

ANALYZING BARRIERS IN EXPANDING MULTILINGUAL INDIAN SCIENCE COMMUNICATION

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Scientific experts such as David Eagleman and Neil deGrasse Tyson have become household names due to their ability to translate complex research concepts into everyday language. This transmission of knowledge from science professionals to non-experts is formally known as “science communication,” and it can take place through audio, visual, literary, and other forms of content sharing. While the principle of breaking down complex topics into easily understandable tidbits has existed for many thousands of years, the impact and reach of science communication as we know it today have especially become important in the most recent decades.¹ Within the United States, science communicators are most likely to be individuals with an advanced degree (e.g. Master’s, MD, Ph.D.) in one of the STEM (science, technology, engineering, and math) fields who are affiliated with universities, research centers, and other academic institutions.

As English has been adopted as the primary language of higher education—and the United States is a driving force of Westernized science curriculum—the expansion of science communication within North America and beyond has primarily been conducted in English as well. However, in many South American, Asian, and African countries, English is only one of many widely spoken languages, and STEM professionals often learn English as their second language. English’s use in international communication has fostered the impact of science outreach, but it has also furthered sociocultural disparities locally. This is especially visible in India, where English maintains linguistic domination even though there are over a dozen national languages. Analyzing barriers in expanding multilingual science communication within India allows us to understand how we can outline future recommendations to empower the general public through promoting wider science accessibility.

Since the middle of the twentieth-century, English has been designated as the “international language of science.”² The rationale was that English could promote global dissemination of scientific knowledge—a common tongue that was promoted for the sake of unity and that proved more efficient than translation itself. However, in the following decades, English has often been used in an opposing, detrimental

¹ “Introduction to Science Communication,” Newcastle University Library, accessed February 7, 2022, <https://libguides.ncl.ac.uk/sciencecommunication>.

² Christine Tardy, “The Role of English in Scientific Communication: Lingua Franca or Tyrannosaurus Rex?,” *Journal of English for Academic Purposes* 3, no. 3 (July 2004): 247-269, <https://doi.org/10.1016/j.jeap.2003.10.001>.

manner, with some scholars painting the analogy of English as a Tyrannosaurus rex that powerfully “gobbles up” and dominates other languages with burgeoning academic potential.³

In India, the use of English stemmed from colonization. During the British crown’s rule from 1858 to 1947, native residents were forced to learn English to align themselves with colonial standards of being “civilized.” The British rulers’ view was that “the new policy of English and Western education would eliminate darkness and liberate the Indians from the age-old enslavement of their tyrannical traditions.”⁴ William Bentinck, the former Governor-General of India, set into motion an education resolution that “all the funds appropriated for the purposes of education would be best employed on English education alone,” and the ripple effects of this time period can be seen in the current system as well.⁵

When a nationwide census was conducted in 2001, the government announced that thirty Indian languages each had more than one million speakers. Additionally, there were 122 languages that each claimed at least 10,000 speakers. From this observation stems a well-known saying that the linguistic landscape of India is such that “the language spoken [...] changes every few kilometers, just like the taste of the water.”⁶ With this linguistic richness in mind, Indian scholars recommend that instead of naming any one particular language as the national language, “it makes more sense to invest in the development of other regional languages and thus preserve India’s multiculturalism through multilingualism.”⁷ English has been informally named India’s language for science, but less than twelve percent of the country’s citizens are able to speak and write the language.⁸ There is a fine line between the use of English for easy utility and the use of English to diminish the cultural significance of regional languages. This disparity is what inspired Indian scientist Kollegala Sharma to create an entirely Kannada language podcast, as approximately seventy percent of Kannada speakers cannot understand science content in English.⁹ Thus, English cannot be the only agent of science communication for empowering a large majority of the population at the local level.

There are many challenges in expanding Indian science communication by translating English-based science into vernacular languages. Concerns include time

³ Ibid.

⁴ Syed A. Rahim, “Language as Power Apparatus: Observations on English and Cultural Policy,” *World Englishes* 5, no. 2-3 (July 1986): 231-239, <https://doi.org/10.1111/j.1467-971X.1986.tb00729.x>.

⁵ Ibid.

⁶ Hari Narayan, “India, a Land of Many Tongues,” *The Hindu*, August 7, 2017, <https://www.thehindu.com/thread/arts-culture-society/india-a-land-of-many-tongues/article19445187.ece>.

⁷ Ibid.

⁸ Harini Barath, “Indian Initiatives Aim to Break Science’s Language Barrier,” *Nature News*, June 10, 2019, <https://www.nature.com/articles/d41586-019-01815-1>.

⁹ Janani Hariharan, “The Languages of Science (Las Lenguas De La Ciencia),” *STEM and Culture Chronicle*, December 17, 2020, <https://medium.com/stem-and-culture-chronicle/the-languages-of-science-d5ca7cc832c9>.

constraints, linguistic feasibility, and apprehension surrounding stigma, among others. Indian scientists are often frustrated with the lack of general resources and support from national and local governments, and since the majority of STEM professionals have limited time available outside of research duties, they deprioritize multilingual science communication. If public officials who lack an expert background try to represent the face of the science community (as seen during the current pandemic), information transmission becomes insufficient: “communicating with laypeople is no trivial task and requires motivation, time, and communication skills.”¹⁰ Expecting scientists to go above and beyond without adequate support is incredibly unfair and shifts the burden without actually having any true impact.

Scientists are also apprehensive because of the possibility of making errors while translating resources or science articles into languages other than English. Most English-speaking Indian scientists are also native speakers of at least one regional language, but that does not guarantee that they will be able to convey their scientific expertise in their native language. Discussion of topics such as HIV/AIDS transmission and mental health is already surrounded by stigma, and scientists are often hesitant about whether their presentation skills will convey the same level of empathy and openness that they could easily share when speaking in English. Using a slightly different term in place of another while translating could seem like a small error, but if it takes place in an emotionally sensitive discussion, it could unintentionally misinform and even hurt community members.

Additionally, scientists need to create accommodations for their STEM expertise in their native languages by adopting or fashioning new terminology. For example, modern science terms such as “metabolism” do not have direct translations to regional languages, but Abhishek Chari, a science communicator and native speaker of the South Indian language Tamil, utilized the word’s Greek etymology (*metaballein* meaning “to change”) to present “valarchithai” in Tamil (combining *valar* meaning “to grow” and *chithai* meaning “to disperse”) as an equivalent term. Although the term “valarchithai” itself is not scientific, it becomes scientific through the manner that Chari utilizes it. Chari shared that the “agglutinative (putting multiple words together) nature of the Tamil language came to [his] rescue,” illustrating regional languages’ “fluid and adaptable” nature even if the lexicon can be scientifically archaic.¹¹ While time-consuming, taking the initiative to assimilate English jargon into these languages enables more timely information dissemination. Recently, for instance, COVID-19 informational flyers with a mix of English terms translated into Telugu phrases were distributed by healthcare workers. In the midst of the public health crisis, the

¹⁰ Hans Peter Peters, Sharon Dunwoody, Joachim Allgaier, Yin-Yueh Lo, and Domonique Brossard, “Public Communication of Science 2.0,” *EMBO Reports* 15, no. 7 (June 2014): 749-753, <https://doi.org/10.15252/embr.201438979>.

¹¹ Harini Barath, “Indian Initiatives...”

translation allowed non-English-speaking elderly citizens to understand crucial hygienic practices.

Furthermore, science communicators can struggle to balance direct translation and cultural context. If a scientist's mother tongue is a South Indian language but they grew up in one of the northern Indian states, they may not understand certain cultural references the same way someone who was born and raised in southern India may know. This can lead to a loss of underlying cultural content while communicating with native speakers. For example, there is an important alternative medical system known as Ayurveda that is especially popular among South Indian residents. If a scientist had not been acclimated to a community that practiced Ayurvedic traditions, they may struggle to understand the significance of Ayurvedic home care remedies used by many Indians during the COVID-19 pandemic. Maria Radloff of the National Ayurvedic Medical Association writes that the "true meaning of Ayurveda resides in its native language," and if a scientist is not able to fully grasp the cultural context surrounding Ayurveda's linguistic history, they may have a biased outlook.¹²

While expanding science communication to multilingual communities locally can seem like a daunting task, there are many small-scale action items that are important for motivating broader progress. One example is how science communicators such as Abhishek Chari and Kollegala Sharma are taking advantage of accessible media platforms such as podcasts and Instagram to directly connect with receptive younger demographic groups.¹³ Blogs, podcasts, and interview series are increasing in popularity as it is easier to release multiple translated versions of short episodes or adopt captions in different languages through these avenues. These grassroots methods are more convenient than traditional platforms such as television media which require more production resources and financial investments. Furthermore, passionate youth listeners and viewers also play a unique role in science communication efforts as they are able to (1) pressure policymakers about current scientific needs, (2) connect with role models, and (3) amplify awareness by sharing with family, friends, and peers—all through their everyday, native languages.¹⁴

At the academic level, Indian scientists need to continue advocating for publication journals and conferences to "compile reviews of research [including] speakers of a variety of languages so that important work isn't overlooked."¹⁵ English publication journals set the tone for article citations and international research

¹² Maria Radloff, "Sanskrit: The Language of Ayurveda," *National Ayurvedic Medical Association*, September 19, 2019, <https://www.ayurvedanama.org/articles/2019/9/19/sanskrit-the-language-of-ayurveda>.

¹³ Melissa C. Márquez and Ana Maria Porras, "Science Communication in Multiple Languages Is Critical to Its Effectiveness," *Frontiers in Communication* 5, no. 22 (May 2020), <https://doi.org/10.3389/fcomm.2020.00031>.

¹⁴ "Introduction to Science Communication."

¹⁵ Ben Panko, "English Is the Language of Science. That Isn't Always a Good Thing," *Smithsonian.com*, January 2, 2017, <https://www.smithsonianmag.com/science-nature/english-language-science-can-cause-problems-180961623/>.

collaboration, emphasizing multilingualism at the heart of science dissemination can trickle down to local efforts as well.

Last but not least, Indian graduate-level institutions must concretely embed language courses into their curricula. Within the United States, for instance, medical schools have adopted language courses so that training physicians will be able to communicate with Spanish and Mandarin-speaking patients within predominantly minority communities, yet this has not translated into traditional science graduate pathways. Gaining scientific expertise through a second language should be promoted among Indian students to allow more fluid communication later in their future careers.

Overall, the special sociocultural context within India needs to be taken into account when understanding how to expand inclusive community engagement. The methods of empowering members of the general public are different from region to region, yet there are many underlying issues in common. It is important to note, however, that while promoting multilingual science communication begins at the ground level with individual scientists' efforts, the detailed barriers can only be overcome through the support of academic institutions, community members, and government officials. Multilingual science approaches will not only be able to strengthen Indian citizens' belief in science but also set the tone for global science communication efforts.

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