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Article

S&T coverage in English-language Indian dailies

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ABSTRACT: The paper examines the coverage of S&T related items published in selected English-language Indian newspapers in terms of their quantification and thematic representation. S&T is not the priority of the English-language newspapers in India. Even sports get several times more coverage than science. There is a case for amply visible representation of science in the press. Health, Environment, Space S&T, and Astronomy were the four dominant subjects covered. Most of the science covered in the newspapers was performed in the US, the UK and other advanced countries of Europe. Among all the newspapers, The Times of India devoted the maximum space to S&T coverage.

Introduction

Newspapers are one of the oldest and most important channels of mass communication. Despite the onslaught of electronic media, most of the literate people in India still read newspapers and rely on them for information.[1] Mass media representations are probably the most important, continuing influences shaping perceptions about science and technology (S&T).[2] For most people, the reality of science is what they come to know through the mass media, as only a minuscule proportion of the populace in any country is exposed to formal science education.[3] Most people understand science less through direct experience or past education and more through the filter of journalistic language and imagery.[4] The media are their only contact with what is going on in rapidly changing scientific and technical fields, as well as a major source of information about the implications of these changes in their lives.

As S&T has intruded in almost all aspects of our lives today, it is crucial that the populace in the country is aware of developments in this field. S&T information inputs, for example in the area of health may be of great help in arriving at decisions that are vital to individuals' lives. Such decision making, if based on well informed choices may ultimately prove judicious and beneficial to the individuals, and collectively to society as a whole. Moreover, in democratic societies, awareness about the S&T issues is vital as S&T related decisions are taken up by peoples' representatives which have political ramifications at the local, national or international levels, for example nuclear science and technology, organ transplantation, global warming & climate change, and a wide spectrum of bio-ethical issues, etc. It is here that the role of newspapers as a cost effective tool for disseminating information among the people becomes very critical. Democratic dialogue on scientific matters is crucial to modern societies.[5]

Historically, the English language has been the official working and link language of the Government of India. Those well versed in this language have always commanded awe and authority in the country. Even after more than 60 years of independence, English is still valued as a language of the privileged and powerful, so more and more people in the country intend to acquire the skills of the language and socialize in it. Due to the colonial legacy and the cultural values passed on to the next generations, the fact remains that no other language in the country is endowed with as much value, power, and respect as is the English language. Also, in the recent past, the process of globalisation and liberalization has acted as a catalyst in the rise of English language in India. According to National University for Educational Planning and Administration (NUPEA) the nationwide enrolment in the upper primary section of English-medium schools rose by 74% during 2004-06. In actual figures, this is a rise from 5.47 million students in 2003 to 9.51 million in 2006. However, it may be possible that most English medium school registrants are not readers of English-language dailies. Hindi remains the most preferred language for leisure reading (33.4%) as well as the principal medium of instruction[6] (National Youth Readership Survey 2009).

Public interest in science has increased and the scientific community has become more diversified whereby newer and newer areas of S&T like nano-science, gene mapping, telemedicine, etc., have emerged. There has also been a re-emergence of infectious diseases coupled with efforts by the scientific community to find their remedies; therefore, one might expect to find a broader and more regular coverage of S&T related items in the newspapers.

An earlier study conducted by the authors for 1996 English-language dailies estimated less than 1% of the printed space to S&T related items.[7] This study revealed that highest proportion of the space was devoted to nuclear S&T followed by defence, space S&T and astronomy. However, this study did not include health related items. Mazzonetto estimated 3% space to S&T items in Indian mass media.[8] Another study made several recommendations for more science representation in Indian media.[9] Some other studies on S&T coverage in Indian newspapers were also available but their samples were very small and for short durations.[10-12]

Outside India, a number of researchers have studied different facets of S&T coverage in newspapers. Massarani et al.[13-14] has studied science in the press in Latin American countries. Bauer et al.[15] have examined S&T coverage in the British Press from 1946 to 1990. Pellechia[16] looked into the science coverage in three American newspapers pointing out that methodological and contextual accounts are omitted from the science news**.** Some other studies on S&T coverage from other countries are also available in literature (Meadows,[17] Einsiedel,[18] Clayton, Hancock-Beaulieu and Meadows,[19] Metcalfe and Gascoigne,[20] Buchchi and Mazzolini,[21] Hijmans[22] et al, Hyde and King,[23] Clark and Illman[24]).

A cursory look at the English-language national dailies reveals that S&T related stories encompassing a broad range of scientific and technological issues, which touch peoples' lives at various levels, are allocated space in the newspapers. In view of the above, it is imperative to study the S&T coverage in English-language newspapers published in India.

Objectives

The objectives of the study are as follows:

- Quantification of the number of items on S&T issues published by select newspapers;
- Classification of the above items into broad disciplines, and identification of the disciplines that received maximum attention in terms of the number of items and space devoted to them;
- Identification of newspapers that gave maximum emphasis to S&T topics;
- Identification of the work place and the sources of the covered items;
- To analyse the prominence of the reported items; and
- Identification of themes, issues, and concerns as reflected by these items.

Data and methodology

The study was based on the items on S&T appearing in 37 prominent and popular national English dailies published from metropolitan cities and state capitals. The selected newspapers make up a large proportion of the total circulation. The advantage of selecting prominent and popular dailies has also been pointed out by Moyer and colleagues.[25] Authors identified the relevant stories and articles (hereafter called "Items") on empirical research in sciences, applied sciences or development, engineering, technology, medicine or health, published in the selected newspapers irrespective of the performing country. Pellechia,[26] Bader,[27] and Evans[28] et al have used almost similar definition of science and technology or medicine. Each item was assigned appropriate sub-discipline based on the headline or the content. The content of the item was studied, wherever the headline was ambiguous. The data were collected for a period of six months (April 1, 2008 to September 30, 2008) and was fed into FoxPro software for analysis.

Results. Following paragraphs present the results of the study under different heads.

Items and Space allocated. A total of 5385 items were published on different aspects of S&T during April 1, 2008 to September 30, 2008, in 37 newspapers published from different parts of India. These items occupied a space of 986,534 cm^2. The average space occupied by each item was 183.3 cm^2 (the

median value being 140). About 18% items each were up to 50 cm^2 and 51-100 cm^2. Thus, one third of the items occupied up to 100 cm^2. The maximum number of items was in the range of 101-200 cm^2. The remaining 30% items were scattered in the range higher than 200 cm^2. Figure 1 indicates that the number of items gradually reduced with increasing space.

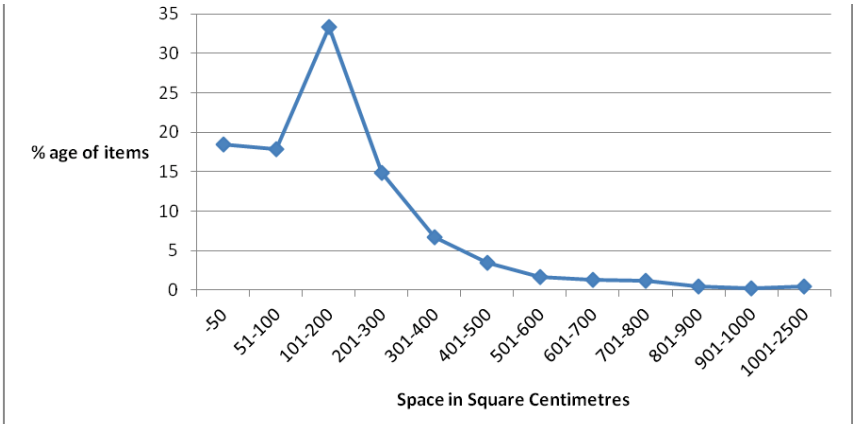

Figure 1. Distribution of items vs. space occupied.

Subjects covered. The maximum space was allocated to items on health (~37%) followed by items related to environment (~15%) and space S&T (~11%). These three categories occupied about 63% of space and 67% of items. The remaining 37% space was allocated to 13 other sub-disciplines excluding the others. Of all the categories listed in Table 1, the least space was occupied by material science, new technology products, agriculture S&T, energy, and science communication. These five categories together occupied about 6% of the total space. Thematic representation of the issues discussed under each sub-discipline is provided in Appendix 1**.**

#	Topic	Number of columns								Total	Space cm^2 (%)
		I	II	III	IV	V	VI	VII	VIII		
1	Health & Life sciences	962	680	347	291	119	136	23	15	2573	360,333 (36.5)
2	Environment	106	114	119	114	84	54	18	27	636	150,699 (15.3)
3	Space S&T	78	80	61	85	47	47	9	10	417	110,728 (11.2)
4	Astronomy	69	53	39	34	19	28	3	3	248	55,557 (5.6)
5	Psychology	65	79	54	43	25	24	4	2	296	46,640 (4.7)
6	Physics	10	13	10	10	13	14	3	4	77	26,397 (2.7)
7	Defence S &T	18	37	15	29	6	7	3	2	117	24,867 (2.5)
8	Robotics	9	11	14	18	6	14	1	2	75	20,012 (2.0)
9	Animal behaviour	21	14	19	21	10	7	2	-	94	17,969 (1.8)
10	ICT	17	16	12	12	11	10	2	2	82	15,676 (1.6)
11	Indian S & T	5	13	2	9	9	6	1	4	49	15,812 (1.6)
12	Science communication	7	11	12	10	5	4	5	2	56	13,047 (1.3)
13	Energy	8	8	7	7	6	6	2	2	46	12,652 (1.3)
14	Agriculture S&T	18	6	5	7	8	6	5	1	56	12,504 (1.3)
15	New technology products	14	11	9	11	10	5	-	1	61	12,329 (1.2)
16	Material science	18	15	8	7	11	-	-	-	59	10,619 (1.1)
17	Others*	120	79	80	67	48	40	5	4	443	89,858 (9.1)
	Total	1545	1240	813	775	437	408	86	81	5385	986,534 (100)

*Others (15): Earth science, Evolutionary science, Biological science, Nuclear S&T, Animal science, Automobile engineering, Palaeontology, Aeronautical engineering, Archaeology, Oceanography, Chemical sciences, Forensic science and technology, Food science and technology, Sexology, and Entomology. Include items occupying less than 1% of space.

Table 1. S&T news coverage: column spread and space allocation in cm^2.

Placement. The data presented in Table 1 indicated that about two-third of the items was allocated a column spread of up to three columns; the remaining one-third was allocated a column spread of more than three columns. The share of items in one column spread was highest. The proportion of items having a column spread of four and five was almost equal. Of the entire coverage spanning over 5,385 items, 129 (2.4%) items appeared on the first page of the newspapers occupying about 4% of the total S&T space across all the newspapers. The majority of these items related to the launch of PSLV**,** global warming and climate change, genetics, cardiology and neurosciences. Not only were these stories positioned on the front page, about 72% of these had a column spread of three or more than three columns to arrest the attention of the readers. Two third of these items were supported by visuals.

Newspapers. The total items appeared in 37 newspapers published from different parts of the country. Of these, the national daily *The Times of India* published from the national capital devoted the maximum space to S&T items (~19%). This was followed by *The Asian Age* and *The Statesman (*Table 2).These three newspapers together accounted for about one-third of the space allocated by all the newspapers and about 39% of the total items. Certain regional newspapers like *Shillong Times* and *Assam Tribune* from North Eastern India, *Daily Excelsior, Kashmir Times*, and *Greater Kashmir* from Jammu and Kashmir, *Nav Hind Times* from Goa and *Hitavada* from Nagpur and *Central Chronicle* from Bhopal accorded little priority to S&T related items.

#	Newspaper	Number of items	Percentage	Space occupied (cm^2)	Percentage
1	Times of India	1,453	27.0	189,554	19.2
2	Asian Age	409	7.6	74,567	7.6
3	Statesman	211	3.9	61,182	6.2
4	DNA	238	4.4	55,203	5.6
5	Mail Today	162	3.0	53,229	5.4
6	Free Press Journal	361	6.7	52,726	5.3
7	Financial Express	251	4.6	50,840	5.2
8	Hindustan Times	246	4.7	50,752	5.1
9	Indian Express	219	4.1	45,144	4.6
10	Hindu	214	4.0	43,351	4.4
11	Pioneer	113	2.1	34,532	3.5
12	Tribune	202	3.8	31,535	3.2
13	Deccan Herald	299	5.6	29,207	3.0
14	Metro Now	129	2.4	28,739	2.9
15	Mumbai Mirror	125	2.3	26,945	2.7
16	Hindu Business Line	128	2.4	24,167	2.4
17	Economic Times	193	3.5	22,528	2.3
18	Mint	50	0.9	20,095	2.0
19	Deccan Chronicle	83	1.5	16,609	1.7
20	Telegraph	47	0.8	16,046	1.6
21	Business Standard	56	1.0	15,576	1.6
22	Political and Business Daily	56	1.0	10,256	1.0
23	Others (15)*	140	2.6	33,751	3.4
	Total	5385	99.9	986,534	99.9

*Assam Tribune, Bangalore Mirror, Financial World, New Indian Express, Central Chronicle, Daily Excelsior, Financial Chronicle, Greater Kashmir, Hitavada, Kashmir Times, Mid Day, National Herald, Nav Hind Times, Sentinel, Shillong Times

Table 2. Space allocation to S&T news items by newspapers.

Sources of items. Of all the reported items, ~ 42% did not mention their sources. The remaining 58% items used indigenous as well as foreign sources. Table 3 presents the distribution of sources for different topics from different countries. Of these, half were indigenous sources and the rest half were foreign. Among the foreign sources, 20 percent were from the UK, 15% from the US and the rest 23% were from other countries. Proportion of foreign cited sources was significantly higher than Indian sources for topics

in the category of environment, space S&T and astronomy. The indigenous news sources were dominated by Press Trust of India (PTI), Indo-Asian News Service (IANS) and Asian News International (ANI), while foreign news sources were dominated by Reuters (UK), Associated Press (AP) and New York Times (NYT) from USA.

		Indian (I)	UK (II)	USA (III)	France (IV)	Others ((V)	Sub total (II to V)	Total
1	Health & Life sciences	841	280	149	93	7	529	1370
2	Environment	134	86	55	53	3	197	331
3	Space S&T	83	43	74	25	8	150	233
4	Astronomy	58	47	22	16	1	86	144
5	Psychology	128	40	28	12	1	81	209
6	Physics	20	12	11	7	1	31	51
7	Defence S &T	44	2	6	3	1	12	56
8	Robotics	19	5	4	12	1	22	41
9	Animal behaviour	30	17	20	7	-	44	74
10	Information & Comm. Tech	33	8	15	6	3	32	65
11	Indian S & T	10	-	-	-	-	-	10
12	Science communication	15	4	4	1	-	9	24
13	Energy	8	7	2	2	1	12	20
14	Agriculture S&T	10	7	8	2	1	18	28
15	New technology products	15	7	5	5	1	18	33
16	Material science	20	3	3	3	1	10	30
17	Others	103	72	69	29	2	275	378
	Total	1571	640	475	276	32	1526	3097

Table 3. Sources of news items.

Workplace of research. About 78% of the items mentioned the workplace of research reported in the newspapers. Research originating from 70 countries found place in the newspapers. However, the most dominating countries were USA (~41%), India (~16%), UK (~15%), and Australia (4%). These four countries accounted for 76 % of those items that had referred to the place of research. Other major performing countries included Germany, Canada, Japan each ~2%, and France, Switzerland, Sweden, and China each 1%.

Visual representations. About 57% of the items were supported by visuals. Of these, the majority (88%) were single photographs. Other forms of visuals included sketches, diagrams and graphs. A small proportion of items had multiple visuals.

Journal citation. Of all the items, 24% incorporated journal citations. Out of these, the maximum items (62%) pertained to health including life sciences, followed by environment (7.7%), psychology (6.7%) and astronomy (4.4%). Other subjects had still fewer journal citations. A large number of different journals had been cited in the items but a few dominant journals included were *Nature, Science, Proceedings of the National Academy of Sciences of USA, New Scientist, PLoS, Lancet, Journal of the American Medical Association, Archives of Internal Medicine and New England Journal of Medicine.*

Concluding discussion

Science hardly gets coverage in a prominent position unless it has socio-political ramifications at national or international level. Only a very small proportion of items get front page positioning and **e**ven celebration of science, like Bhatnagar award distribution ceremony are rarely covered in the science news. In such a scenario decline of interest in science among Indian students should not be surprising where the presence of science is almost conspicuous by its absence from the potential science-societal interface like popular media, the newspapers.

The study revealed that a wide range of topics were covered by the newspapers. However, the four dominant topics related to the coverage of health, environment, space S&T, and astronomy need to be

discussed. Whatever science is covered by the newspapers is overwhelmed by health (including life sciences) related topics as it constituted more than one third of the space and about half of the items. This dominance of health topics was not peculiar to Indian newspapers as similar pattern of coverage is observed in the newspapers published outside India.[29-31] This may be explicable as people understand those issues easily which directly concern their daily lives than more remote subjects, medicine is always better understood than basic physics.[32] Also the area of health entails the concept of "need to know". Thus generally health-related information was of interest and of use to the people. However, there exists a bias in the spread of health news particularly HIV/AIDS among men and women.[33] Next to health related topics environmental issues overwhelmed the coverage. The proliferation of coverage on environment may be due to global political activity raising concern level and interest among the decision makers, policy planners and the populace at large around the world *(during the period of coverage)*. Space S&T is an issue embedded with state of the art big hi-tech science, involving the prestige and power of the performing country, and has political connotations, so it finds the prominence in the coverage. Since time immemorial astronomical phenomena have aroused the curiosity of the mankind. The distance of several light years of the heavenly bodies of the universe from the life of the human beings on earth, an aura of mystery surrounding the astronomical wonder coupled with the modern science striving to unravel the astronomical phenomena creates enormous interest among the populace and the media in the subject, and thus relatively more items were covered on astronomical topics.

Among all the newspapers, the highest priority to science coverage, both in terms of quantum of items as well as space was accorded by *The Times of India*. Most of the regional papers were way behind in their coverage. Mainly, the science topics covered in the newspapers were of scientific research performed in the US, the UK and other advanced countries of Europe, whereas Indian research accounted only for 16% of the items. About half the items mentioned the sources of news. Of these, half were Indian sources, like Press Trust of India, Indo-Asian News Service, and Asian News International, and the remaining foreign sources dominated by the British agency Reuters, followed by American agencies like Associated Press and New York Times, and the French agency AFP. It appeared that Indian English-language press lacked specialized paraphernalia to report science news and instead found it easier to repackage the information based on the items from the foreign news agencies. Journal citations have also been mentioned in one-fourth of items to lend credence and authenticity about the reported research among the readers. However, the area of health had the highest proportion of journal citations among all other subjects. It seemed that in order to weave the story emphasizing authentic flavor, the reporters took special care to mention the journal publishing the research in health-related topics.

To attract the attention of the readers about half the items had a column spread of three or more than three columns. Visual representation too facilitated in attracting the attention of the readers. More than half the items were supported by a single photograph or some form of visual. However, majority of the items occupied space up to 200 cm^2.

Whatever the structure of the coverage in the Indian English-press, it is difficult to avoid saying that science coverage is far from sufficient. It needs to be amply visible to the public to register its presence in the realm of social efforts. There is a case for more science in the newspapers and more science on the front page. The science coverage may not necessarily be a new research finding, it may be anything, like an issue of local or national interest on water quality, or food science, or BT Brinjal, house building, and health care, etc. – the exposure to science behind anything that a common man encounters in quotidian life would indeed help shape peoples' attitude and perception about science besides making them better informed citizens.

Appendix 1

Topics	Sub-topics discussed
Health and life sciences	Research and development on neurosciences, oncology, genetics, cardiovascular diseases, gynecology and obstetrics, diabetes, obesity, HIV/AIDS, orthopedics and rheumatology, dermatology, respiratory diseases, gerontology, sexology, ophthalmology, malaria, tuberculosis, alcoholism, drug abuse, smoking, dentistry, pediatrics, gastroenterology, virology, urology/nephrology and ENT. The highest space was occupied by neurology followed by oncology and genetics.
Environmental sciences	Different aspects of climate change and global warming, air pollution, biodiversity, alternative fuels, carbon emissions and rise in temperature. The share of items in terms of numbers was highest (8.5%) on climate change and global warming.
Space Science and technology	Space S&T in India and China, exploration of mars and moon, launch of PSLV and Chandrayan I by India, and manned space mission by China. Highest number of items was on exploration of mars and moon.
Astronomy	Discovery of new stars, new Plutoid, black holes, galaxy clusters and earth like planet in the universe. Occurrence of celestial event and collision of an asteroid with earth.
Psychology	Behavioral aspects, especially of children, couples, teenage girls, and pregnant women, atheistic beliefs of Indian scientists.
Physics	Large Hadron Collider (LHC)
Defence S&T	Successful test firing of Agni missile series, development and launch of Astra and Nag missiles, successful trial of the Main Battle Tank (Arjuna) and Light Combat Aircraft (LCA). Management aspects of Defence Research and Development Organization (DRDO). Development of tactical laser, and variable velocity gun.
Robotics	Artificial intelligence, development of advanced walking robot, brain controlled robots, emotional robots, fire fighting robots, interactive robots, biological and chemical robots, skin like sensitive robots, robots to invade battle fields and robots for disabled people. Application of robots in disaster management, surgery, bomb diffusion and house hold work.
Animal behavior	Communication among birds and squirrels, loss of bat population and its impact on agriculture, migration pattern of birds, mating among chimps, intelligence and highly evolved sense among animals, and cleverness of fishes.
Information and communication technology	Development of superfast and energy efficient computers, PCs that wake on call, web security, human computer interaction, in-flight surveillance system for terror detection, software for blind to surf internet, development of new virus shield, new bug free software and mapping of black holes in the internet. Development of software for mobile communication, cell phone data tracking, and economics of data transmission.
Indian science and technology	Declining interest of students in studying science and launching of new schemes to attract students towards pure sciences, under representation of women in science, decrease in Indian scientific output as compared to China, plagiarism by Indian scientists, and India's space policy.
Science communication	Popular write-ups on chicken pox virus, thyroid among kids, polycystic ovarian disease, and lack of awareness on child development & basic nutritional facts, lunar eclipse, solar eclipse, experiments performed during solar eclipse, workshop on safely watching the solar eclipse, and act of Venus disappearing behind the sun. Exhibition on space science, science express exhibition, research misconduct among scientists, plagiarism by scientists and green Yagana.
Energy	Renewable / alternative sources of energy like bio-fuels, solar energy, wind energy, and wave energy etc, Development of solar cells using nano particles to improve their efficiency and development of alternative technologies to reduce carbon emissions.
Agriculture science and technology	Genetics research in agriculture science like GM crops such as apple, hybrid variety of maize and paddy, mapping of cocoa gene, plant mutation, and regulation for growing GM crops. growing of vegetables in zero gravity conditions and sky scrapers, development of sensors to detect NO_2 in soil, land reforms, soil contamination by sewage, organic fertilizers, growing of bio-fuel crops, and declining budget allocation for agricultural R&D in developing countries.
New Technology Products	Development of tiny electron microscope, vehicle anti theft system, interactive class rooms, air cooling device, better aircraft wings, 3D camera, eye shaped camera, advanced CCTV camera, cancer patient health care system, device for dissolving dead bodies, infrared night imager, memristors and Gallium Nitride transistor.
Material science	Development of nano materials like magnetic nano fluids, nano material membrane, nano paper, nano nets, nano wires, synthetic nano plastics, and gold nano particles. Biosensors for cancer detection, cell based biosensors, novel superconductivity materials, water proof paper, flat mirror, shock absorbent helmet, solar textile, thinnest leak proof balloon and new invisible material.

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