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## INTER-DISCIPLINARY JOURNAL FOR SCIENCE COMMUNICATION AND JOURNALISM

Vol. 6, Issue 01 & 02, January & June 2015

Directorate of Public Relations and Publications
Cochin University of Science and Technology
Kochi - 682 022, Kerala, India

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*Editorial*

# SCIENCE COMMUNICATION TO PROMOTE INNOVATION

"Science and technology will determine India's future, just as it has played a crucial role in bringing our Nation to where we are today. The Government is fully committed to encouraging research, innovation and excellence in science, particularly among our young minds", said Sri. Narendra Modi, the Prime Minister of India, on the occasion of celebrating National Science Day 2015. This statement is so powerful and exemplifies the strategic perspective of the Government and the importance given to Science & Technology in the country.

Because of the earnest efforts of the Government, over the last few years, the number of scientific publications by Indian scientists working in India has increased at more than 12per cent per annum against the global average of 4per cent. India has moved from the 15th rank in 2003 to the 9th rank in 2010 with respect to the number of publications in peer-valued journals.The university research system is also showing signs of rejuvenation. The country produces 8,900 Ph.Ds annually in Science and Technology, three thousand more than five years ago. Inspite of all these encouraging statistics, over the past few decades, India's relative position in the world of science had been declining and India has been overtaken by countries like China.

Moreover, the Government of India has recently declared 2010-20 as the "Decade of Innovations", highlighting that while research generates new knowledge, there is need for innovation to use this knowledge creatively and productively for social benefit.Hence, S&T is shifting slowly towards creation of a new innovation ecosystem.

It is in this changing scenario that the creation of scientific temper which is important for the masses for the Nation's development, as proposed by former Prime Minister Pundit Jawaharlal Nehru, needs to be revisited. Hence innovative ways and means need to be adopted to inculcate scientific temper in view of the innovation eco-system. Such an important mission can be achieved only by a concentrated and concerted effort from all stake holders and the major tool for its materialization is strengthening of science communication. The message of science should reach the grass root level of the society either through the media or opinion leaders or voluntary agencies. Usually the media influence the opinion

leaders and they in turn pass the message to the society. The traditional rural society accepts such messages with a seal of credibility. The potent doze of medicine for influencing the opinion leaders is print media, even in the area of digital explosion.

From pre-independent era onwards, the print media was providing yeoman service in popularizing science and creating scientific awareness, especially during the last quarter of 19th century and the first quarter of the 20th century. However as time passes, the space devoted by print media for science news and science popularization has been trivialized by other sensitive news. A result of a CUSAT survey conducted during the year 2010 clearly indicates the alarming situation. During the period of survey, the five leading Malayalam newspapers together devoted only 1.06 percent of news space for science. The performance of English newspapers published from the same area was more alarming – only 0.70 percent.

If this is the situation prevailing in a 100 percent literacy state like Kerala, it is definitely a shame, especially at a time when our country is forging ahead for realizing 'make in India' R&D initiatives and marching forward for innovation revolution. It is generally believed that the target of science communication is nothing but propagation of science among the masses for providing scientific awareness and inculcation of scientific temper. Further it should promote tolerance and rationality in their minds. Now it is time to promote science and knowledge creation at any stage for innovation purpose. For such a changed objective the need of the hour is a trained force of committed writers and journalists; perhaps scientists also. The media managers should also understand its relevance and should be well aware of the paradigm shift that is happening.

Today science communication has grown as a distinct discipline, the world over. Of course this is a positive step and most welcome. But at the same time, we should not forget the need for a fool-proof mechanism to intensify the process of training in science writing and innovative promotion and reporting for journalists, media personnel and young science graduates, which is the urgent need of the era. Let us work in tune with the changing policies of S&T and innovation !!!

Editor

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# Science Journalism for Development: Media Sources, Message Design and Audience

**Kiran Prasad**

## Introduction

In the two decades since the early 1990s when India initiated economic liberalization, the human development indicators have shown little improvement. The very slow gains in nutrition, education and poverty alleviation over the last decade suggests that India is passing through an era of growth with widening inequalities and development gaps. Despite rapid economic growth in the post-reform period, India has over 250 million below the poverty line and lags behind in providing access to food and drinking water to all the people, the most basic goals of development (Prasad, 2009). The UNICEF estimates in 2011 show that 55 million out of 102 million underweight children under five in the world, which is 54 per cent of the global total, live in India. It is estimated that nearly 37 per cent of the world's stunted children live in India.

India recorded a high economic growth of 9 per cent per annum during 2005-06 to 2008-09. In 2014, India's HDI stands at 135 out of 187countries (similar as in 1980-32 years ago) (UNDP, 2014). The human development status of India reveals that there has been very little effort to utilise our scientific and technological knowledge to bring sustainable development to our vast rural hinterlands in spite of the wealth generated by the expansion of the economy. The communication of science and technology must be accompanied by practical and measurable steps for enabling people to adopt suitable technologies for finding solutions to their development problems. The communication of science must be applied to find answers to the depressing conditions of the poor and bring them to a dignified status which fulfils their basic needs of food, clean drinking water and shelter.

## Science Journalism: Sources

Science communication resources include interpersonal, group, and mass media, new technologies, content services, networks and institutional capacities that are available and must be utilised more efficiently to reach the intended audience. A combination of communication sources including print and broadcast media, ICTs and social media, mobile communication, local institutions, scientific advisory and information

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providers, teachers and opinion leaders constitute the channels for establishing interactions at the grass root level. Science journalism sources have predominantly included information, knowledge and expertise flowing from scientists, development planners, policy makers and bureaucrats.

Other sources for science communication include project managers, documentation and communication officers, environmentalists, advocacy professionals, managers in policy making bodies, strategic think-tanks, NGOs, UN agencies, international development groups, aid agencies, advocacy groups, and science organizations. There is dissemination on the status of various sciences projects and research in a wide variety of areas at science congresses, conferences and seminars. This information seeks to build networks among groups of individuals and communities that explore ways and means of applying scientific technologies in promoting sustainable development.

The entry of web-based and mobile technologies have contributed to the popularisation of science communication. Many forms such as user groups, weblogs, microblogging, wikis, photo and video sharing, link sharing services, mobile phones with interactive and networking capabilities. Internet based photo sharing, social bookmarking, social networks, twitter, blogs and video sharing. Social media has made possible many new forms of learning, education, health services and livelihood options for the marginalised communities and hitherto unconnected individuals (Mathew, 2012).

Within the traditional realm of interaction before the advent of the internet, there existed personal and face-to-face networks of those involved in planning, implementation and participation of development activities. Such networks are extensively present in the rural areas as they regarded more stable, credible and effective ways of bringing those involving in development planning and beneficiaries at the grassroots.The opportunities for the effective use of communication media in science journalism lies in its potential for sharing information, networking, and action in the public realm.

**Community Media**

Community media in various forms- radio, video, television, information and communication technologies such as the Internet and web based networks are enabling rural people to debate about their rights and empower them through knowledge about different social, political economic and environmental policies and programmes (Prasad, 2006). The broadcast policy of October 2006 permitted civil society organizations to own and operate their own community radio stations (Prasad, 2006) before which only corporate houses could buy FM frequencies. There are 130 community radio stations in India at present. Community radio has

enabled local people to debate and decide on issues which are relevant to them.

In a country where literacy remains a substantial barrier to development, radio, especially community radio, plays an important role in addressing the gap in media exposure. Radio can reach larger numbers of poor people because it is affordable and uses little electricity which is in low supply in many countries and barely affordable for many of the poor. Community radio, which is spurred on by new social movements and grassroots organizations articulating alternative thinking and development, aims to be the voice of the voiceless, a mouthpiece of oppressed people, especially for those marginalized within a community on grounds of gender, caste, or class.

Community radio enables local people to debate and decide on issues which are relevant to them. The programmes are recorded in the houses and courtyards of people. Youth associations, women's and other groups mix discussions on day-to-day problems and success stories of individuals with recordings of local skits, songs and music. The use of informal local dialect adds to the comfort and confidence of listeners, as well as their comprehension of the information imparted (Uniyal, 1999).

The *Women Speak to Women Project* of the Deccan Development Society of Andhra Pradesh; the *Radio Ujjas* of KutchMahilaVikasSangathan in earthquake ravaged Bhuj;*ChalaHoGaon Mein* of Alternative for India Development, Bihar, in the Palamau tribal district of Jharkhand; *NammaDhwani*, the VOICES initiative in Budikote, Karnataka; SEWA's *Rudi no Radio* in Gujarat and Agragamee's*Ujjala* in Jeypore, Orissa, have programmes designed and produced by the rural people's networks focusing on remote villages that remain untouched by the mainstream media.

The tribes of Chhattisgarh who are among the poorest are among the latest to enter the media sphere. Most of the news sources are in Hindi, a language alien to them. Tribal journalists are scarce and very few among them are trained in the tribal language. Radio is the only medium suited to such an illiterate population. But unfortunately AIR has no news service in the tribal language. Community radio operation is also hampered due to difficulties in obtaining licenses. A unique cell phone-based networking system in Chhattisgarh helps the Adivasi Gonds to share local news and air (Acharya, 2013; Choudhury, 2012).

In 2000, CGNetSwara was started by Shubhranshu Choudhary as a voice based portal, based on Audio WiKi software developed by MIT, which is freely accessible via mobile phone and it shares local news with both the citizen journalists and the tribals living in remote areas. Choudhary has trained more than 100 citizen journalists to produce audio news

reports. CGNets receives on an average 200 calls a day from local people for accessing those reports. Stories are also posted on a website to reach a wider audience.

**Science Journalism: Designing Messages**

The United Nations Human Development Report (2014) has calculated that India is home to more than half of the world's multi-dimensionally poor population (55.30 per cent of the population). Development paradigms have relied heavily on top-down approaches with information, knowledge and expertise flowing from scientists, development planners, policy makers and bureaucrats who advocated 'from the lab to land' approach symbolized by the green revolution in India. As Vandana Shiva puts it:

The so-called green revolution was neither green, nor revolutionary. It has dispossessed small peasants, pushed our rich agro biodiversity to extinction, mined our aquifers, desertified our soils and undermined our nutrition and health…It was supposed to create prosperity, but it left farmers steeped in debt. Both in financial and ecological terms, industrial agriculture and chemical farming is based on a negative economy – it uses more inputs than it produces. The consequence is impoverished eco-systems and impoverished and indebted farmers (Shiva, 2009: 25).

Buttressing the above argument is the case of Punjab. Once regarded the cradle of the Green Revolution, the prosperity of Punjab was the success story across urban and rural India for decades. Punjab now has 7,000 farmers who have committed suicide with eleven villages put up for sale and a phenomenal debt of farmers estimated to a tune of over Rs. 9886 crore (Dey, 2014). While it is well documented that over a quarter million farmers have committed suicides from 1995 to 2010 in Maharashtra, Andhra Pradesh and Orissa, more and more farmers across India are being pushed to the brink of debt and suicide.

Farmers, tribals and women previously viewed at the fringes of this top-down approach have emerged as innovative farmers who challenge many mainstream notions of commercial agriculture. Agricultural innovation has entered a new phase with organic farming and a reverse strategy from the land to the lab where agricultural scientists go to the field and often return to the lab to understand the regenerative power of nature and knowledge inherent in communities. Communication technologies like the mobile media, Internet and social media are being used to disseminate innovative farming techniques for achieving food security and greater agricultural productivity.

The Narmada Bachao Andolan (NBA) led by Ms. Medha Patkar has been able to drive home the message that 'There Are Many

Alternatives' as against the global media refrain that 'There is no Alternative' (TINA). Intermediate technologies in the form of check dams, rain water collection tanks, and mini water projects, with the active involvement of the local people in several states, have evinced greater support and participation rather than large dams involving massive funds with heavy costs of submergence, environmental impact, rehabilitation and resettlement of the affected people.

Environmental communication is increasingly making use of visual media such as documentaries and short films which are uploaded on web platforms such as YouTube for gaining greater support among those working for protection of natural resources (Prasad, 2013). In India's real-life *Avatar* – there is a struggle to save the mountains that are sacred to the tribals that is their only habitat and a UK corporate giant, Vedanta. The Dongria and KutiaKondh , the tribals who live in the 250 km Niyamgiri Hill Ranges of Western Orissa's Kalahandi district, have been officially recognized as primitive tribal groups that need special protection. On YouTube, a series of spots campaigns have been running for their rights against a corporation named Vedanta. The Niyamgiri Hills which the DongriaKondhs worship is the centre of rich deposits of bauxite that Vedanta wants to mine. The SaxenaCommittee that enquired into Vedanta's business suggested that the Vedanta operations endanger nearly 750 square km of forest land. The Environment Ministry has also stepped in to keep Vedanta from developing its plans to mine in the Niyamgiri Hills after the tribals won a court verdict in their favour.

It is estimated that fifteen million people worldwide earn a living through waste picking. Waste pickers are now seen as offering a solution for climate change mitigation and waste management that make economic, ecological and social sense. The UN Framework Convention on Climate Change (UNFCCC) Conference in Tianjin, China saw three women rag pickers from India sharing their experiences on the steps taken by them to reduce green- house gases. BaidabaiGaikwad from Pune, Maya Khodave from Nasik and Sushila Sable from Mumbai, were representing waste pickers from around the world at the United Nations and explained the implications of the UNFCCC process on the marginalised in different parts of the world. These environmental movements led by women, tribals, peasants and local communities are mainstreaming their perspectives to create awareness about the rights of people to local resources, prevent their over-exploitation and promote conservation efforts. Their voices which were rarely heard or even considered in development policies have now begun to acquire a new meaning with the local communities assuming custodianship of their environment and natural resources which previously was the sole responsibility of the government.

The Nagoya Protocol, a new international treaty, is seen as one of the victories for India and other developing nations, to ensure that the benefits of natural resources and their commercial derivatives are shared with rural communities. Rural women play a significant role in the management and protection of natural resources. The Nagoya Protocol includes a sweeping plan to protect bio-diversity by setting targets for 2020. They agreed to make 17 per cent of the globe's land area and 10 per cent of coastal and marine areas into protected regions, as opposed to the current levels of 13 and one per cent. They also agreed to bring "natural capital" into national accounting systems so that the trillions of dollars' worth of benefits that nature provides to economies are valued. This agreement is a result of almost two decades of U.N. negotiations where India leads a group of 17 mega diverse countries with rich reserves of exploitable natural resources.

The new Access and Benefit Sharing (ABS) rules mean that multinational companies will have to share their profits with local communities not only for using the original resource, but also any derivative products developed from it. For example, a pharma company which develops a new drug from ingredients found in an Indian plant will now have to give a fair share to Indian communities which nurtured the plant in the first place. International drug firms will also have to pay to use human genetic material such as pathogens – the germs responsible for virus pandemics which are used to develop lucrative vaccines. This is in the light of the previous practice of companies who just took the pathogens from the developing countries, made the vaccine, and then sold it back to them for billions of dollars. However, the flip side is that the U.S. - one of the largest users of such resources - is not among the nearly 200 signatories of the rules of the Nagoya Protocol (Jebaraj, 2010).

**New Media in Science Communication**

Social media have become online platforms for sharing information and knowledge. It is interesting to cite the example of Collaborative Change Communication (CCComDev) in this context. CCComDev is a capacity development and knowledge sharing initiative aimed at increasing learning and networking opportunities for communication practitioners in developing countries around the world. By fostering the exchange of contents, experiences, methodologies and learning resources, the goal of the platform is to empower local practitioners, strengthen their professional capacities in communication and development, and build and consolidate online and offline knowledge networks to the end of facilitating the creation of a global community of practice in communication for development.

CCComDev also maintains a facebook page for learning and knowledge sharing among practitioners of communication for development

who are testing new approaches in the field, searching for practical knowledge, or seeking new ways to collaborate in the rural sector. It is designed as an interactive platform where communication and development practitioners can find information on training opportunities, access learning resources, exchange experiences, and explore collaborations. Users are invited to share videos, photos, publications, learning resources, and good practices.

Another useful feature of CCComDev includes an interactive map that helps practitioners visualize ComDev training opportunities and providers that have been identified worldwide. Different labels are used to indicate various types of organizations and institutions providing formal (academic courses) or informal training in communication for development (seminars, workshops, etc.). By clicking on a selected item on the map one can access the complete profile of a training provider, including contact details and more information about the courses and the training programmes offered. Such interactive maps are immensely useful to provide information about various development initiatives in rural areas.Various resources are also available for download, including training/learning materials, case studies, technical papers and reports, and multimedia. There are also step-by step field-oriented guides on how to design and implement locally relevant and sustainable communication strategies to tackle development issues in the agricultural and rural sector.CCComDev also hosts the ComDev Asia portal, which focuses on ComDev experiences and good practices in the Asia-Pacific region.

**e-Networking**

Social media can be used as a channel for user engagement among people of different organizations as well as between people of different organizations. They can align their social media strategy by evaluating appropriate channels, content, tools, techniques and resources for organizational social media optimisation. It provides new opportunities to share content, engage in social bookmarks and blogging. Development organizations can utilise various social media platforms and their features, and use social media as a channel for community engagement. Environmental conservation which is the touchstone of sustainable development requires networking among various sections of society. Rural communities who have often been excluded from the big mainstream media are beginning to use alternate media such as the social media for communication and networking.

**Science Journalism: Audiences**

There is tremendous diversity in the audience for science communication which include gender, age, educational, social, cultural, religious, economic, linguistic and urban-rural characteristics. Designing science communication content for such an audience is indeed a challenge

and needs the collaborative efforts of a creative media team. For example, a woman's autonomy and physical mobility are restricted by various cultural traditions and practices, which pose a lifelong disadvantage particularly to rural women. Women in the rural areas are not to be seen in public, leave alone be heard in their own voices. Involving them in scientific discussion requires suitable media that they can access on their own terms such as community radio. In this context, community radio has tracked the difficult journey of rural women who are often home-bound, have lower exposure to mass media and have rarely appeared before the television camera for a highlight of their problems.

There are a variety of social movements with different goals such as human rights, women's rights, child rights, rights of tribal and socially disadvantaged groups all present science communicators with opportunities to integrate science messages for better interaction with their target groups. Peace movements, the campaign for the right to information and environmental conservation have all invariably sought to address issues on science, technology and development from a human perspective.

There is a need to change the stereo-typed ideological perception where science is seen as a man's world. Science journalism must be more participatory and include articles for women's development.Women in the rural areas have been practising integrated soil and water management technologies leading to a rise in organic farming (Chauhan, 2006). Rural women can benefit from a range of technologies like solar cookers, biogas plants, fuel-saving cooking techniques, appropriate community water solutions, rural housing technologies, technologies that lighten the drudgery of agricultural tasks, battery operated vehicles, and many intermediate technologies that aid value-addition of farm products that can be scaled to micro-enterprises (Chauhan, 2006).

**The Way Forward**

Science journalism is the much needed light to brighten the prospects of the millions of poor hoping for a better quality of life. As Swami Vivekananda said: "Bring light to the poor and bring light to the rich, for they require it more than the poor. Bring light to the ignorant and more light to the educated, for the vanities of the educated are tremendous". Science journalism must enable a more just and participatory development that benefits the needy than only reaching the elite. India's dismal human development status is in need of a more humane science journalism with a renewed focus on poverty reduction, livelihoods, basic health care, local innovation, disaster management and environmental conservation for sustainable development.

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# Rolling History of Printing Technology and Mounting-up Copyright Issues

**V. Ajit Prabhu**

## Introduction

The invention of the printing press revolutionized communication and book production leading to the spread of knowledge and it has become easier to take multiple copies and this posed a serious threat to the original author of works. Therefore, the growth of copyright and the growth of printing technology are inter-connected. However, in the present Knowledge Era, due to the bombarding spread of internet, world wide web and other digital technology, the definition and domain of copyright has expanded. This article is a peep into the history and progress of printing technology and also makes an account of copyright issues in the current digital scenario.

## A Glimpse into the history of printing

When we look at the history of printing, credit goes to the technology of duplication of images by means of stamps used in very ancient periods. The use of round seals for rolling an impression into clay tablets goes back to early Mesopotamian civilization before 3000 BCE. For more than 2,000 years, the ancient Sumerians, Babylonians, Assyrians and Hittites produced written works by using styluses to carve pictographs and characters onto wet clay tablets that were left to dry in the sun. The ancient Egyptians wrote on rolls made of papyrus, and their Chinese counterparts, a bit later, made books from strips of wood or bamboo bound together with cord. Later, the Greeks and Romans used papyrus rolls and waxed wooden tablets. The Romans developed a book trade by dictating manuscripts aloud so they could be copied simultaneously by hand by as many as 30 slaves, thus producing 30 copies at a time. Still latercame the codex, consisting of folded sheets of papyrus bound at one end, thus allowing for writing on both sides of the papyrus. The original papyrus used to make codex was later replaced by parchment and vellum.

By the 6th century AD, the Chinese had developed the means of making multiple copies of manuscripts by inking carved wood blocks and

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pressing pieces of paper placed over the raised characters on the blocks. Though European printers never completely adopted that method to print books, they did adopt a similar method for producing illustrations and large, ornate letters at the beginning of chapters.

*Yuan Dynasty woodblock edition of a Chinese play*

In India, during Buddha period, great significancewas found given for copying and preserving texts. The fourth-century master listed the copying of scripture as the first of ten essential religious practices. *SukhâvatîvyûhaSûtra* urges to hear, learn, remember and study the text but to obtain a good copy and to preserve it. This 'cult of the book' is believed to have lead to techniques for reproducing texts in great numbers, especially the short prayers or charms known as *dhâraGî-s*. Stamps were carved for printing these prayers on clay tablets from at least the seventh century. Especially popular was the *PratîtyasamutpâdaGâthâ*, a short verse text summing up *Nâgârjuna's* philosophy of causal genesis or dependent origination. Nagarjuna lived in the early centuries of the current era and the Buddhist Creed, as the *Gâthâ*was frequently called, was printed on clay tablets in huge numbers from the sixth century. This tradition can be seen to be transmitted to China and Tibet with Buddhism.

*Jikji, Selected Teachings of Buddhist Sages and Seon Masters, the earliest known book printed with movable metal type, 1377.*

Records say that during 1300 block printing was practised in Europe as a method for printing on cloth.Stencils were also found to beused to color cloth during the Edo period in Japan. In Europe, from about 1450, they used to colour old master prints printed in black and white, usually woodcuts. Stenciling back in the 27th century BC was different. They used color from plants and flowers such as indigo (which extracts blue). Stencils were used for mass publication, as the type didnot have to be hand-written and also maintain uniformity.

At around 1040, the world's first known movable type system was created in China by Bi Sheng out of porcelain.Metal movable type began to be used in Korea during the Goryeo Dynasty (around 1230).Jikjia (Korean Buddhist document), printed during the Goryeo Dynasty in 1377, isconsidered as the world's oldest extant book printed with movable metal type.

**Invention by Gutenberg in Printing**

*Johannes Gensfleischzur Laden Gutenberg (1398-1468)*

Two major technological developments in the 15thcentury revolutionized book production especially in Europe. The first was the development of paper; the second was the creation of the first practical movable type printing system developed by Johannes Gutenberg in 1436. The printing press is considered one of the most important inventions in history.With movable type, raised letters could be hand-set, word by word, into a frame that held the letters together. The raised letters were then inked; a sheet of paper laid over them and pressed down on the letters with a screw-driven press. Once the desired number of copies had been printed, the letters could be removed and the frame could be re-set for printing the next manuscript. Movable type provided the ability to produce a large number of copies quickly and economically, leading to far wider distribution and accessibility of the printed word, and a dramatic increase in the number of printers over the next century.

The high quality and relatively low cost of production established the superiority of movable type, and printing presses rapidly spread across Europe, and later all around the world. Today, practically all movable type printing ultimately derives from Gutenberg's movable type printing, which is often regarded as the most important invention of the second millennium.

A chronological development in the printing technology may be seen in the following table.

**Milestones in the History of printing**

| | | | |
|---|---|---|---|
| Woodblock printing | 200 CE | Photostat and Rectigraph | 1907 |
| Movable type | 1040 | Screen printing | 1910 |
| Printing press | 1377 | Spirit duplicator | 1923 |
| Etching | 1515 | Xerography | 1938 |
| Mezzotint | 1642 | Phototypesetting | 1949 |
| Aquatint | 1772 | Inkjet printing | 1951 |
| Lithography | 1796 | Dye-sublimation | 1957 |
| Chromolithography | 1837 | Dot matrix printing | 1968 |
| Rotary press | 1843 | Laser printing | 1969 |
| Hectograph | 1869 | Thermal printing | 1972 |
| Offset printing | 1875 | 3D printing | 1984 |
| Hot metal typesetting | 1884 | Digital press | 1993 |
| Mimeograph | 1886 | | |

*A Gutenberg press replica at the Featherbed Alley Printshop Museum in Bermuda.*

**Brief History of Copyright**

The invention of the printing press revolutionized communication and book production leading to the spread of knowledge. Due to the advent of the printing press and the further development of printing technology, it was easy to take multiple copies and this posed a serious threat to the original author of works. Therefore, the growth of copyright and the growth of printing technology are inter-connected.The foundation for printing press

*A paper codex of the 42-line Bible, Gutenberg's major work.*

by Gutenbergcaused a proliferation of books across Europe and other countries. It is estimated that before Gutenberg's printing press, the number of books in all of Europe numbered in the thousands, but within 50 years then, that number approached ten million. Such explosive growth and its accompanying economic opportunities created an immediate need for protection of the rights of both author and publisher from the earliest of literary pirates and adoption of unfair practices such as unauthorized printing by competing printers. This led to the Royal Charter in 1556 granting copyright to the Stationers' Company.

The world's first copyright law, the Statute of Anne, was enacted in England in 1710. Exercising its power under the newly adopted Constitution to secure the rights of authors and inventors, Congress passed an Act almost identical to the Statute of Anne as the first American copyright law in 1790.

The first known dispute over ownership rights was recorded in 560 A.D., resulting in what may be described as the first copyright adjudication and the first recognition that the ownership of a creative work is akin to ownership of other types of property.The dispute arose in Ireland between Saint Columba and Saint Finnian. The former secretly, and without the latter's permission, copied a Latin Psalter owned by Finnian, who placed considerable value on the book. When Finnian learned of what had occurred, he demanded the copy, but Columbia refused to surrender it. Finnian then petitioned Dermott, the King of Ireland, who issued an edict in favor of Finnian stating, "to every cow belong its calf, so to every book belong its copy."

Upon Parliament's refusal to renew the Licensing Act in 1695, the Stationers' Company made several petitions and lobbied for legislation for various forms of exclusive rights to print. Each was denied or ignored. However, in January 1710, a bill was presented to the House of Commons, and after consideration and revisions, in April 1710, it became effective as the Statute of Anne, "An Act for the Encouragement of Learning, by Vesting the Copies of Printed Books in the Authors or Purchasers of such Copies, during the Times therein mentioned." It states, (in part) :... The Author of

any Book or Books already Printed, who hath not Transferred to any other the Copy or Copies of such Book or Books, Share or Shares thereof, or the Bookseller or Booksellers, Printer or Printers, or other Person or Persons, who hath or have Purchased or Acquired the Copy or Copies of any Book or Books, in order to Print or Reprint the same, shall have the sole Right and Liberty of Printing such Book and Books for the Term of One and twenty Years,... and no longer; and that the Author of any Book or Books already Composed and not Printed and Published, or that shall hereafter be Composed, and his Assignee or Assigns, shall have the sole Liberty of Printing and Reprinting such Book and Books for the Term of Fourteen Years, to Commence from the Day of the First Publishing the same, and no longer;...

As the first modern copyright law, the Statute of Anne recognized copyright as an author's right, a major and important change in philosophy and in law. The Statute of Anne required the authors or owners of the rights to register their works in the Stationers' Company register book as a condition of protection. Under this statute, if the author were living at the end of the initial fourteen year term, the author would receive another term of exclusive copyright protection for another fourteen year term.

As books continued to be easier, faster, and cheaper to produce and distribute, domestically and internationally, in Europe and North America, it became clear that enhanced protection of authors and uniform international copyright standards were required. One such movement for international uniformity led to the Berne Convention and its 1887 adoption of certain, standard, minimum levels of copyright protection and their enforcement in the member countries across Europe and elsewhere in the world.

**What is Copyright ?**

As per TRIPS agreement, Copyright is the exclusive right granted to the owner of a literary, artistic or scientific work to use it or authorize others to use it for its reproduction, public performance, translation and adaptation. Copyrights do not protect ideas; it protects the expression of ideas. The matters which can be protected under Copyright are :

i. Literary, Dramatic and Musical work. Computer programs/ softwares are covered within the definition of literary work.
ii. Artistic works (Drawings, Paintings, etc.)
iii. Cinematographic films which include sound track and video films.
iv. Record - any disc, tape, perforated roll or other device.

**Increasing Issues in Copyright**

In the 21st century, with the advent of computers, computer programs were also brought under the copyright protection. However,

right from the invention of the printing press every technology has challenged or threatened the copyright regime. The latest challenge is digital technology where by works like music, soundrecording, computerprogrammes, writings, photographs,etc.could easily be transported across the networks in a matter of seconds. In fact, the same technology, which could be used for the enormous benefit of the creators, has sounded death knell of copyright. With a click of the mouse, a perfect replica of copyrighted work can be produced in several multiples.

The internethascrossed national boundaries and has broken all the barriers of distance. It has also caused proliferation of other problemssuch as digital copying, cyber crimes,fraud, pornography etc.Along with the digitization, networking and World Wide Web have changed the copyright regime to unprecedented domains. Together, the new information and communication technologies (ICTs), and in particular the Internet, have enabled unauthorized creation of unlimited,perfect and costless copies of protected works,as well as their almost instantaneous and worldwide distribution,which poses extreme challenges to copyright law. Digitization (through DVD, CD-Rom and broad base) has also enabled the rapid development of the multi-media product, combining written text with sounds and images, still and moving. The digital work would always enable brisk copying perfectly.

In the digital environment, the most fundamental issue that has emerged in the field of copyright is the scope of protection, i.e., how these rights are defined, and what exceptions and limitations are permitted. Other important issues include, how these rights are enforced and administered in this environment; who in the chain of dissemination of infringing material can be held legally responsible for the infringement; and questions of jurisdiction and applicable law. Similarly, when multiple copies are made as works traverse the networks, does the reproduction right implicated on each copy; and does a public performance take place when different individuals view a work on digital systems at different times. Similar questions are also raised about exceptions and limitations to rights like that for research and education, and what is meant by the “fair use” of the copyrighted work in this situation.

Issues of enforcement and licensing of copyright take an added dimension and urgency when works are exploited on digital networks. In order for legal protection to remain meaningful, right holders must be able to detect and stop the dissemination of unauthorized digital copies. It is necessary to protect the economic interest of the author of the work especially in the context of e-commerce.

**Opportunities and Challenges in Copyright and Internet**

Copyright law grants exclusive rights to authors in order to encourage the production of creative works, to the benefit of society as a

whole. These exclusive rights are balanced by a range of limitations and exceptions that permit some uses of copyrighted works without the need for authorization. Copyright has been a vital contributor to the cultural and economic development of a country.

As copyright continues to grow in importance, the parallel rise of digital technologies has presented new opportunities, as well as a host of complex issues. Governments, including their judicial branches, along with private sector interests around the world have been grappling with these issues for over twenty years. Their efforts represent the continuation of a long process; the history of copyright is integrally entwined with and has always been shaped by technological change. The impetus for the first copyright laws was the revolutionary technology of the printing press. In the course of the 21$^{st}$century, copyright confronted new technologies ranging from player piano rolls to motion pictures, television and radio,to photocopy machines, computers, and other digital devices. Because of the Internet and worldwide web, it has become difficult to clearly define the boundaries of copyright protection and enforcement. The pace of technological change has only increased complexityin legal analysis and forming a framework.

**Copyright Enforcement in Digital Environment**

Estimates of global losses from pirated books, music and entertainment software range into billions of dollars. The Internet in a way presents a troublesome situation for copyright holders as the users become mass disseminators of others' copyrighted material and creates disequilibrium between the authors and users. Digital technology has also made copyright enforcement difficult to achieve in theworldwide computer-based communications and created a new realm of human lifestyle. In the online environment, works such as videos, recordings of musical performances, and texts can be posted anywhere in the world, retrieved from databases in foreign countries, or made available by online service providers to subscribers located throughout the globe. The present system of international copyright protectionis based on the application of national copyright laws with strict territorial effects and on the application of choice-of-law rules to determine which country's copyright laws would apply. Moreover, with different locations where unauthorized use of the work may be violative of owner's rights, whose law should determine whether the transmission or reproduction of a protected work constitutes infringement, is a major issue. Therefore such issues pose legislators with a choice: either expand or modify existing 'old media notions' or redefine the catalogue of restricted acts, taking into account the peculiarities of the new environment in multiple facets. Anyway a globally enforceable law to identify the 'epicentre' from where the propagation of multiple copies emanated and wherever it has been circulated and severity of punishment, etc. needs a contemporary review.

The WIPO Performances and Phonograms Treaty, 1996 contains two articles (Articles 7 and 11) for the protection of the reproduction right enjoyed by Performers and Phonogram Producers respectively. Under the WPPT performers and phonogram producers are vested with "the exclusive right of authorizing the direct or indirect reproduction of their respective protected subjects in any manner or form" (Agreed Statement concerning Articles 7, 11 and 16 of the WPPT). The Agreed statements attached to the WCT and WPPT make it clear that the Article 9 of the Berne convention shall apply mutatis mutandis to the protection of the reproduction right in the digital environment. At first glance, what is clear under these two agreed statements is that permanent digital copies, for example, copies stored in floppy disks or a computer's read only memory (ROM), are protected by the WIPO Treaties 1996. Moreover, members are free to introduce new limitations or exceptions to the re-delimited reproduction right, subject to the three-step test. Yet the ordinary meaning of the second sentence of the agreed statements, in particular the term "storage", still remains largely ambiguous and obscure. There are other areas like broadcasting,satellite transmission,data bases,distribution rights, fixation rights, reproduction rights etc. which have also raised serious copyright issues. Nevertheless IP protection of databases is another very important issue for science, research,innovation and creativity, in view of the global proliferation of computerized information services.

**Conclusion**

The history of printing technology and growth of information sources has given rise to a paradigm shift in copyright and allied issues. The explosive growth of ICT and other digital technologydevelopments have threatened the rights of authors and copyright holders, at the same time, there is a growing trend within the publishing and software industries towards distribution of content on-line. The sophisticated form of technological protection needs to be given to copyright holders and should re-define traditional "fair use" rights to browse, share, or make private copies of copyrighted works in digital formats, since works may not be accessible without payment, even for legitimate uses. Copyright problem posed by the Internet is only one aspect of the matter. Advances in information and communication technologies have made digital databases of factual information an essential resource for accelerating the growth of knowledge and for producing new discoveries. The expansion of Internet facilitates their wide dissemination and easy use. At the same time, the same technologies make unauthorized use and wholesale misappropriation of these valuable databases relatively simple. In view of this it is imperative to bring all such emerging issues on a common platform, probably, another Summit for clearly updating the copyright and allied rights for giving genuine protection to the creators without affecting information flow and economic development.

# Science Fiction Studies: A short review

**T. V. Venkateswaran**

**Abstract**

Question of origin, characteristics and the social function of Science Fiction has been some of the questions enquired by the scholars in the last few decades. This short review paper provides a sucient overview of the status of the debate today.

**Introduction**

Brightly coloured covers illustrated with intricate spaceship floating all alone in the vast space of weird looking aliens' humans or cyborgs in bizarre apparels in futuristic cities, science fiction (SF) books, are hard to miss in any well stocked bookstores. Flip through it, the tropes are quite recognizable: travel to other planets, encounters with extraterrestrial life forms, utopian social speculation, futuristic extrapolation or even travel back or future in time. The storyline may vary from intense romance between a woman and a machine (Bicentennial man) to a thriller, horror, drama; humour, action or soap opera (Star wars). Indeed each individual science fiction book could be potentially identified with one of these genres. However what sets apart SF from other literature is its immediately recognizable narrative centred on the 'sense of wonder'. The sense of wonder is the emotional crux of SF. The sense of wonder might be engendered by the natural, such as the rings of Saturn, event horizon of the black hole or technological like the rocket ship, computer controlled society or socialsuch as gender role reversal.

Science fiction is enormously popular and has today a large audience base, at least in developed countries. It accounts for one in ten books sold in Britain, and in the United States the number is as high as one in four' (McCracken 1998:102). In contemporary times, science fiction is available in multitude of forms such as short stories, novels, films, TV shows, comics, video games, pop music and so on. There are magazines and periodicals devoted to science fiction. With youthful readership, Science fiction as Roger Luckhurst, says is 'an adolescent and exuberantly kinetic genre' (Luckhurst 1997:4).

The recent surge of interest in science fiction is seen to have commenced in the early decades of twentieth century. Hugo Gernsback is one of the identified founders of this pop culture in science fiction. His periodical, Science Wonder Stories, began publication in 1929. The

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periodical had a declared policy of publishing only those stories that have their basis in scientific laws as we know them, or in the logical deduction of new laws from what we know'. He even set up a panel of experts to judge the submissions to weed-out what were not proper and identify the 'correct' science fiction from the submissions made to the magazine. However, science fiction has moved far away from such simplistic notions. Today SF suggests an imaginative fiction in which one or more of the contemporary constraints upon the business of living are removed or modified, rather than simplistic adherence to particular discourse of 'science'.

As science fiction was seen to be influencing the 'common sense', at least in the west, and perceived as a potential literary form for 'estrangement' it attracted scholarly attention.

Since 1950s there is a thriving scholarship on science fiction. Journal of Science Fiction Studies, was established in 1973 by R.D. Mullen. The New York Review of Science Fiction, published since 1988, includes works of science fiction criticism, essays, and in-depth critical reviews of new works of fiction and scholarship. The Britain based Science Fiction Foundation publishes a journal *Foundation: The International Review of Science Fiction*[1].

The scholarly critical examination have tended to look into various aspects of SF. For example, some of the themes of special issues of the Journal of Science Fiction studies are Technoculture and Science Fiction, Afro-futurism, Latin American Science Fiction, Animal Studies and Science Fiction, and Slipstream. Post-modern criticism, critical theory, feminisim have also brought valuable insights into the SF studies., in This short paper aims to provide a brief overview of three issues being debated in the science fiction studies. The question of origin of SF, what characterizes SF and the function, if any, of SF in mass culture.

**Origins**

Jules Verne from the 1860s onwards, and H.G. Wells from the 1890s are generally identified as 'fathers' of science fiction[2]. However, which was the first science fiction story; when did the genre originate; what era or period marks the commencement of this genre-are all contested questions. The house is divided, and the arguments rage even today. For some, the genre matured and was established with the founding of the pulp magazine 'Wonder science stories' by Hugo Gernsback in 1926 (Westfahl 1998). On the other end, there are those who claim a 'long

[1] See Hollinger, V. (1999)

[2] It is to be noted that although Verne and Wells are identified as two fathers, there are several critics who identify Mary Shelly as the 'founding mother' of science fiction.

history' for science fiction and argue that it is a cultural mode from antiquity evidenced by the works such as Euripides, Cicero, Plutarch, Diogenes, and Lucian (Roberts 2006). However most of the scholars do not subscribe to this view and see the emergence of science fiction genre as recent (Brian Aldiss 1973). Early nineteenth century works such as Mary Shelley's Frankenstein, or, the Modern Prometheus (1818) Edgar Allan Poe's works during 1830s, are considered by those who argue for 'short history', as early works that announced the arrival of science fiction genre.

The debates over the emergence of science fiction genre could be seen to resemble the debates on the rise of novel in the literary theories. While scholars such as Lukas and Ian Watt see rise of novel in the emerging capitalism in the English society during the late eighteenth century, Margaret Anne Doody argues that the novel could be traced to antiquity. Taking a perception that "a work is a novel if it is fictional, if it is in prose , and if it is of a certain length.", she argues that "The Novel as a form of literature in the West has a history of about two thousand years…[It]was produced in antiquity by…writers who came from the Near East and Africa…It is the product of contact between Southern Europe, Western Asia, and Northern Africa…We can assume the possibility of story and style filtering in from the Balkans and the Celtic lands in the West, from Persia and India in the East, from the Sudan and Kush and Katanga in the South (Margaret Anne Doody 1996)."

While closure of the debate has not occurred, many literary historians and scholars are not much convinced with the arguments of Doody. Even while one may not see genre of novel as a sudden emergence during the early eighteenth century, scholars recognize that it is linked to the social change taking place during that time in England along with emergence and proliferation of print medium and growth of middle class readership[3]. Novel was "a break with old fashioned romances", was infused with "realism as the defining characteristic which differentiates the work of eighteenth century novelists from previous fiction". Further "The novel's serious concern with the daily lives of ordinary people seem to depend on two important general conditions: that society must value every individual highly enough to consider him the proper subject of serious literature; and there must be enough variety of belief and action among ordinary people for a detailed account of them to be of interest."(Watt 2001 :60)

[3] For an interesting account of the emergence of novel in Tamil see Venkatachalapathy, A. R. (1997).

Mirroring these perceptions in the literary theories, science fiction studies too have schism. In India too, claims of short and long history of science fiction is a vexed question. Some want to see mythological stories such as flying machine in Ramayana or Kunti giving birth to Karna without carnal intercourse as 'science fiction'[4]. MH Srinarahari, General Secretary of the Indian Association for Science Fiction Studies (IASFS) concurs. He says that "Science Fiction has been a part of Indian literature since the Puranas and the Mahabharata," and argues that "there was the palace of wax made by the Kauravas and Ram faced Mrigmarichika, which was nothing but an illusion" (Arshad Said Khan 2007).DilipRaote (2012) says 'according to Western belief, ancient past was devoid of science, and therefore of science fiction. This is fundamentalism'.

It is reasonable to arguethat in the science fiction genre, 'science' is the indelible factor. If that is so we need to look at the emergence of the idea of 'science' itself. The technical word 'science' was coined by William Whewell (1858: pp.5) only around 1850s. The modern idea of 'science' itself crystallised with the works of Al Hytham and Galileo and historians of sciences characterise 'modern sciences' as post -Galilean sciences (Burtt 2012). It is not the area of enquiry or instrumentation but the epistemological underpinnings that assume significance in drawing a line between modern and ancient in the history of sciences. 'Modern sciences' holds that 'reliable knowledge is rooted in the evidence of the senses, carefully sifted by deductive reasoning and the experimental testing of generalizations' (Brian Stableford 2003; 15). Formal role for authority or scared literature as evidences (pramanas) are outright rejected and thus 'modern science' is also a form of 'public knowledge' (Ziman, J. M. 1968). Training and building of expertise might be required in the actual practice of science, say for reading an ultrasound image, but in principle, science holds that anyone can master it and anyone can practice it. For 'doing science', in principle, one need not be the 'chosen' one, unlike certain other knowledge claims. If SF is to be necessarily infused with 'science' in this sense, implies that science fiction cannot be antiquity beyond the emergence of modern science.

In the European context, from about seventeenth century, one can see the emergence of speculative fictions, accommodating, rather tentatively, recent discoveries of science and technologies (Brian Stableford 2003; 15). Johannes Kepler's Somnium (Latin for "The Dream")

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[4] There are some who see these as not 'fiction' but fact; 5000-10000 years ago during the so-called vedic times or pre-vedic times India had aeroplanes, plastic surgery and what not. We are not discussing these flights of fancy but are drawing attention to antiquity origin debate in Indian context.

written in 1608 is a fantasy novel set in Moon and presents an imaginative description of how the Earth might look when viewed from the Moon. Although it was presented in the form of dream, it was Copernican essay on the solar system and a subversion of Aristotelian ideas by concealing radical ideas in the guise of classical mythology (Christianson, G. E. 1976). The story of Somnium is an extrapolated voyage of discovery. Copernicus had shifted the center of the Universe to the Sun. Kelper's aim was to explore this alien panorama from the alternative standpoint of Moon. He wanted to describe what the new astronomy will be like from the perspective of another planet. In this way the feasibility of non-geocentric system could be explored. Further this novel, unlike the earlier times of Lucian and Plutarch, does not take the shortest path from Earth to Moon to be a straight line but to a point in space where the Moon and the lunar voyagers would arrive simultaneously (Brake 2007a :pp8-9). As Brake (2007b) observes 'age of discovery and enlightenment of the Scientific Revolution and the universe of Copernicus were responsible for a new way of imagining, which we now call science fiction'.

It is not as if in European literature prior to seventeenth century there was no speculative fiction that imagined, say space travel. In Roman writer Cicero's, Dream of Scipio (51 bc), the narrator dreams of roaming through the solar system while in Italian poet Dante Alighieri's epic poem Paradise (c.1300s), the protoganist moves outwards from the Earth to the Moon, planets, and finally to the sphere of the fixed stars. However, these focused more on spiritual ideas more than scientific. The protagonist of Italian poet Ludovico Ariosto's poetical romance, Orlando Furioso(1532) makes journey to the Moon with the 'magical' help from John the Baptist. The 'space' in these novels is not a material place, but a part of the Ptolemaic cosmos full of spiritual and theological objects, premised upon Aristotelian ontology.

Even Kepler takes the aid of a witch and a demon to take the protagonist to Moon. But once there, the story is no longer magical. The plot revolves around detailed scientific speculations about what life might actually be like in a place where the day length would stretch to a fortnight. Weird utterly inhuman alien life forms are imagined but none are suffused with supernatural powers and all events are subject to the usual science. For example they are shown to be hiding in caves from the intense heat of the day. Kepler also added carefully researched scientific appendices, which was four times the size of the story itself to provide scientific reason and justification for the speculations. The meticulous care and fidelity to science of those times has inspired some to even dub this as the first 'true' science fiction (Roberts 2006: 42–5).

If Kepler took a flight to Moon, Thomas More's protagonist in Utopia (1516) travelled to a distant crescent shaped island hidden from rest of the world[5]. "Utopia" in Greek has two connotations; eu-topia means "good place" and ou-topia means "no-place"-a place both ideal and fictional. Using this double meaning, Thomas More presents the island with an ideal society in which everybody coexists harmoniously. It is partly satire on the shortcomings of the actual English society, partly a blueprint for a better way of ordering society.

Distinctly unique features seperate Kepler's Somnium and Thomas More's Utopia from the speculative fictions of earlier times. Kepler's and More's are speculative and fantastic stories but are thoroughly rational in its Renaissance aims as to include nothing mystical or supernatural whatsoever. They are 'fantastic' stories, but they are not pure fantasy. They are solidly science-based imaginative extrapolations.

It is in this background that scholars like Adam Robers(2009) locate the emergence of the science fiction in the west to the intellectual impact of the Copernican revolution[6]. Copernicus's radical idea was that it was not Earth that is at the center of Universe, but Earth and all planets (except Moon) went around the Sun, while Moon orbited Earth. Now, Earth was just another planet, one among many. This was a radical departure from the theological ideas prevalent in those times. Ideas of Copernicus came under attack by the Catholic Church. It persecuted the theory well into seventeenth century. When Italian astronomer Galileo Galilee published his scientific works in support of Copernicus in 1632, he was condemned by the inquisition and compelled to recant. Such was the fear of the new cosmology to the established Church and its dogmatic ideology.

The Copernican revolution radically changed the status of other worlds in relation to our own. Earth no longer placed at the center of the universe became potentially, just one more among the incalculable plurality of worlds and thus opened up the cosmos. Galileo busted the celestial-terrestrial divide and created an epistemic rupture. If one of the planets could be habitable, why not others? Writers spun imaginative stories in radically new and materialist ways.

By challenging the authority of scripture, Copernicus challenged the authority of the Church, the prime axis of political power in his times. Potential dissolution of the social and political arrangement that was hitherto seen as permanent and god given, opened new avenues to imagine future social arrangements, radically different from the present. It is in this context that we should read Thomas More's Utopia or Kepler's Somnium. The protagonist of these fictions sees the 'world' as antithetic to that of what is present before them.

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[5] See Freedman C. (2000) for a discussion on the science fiction and utopia.

[6] See also Wolfe G. K (2009).

'Long history' of science fiction, seen from these perspectives seems lame and provides no vision or insight. If we acknowledge the emergence of fiction along with the emergence and development of 'modern science' then the claims to classify Indian puranic myths as 'science fiction' do not appear appropriate. Peter Nicholls observes that proper science fiction, 'requires a consciousness of the scientific outlook', and that 'a cognitive, scientific way of looking at the world did not emerge until the 17th century, and did not percolate into society at large until…the 19th'. Thus, their contention that 'there is no sense at all in which we can regard SF as a genre conscious of being a genre before the 19th century' appears to be reasonable (Clute and Nicholls 1993:567–8).

**SF goes east**

We cannot take that the scholarship in the last four decades have resulted in the closer of this question. Far from it. SF is no longer a western genre. The history of the emergence of this literary form in non-west is a less explored question. While the initial impetus of the speculative fiction in Europe could have emerged with Copernican revolution, the recent work by John Rieder (2008) highlighting the link between the colonial gaze and the science fiction tropes of nineteenth century Europe opens up possibilities of new perspectives. With the discoveries such as magnetism, electricity and evolution, the second half of nineteenth century was brimming with new scientific insights. Disciplines such as sociology, anthropology and eugenics that were emerging 'received their justification and logic from colonial contact, and colonial locations also became sites for testing out these new sciences'. The often used tropes of SF lost races, construction of racial anthropological Others, artificial humans, and catastrophe literature are closely linked to these emerging new disciplines and are 'thus intricately tied to the colonial logic' (Chattopadhyay, Bodhisattva 2011). The turn in SF genre that took place with HG Wells, Jules Verne and Mary Shelly during nineteenth century is a story that needs a closer examination.

Although in popular consciousness, early science fiction is associated with Britain or France, in her ground breaking work Rachel Haywood Ferreira's *The Emergence of Latin American Science Fiction* (2011) shows science fiction has always been a global genre and SF in Latin America can be traced to 1775. With a useful bibliography of SF in Latin America between 1775 to 1920, the book presents us with how Latin American science fiction writers have long been active participants in the SF literary tradition, expanding the limits of the genre and deepening our perception of the role of science and technology through the Latin American imagination. Anindita Banerjee's *We Modern People:* Science Fiction and the Making of Russian Modernity (2012)explores how science fiction forged a unique Russian vision of modernity distinct from Western

models. The genre was appropriated not only by the literary circles and popular culture, but also by scientists, engineers, philosophers, and political visionaries. The work critically examines the relationship between science, technology, the fictional imagination, and the consciousness of being modern in the Russian cultural cosmos. Ginway, M. E. (2004). Brazilian science fiction: cultural myths and nationhood in the land of the future looks at the impact of modern science on popular imagination.

Interestingly SF in India, particularly Bengal emerged almost at the same time as the first works of H. G. Wells in Britain. K.C. Dutt's 'A Journal of Forty Eight Hours of the Year 1945' published in the Calcutta Literary Gazette in June 1835 was the first Indian science fiction in English. This speculative fiction is actually a historical fantasy, in which the authordescribed a war of independence, led by a charismatic leader, which Indians would fight against the British at a time about a century in the future. SosheeChunder's The Republic of Orissa: A Page from the Annals of the 20th Century (1845), that narrates "the bid, in 1916, of the people of the state of Orissa to break away from the British Empire" and "Sultana's Dream" (1905) by RokeyaSakhawat Hossain are some of the pioneering science fiction work by Indian authors in English. The "Sultana's Dream" that was published with a tag line "a terrible revenge!" (against men) in The Indian Ladies' Magazine,was a utopian tale of gender role inversion, that placed hope on the power of modern education to transform the position of women in contemporary Muslim society (Sengupta, Debjani 2003, Mathur, S. 2004 and Khair, T. 2008).

If works as above in English reached the emerging Bengali Badralog, science fiction novels in Bengali such as Jagadananada Roy's ShukraBhraman (Travels to Venus), published in 1879, Hemlal Dutta's "Rahashya" ("The Mystery") in Bengali, published in two installments in 1882 in the pictorial BigyanDarpan magazine and the PremendraMitra's "PipreyPuran" ("The Annals of the Ants")and "Mangalbari" ("The Martian Enemies") addressed the 'native' educated population. The author uses the science fiction as a device to criticize the strife and division amongst humans and yearns for unity of human kind to face the challenges. J.C. Bose, a famous scientist of late nineteenth century, celebrated today along with Marconi for discovery of Radio communication, wrote a science fiction novel PalatakToofan ("Absconded Tempest") in 1896 which narrates a thrilling story of how a turbulent sea was calmed with the help of a bottle of hair oil.

In Tamil, the famous national poet, Mahakavi C. SubramaniaBharathiyar wrote a story entitled, Kakkai Parliament (Parliament of the Crows) capturing various aspects of science fiction elements. Told in first person, Bharathi is taught the language of crows and he is able to eavesdrop into a conversation of 'parliament' of crows.

The plot revolves around the king crow that has recently returned from a journey to Russia, wherein Czar has been overthrown by the revolution and issues of inequity in the contemporary society are discussed. In another work, Ganarathan (wisdom chariot), Bharathiyar goes on a voyage to other 'worlds'. The sojourn is not to planets in solar system or other galaxies, but to the 'worlds' speculated in Hindu purans; such as Kandarvalog, Sathyalog and so on.

Bharathi says, "if some of the pleasures of the Gandharvalog appears to be against the 'aacharadharmam' (etiquette and public morality) do not curse me. I am provoked to laugh at the sermons made by Indians, who are but slaves, saying that this pleasure is immoral and that action is degenerate", and gives a vivid description of lip-lock kiss he received from a beautiful Ghandarv- maiden and describes with awe the nudity and celebration of beauty that he found in Gandharvalog. The guard at the gate of 'Upasanthilog' (world of peace/bliss) holds a gleaming sword – wisdom. The story narrates how an enormously rich man on reaching satyalog (world of truth), immediately ran away howling, unable to withstand the intense light of 'truth'. Through the allegory of travel to other worlds, Bharathi in his Gnanaratham is actually describing his 'utopia' and provides scathing criticism of conservative orthodox 'native' society. One may object that perhaps Bharathi's work is actually 'fantasy'; yes, fantasy is an aspect, but the storyline is completely devoid of 'supernatural' or 'magical'.

SF in colonial India perhaps is an outcome of a shared field of ideas from English literature used by Indian writers. However were the grounds for engaging with similar ideas different for the Indian writers from that of European SF writer? Even if Indian SF, particularly in colonial period, is understood as a by-product of colonisation, was it merely a 'derivative' discourse? Whether and if so how, Indian writers encountered modern science and indigenous knowledge systems? Was the dream – utopia- just the same? As Bodhisattva Chattopadhyay (2013) observes 'story of emergence involve[s] the study of literary production outside the Anglo-American (and European) world'.

**What is science fiction?**

If the original question is sufficiently embarrassing, the question of what is 'science fiction' is even more perplexing. All science fictions are not space travel or full of robots. As said earlier, the plots vary from being a romance, to thriller, and drama, to soap-opera. Hence it becomes essential to analyze the true nature and vast scope of science fiction.

The 1979 edition of the TheEncyclopaedia of Science Fiction gave not less than twenty definitions. By 1993 editorial staff could whittle it down only to eleven. The Science Fiction Reference Book quotes sixty-

eight definitions. The question is so frustrating that Edward James (1994:p.3) simply suggests that 'SF is what is marketed as SF'[7]. Damon Knight (2013) dismisses the question by saying 'science fiction is what we point to when we say it'; and Norman Spinraid escapes by arguing that 'science fiction is anything published as science fiction' (cited in Roberts,2006:2). Even while many critics abdicate from the daunting task of articulating an acceptable definition, it is a fact that almost all books on science fiction begin with a more or less extended discussion of the problem of definition testifying the importance in establishing a framework for constructing the history of the genre, specifying its range and extent, locating its principal sites of production and reception, selecting its canon of masterpieces, and so on.

Although what is science fiction may be difficult to delineate, features and tropes of science fiction: travel to other planets, encounters with extraterrestrial life forms, utopian social speculation, and futuristic extrapolation are all readily apparent. Spaceships, interplanetary or interstellar travel; Aliens and the encounter with aliens; Mechanical robots, genetic engineering, biological robots ('androids'); Computers, advanced technology, virtual reality; Time travel; Alternative history; Futuristic utopias and dystopias the plot themes are many.

Hugo Gernsback'scharacterisation of science fiction as "charming romance intermingled with scientific fact and prophetic vision" (Westfahl, G. 2007) is all too simple. Parrinder (2014; 68) points out that it is not just the case of "getting the technical details right", but science fiction often deal with non-technologies namely social and institutional extrapolations, living arrangements, norms of sexual behaviour, religious cults, even future art forms and board games.

Science fiction is not 'realist' literature in so far as it does not attempt to depict the real world we live in. It is set in a fictional world, either in space or time, removed from ours, and hence is necessarily a fiction of the imagination rather than observed reality. Therefore science fiction firmly is part of the fantastic literature. On the other hand science fiction plots are not satisfied with agency of supernatural or arbitrary. Science fiction is firmly anchored in material and physical rationalisation. This grounding of SF in the material rather than the supernatural becomes one of its key features. Often it is the 'science' that provides the grounding in realism. science is after all one of the dominant realist discourse of the present day. But sometimes, the realism is not truly 'scientific' and use non-scientific but material explanations. Nonetheless, unlike the

[7] With a caveat that this definition is 'a beginning, nothing more'.

supernatural horror stories, which are moored in religious ways of understanding existence, which is, in essence, a magical apprehension of the cosmos, science fiction is firmly tied-up with newer materialist, non-magical discourses of science. Thus, science fiction, as a subdivision of fantastic literature, smugly lies between the fantasy fiction and supernatural horror (Roberts, A. C. 2000).

The World as it Shall Be (1846) which depicts a world in the year 3000AD has air conditioning, designer drinking waters, steam-driven submarines, and phrenology-based education. Albert Robida's The Twentieth Century (1883), protagonist, a young woman is exploring the Paris of 1952, looking for a suitable career. The 'utopian' Paris in the imagination of the author was teeming with 'aircabs' that transported its citizens, and each home contained a 'telephotoscope' to broadcast the latest news and entertainment, and where the government is swept out of office every ten years in a planned "decennial revolution." The novel did not only speculate on the technology, mass transport and communication, but speculated on questions of feminist issues (women's career) and forms of government (elected democracy). Reading such instances would lead one to assume that the chief mode of science fiction is prophecy. However if one shifts through hundreds of thousands of science fiction texts of earlier centuries, the predictions coming true has been less than what one expect by pure operations of chance. The significant mode of science fiction is not prophecy, but nostalgia and/or hope. Science fiction actually is interested in how things are, even if it is asking 'what if' question.

Although the compilers of the 1993 edition of The Encyclopaedia of Science Fiction concluded that a single all encompassing definition was more than likely impossible (Clute, John and Peter Nicholls 1993), scholars find DarkoSuvin's, proposal for characterising science fiction as "a literary 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" (Suvin 1979:8–9) as productive and insightful.

Suvin'snotion of 'Cognitive estrangement', the purposeful or determined separation of a person from the rest of human society emanate from Russian Formalists, and Berthold Brecht's Verfremdungseffekt (alienation effect) percepts[8]. The playwright Bertolt Brecht, who had a strong theoretical influence on Suvin, identified estrangement with the scientific outlook and saw it's role as being the dislocation of what Brecht called "our stock associations". The Formalists had claimed that art always makes the receiver aware of reality in an intensely fresh way, by subverting and 'roughening' the habitual responses one develops in the routines of

[8] See Spiegel S. (2008) and Suvin D. (1972)

everyday existence. Brecht had adapted the Formalists' idea to theatre, proposing that estrangement should be an explicitly political act, which draws the audience's attention to the fact that the spectacle they are witnessing is an illusion, stimulating the crowd to become aware of their situation as passive receivers, an awareness they might then extend to reflection about their similar situation in the manipulated illusion-world of bourgeois domination.

In Suvin's opinion[9], the focus of the genre lies in encouraging new ways of thinking about human society, or to inspire those who are oppressed to resist. Suvin argues that science fiction presents aspects of our empirical reality 'made strange'. The familiar is recast for a specific purpose to making the reader come-out and hold the world we live in as if in our hands and examine it critically. As long as readers are able to recognize reality in the fiction, it is a gain in rational understanding of our social conditions of existence. Science-fictional estrangement works like scientific modelling the familiar (that is, naturalized) situation is either rationally extrapolated to reveal its hidden norms and premises or it is analogically displaced on to something unfamiliar in which the invisible elements are seen freshly as alien phenomena.

If Suvin begins his theory from the 'science' part of 'science fiction', Robert Scholes, in his book Structural Fabulation, starts from the second part 'fiction'. Highly influential in contemporary times, Scholes concentrates on the literary features of the science fiction texts. He defines 'fabulation' as any 'fiction that offers us a world, clearly and radically discontinuous from the one we know, yet returns to confront that known world in some cognitive way' (Scholes 1975:2)[10]. Thus for him science fiction is a fiction which is 'fabulous', in the above sense.

Although the scholars may differ in characterising science fiction what these perceptions have in common is 'science fiction in a crucial sense is an encounter with difference'. Science fiction presents the difference between the imagined world and the world which we inhabit through introduction of 'novum', a conceptual yet material plot or the 'difference' or 'alterity'. "Reading SF, in other words, is about reading the marginal experience coded through the discourses of material symbolism, which is to say, it allows the symbolic expression of what it is to be female, or black, or otherwise marginalised. SF, by focusing its representations of the world not through reproduction of that world but instead by figuratively symbolising it, is able to foreground precisely the ideological constructions of Otherness. In other words, in societies such as ours where Otherness is

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[9] See Renault G. (1980), Suvin D. (2000)

[10] Also see Zgorzelski A. (1979) and Scholes et. al ed (2006).

often demonised, SF can pierce the constraints of this ideology by circumventing the conventions of traditional fiction (Roberts, A. C. 2000; 30)."

Take the Philip K. Dick's science fiction novel "Do Androids Dream of Electric Sheep". The novel explores an imagined world where the difference between humans and androids (robot humans) have narrowed so much that it is not easy to distinguish one from another. The central plot revolves around the question, trappings aside, if the humans in the novel can consider that their android counterparts are not so different from them, then their mistreatment of the androids is mistreatment and enslavement of humans by each other. The novel came out when the US civil rights movement was at its peak and human segregation was nowhere near being resolved. Novel's message becomes especially poignant and socially acute when we see it essentially as a projection of the segregated social life in the contemporary US onto the imagined future world of humans and 'other' humans.

On the other hand the graphic novel called "The Resonator" by Prentis Rollins is set in a future where humans do not sleep anymore. The reason is unstated, but sleeping is considered as a punishable offence, and in this imagined world, sleep can only be achieved by using mysterious resonators which are illegal. Aaron Bronson, the protagonist of the novel is being detained because he has been accused of using a resonator. While being interrogated by a lawyer, the graphic novel depicts Bronson yawning during the tedious procedure. As we read the panel from left to right we see Aaron begin to yawn. This is familiar to us. But in the next panel we are startled to see expression of shock in the face of lawyer's face, and the speech bubble says, "…My god, he's yawning. He's sleepy. This is what it is to be sleepy." We know what it is like to feel tired and to yawn. Because of the close familiarity of this phenomenon we hardly 'notice' it. However the cognitive estrangement, shock on the face of the lawyer, forces us to reflect and see sleep in a completely different way. Obliquely the graphic novel may also be seen as a critique of the way leisure is being robbed in the neo-liberal social order and working people are forced to take up more than one job to meet both ends.

The novum, Suvin says is a defining character of SF, it "is so central and significant that it determines the whole narrative logic" (Suvin, D. 1978) and is validated by cognitive logic. The novum is the historical innovation or novelty in a science fiction text from which the most important distinctions between the world of the tale from the world of the reader stem. It is, by definition, rational, as opposed to the supernatural intrusions of marvelous tales, ghost stories, high fantasy and other genres of the

fantastic. Scientific novum must function as the nucleus for the whole project, the thing from which plot, structure and even style flow. Usually in the story line or plot, novum appears as an invention or discovery around which the characters and setting organize themselves in a cogent, historically plausible way. The novum is a product of material processes. It produces effects that can be logically derived from the novum's causes, in the material and social worlds and it is plausible in terms of historical logic, whether it be in the history of technoscience or other social institutions. The resonator and the android-updates are the novum, for example in Prentis Rollins and Philip K. Dick's novels.

The key symbolic function of the SF novum is precisely the representation of the encounter with difference, Otherness, alterity. 'Difference', in other words, is often reduced to stereotype, and stereotype is always at the bottom of racism, sexism or any other bigotry. Thus by facilitating us to look at the 'other' in a different light, science fiction enables critical self-introspection and shakes us out of 'stock conceptions'. While the novels such as Dick's, opens our mind to our unconscious everyday practice of bigotry, novels such as Stanislaw Lem's Solaris (1961) shows it is possible to explore the strangeness and threat of the Other without surrendering to two-dimensional caricature of Otherness as evil.

Suvin's idea of the presence of a "novum" as a key science fiction signature has been challenged by Csicsery-Ronay (1996 and 2008). Arguing that 'as the world undergoes daily transformations through the application of technoscience to every aspect of life, science fiction has become an essential mode of imagining the horizons of possibility', and that "science fiction is not a single entity but a variety, a constellation". He states that one single feature is inadequate to recognise SF. He argues that "rather than a program-like set of exclusive rules and required devices, this mode is a constellation of diverse intellectual and emotional interests and responses that are particularly active in an age of restless technological transformation. I consider seven such categories to be the most attractive and formative of science-fictionality(Csicsery-Ronay 2008; 5)." While Suvin'snovum is always singular, Csicsery-Ronay shows that in works such as Kim Stanley Robinson's Mars trilogy, more than one element could be characterised as novum. He goes further and suggests that the novum may not actually be an essential element of science fiction by showing that 'alternate history' SF literature may not have any material novum at all. In place of one single novum, he identifies 'seven beauties' of SF; neology, fictive novums, future history, imaginary science, science-fictional sublime, the science-fictional grotesque and technologiade as characteristics of SF[11]. Neither of these seven are exhaustive, essentialnor does one takes priority over any of the others. A science fiction story might

have any combination of these characteristics, or none of them, and still be science fiction.

In earlier version Csicsery-Ronay (1996) states the seven beauties as 1. Neologisms-invented words,intended to refer to imaginary" new realities.2. Novums (or nova, from the Latin for "new things")- imaginary invention discoveries, or applications that will have changed the course of history. (E.g., hyperdrive, time travel, faster-than-light travel, cloning, neural-interface computing, artificial consciousness, cyborgs) and 3.Historical extrapolation/historical futurism-historically logical explanations (explicit or implicit) for how we got from the author's real-time present to the future. This can apply to the development of a technology, or a society. The present is depicted as the prehistory of the future. (In other words, supernatural explanations are out. So is the depiction of a world with no connection to the human earth) 4. Oxymoron-some where at the heart of the tale is an absurd logical contradiction,at least viewed from the perspective of current common sense. This oxymoron may be spectacularly interesting. Some writers emphasize it, some writers keep it in the background.(Time travel is the most obvious; an alternate universe is another example.) 5. Scientific impertinence (related to oxymoron)-sf tales (even those written by scrupulous scientists) generally violate currently known scientific laws at some point. The purpose is not to criticize current scientific understanding (though that may enter into it), but to create uncanny, sublime, comic, or metaphysically intriguing dramatic situations. 6. Sublime chronotopes- chronotope comes from the Greek words for space and time; a chronotope is a literary" space-time" where fictional things work according their own particular laws of time and space. SF works generally depict one or more special chronotopes that are wonderfully strange and ultimately shockingly vast and powerful.( E.g., cyberspace," The Galaxy," "the brain," alien planets, future earths.) 7.) Parable-[i] [i].

This has brought the circle once again to the starting point; What is this strange animal called Science fiction?

**Mirror from the future**

The Hollywood block-buster Elysium uses a mid-22th century dystopian future to present a griping story. As the Earth gets polluted and ravaged, wealthy elitists live in a place called Elysium, a pristine utopia housed in a massive high-tech space station, where sprawling mansions abound and medical technologies have advanced to the point that all diseases are met with an instant cure. Those who are unfortunate enough to be located outside of the Elysium realm must endure an overpopulated, poverty-stricken, crime-ridden, disease-filled Earth. Residents of Elysium vigorously enforce anti-immigration laws to keep the earthbound masses from entering their immaculate biosphere. The protagonist of the story

suffers an accident on the job and is exposed to a potentially lethal dose of radiation. He now has five days to travel from Los Angeles to Elysium to obtain a cure. By kidnapping a wealthy businessman, the protagonist gains entry into Elysium. The film is written, co-produced, and directed by Neill Blomkamp. When he was asked if this is his prediction of what will happen 140 years from now, he replied emphatically "No, no, no. This isn't science fiction. This is today. This is now" (Neill Blomkamp 2013).

Fiction, even realist ones, create situations different from reality, and require at least a modicum of ' suspension of disbelief' and acceptance of the make-believe world as 'real'. On the other hand science fiction creates situations even more remote (in space and time) from the reality. But science fiction wants to rub the difference in your face, rather than expecting 'suspension of disbelief'. The main task of science fiction is to present worlds that are different, than our own by asking "What if...?" questions. For a reader to associate with these stories and characters, you must compare it with your own world view. Science fiction will focus that introspection by positing major differences from what you know to be true. Jones (1999; 5) sees science fiction as a form of thought experiment, an elaborate 'what if?' game where the consequences of some or other nova are worked through. In other words, it is not the 'truth' of science that is important to science fiction; it is the scientific method, the logical working through of a particular premise. [i] 'In pre-scientific era cognitive estrangement was to be found in satire and social critique (Utopia and Gulliver's travels) and in the scientific era it was to be found in the possibilities inherent in the natural sciences' (James, E. 2001). Frederik Pohl and C.M. Kornbluth's 'The Space Merchants' is a critique of rising consumerism and surging hold of advertisement on our imagination in the US of 1950s. The protagonist who is a copy writer with an advertisement firm is tasked to create advertisements to entice people to migrate from the over populated Earth to otherwise inhospitable Venus. Karel Capek's R.U.R uses robots in a factory as an allegory of the way workers are treated in a factory and provides a scathing commentary on the living condition of workers and workers' rights during the early twentieth century Europe. H.G Wells' book, The Island of Doctor Morea is really a take on the Eugenics, an idea that was gaining friends in the high society of England and an idea that will propel Hitler. The novel warns of the moral dangers in hobnobbing with Eugenics. Thus science fiction is actually a counterfactual literature and not things as they actually are, but as they might be, whether in the future, in an alternative past or present, or in a parallel dimension.

Science fiction's ability to offer new, alternative ways of understanding humanity, to function as a critique of and commentary on humanity is readily apparent even with a cursory glance. Science fiction

genre is built on hope, and it is this hope that drives the utopian imagination, and as such it has been installed as the active principle producing the speculative futures of science fiction. Hope is our desire for a better, different future; a hope both personal and political that appears on a scale that is sometimes commonplace and sometimes magnificent. Built on hope, many science fiction works are pointedly utopian. They paint a society that can be different; better, just and equal (Williams, R. 1978, Suvin, D. 1972).

The hero in Kim Stanley Robinson's, The Years of Rice and Salt declares, "We will go out into the world and plant gardens and orchards to the horizons, we will build roads through the mountains and across the deserts, and terrace the mountains and irrigate the deserts until there will be garden everywhere, and plenty for all, and there will be no more empires or kingdoms, no more caliphs, sultans, emirs, khans, or zamindars, no more kings or queens or princes, no more quadis or mullahs or ulema, no more slavery and no more usury, no more property and no more taxes, no more rich and no more poor, no killing or maiming or torture or execution, no more jailers and no more prisoners, no more generals, soldiers, armies or navies, no more patriarchy, no more caste, no more hunger, no more suffering than what life brings us for being born and having to die, and then we will see for the first time what kind of creatures we really are."

Another crucial aspect of science fiction is that it is all about future. This may seem obvious; after all, most science fictions that come to our mind are set in future, in far- away spaces. However there is a genre of science fiction which is set in the past; or pre-history. Some like 'The year of Salt' conjure alternate history. Even when science fiction novels are set in the past, say 2001: Space Odyssey, the implications are about future; what sort of world we want for ourselves. If the 2001:Space Odyssey makes us ponder about the potential negative role of technology, Doris Lessing's novel The Cleft (2007) set in pre-historic times, makes us reflect on gender questions. '"Future" in science fiction express our utopian hopes and dystopian nightmares, distilling in often spectacular visions of what we see as best and worst about our present' (Zepke, S. 2012).

Robinson's Mars trilogy (Red Mars (1992), Green Mars (1993), Blue Mars (1996)) is a tale stretching over 200 years, of terraforming of Mars and the human consequence for the colonists. It is a benchmark for realist, scientifically, and politically literate science fiction and explores themes such as colonialism, science and/as politics, memory and nostalgia, the powers and perils of human ingenuity, self-interests vs. community interests, debates about terraforming and economic systems, etc.. Mars gives Robinson the opportunity to imagine humanity eventually getting things right, overcoming Earth's massive economic and class divisions, environmental degradations, political corruption(s), and so forth. Robinson also establishes-and makes an argument for-science as the

basic means by which getting things right can be realised. Taking lessons from the Soviet experimentations, Robinson hopes to have "equality without conformity" and speculates how one may achieve it in his much acclaimed Mars trilogy.

Cognitive estrangement in the science fiction makes it possible to step outside a situation (seeing it from another's perspective), helps us detach ourselves from the world we live in, and have an insightful gaze at it, have a view of what it really is, rather than as what it appears in our everyday life. It is like the thought experiment, going above the solar system and looking down to see that it is really Earth that is rotating around itself and revolving around Sun rather than our every day experience of Sun going around Earth every day. That is we are able to get beyond the appearances and 'common sense' to a better and 'scientific' understanding of the situation.

Jameson (1982) argues that science fictions are fantastic displacements of the present's 'ideological contradictions into the future; at best, major reflective works of SF can make us aware that we are unable to imagine any utopian transformations'. Jameson puts it clearly, arguing that the utopian fantasies of science fiction 'defamiliarize and restructure our experience of our own present'. As such, science fiction is, following Lukács- a form of 'realism' that does not show us the future as such but is instead 'a symptom and reflex of historical change'. According to Jameson, science fiction is fundamentally political in nature. As he argues, '[one]cannot imagine any fundamental change in our social existence which has not first thrown off Utopian visions like so many sparks from a comet.' (Jameson,2005; xii )

For enthusiasts, science fiction offers a means, in a popular and accessible fictional form, for exploring alterity and provides a space for articulating the perspectives of normally marginalised discourses of race, of gender, of non-conformism and alternative ideologies. These are often stated as progressive potentials of science fiction. Science fiction, in particular, imagines change in terms of the whole human species, and these changes are often the results of scientific discoveries and inventions that are applied by human beings to their own social evolution. Set in future earth or a story about an alien civilization, SF and utopian fiction have been concerned with imagining progressive alternatives to the status quo, often implying critiques of contemporary conditions or possible future outcomes of current social trends. No wonder that socialists of one hue or other like Edward Bellamy, William Morris, H. G. Wells and Jack London were founders of SF in the west in the beginning of the twentieth century. All these authors shared the notion that scientific and utopian romance was allied with the social reform of amoral laissez-faire capitalism.

The SF of 1960-70s have been impelled more by what Italo Calvino called 'a utopian charge', a powerful, unformed desire to rid the world of poverty, racism, sexual repression and exploitation, than naïve scientific romance. By imagining desirable and humane alternatives to the bipolar, irrationally militarized world order of the Cold War, SF became one of the privileged instruments of this current of thought. A multitude of alternative intentional communities were attempted, and cultural life was increasingly marked by criticisms of the status quo from imaginary standpoints where the problems of the present were resolved, even if uncertainly. Soviet writer Ivan Yefremov's acclaimed SF novel, Andromeda(1957), which broached upon virtually every issue relevant to socialist concerns, from science to the arts to ethics and beyond, and engaged Western SF in a well-informed subtle polemical dialogue is also noteworthy.

This is not to conclude all SF in contemporary times were to take a socialist and progressive standpoint. SF critics have pointed out that in recent times,the pulp SF, especially originating from America, has been a major inspiration, indeed an imaginative engine, for the development of super-weapons of mass destruction. SF-films like 'Independence day' and 'Armageddon' have been deconstructed to bring out the insidious ideological force of an apparently harmless form of entertainment. Scholars point out that these films attempt to justify and rationalize nuclear weapons while mass movements for abolition of nuclear weapons in the world were growing in strength. The role of American pulp SF in denying global warming is well known. Further even a careful glance will show that many pulp SF are subtle justification for technocracy and rule-by-elite. Deviously asserting that haves and have-nots cannot be eliminated these pulp SF often focuses on, variously, the possible negative and often apocalyptic future. The grim picture that they paint warns the reader of the hopelessness of collective action. Set in action packed plot of a 'rebel' protagonist overthrowing a 'totalitarian' regime, the change is projected as ultimately a change from one ruling elite to another oligarchy. Many of the contemporary science fiction works have a tendency to fetishise technology, particularly military technology, and its reliance on stock types of character and plot that are often flat and caricaturing. They hardly provide engagement with any meaningful comprehension of the marginal, of Otherness. Many pulp science fiction plots introduce difference only to demonise it.

Hope and utopia are not the only traditions in science fiction (Moylan 2003). Despair and anti-utopian (or dystopian) strain appeared as early as Yevgeny Zamyatin's book We (1921) in the history of science fiction. The Dystopian strain can also be seen in works such as Aldous Huxley's Brave New World (1932) and George Orwell's 1984 (1949)all

rejecting the possibility of co-operative forms of politics and just and equal social order. Many pulp science fiction also take these troupe and present a view that social order cannot be fundamentally changed. Manyscience fictions have a simple plot filled with muscle-bound macho heroes swaggering and bullying their way through the galaxy. Through plots such as futuristic human spacefarers engaged with galactic level conflicts and smart elites on the reins of power, aggression and violence, hierarchical social order and so on are presented as an inevitable. At times the progressive thoughts are challenged and shown to be either unworkable or leading to tyranny or stifling of creativity[12]. All said and done, bottom line, critics say 'above all else [science fiction] write the narrative of the other/s?', at least 'in the spirit of description (though hardly of definition)'. That is at least SF suggests us to look deep inside us to our prejudices. Broderick (1995:51) contests this claim and says that 'SF writes, rather, the narrative of the same, as other'.

So what is SF doing? Does it promote critical reflection through the process of 'cognitive estrangement'? Present 'alterity' so that we can look into mirror? Is it escapism, evasion of the contemporary or seeing silver lining in the dark clouds? Or is just plain fun, nothing more?

**What do we want?**

In its time Don Quixote's duel with the windmill may have been perceived as hilarious, but after August 1945, technology is anything but naively good. Naturally, man-machine relationship has engaged the imagination of SF writers. Naive view of technology that 'machine relieving man of the drudgery' has given way to suspicion and mistrust of technology in recent times. When an ultra-modern new generation computer is asked the question "whether there is God", the machine replies "Yes" and strikes dead a man who is about to turn off the machine in Fredric Brown's SF-Answer (1954). In the recent SF literature we can observe that effectively men become mechanized while machines become humanized or even super-humans. The famed three laws of robotics and other ideas are nothing but reflections on the ever complex relationship that is emerging between humans and machines.

Shifting through recent SF will reveal that they question tie-in-neck and briefcase in hand-conformism, creeping bureaucracy and commodification. They highlight the cause of environmentalism, caution xenophobia and advocate tolerance and multi-culturalism. They critique capitalism's expanding sphere of influence and its often sinister relationship to technology (Avtar). However unlike the earlier times, they rarely pose solid political questions or offer alternatives to global capitalism. We seem to know what we do not wish, but it appears that we are not yet able to articulate what we desire.

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# News programming and Presentation of Content by Newspapers; A study of Malayalam Dailies

**M. S. Harikumar**

**Abstract**

This study seeks to determine the extent of convergence between the various categories of news content programmed by Malayalam newspapers and their readers' preferences in reading such content. Study objectives called for a content analysis and a readership survey of the selected Malayalam dailies namely, Malayala Manorama and Mathrubhumi. While content analysis was carried out to meet the first objective of determining the news programming practices of the selected dailies, readership survey was aimed at finding out readers' preferences in reading the programmed content and their reading patterns. No matter how well editors try to provide a news fare suiting to readers information needs, the reader-editor gap continues to exist. A primary reason for the reader-editor gap is the high selectivity that readers exercise while reading. Therefore the editors consciously try to improve their news presentation styles to ensure a greater readership of the content. Nonetheless, the reader-editor gap exists reminding of the need for a better understanding of the readers' content preferences while gate keeping the content by the editors. It is in this context that this study is envisaged to examine the news programming practices and readers' content preferences with specific reference to Malayalam dailies. The findings of the study highlight the fact that readers do not read everything that is printed by the newspapers. Newspaper readers are far more selective than the editors are.

**Introduction**

Newspapers plan, select and present news based on news value judgment and editorial policies so as to provide their readers with news and information that could be of value to them in understanding the society and its various sub-systems.

When editors use a variety of news presentation techniques, the aim is to present news in an orderly and easy to read manner. By using several design elements, editors strive to enhance the visibility of the content and there by its readership. The resulting design often connotes something beyond the meaning of the words. Such connotations may

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range from telling the readers which story is significant and serious to those which emphasize light hearted tongue-in-cheek approach.

Such editorial practices are modified from time to time to suit the changing needs and expectations of the readers. No matter how well editors try to provide a news fare to match their readers' needs and wants, the reader-editor gap continues to exist.

**Past Research**

This reader-editor gap is often a subject of investigation in communication studies. Scores of western media-researchers have investigated this facet from the perspectives of 'gate keeping' and 'agenda setting' functions of the media. Among them, the agenda setting studies of McCombs and Shaw (1976), Dearing and Rogers (1996), Davis and Robinson (1986) are of significance as they indicate the presence of differences in prioritizing news at the macro level though not at the micro level. Studies conducted by Bogart (1979), Robinson and Leev (1986) and Hargrove and Stempel (2002) have demonstrated the wide mismatch between editorial judgments and audience interest in news topics. Likewise, in a more recent study, Tai and Chang (2002) pointed out the absence of any correlation between the news coverage and audience interest in reading the reported news.

Such studies however have not been conducted in the context of Indian newspapers and their readers. What has been investigated remains confined to content analysis. This has been the case of studies conducted by media professionals and academics such as T.J.S. George (1967), Ahmed and Subash (1981), Vilanilam (1985) and Ahmed (1986 &1992).

Several students of graduate studies have either examined the content analysis of Malayalam dailies (Joseph 1990, Kumar 1993, Rajesh 1996, Panikkar 1994 and Anil 1997) or investigated the readership of select content (Radhakrishnan and Ranjan 2001, Suresh 1993, Devi 1994, Rajiv 1996 and Nair 2003).

**Study Objectives**

Such being the character of Indian studies conducted elsewhere also, the present scholar decided to investigate the relationship between the news programming practices and readers' preferences in the context of Malayalam Newspapers with the following objectives;

1. To find out newspapers news programming practices in relation to various categories of news content
2. To find out the readers' preferences in relation to the various categories of news content

3. To ascertain the relationship between the news programming practices of the selected dailies and readers' preferences in reading the programmed content.

**Study Sample and Method**

To realize the study objectives, the Malayalam press was chosen for this study as it constitutes a significant and dynamic part of the Indian press system. Needless to say, the Malayalam press is dominated by two dailies; the MalayalaManorama and Mathrubhumi. Together they command a daily circulation of nearly 3.5 million copies which accounts for more than 70 percent of the circulation of Malayalam dailies. Hence, Malayala Manorama and Mathrubhumi were selected for the study which was conducted in two phases.

Phase I of the study was concerned with content analysis of the dailies to gauge the news programming practices followed by the sampled dailies in relation to various content categories. The content analysis was conducted in two laps; lap I on June 2nd and lap II on June18th of 2013.

After ascertaining the news programming practices by the sampled dailies, as manifest in the content analysis, the second phase of the study was undertaken. In this phase, a survey was conducted among the readers of the two dailies to determine their preferences in reading various categories of news content.

**Readership Sample**

The study was conducted in four major urban centers of Kerala- The southernmost state of India- namely Thiruvananthapuram, Kottayam, Kochi and Kozhikode. From each of these centers a quota sample of 100 readers of the sampled dailies was drawn through a multi-staged sampling procedure. Thus together the total sample size was 400.

**Use of Novel Aided Recall Method**

This study used a hybrid method to gather readership data. A structured questionnaire was administered to elicit data on readers' socio-demographic variables as well as their newspaper reading habits. In addition, the study adopted a novel aided-recall method to ascertain readers' reading patterns and preferences of news content. The novelty of this method was inherent in the fact that the respondents were supplied with a copy of their previous day's newspaper, wherein each news item had been chronologically numbered. And, they were instructed to scan the newspaper and mark the news items read by them the previous day. This method was bound to give far more accurate responses as the readers had with them the copy of the daily they had read the previous day. As a result, it was far easier for them to recall with greater certainty the order in which they read the various news items. Using this method, the data

pertaining to readers' preferences in reading various content categories of news was collected in both the laps of the study.

In lap I of the study, each member of the sample was administered a questionnaire on June 3rd to elicit data on their demographic features and news reading habits. To ascertain their preferences in reading news content programmed by the dailies, they were supplied with a copy of the previous day's newspaper and were asked to mark the items read by them. The respondents of lap I were met again on June 19th to collect data of lap II of the study.

**Data Analysis and Findings**

The data so collected was analyzed sequentially to examine the tenets of the three objectives. Here lap I and II data of both the dailies was analyzed independently to examine whether the dailies follow a set pattern in programming news content under the three content categories-geographic, generic and subject matter. The data was coded and classified by two coders independently. As is required, the reliability of the coding decisions of the two coders was assessed using Cohens (1966) method in respect of the three content categories. The inter-coder reliability between the coders was significantly high: 0.885 for the generic category; 0.896 for the geographic category and 0.888 for the subject matter category. To establish the statistical significance of the similarities and differences in the content of the two dailies across lap I and II, the data was subjected to Chi square test of significance.

To ascertain whether the two dailies follow similar editorial programming practices, the lap I and II data was merged to constitute the aggregate data. The aggregate data so obtained in respect of the three content categories of the two sampled dailies was correlated using Pearson correlation test.

Having analyzed the content analysis data as described above to realize the first objective of the study, the researcher proceeded to the second objective of gauging the readership and reading preferences of the news content.

Lastly the analysis focused to examine the third objective of the study concerning the relationship between the news programming practices and readers' preferences in reading the programmed content. To ascertain the facial relationship between the two factors cited above the data was subjected to the test of proportion. The major findings arising from the analysis are reported here under.

**No Set Pattern in the Distribution of News Across Pages**

On investigating the various facets of the objectives, it was found that Mathrubhumidevoted more space to news and thereby programmed

more news items as compared to MalayalaManorama. However, on analyzing the distribution of news across pages it was found that both the dailies had no set pattern. Some pages had a higher number of stories in both the laps. It was page 2, devoted to local news, which by-and-large had the largest number of stories. The educational pages of both dailies too had a higher quantum of news items.

**Prime Focus on Regional News and Straight News**

It is well known that most language dailies are regional in their character and content programming practices. The dailies sampled for this study were no exception. The analysis of the geographic categories of news revealed that in both the laps, the largest number of news items programmed belonged to the regional news category followed by local news, national news and international news. Thus the two dailies adopted a set pattern in programming various geographic categories of news. Likewise, the prime concern of both Malayala Manorama and Mathrubhumiin both the laps was on providing straight news about events and issues of the previous days to their readers.

**Similarities in Editorial Practices of the Details**

The two dailies however differed in their practices of programming various subject matter categories of news across two laps. In MalayalaManorama, domestic news followed by education/social service, arts/culture/entertainment occupied the top three positions in lap I. But in lap II, there was a slight difference with education/social service taking the prime place followed by science/IT, domestic politics and art/culture/ entertainment. On the whole, such differences were not statistically significant.

The news programming practices of Mathrubhumi in respect of the subject matter categories differed significantly from lap I to lap II. Here along with domestic politics, education/social service and arts/culture/ entertainment, the subject matter category of crime/terrorism had obtained a prominent place.

The incidence of providing news stories with pictures was confined to a few stories in both the dailies. The highest usage of pictures was in MalayalaManorama as compared to Mathrubhumi. The Practice of publishing pictures alone as independent news stories was also relatively high in Malayala Manorama.

**Reader Satisfaction and Credibility Assessment**

Readers' satisfaction with the programmed news content matters much in making newspapers popular. Also, readers' satisfaction with the programmed content plays the role of an intervening variable in the

possible relationship between the news content programmed by the dailies and the content read by the readers. From this perspective, the study gauged the satisfaction index of the sampled readers of both the dailies in respect of the three content categories. On the whole, the analysis showed that Malayala Manorama readers were far more satisfied with all the four geographic categories of news as compared to Mathrubhumireaders. For unknown reasons, readers of Mathrubhumi were not deriving a high satisfaction from the programmed content.

Likewise, on analyzing the perceived credibility of the sampled dailies, Malayala Manorama achieved a higher credibility score than Mathrubhumi.

**Reading Preferences of Content**

To realize the second objective of assessing readers' preferences in reading the content programmed by the sampled dailies, this study examined the readership of the various pages and the quantum of news read by the readers in respect of the three news content categories. The analysis yielded the following results.

**Most Read Pages: Page 1 and 3**

From among the large number of pages, the readers of both the dailies had their own preferences in reading the pages across two laps. The most read page in Malayala Manorama was the front page. The other pages preferred were page 3, page 4, page 10, and page 17. But in Mathrubhumi, it was not page 1, but page 3, which had the highest readership.

The second highest readership however belonged to page 1 in Mathrubhumi. The other pages which had highest readership in Mathrubhumi were page 10, page 5, and page 2 and page 13.

**Low Readership of Content**

The study revealed an abysmally low readership of the news programmed by the dailies. While the readers of Malayala Manorama had read only 32.1 percent of the stories published, the readers of Mathrubhumi read less than 26 percent of the stories reported. This finding highlights the fact that readers do not read everything that is printed. Instead, they are very selective and read only a handful of news items. Thus it could be inferred that the reading preferences of readers do not match with the total quantum of news programmed by the dailies.

**Similarities in Reading Preferences of Content Categories**

Further it was found that the readers of the two dailies do not differ much in reading different categories of news-geographic, generic

and subject matter. The readership of content under each of these categories was by-and-large similar as was detected when the data was subjected to Pearson Correlation test.

**Convergence in News Programmed and News Read**

To realize the third objective, there was a need to examine the probability of similarity noticed between items programmed and items read in the sampled dailies in respect of each news category.

For this purpose the data was subjected to the test of proportion. The results of which pointed out that the news programmed and read in respect of the three geographic categories was similar in Malayala Manorama and Mathrubhumi. Similarly, the three generic categories of news programmed in them and the proportion of news read in respect of each of the three generic categories by the readers of the two dailies was similar.

The subject matter categories of news programmed and read was also subjected to the test of proportion. Barring two categories of subject matter, in the rest of 12 categories, the proportion of news programmed and the proportion of news read matched in the case of the two dailies.

From such findings two conclusions could be drawn. First, the quantum of news read by the readers of the two dailies is abysmally low compared to news programmed by the editors. The second conclusion could be that of a greater convergence between the news programming practices followed by Malayala Manorama and Mathrubhumi and the reading preferences of their readers.

These broad findings and conclusions are tentative. Further research requires to be undertaken to validate the findings. It is suggested that similar studies be conducted using the same research designs in different locales. In addition, there is a need to conduct studies with an enlarged sample of newspapers as well as readers both in the context of the Malayalam press and in the context of other language dailies including English. Such studies besides enriching research literature would also be of value to editorial managers and planners of Indian newspapers.

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# Television's Influence on Snack Food Consumption among Children

**Beulah Rachel Rajarathnamani**

## Introduction

Children are born into media rich environment. Television has become a part and parcel of children's lives. Television viewing is typically a child's first media experience. Television conveys various messages to children. The availability of television at home makes television messages easily accessible by children. Today the food industry is a huge market. Food industry uses television to advertise their products. Research has indicated that television provides a large source of food-related messages to children (Story & French, 2004). These food-related messages are particularly received through television advertisements. Amongst the food items advertised to children, snack food-items lead the list. Most of the snacks advertised are calorie dense products. Children are unaware of the marketing gimmicks used by the food industry and prefer to buy and consume the snacks. Consumption of these calorie dense snacks could cause ill health among children. When considering the aspect of time spent with television, children differ in the time they spend viewing television. Children who spend more time viewing television are the ones who are more exposed to snack advertisements. This study adopts a cultivation theory approach (Gerbner, Gross, Morgan & Signoreilli, 1986) assuming that the amount of television viewing has an impact on the preferences and consumption of snack foods among children.

Television advertisements directly target children who are their potential consumers. The advertisers use various marketing strategies to attract children. Williams, Achterberg & Sylvester (1993) have indicated that food and toys are the two largest categories of products that target children. Similarly, another study on food advertisements on networks reported that one-fifth of the commercials were for food, and that food advertisements were especially prevalent during Saturday morning cartoons and on children's networks (Bell, Cassady, Culp, & Alcalay, 2009). An analysis of 27.5 hours of children's television revealed that 49% of the advertisements were for food (Seitz, Wootan, & Story, 2008). This trend has not changed over the years and is prevalent even now. Food advertisements that target children often appear on children's channels since food companies become the channel's main advertisement sponsor.

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**Snacks**

Numerous food products are advertised during children's programmes. Researchers when examining the type of food product advertised during these programmes found that snacks were the chief food item that was advertised. In children's programming, 83% of all advertisements are for fast food or snacks (Harrison & Marske, 2005). Most of the snacks advertised are junk food items that are unhealthy.

In India, every state has a traditional snack that is common among the people of that region. Traditionally snacks were prepared from ingredients commonly available at home. Most of these snacks were healthy. They were home-made. The art of preparation of these snacks was handed over from one generation to the next. The ingredients were added with a conscious effort bearing health in mind.

Modern day snacks are very different from the traditional snack items. Snacks come in various forms. They include processed and packaged snack foods. Snack foods are typically designed to be portable, quick and satisfying. Processed snack foods are designed to be storable, more durable and less perishable than traditional snack foods. They often contain substantial amounts of sweeteners, preservatives and ingredients such as spices, chocolate, and artificial flavours. These specially-designed flavours are appealing to children but at the same time they are very harmful. They might contain ingredients that could cause ill effects on the health of the individual who consumes it. These snack foods are often classified as junk foods because they typically have little or no nutritional value. They do not contribute towards general health and nutrition. Since most of the times they are high in calorie they lead to various health related problems. Health experts are specifically concerned and recommend that people avoid high-calorie, low nutrient junk food. The modern day snacks include candy bars, chips, cookies, biscuits, popcorn, pizza, sandwich, and burgers which are high in calorie and low in nutrition.

Since children mostly see snack advertisements on television they show preferences to buy and consume them. Studies have supported this claim and said that exposure to food advertisements increases young children's snacking behaviour that in turn increases their caloric intake (Bolten, 1983). Due to the numerous snack advertisements that appear on television, snacking behaviour among children has seen an increase over the years. A study of more than 21,000 children and adolescents has found that the prevalence of snacking has increased considerably during the past 20 years. By the mid 1990's, children were consuming 25% of their daily calories a day by snacking, compared with 18% in 1977, and teens consume 610 calories a day by snacking (Jahns, Siega-Riz & Popkin, 2001). This is because the number of snacks advertisements that

appear on television has increased. A study by Harrison & Marske, (2005), found that snacking was shown in commercials more often than breakfast, lunch, and dinner combined.

Snack foods advertising on television is said not only to make children choose snacks but also keep them away from eating fruits and vegetables. Since fruits and vegetables are never advertised, children generally see snack food advertisements and prefer these snacks instead of unadvertised fruits and vegetables. A study of 500 middle school students studied over a 19-month period found that for each additional hour of television viewed per day, consumption of fruits and vegetables actually decreases among teenagers, which may be attributable to television advertising of snack foods (Boynton-Jarrett, Thomas, Peterson, Wiecha, Sobol, & Gortmaker, 2003).

Most of the snacks advertised are unhealthy. Children choose snacks advertised on television and consume them. These snacks are high calorie food items. Many children are not aware that these snacks when consumed in excess cause serious health related problems.

**Appeals used**

Advertisers use different appeals to sell their products. They study their consumer and choose appeals to attract them. There are various tactics that advertisers employ to attract children to buy their products. When analysing the type of appeal used to attract children, studies found that the most commonly employed appeal is associating the product with fun and happiness rather than conveying any factual product-based information (Folta, Goldberg, Economos, Bell, & Maltzer, 2006). Research studies have indicated that advertisements are cleverly constructed to get viewers to associate the food product with happiness and fun, rather than taste or nutritional benefit (Scammon & Christopher, 1981). Children fall prey to these marketing gimmicks and think that consuming the snack item might make them experience the same fun and happiness shown in the advertisements. Food advertisements can show exaggerated pleasure responses to eating a food product (Page & Brewster, 2009). This creates a forceful desire in the child to buy the snack product and consume them to experience the pleasure and happiness that the advertisements say the product would give.

**Preferences towards junk foods**

Viewing of television food commercials is associated with attitudinal and behavioural changes among children. Children get influenced by the food advertisements shown on television and purchase them. Chamberlain, Wang, & Robinson, (2006), have indicated that children have been found to request more advertised junk foods and drinks and

also attempt to influence their parents' purchases. Pre-school children who watch food advertisements get influenced and prefer foods shown in the advertisements (Borzekowski & Robinson, 2001).

Studies from the past have indicated that the amount of time children view television has an influence on the consumption of television advertised food products. In a study of 3-to 8-year-olds, the number of weekly viewing hours correlated significantly with both children's caloric intake and children's requests to parents for foods shown on television (Taras, Sallis, Patterson, Nader, & Nelson, 1989). If children spend more time with television they are said to request more of television advertised foods. It is worth noting that the children who viewed television for more hours, expressed strong desire for the food products shown on television. In this way they were demonstrating persuasion effects in the form of positive attitudes to the product, even if they did not go so far as to engage in purchase-related behaviour (Hastings, McDermott, Angus, Stead, & Thomson, 2006). These studies clearly highlight that the amount of television viewed by the children has an influence on the purchase and consumption of television advertised food items.

Studies argue that food advertising contributes towards childhood obesity by distorting children's food preferences, requests, consumption patterns and nutrition knowledge (Cairns, Angus, & Hastings, 2009). Unable to understand the nutritional value in the snacks advertised on television, children consume them in excess. These foods could be harmful to the health of the children. Snack food consumption can increase obesity rates among children. Obesity could lead to various health problems at a later stage in a child's life.

**Research Objective**

This study attempts to find the relationship between television viewing and snack food consumption among children. This study works from the premise of cultivation theory (Gerbner, Gross, Morgan, & Signoreilli, 1986) that assumes the time spent viewing television could have an impact on the preferences and consumption of snack foods among children. This study supposes that children who spend more time in front of television could have more preferences towards snacks advertised on television when compared to children who spend lesser time in front of television. Television viewing time could influence them to prefer these snacks, create a desire to purchase them, request parents for these snacks and ultimately influence in the consumption of these food products.

**Method**

A survey method was adopted for this study. A questionnaire was distributed to the children. Data collected from 300 school children

(150 boys, 150 girls) in Chennai was analysed for this study. The children were from the 3rd, 4th, and the 5th standard. The children belonged to the age group of 7 to 10 years. The data of the 300 respondents was coded and statistically analysed to arrive at the results.

Television viewing was defined as the number of hours children spend viewing television in a day. Higher scores indicated higher television viewing. The number of hours of watching television daily, a numeric variable was collapsed into a categorical variable, called TV viewing, by dividing it into three groups: High TV viewers (those who watch more than three hours TV), medium viewers (those who watch more than one hour but less than three hours of TV), and low viewers (those who do not watch TV at all or watched less than one hour of TV).

A one-way analysis of variance was performed with the compound variable, television viewing, as the independent variable on the following dependable variables.

**TABLE**

Details of the dependent variables and the significant results

| Sl. No. | Dependent Variables | Degrees of Freedom | | F | P |
|---|---|---|---|---|---|
| | | Within | Error | | |
| 1. | I buy the snacks advertised on television | 2 | 295 | 5.682 | .003 |
| 2. | I ask my parents to buy the snacks that are advertised on television | 2 | 295 | 3.435 | .002 |
| 3. | I am ready to spend money to buy the snacks that are advertised on television | 2 | 295 | 7.236 | .000 |
| 4. | I feel eating the snacks that are advertised on television will make me happy | 2 | 295 | 6.740 | .002 |
| 5. | There is a lot of fun involved while eating the snacks that are advertised on television | 2 | 295 | 3.866 | .004 |
| 6. | Eating the snacks shown on television will not harm my health | 2 | 295 | 9.745 | .000 |
| 7. | I prefer to eat the snacks that are advertised on television | 2 | 295 | 4.568 | .003 |
| 8. | I prefer to eat snacks shown on television than vegetables | 2 | 295 | 8.232 | .001 |
| 9. | I prefer to eat snacks shown on television than fruits | 2 | 295 | 7.562 | .003 |

1. I buy the snacks advertised on television on TV viewing F (2,295) =5.682, p=.003. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.993) buy the snacks advertised on television significantly more than children with low or no TV viewing (M=2.237).

2. I ask my parents to buy the snacks that are advertised on television on TV viewing F (2,295) = 3.435, p=.002. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.534) asked their parents to buy the snacks that are advertised on television significantly more than children with low or no TV viewing (M=1.938).

3. I am ready to spend money to buy the snacks that are advertised on television on TV viewing F (2,295) = 7.236, p=.000. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.842) were ready to spend money to buy the snacks that are advertised on television significantly more than children with low or no TV viewing (M=1.788).

4. I feel eating the snacks that are advertised on television will make me happy on TV viewing F(2,295) =6.740, p=.002. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.996) felt that eating the snacks that are advertised on television will make them happy significantly more than children with low or no TV viewing (M=2.125).

5. There is a lot of fun involved while eating the snacks that are advertised on television on TV viewing F(2,295) =3.866, p=.004. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.457) felt that there is a lot of fun involved while eating the snacks that are advertised on television significantly more than children with low or no TV viewing (M=1.938).

6. Eating the snacks shown on television will not harm my health on TV viewing F(2,295) =9.745, p=.000. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.759) felt that eating the snacks shown on television will not harm their health significantly more than children with low or no TV viewing (M=1.211).

7. I prefer to eat the snacks that are advertised on television on TV viewing F(2,295) =4.568, p=.003. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.633) always preferred to eat the snacks that are advertised on television significantly more than children with low or no TV viewing (M=2.102).

8. I prefer to eat snacks shown on television than vegetables on TV viewing F(2,295) =8.232, p=.001. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.495) preferred to eat the snacks shown on television than vegetables significantly more than children with low or no TV viewing (M=1.361).

9. I prefer to eat snacks shown on television than fruits on TV viewing F(2,295) =7.562, p=.003. A post hoc Tukey test was done to see if any category was significantly different from the other. The test revealed that children with high TV viewing (M=2.987) preferred to eat the snacks shown on television than fruits significantly more than children with low or no TV viewing (M=1.564).

**Discussion**

The main findings from the above study is that children who are high TV viewers are the ones who are most influenced by snack food advertisements that are shown on television. They are the ones who prefer to buy or request the snacks advertised on television more than low TV viewers. These children are ready to spend money to purchase the snacks. They also desire these snacks expecting the experience of happiness and fun that the advertisements promises to offer if the snack is consumed. They are the ones who consume these snacks more than low TV viewers. The high TV viewers eat the snacks thinking it is not harmful to their health and prefer to consume snacks more than vegetables and fruits.

The findings from this study is similar to past studies (Taras, Sallis, Patterson, Nader, & Nelson, 1989; Hastings, McDermott, Angus, Stead, & Thomson, 2006) wherein the amount of time spend with television has an influence on the preferences and consumption of foods advertised on television. This research has specifically studied the influence time spent with television has on the snack food consumption among children. The findings clearly demonstrate that the longer hours children spend with television the more likely they would purchase and consume the advertised snacks. The amount of television viewing has an impact on the consumption of snack foods among children. From the study it is understood that children's television viewing time is found to cause an influence in the

consumption of snacks. Parents should monitor the television viewing of their children and restrict long viewing hours to avoid unwanted influence. Since television viewing is one of the major entertainments at home, some children sit in front of the television sets for many hours together. Being bombarded continuously with food related messages they become easily susceptible to television promoted food habits.

## Conclusion

Children's exposure to television food advertising increases children's preferences, choices, consumption and requests to parents for advertised brands. Advertisers primarily focus on children when promoting snacks. The influence of television advertisements is such that it influences the children's consumer behaviour. Attractive characters and models are used in these advertisements and false claims are made to attract the children to buy the snacks advertised. Children are unaware that these snacks are harmful to health. They easily get attracted to the advertised product and consume them. Of late, children's food consumption patterns have shifted in directions promoted and modelled by television. Children now are no more interested in the traditional family food culture that includes snacks that is home-made with ingredients that promote good health. They prefer to follow the food culture promoted by television which is mostly snacks rich in calories, but with low nutritional value. Given the nature of snacks promoted on television, consumption of such food products would only have a negative impact on the health of the children.

The principal public health concern is the marketing of unhealthy foods to children. In response to this concern, children should be educated about the biased nature of advertisement messages and taught to defend against advertising influence. They should be encouraged to eat traditional snacks that are being forgotten in this commercial world of marketing strategies. Going back to our traditional roots and rediscovering the foods made in our traditional society will definitely provide good health to the children.

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# Livelihood Imperatives of the Fishing Communities in a Dynamic Environment of Climate Change

**D. Rajasenan**

## Introduction

Climate change is entirely stochastic to the lives and livelihoods of people both in the developed and developing world. In the developed world this is being addressed with the use of modern scientific knowledge for developing appropriate coping and mitigating strategies. Given the resources, the developed world has the wherewithal to trigger alternative livelihoods tothe affected groups or move people from one sector to another. The situation is diametrically different in the developing world. Livelihoods in many of the countries continue to depend on agriculture, fisheries and other natural resource based allied sectors where the impact of climate change is likely to be higher. While the problem is global in nature-the poorest of the poor in fisheries and agriculture sectors in the developing world are likely to face the wrath of the vagaries of climate and its change.

Climate change begins in the form of surface temperature warming of the oceans resulting in either continuous process or stochastic influence in the form of El Nino effect (ocean wave and wind circulation pattern in temperature) with reduced rainfall and change in the regular pattern of rainfall (Mooley and Parthasarathy, 1983). This has far reaching implication in the cropping pattern in agriculture and marine fishery resources, specifically reproduction, trophodynamics, rise in sea water levels and the nature of its seasonality.

The level of vulnerability of the traditional fishing sector, if analyzed in a matrix scale, will fall under the first row-column. Poor communities in coastal areas tend to be dependent on climate sensitive resources and do not have the means to adapt rapidly. There is an increasing concern over the consequence of global warming for food security and livelihood of the world's 36 million fishers and nearly 1.5 million consumers who rely on fish for fulfilling more than 20 percent of their dietary annual protein.

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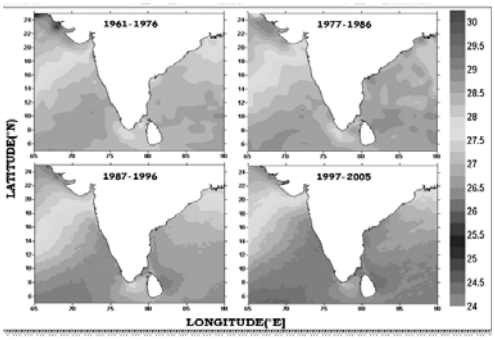
IPCC (1996) report estimates that 46 million people per year are currently at risk from flooding due to storm surges in the world's coastal zones, and climate change induced sea level rise. In the absence of adaptation, this figure is likely to increase in the years to come. This has been well understood by the scientific communities, who have undertaken several studies to address the issue. However, most such studies are technical in nature with less emphasis on socio-economic and vulnerability dimensions of the poor. IPCC (1996) report also gives a sad commentary that overfishing is awfully much more critical than climate change impact in fishery. This shows that the traditional fishers are in between the twin dangers of Scylla and Charybdis. Hence it is of paramount importance to salvage the traditional fishers from the impending catastrophe of climate change induced oscillation in fishing fortunes with timely coping and mitigating strategies.

**Problem**

Using 35 emission scenarios, the IPCC (2007) has predicted that the global average temperature would rise between 1.4 and 5.8 degree Celsius between 1990 and 2100 with the most likely change between 2.0 and 4.5 degree Celsius. Average of seven climate models and 35 emission scenarios predicts increase in global sea level in the range of 15 to 25 cm over the next 50 years. The change of sea temperature on the Indian coast is depicted in Figure 1, which clearly shows higher temperatures in the southern coast of India. This is likely to have far reaching implications in the lives and livelihood of the fishing communities in coastal areas as climate change impacts affects the fishing sector directly but also has indirect impact on the economy and the society. This needs to be addressed in a quartet nature of change-cause-consequence-copying levels for developing a policy strategy for traditional fishermen, a subset in a universal set of climate impacting and livelihood variables.

**Figure 1: Temporal Impact of Sea-level Temperature Changes**




Source: Vivekanandan et al., 2009

India is ranked third in the list of the global marine fish producing countries but its pressure in the form of dependency on the fishing sector for livelihood is significantly high. Statistics show that more than 40 million people reside along the Indian coastline surrounded by Arabian Sea in the west, Bay of Bengal in the east and Indian Ocean in the south. Climate change combined with human activities poses significant risks to people's livelihood especially in the traditional fishing sector and allied sub-sectors as a result of the low level of adaptation and mitigation programmes (understand the change in seasonality, species change pattern, fishing ground changes). Fisheries form an important component in the coastal villages of India, in terms of protein and nutritional security not only for the fishing community but also to the non-fishing communities.

The coastal states of India form a unique fishing centre in the east coast and west coast exhibiting a unique oceanographic-cum-fishing feature with members of the fishing communities having common socio-economic characteristics. The coastal fishing communities show considerable variation in the possession of fishing equipments, catch patterns, infrastructural facilities and income earning levels. The climatic changes add to the already existing tribulations and vulnerability of fishing communities. IPCC (2007) cites this nature of vulnerability as the degree to which a system is susceptible to or unable to cope with adverse effects of climate change, including climate variability and extremes.

## Nature of the Fishing Sector

Table 1 Marine Fishery Resources

| | India | Kerala | Karnataka | Tamil Nadu | Andhra Pradesh | Goa | Gujarat | Maharashtra | West Bengal | Odisha |
|---|---|---|---|---|---|---|---|---|---|---|
| Length of coast line (km) | 8118 | 569.7 | 280 | 906.9 | 973.7 | 104 | 1600 | 300 | 158 | 480 |
| Exclusive Economic Zone (million sq.km) | 2.02 | 0.02 | 0.87 | 0.7 | 0.37 | 0.011 | 0.11 | .014 | .013 | .002 |
| Continental sq.km) | 530 | 39.14 | 70 | 190 | 185 | 10 | 184 | 112 | 17 | 26 |
| No of Fish Landing centres | 1537 | 178 | 88 | 352 | 271 | 33 | 121 | 96 | 59 | 73 |
| No. Of fishing villages | 3322 | 222 | 156 | 581 | 498 | 39 | 247 | 144 | 188 | 813 |
| No of Fishermen Families | 8,74,749 | 120,486 | 30,176 | 192,152 | 129,246 | 2189 | 62,231 | 81,492 | 76,981 | 1,14,238 |
| Fisherfolk Population | 40,56,213 | 602,234 | 170,914 | 790,408 | 509,991 | 10,668 | 3,23,215 | 3,19,397 | 2,69,565 | 4,50,391 |

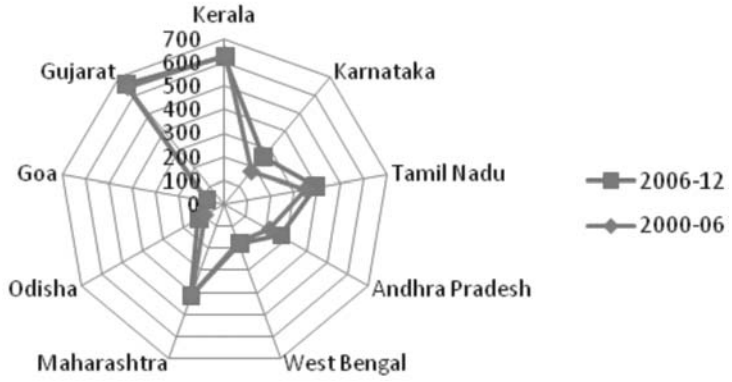
Source: Ministry of Agriculture, 2013

India has 8118 km long coastal line with a large marine sector that cover with varied fish resources. There are 1537 fish landing centers, 3322 fishing villages and 8, 74,749 fishermen families in India. The overall picture of the marine fishery resources coastal state-wise is summarized in Table 1.

**Production Scenario**

Fisheries play an important role in the national economy, contributing to the GDP and earning substantial foreign exchange. The average annual fish production in India during the period 2000-12 is presented in Figure 2.

**Figure 2: Average Annual Marine Fish Production**




Source: Computed from the Ministry of Agriculture, 2013

The average annual growth during 2006-12 is higher than the growth during the period 2000-06. Most of the coastal States of India except Kerala and Goa have a positive growth trend; however, growth pattern is very negligible in the west coast in comparison to the east coast. Some scientific facts have also been corroborated with this recent change (in catch pattern and shift in fish colonies) as sea water temperature rises and the resultant movement of the species to cooler waters. There are innumerable oceanographic reasons for the decline in the catch pattern in the states of Kerala and also the very high increase in the catch trend in Tamil Nadu, Andhra Pradesh and Karnataka. One such reason quite often cited from the marine scientists is climate change induced drift from the east to west.

**Demographic and Employment Scenario**

The total marine fisher's population is about 6 million comprising in 864,550 families. Nearly 61 percent of the fishermen families were under Below People Line (BPL) category (Ministry of Agriculture, 2012). The average family size is 4.63 and the overall sex ratio is 928 females per 1000 males. About 38 percent marine fishers were engaged in active fishing with 85 percent of them having full time engagement (see Tables 2 and 3).

## Table 2: Employment Generation in the Fishing Sector

Table 2 Employment Generation in the Fishing Sector

| Year | family members in fishing operations | | Family members engaged in fishing related activities other than actual fishing | | | |
|---|---|---|---|---|---|---|
| | *Full-time* | *Part-time* | *Marketing* | *Repair of Fishing nets* | *Processing* | *Other activities* |
| **2013-14** | 933124 | 1072079 | 391000 | 245100 | 46200 | 334700 |

Source: Fishery Statistics, 2014

## Table 3: State Wise Marine Working Populations

Table 3 State Wise Marine Working Populations

| State | Active Fishermen | Fishing Allied | Non Fishing |
|---|---|---|---|
| Kerala | 114756 | 32728 | 75626 |
| Karnataka | 14410 | 9876 | 54753 |
| Tamil Nadu | 69343 | 43070 | 83211 |
| Andhra Pradesh | 117460 | 150735 | 304893 |
| West Bengal | 267944 | 446517 | 364618 |
| Odisha | 35304 | 38821 | 61331 |
| Goa | 2199 | 1682 | 2400 |
| Maharashtra | 19606 | 49677 | 49130 |
| Gujarat | 83677 | 36984 | 51698 |

Source: Fishery Statistics, 2014

There are 52982 traditional crafts, 73410 motorized crafts and 72749 mechanized boats operating in Indian Seas. Sector wise contribution to all-India marine fish landings indicates the dominance of mechanized vessels. The mechanized sector continued to be the major contributor to the landings in most of the coastal states. Though there is euphoria for mechanization and motorization in the marine fishing sector in these states, traditional fishing is still prevalent among the poorest of the fishermen, who also face the major impact of climate change in fisheries.This clearly highlight the species diversity and richness of the Southern maritime states' marine waters (Table 4) and the high potential in the sector for coastal fishing village development, domestic nutritional security, employment generation, gender mainstreaming as well as export earnings. Yet, serious concerns are arising out the impact on mechanization, technology, GPS tracking, fishing during fish holidays *inter alia* climate change since production depends largely upon several man-induced and oceanographic factors.

## Table 4: Fish Species Pattern in the Southern Coast

Table 4 Fish Species Pattern in the Southern Coast

| State | Marine Species |
|---|---|
| Karnataka | Flatfish,Indian Salmon, Indian Oil Sardine, Lizard Fishes, Silver Bellies, Seer Fish Scomberomorus spp. |
| Kerala | Silver Bellies , Croackers, Perches, Indian Salmon, Carangidae (Bangada), Butter Fish, Indian Oil Sardine, Anchovies,King Mackerel, Other Clupeids |
| Tamil Nadu | Silver bellies, Croackers, Perches, Kala Bangada, Chirocentrus spp., Spanish mackerels, Sear fish Scomberomorousspp, Half beaks |
| Andhra Pradesh | Lizardfish, Goatfish, Halfbeaks, Indian Salmon, Kala Bangada, Butterfish, Anchovies, Parava, Perches, Indian Oil Sardine, Seer fish scomberomorousspp |
| Maharashtra | Flatfish,HarpodonNeherus, Sea Catfishes , Croackers, Goat Fish , Butterfish, Indian Oil Sardine, Anchovies, StruooedSeerfish |
| Goa | Half Beaks, Indian Oil Sardine,Seer fish scomberomorous spp., Other Clupeids, Croackers, Flatfish |
| Gujarat | Flatfish, HarpodonNeherus, Croackers, Perches, Mullets, Carangidae (Bangada), Anchovies, Other Clupeids, Chirocentrus spp., Seer Fish Scomberomorus spp. |
| West Bengal | Hilsallisha, HarpodonNeherus, Sea catfishes, Croackers, Mullets, Butterfish, Indian oil sardine, Silver bellies, perches, Kala bangada |
| Odisha | Sea catfishes, Mullets, Indian oil sardine, Hilsallisha (Tenualosa), Carangidae, Anchovies, Other Clupeids |

Source: Extracted from Fishery Statistics, 2014

## Conclusion

The climate change related issue comes in the fishing sector firstly in the form of production variation, seasonality changes and changes in the species composition. Fishery statistics is sufficient to understand these impacts. But the wider ramification associated with this like livelihood issues and vulnerability of the fishing community cannot be identified with the aid of fishery statistics alone, it needs deeper intervention so as to understand the perception of the fishers as their socio economics is entwined with the fear and psychic behavior.One possible solution in this respect is to make the fishers aware of the impending danger which they are going to face in the fishing sector in manifold dimensions. The role of the government is very crucial in this respect for developing coping and adaptation strategies to mitigate the problem in the short-run as well as in the long-run. Region specific case studies is one such measure to address the fishers problem incorporating the various climate change impact parameters and the associated vulnerability of the fishing community, which in turn would help the fishing community to make some changes in fishing practices along with certain actions to divert the fishing pressure with alterative income earning activities.

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# Nehru and the Scientific Temper

**H.J. Bhabha**

**Introduction**

Nehru had a profound belief in science and the scientific method and realized that without science and technology we cannot progress, says Dr. H.J. BHABHA and concludes that it is, for all of us and particularly to young men and women of India, to follow him in approaching all problems of life in the temper of science and in his fearless quest for truth.

**Vision of Nehru**

If one reads through the numerous writings of Jawaharlal Nehru, and the records of the speeches he gave, usually extemporaneously, on numerous occasions, two dominant impressions are left in one's mind. One is his enormous vitality and zest for life, his sense of enthusiasm and participation in anything worthwhile that was going on. The second is his approach to all problems with an open mind in what he himself would describe as the temper of science.

He had a profound belief in science and the scientific method and realized that "without science and technology we cannot progress". But science for him was something much more. To quote a passage from the Discovery of India, 'The applications of science are inevitable and unavoidable for all countries and peoples today. But something more than its application is necessary. It is the scientific approach, the adventurous and yet critical temper of science, the search for truth and new knowledge, the refusal to accept anything without testing and trial, the reliance on observed fact and not on pre-conceived theory, the hard discipline of the mind-all this is necessary, not merely for the application of science but for life itself and the solution of its many problems…….. The scientific approach and temper are, or should be, away of life, a process of thinking, a method of acting and associating with our fellowmen". He had this approach to life and its problems in full measure and wanted others to have it. For, he continued, "That not only gives us a greater understanding of the world as it is, but creates ultimately a temper, an objective temper, a dispassionate scientific temper, which should help us in dealing with other problems that come up in Parliament or elsewhere, or whatever they may be, could be dealt with better if we approach them in a scientific frame of mind".

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Dr. Homi Jehangir Bhabha (1909-1966), world famous nuclear physicist and founding Director of Tata Institute of Fundamental Research, as broadcast in 1982 through All India Radio (Nehru and Scientific Temper, STEC, Tvm.)

Much is said today about “the two cultures”, the scientific culture and the humanistic culture, the latter being considered to include appreciation of human and aesthetic value, of beauty in whatever form.

Much is also said of the need to fuse these in some sort of higher synthesis. What is not realized is that these two cultures, so-called, are merely two different approaches to the world around us-approaches which are not antithetical but complementary in the sense in which this word is used in physics.

A physicist knows that the position of a particle and its velocity - I shall not use the more correct expression ‘momentum’ - are complementary attributes of a particle, and the more precisely he determines either one of these the less precise in principle becomes his determination of the other.

“It is, therefore, with the temper and approach of science, allied to philosophy, and with reverence for all that lies beyond, that we must face life.

Similarly, the scientific method can be applied to the study of all phenomena which confront us, but to the extent that one is engaged in this activity and acquiring this knowledge, the activity of emotional response to the phenomena, which is what is involved in the perception of beauty, must become less intense. And conversely, there is nothing to stop anyone from approaching a phenomenon in both these way, but he cannot do so simultaneously.

Jawaharlal realized this position intuitively. He wrote in the Discovery of India, “Science deals with the domain of positive knowledge but the temper which it should produce goes beyond that domain. The ultimate purpose of man may be said to be to gain knowledge, to realize truth, to appreciate goodness and beauty. The scientific method ofobjective inquiry is not applicable to all these, and much that is vital in life seems to lie beyond its scope-its sensitiveness to art and poetry, the emotion that beauty produces the inner recognition of goodness. The botanist and zoologist may never experience the charm and beauty of nature; the sociologist may be wholly lacking in love for humanity. But even when we go to the regions beyond the reach of the scientific method and visit the mountain tops where philosophy dwells and high emotions fill us, or gaze at the immensity beyond, that approach and temper are still necessary.

The astronomer or the astrophysicist who spends his time calculating the distances of remote stellar objects, distances so large that they are only measured in many power of ten or in studying the processes of cosmic evolution, is certainly not prevented from sharing with the non-scientist the emotion of wonder at the beauty of the heavens. Indeed, he may experience another aesthetic emotion which someone ignorant of the discoveries of astronomy or astrophysics cannot wonder at the astonishing size of the Universe and the processes of cosmic evolution.

It is almost certainly true that there are more scientists in the world with at least some appreciation of the arts than there are artists with appreciation of science and the scientific method. As Nehru said in one of his speeches, "There is no particular reason why the scientist is more cultured and more integrated than a person who has read, let us say, only literature".

These aesthetic experiences, however, have to be differentiated from superstition. As Jawaharlal wrote: "As knowledge advances, the domain of religion in the narrow sense of the word shrinks. The more we understand life and nature, the less we look for supernatural causes. Whatever we can understand and control ceases to be a mystery. The processes of agriculture, the food we eat, the clothes we wear, our social relations, were all at one time under the domain of religion and its high priests. Gradually they have passed out of its control and become subjects for scientific study. Yet much of this is still powerfully affected by religious beliefs and the superstitions that accompany them. The final mysteries still remain beyond the reach of the human mind and are likely to continue to remain so".

Science, unlike philosophy, has advanced immensely, because it has been content to tackle and solve individual problems, even small ones, at a time, without waiting to solve the entire problem of the Universe.

Nehru's practical and scientific approach caused him to write the comment: "But so many of life's mysteries are capable of and await solution that an obsession with the final mystery seems hardly necessary or justified. Life still offers not only the loveliness of the world but also the exciting adventure of fresh and never ceasing discoveries, of new panoramas opening out and new ways of living, adding to its fullness and ever making it richer and more complete". He continued, "It is therefore, with the temper and approach of science, allied to philosophy, and with reverence for all that lies beyond that we must face life. Thus we may develop an integral vision of life which embraces in its wide scope the past and the present with all their heights and depths and look with serenity towards the future".

Later, reverting to the same subject in the Discovery of India, he wrote, "We have to function in line with the highest ideals of the age we live in, though we may add to them or seek to mould them in accordance with our national genius. Those ideals may be classed under two heads-humanism and the scientific spirit. Between these two there has been an apparent conflict, but the great upheaval of thought today, with the questioning of all values, is removing the old boundaries between these two approaches, as well as between the external world of science and internal world of introspection, there is a growing synthesis between humanism and the scientific spirit, resulting in a kind of scientific humanism",. The synthesis is in fact the recognition that humanism and the scientific spirit are two complementary approaches, both valuable,

both of which can be appreciated by the same individual and add to the richness of his life.

His internationalism was indeed a result of his open mind and his scientific approach. "In every matter", he said "be it education, science, culture or anything else, I dislike nothing so much as the narrowly nationalistic approach which makes us think that we have attained the summit of wisdom and that we need not learn anything more. This kind of attitude denotes a static condition. And anything that is static becomes stagnant and gradually leads to death. I am all for opening our minds to every kind of knowledge or information that can be obtained. I am all for free intercourse with the rest of the world. I am all for inviting people from other countries to come here to learn from us and to teach us; I want no barriers".

While he had the most profound appreciation of the great cultural heritage of India, he had no use for the inferior repetition of artistic pastiches and clichés from the past, the sort of thing that is often inflicted on distinguished foreign visitors as "Cultural shows".

Referring to the forces which "under the guise of what people call culture, narrow our minds and outlook", he said, "these forces are essentially a restriction and denial of any real kind of culture. Culture is the widening of the mind and of the spirit. It is never a narrowing of the mind or a restriction of the human spirit or of the country's spirit. Therefore, if we look at science in the real way and if we think of these research institutes and laboratories in a fundamental sense, then they are something more than just little ways of improving this and of finding out how this or that should be done. Of course, we have to do that too. But these institutes must gradually affect our minds, not only the minds of the young men and women who work here abut also the minds of others, more especially the minds of the rising generation, so that the nation may imbibe the spirit of science and be prepared to accept the new truth, even though it has to discard something of the old. Only then will this approach to science bear true fruit".

Jawaharlal Nehru had a fearless and questing mind, one which was thrilled with the adventure of the discovery of new truths, with new glimpses in to the mysteries of nature. He wrote in his book on World History, "Human thought is ever advancing, ever grappling with and trying to understand the problems of nature and the Universe, and what I tell you today may be wholly insufficient and out-of day tomorrow. To me there is a great fascination in this challenge of the human mind, and how it soars upto the uttermost corners of the universe and tries to fathom its mysteries, and dare to grasp and measure what appear to be the infinitely big as well as the infinitely small".

It is for all of us, and particularly the young men and women of India, to follow him in approaching all problems of life in the temper of science and in his fearless quest for truth.

# Rising Demand for Mass Communication on IPR related Issues

**Suresh Kumar G., V. Ajit Prabhu**

India has become a member of the global patent regime but it is an accepted fact that awareness and expertise on the subject of Intellectual property Rights (IPR) in the academic institutions is still inadequate.In 2012-13, the Office of the Controller General of Patents, Designs, Trademarks and Geographical Indication, Govt. of India, granted 4126 patents. The number of patents granted during the previous four years was 4381, 7509, 6168 and 16061 respectively. Thus it can be seen that more than 38000 patents were granted during the five-year period 2008-2013. Ministry of Commerce & Industry, Govt. of India, in a report, has pointed out that Patent applications filed by Indian applicants was 25 percent of the total number of applications filed in the year 2013-14 as compared to 22 percent in the year 2012-13 and 20 percent in the year 2011-12. The factors responsible for low percentage of patent applications filed by Indian applicants has been identified as the lack of awareness about the patent system and its benefits, lack of proper planning by Indian industry for building of patent portfolio and lack of modern research facilities in Indian industry.

A nation's ability to convert knowledge into wealth and social good through creativity and innovation has become the determining factor of its future standing in the community of nations. In today's world, confidence in the intellectual property system acts as a powerful stimulus to creativity and innovation. Generating new knowledge and converting it into useful products, transfer of such products and technologies to industry and commerce with appropriate safeguards for Intellectual Property Rights (IPR) protection is the process of wealth creation.

It is interesting to note that we are entering a phase where the 'human mind' enterprises have overtaken the earlier 'brick and mortar' assets. That the richest man in the world consistently for the few years with a sized knowledge companies have surged ahead of older industrial giants emphasizes dramatically the importance of Intellectual Property. All major

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countries now recognize the creation of appropriate understanding and appreciating the IPR, its future and rationale for protection is a prerequisite for comprehending its role in formulating national strategies for enhancing competitiveness.

Based on these facts there are raised eye-brows on what should be the next step after getting a patent. Companies and corporates have a clear mechanism for the management of IP and to convert it into wealth. But individual inventors are not tuned to translate the patent into successfully commercialised IPs. If an individual gets a patent and does not do anything with it, it is difficult to use it for economic gains. Hence awareness on IPR is important and at the same time systematic approach on further economic activities after getting the IPs are also important as well.

Let us look at some examples of good inventions in view of IPR regime. BBC's Top Gear magazine had reported on Elon Musk, CEO of Tesla Motors, announcing that the company will allow its technology patents for use by anyone in good faith, in a bid to entice automobile manufacturers to speed up development of electric cars. But for the CEO of a company to open up several years' and millions of dollars' worth of information for the development of a particular manufacturing sector is a fantastic gesture, fit to be emulated by many others. So the idea is to develop a breakthrough technology and for that the company is liberalising technology transfer norms.

SpaceX, another company headed by Musk which develops and manufactures space launch vehicles with a focus on advancing the state of rocket technology, made history as the first commercial company to launch and dock a vehicle to the International Space Station. Musk's as well as SpaceX's goals include simultaneously lowering the price of orbital spaceflight and improving reliability, both by an order of magnitude, while creating the first fully reusable orbital launch vehicle. His personal goal is to eventually enable human exploration of and settlement on Mars and hopes to send humans to Mars' surface within 10–20 years. Though ambitious, technology development is the underlining feature behind this mission.

Another brainchild of Elon Musk is the Hyperloop, a conceptual high-speed transportation system incorporating reduced-pressure tubes in which pressurized capsules ride on a cushion of air that is driven by a combination of linear induction motors and air compressors. The conceptual route runs from the Los Angeles region to the San Francisco Bay Area, with an expected journey time of 35 minutes, meaning that passengers would traverse the 570 km route at an average speed of around 962 km/h, with a top speed of 1,220 km/hr.

Anand Mahindra, Vice Chairman and Managing Director of Mahindra & Mahindra, is another person with an open mind for innovators, mavericks in particular. In an article "The Creative Future" which appeared in the 2005 Anniversary Issue of Business Today, he wrote about Radhey Sham Tailor, 62 years old, and NathulalJangid, 52-residents of Sikar, Rajasthan, one of whom is a commerce graduate and the other a fifth standard dropout. In 1999, during a bus journey through Rajasthan, they looked out of the window and saw labourers digging trenches under the scorching desert sun. Unable to forget their plight, they went back home and invented a trench-cutting machine attached to a tractor, which could dig 65 metres of trench per hour. By 2003 they had sold 15 such machines for Rs 1.5 lakh each. Anand Mahindra's belief in Indian innovation was evident from the article's concluding words - India, therefore, is condemned to creativity. The Mahindra Rise campaign that is envisaged to encourage alternative thinking is an example of his initiative. Recently, Mahindra announced a USD one million cash prize for winners of two new challenges under 'Spark the Rise'. Mahindra Rise believes that the nation doesn't have enough world-class ideas and has recently launched a TV-led campaign to promote this initiative.

The Rise Prize is a direct application of the brand's idea of challenging and inspiring people to stretch, to raise the bar and do more than they thought possible - to 'rise'. The platform 'Spark the Rise' was started with the intent of making it a platform of choice for innovators, entrepreneurs and change-makers. The Rise Prize comprises two challenges - one is the creation of a 'Driverless Car for Indian Conditions' while the other is an 'Affordable, DIY Solar Kit'.

The examples highlight an exponential growth of scientific and technical knowledge that have taken place. There is an increasing demand for easier access to information related to Intellectual Property also. If the Intellectual property is properly managed, the system may contribute for the betterment of human conditions in all societies and environment, which ensures its rewards. With the expansion of the global economy, it is even more essential for both domestic and international business to have a system, which protects their intellectual investment. Competition is fierce, and timing is a critical component for success.

India is becoming a top global innovation hub for high tech products and services. However the fact that our country is under performing relative to innovation potential is saddening to the policy planners and scientists.

India has the added advantage of having a dynamic young population with more than half of the country's population under the age

of 25 years. But the knowledge creation and absorption is still in the infant stage to harness the real potential of the young generation in India. Generation of knowledge is as important as commercialising it so as to reach it to the mass for the social benefit. It can be safely assumed that only a handful of patents will ever materialise as actual products for the consumer. If this is the situation in India, we can imagine the situation worldwide. If the patent holders are willing to contribute the technology and if the corporates or the government are equally willing to develop products, the results will be beyond our imagination.

Recognising the importance of generating, commercialising and absorbing innovations, government has created various R&D support programmes. The Ministry of Science & Technology is gearing up for a national innovation programme to scale up or adaptation of technologies for commercialisation. Moreover, government is developing new approaches that leverage the strength of R&D and awareness creation for innovation management, IPR and start-ups.

The National Innovation Foundation-India which provides institutional support to grassroots innovators and outstanding traditional knowledge holders from the unorganized sector of the society is the front-runner in encouraging innovative activities in the country. National Innovation Foundation (NIF) is an autonomous body of the Department of Science and Technology, Government of India, based on the Honey Bee Network philosophy, which provides institutional support to grassroots innovators and outstanding traditional knowledge holders from the unorganized sector of the society and function with the objectives to help India become an innovative and creative society and a global leader in sustainable technologies by scouting, spawning and sustaining grassroots innovations. The major activities include scouting and documentation of innovations, research for value addition, IP management, business development and providing micro venture innovation fund, dissemination and social development. Also NIF is promoting the innovations through Awards and recognition of the innovators.

Department of Science & Technology under Government of India through its autonomous Technology Information Forecasting and Assessment Council (TIFAC) has instituted Patent Facilitation Centre (PFC) primarily to create awareness on IPR among the scientists, researchers and students in the Universities, Colleges and other Institutions. The main objectives of TIFAC include generation of Technology Forecasting/ Technology Assessment/ Techno Market Survey documents, developing on-line nationally accessible information system, promotion of technologies and evolving suitable mechanism for testing of technology and enabling technology transfer as well as commercialisation.PFC functions with major objectives such as : Introducing patent information as

a vital input in the process of promotion of R&D programmes, Providing patent facilities to scientists and technologists in the country for Indian and Foreign patents on a sustained basis, Keeping a watch on developments in the area of IPR and make important issues known to policy makers, scientists, industry etc., creating awareness and understanding relating to patents and the challenges and opportunities in this area including arranging workshops, seminars, conferences, etc. PFC has also established Patent Information Centres in the States which function as the satellite Centre of PFC and function with almost same objectives.

The State S&T Councils in India are also striving along this direction. The activities of Kerala State Council for Science, Technology and Environment (KSCSTE) includes various schemes and programmes to promote R&D, Innovation and technology development and also IP management. Patent Information Centre – Kerala under KSCSTE is propagating IPR awareness in the Kerala State in Engineering Colleges, Universities, R&D Institutions, Colleges, Schools and even at grass root levels.

The ambit of science communication should not be limited to the singular aim of science popularisation or inculcation of scientific temper. In view of the emerging demand, the canvas of science communication needs to be broadened and strengthened with IPR issues including patents and technology transfer. Not only should an awareness be created on patents but the fruits of application of the technology developed from patents should also reach the common man. Then the science communicators can play a significant role in spreading information on patents and the technologies for social reform and the welfare of humanity.

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