channels had made science and technology television programmes more attractive to the general audience. It also stressed the importance of producing more science and technology programmes in different Indian languages to inculcate scientific temper across the country.

Nautiyal (2010) in his research article titled 'A look at S&T Awareness — Enhancements in India' raised a valid point about the films, especially the ones that were produced in Hindi and Bengali and which were based on classic science-fiction books/stories. The study concluded that they can hardly be considered real science-fiction movies. The author also mentioned some of the Bollywood science-fiction movies including *Wahanke Log* of 1967, which featured alien visitors from Mars. This movie was not received well by the audience. Like the paper titled 'User Experience and Science-Fiction in Chinese, India, and Japanese Films (Marcus, 2013)', the research paper by Nautiyal (2010) also mentioned the movie '*Koi...Mil Gaya*'.

Krishnan (2020) in his research article 'Science and Scientists: Portrayals in Tamil Cinema' took the example of three popular Tamil science-fiction films and showed how science has been presented in them. The films included *Andha Naal* (1952), a mystery-thriller science-fiction movie based on Japan's bombing of the Indian city of Chennai.; the second film, *Ulagam Sutrum Valiban* (1972) — a Tamil science-fiction film featured an Indian scientist who discovered an innovative way to store a part of the energy unleashed from lightning. The story in this film revolved around the theft of his discovery by another scientist who had an evil motive. The third movie *Ethiran/Robot* (2012) featured a discovery by an Indian scientist — a robot with an infinite capacity for memory-action synthesis. This film portrayed the narcissistic behaviour of the robot who fell in love

with the scientist's girlfriend. Taking the opportunity, another scientist harbouring sinister designs, programmed the robot to be destructive.

The author Rajan Kurai Krishnan in his article wrote 'While both science-philia and science-phobia could be seen in many films as an element of the main narration or that of comic subplot, the basic line is while science is good, men, the scientists could often deploy science for destructive purposes out of greed or self-aggrandizement.' The first example *Andha Naal* directed by S. Balachandrarhas characters Rajan as a radio engineer and Usha as his freedom struggle supporting his wife. Operating on two different ideological planes, the conundrum of science is played out such that when Rajan was about to execute the bombing of Chennai with Japanese help, he gets accidentally killed by his wife. In the words of the author 'such is the manipulative side of science and technology that leads to self-destruction as per the film'.

The second film, the mass entertainer directed by M.G. Ramachandran *Ulagam Sutrum Valiban* (A young man who travelled around the world), in which Murugan, the scientist, invents a high-energy capsule-like device intended to be used for constructive purposes ultimately ends up with others using it for creating chaos and destruction, even though the formulae for making the bomb-like device were stored in three different locations of the world to prevent its misuse. To quote the author, "the film did succeed in making the uneducated or rather illiterate masses reckon with the possibility of science as something that can place great potential in the hands of humanity which may be used creatively or destructively".

The third film *Enthiran/Robot* (2012), a blockbuster directed by Shankar has a scientist in the character of Vaseegaran who creates a unique neural circuit to develop a superhuman robot capable of doing what a thousand soldiers could do for defending the nation. The plan ultimately boomerangs when the creator-scientist destroys the robot because it refused commands it was intended to react to and the rival scientists pick up the dismantled pieces to turn them into a weapon of destruction to be sold to foreign mercenaries.

The article establishes the pay-off in these three films as being manipulative of scientific facts even though they borrowed from core science concepts that were dressed as fiction. The films hardly supported the informative messages that science-fiction films in West are known for. The author desired the possibility of positive and educative narratives in future science and science fiction film production efforts in India.

As far as the popular public appeal of science and science fiction films are concerned, the trailblazer in this direction has been the telecast of landmark science serials over the state television Doordarshan and its channels from 1970 to 1990 across the length and breadth of India. Additionally, Indian mainstream cinema while making science fiction films must consider the difference between real science fiction, science fantasy or just a fantasy where science plays a role only in keeping the audience entertained. The execution of the findings calls for a collaborative approach among science subject and film production experts. Though the biggest challenge widely acknowledged has been the non-availability of science films in multiple language dub versions, even rudimentary efforts at undertaking original productions in regional languages might provide a good working indicator for large-scale productions.

Although many regions in India have their own television programme or celluloid film production set-ups, the only films that get dubbed into regional languages are from the genres of drama, romance, thriller and comedy. Since documentaries do not set cash registers ringing, they are out of the reckoning in consideration of market dynamics. However, some private channels like Discovery, National Geographic, History Channel and Animal Planet have mounted science shows that have been received well and have also been successful in generating reasonably sufficient revenue. Their reach could have been considerably larger, had the programmes been telecast in regional languages apart from English.

Though a few television series have been dubbed into Hindi and telecast with good results, other regional languages have yet to attract better attention. And who would deny that ultimately a science filmmaker would always wish to see how the treatment of the content and the aesthetics of filmmaking achieved through

balanced handling of objective research on a subject of science, combined with the elements of artful storytelling, scripted narration and the visual and audio design of the film have together been able to build curiosity among the audience.

Conclusion

Except for the research article ‘Science Film-making for Science Communication — A Study of Filmmakers’ Perspectives in India’ by Kapoor and Nath (2019), the central concern of all four research articles are popular films and television documentaries that use concepts from science and technology at the core of their stories and how cinematically-effective storytelling makes a film received well by the viewers. Even though the films were produced in Assamese, Hindi, Tamil, Telugu and Malayalam languages, their catering to popular public taste and the cultural grounding of the audience also contributed to their success. Various conclusion semerged from the survey on filmmakers’ perspectives on science filmmaking for science communication in India by Kapoor and Nath. While almost all the filmmakers who responded hoped for a better time ahead for science films in India, about half of them considered documentaries to be a good format for science films.

The preferences about the length of science films showed a distinct leaning for the duration to be between 10 to 15 minutes. Only a little over a quarter of the surveyed filmmakers thought the duration of 5 to 10 minutes was suitable for science films. The research paper by Aaron Marcus shows science films lose on the ground of star cast, high production budget, music, action, drama, adventure and romance which made the science-themed movies of Bollywood box office hits. The paper Science Popularisation Activities in Assamese by Dinesh Chandra Goswami looked at popular science films telecast by Doordarshan and its regional centres during the 1970s and 1980s to conclude that they were effective in communicating science.

The study also established the fact that certain international private channels also made science and technology films more attractive to the general audience. The paper also suggested more science film production efforts be made in different Indian languages. The research article ‘A look at S&T Awareness —

Enhancements in India' by Chandra Mohan Nautiyal noted that the Hindi and Bengali language science fiction films based on classic science fiction books could hardly be considered real science fiction movies. Rajan Kurai Krishnan in his article 'Science and Scientists: Portrayals in Tamil Cinema' while citing three very popular Tamil films showed how science and scientists are viewed in them and concluded that despite the film plots turning science and technology concepts into a force for destruction, Tamil cinema "is still linked with the human enterprise for betterment, though there are many a risk that hinder the process due to human vulnerabilities like greed and narcissism".

Our results point to at least three implications for future science filmmakers in India. One, the handling of narrative norms in science television documentaries, science and science fiction films is a tight-rope walk which while focusing on the entertainment quotient needs to strike a fine balance between communicating accurate science messages and the judicious use of modern visual media technologies placed at the hands of filmmakers today. And the second — a decennial manner of 'Script-to Screen' scholarly critique of science television documentaries, science films and science-fiction films produced in India might just be of some help not only for the professional science communicator filmmakers but also for scholars undertaking research in this not-so-explored area of study. The third is the need to amplify research skills into science themes for laying hands on credible sources while exercising control over the information received during the pre-production stage to write the first draft of the film script. This aspect which is often the bane of a good and well-received science film requires focused attention by filmmakers to create value in the products they so painstakingly make.

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References

- 1 Goswami DC (2007) Science Popularisation Activities in Assamese. *Indian Journal of Science Communication*, 6, 3-8.

- 2 Kapoor N, Singh SN (2019) Science Film-making for Science Communication- A Study of Filmmakers' Perspectives in India. *Journal of Scientific Temper*, 7, 8-37.
- 3 Krishnan RK (2020) Science and Scientists: Portrayals in Tamil Cinema. *Indian Academy of Sciences*. 11 January 2020.
- 4 Marcus A (2013) Design, User Experience, and Usability. Design Philosophy, Methods, and Tools. In: *Second International Conference, DUXU 2013, Held as Part of HCI International*, Las Vegas, NV, USA. Springer Nature.
- 5 Nagaraj KV (2013) Media research in India - the great many obstacles. *Science Communicator*, 4, 06-11.
- 6 Nautiyal CM (2010) Science and Science Communication in India. *Journal of Science Communication*, 385-392.
- 7 NSO (National Statistical Office), India Survey 2017-2018)
- 8 Patairiya M (2003) Science communication in India: perspectives and challenges. *Scidevnet*, 23 April 2003.
- 9 Priyadarshani S (2014) Radio and science. In: *Nature India*. Available at <http://blogs.nature.com/indigenus/2014/07/radio-and-science.html>
- 10 Rautela GS, Chowdhury K (2016) Science, Science Literacy and Communication. *Indian Journal of History of Science* 51, 494-510.
- 11 Raza G (2011). Science films need science channel. *Nature India*. 21 January 2011.
- 12 UNESCO (2017) Global Education Monitoring Report 2017-18. Available at <https://en.unesco.org/gem-report/events/201710>