Ramendra Sundar Trivedi

The joy of science and other things

Santanu Chacraverti

[An earlier version of this article had been uploaded to this site in 2014. Today, I visited it again to notice a number of embarrassing typos. Have corrected them the best I could and hope that all the significant ones have been taken care of. Except the few typos and a solitary footnote, the article remains as it originally was.]

Introduction

This is the sesquicentennial year of Ramendra Sundar Trivedi's birth. This article is my homage to the man.

Ramendra Sundar Trivedi was born on August 20, 1864, in a family of landholding Jijhotia Brahmans settled near Jemo—in the Kandi Municipality of the Murshidabad district of Bengal. He lived his adult life mostly in Kolkata and drew his last breath on 6 June 1919.[1]

Ramendra Sundar was a man of varied engagements. He has been identified as the cardinal spirit behind the Bangiya Sahitya Parishat. His contributions (as teacher and later Principal) towards the development of Ripon (Surendranath) College were phenomenal. His translation of the *Aitareya Brahmana* into Bengali was a work of stupendous scholarship. His studies in the evolution of the *yajna* and his effortless expertise in employing to tools of comparative religion continue to amaze us. His contributions to the development of scientific terminology in Bengali have earned praise in knowledgeable quarters. His contributions to writing on science in Bengali are considered path-breaking. Yet, even this is far from being an exhaustive summary of his activities.

In this essay, we shall attend to certain aspects of Ramendra Sundar's intellectual concerns, and focus mostly on his science writings.[2]

Ramendra approach to science and modernity

Four elements define the nature of Ramendra's intellectual instincts and proclivities.

The first is best captured in the term *philosophy*. Here, the term must be understood in its etymological sense—love of wisdom. The later day Ramendra would perhaps think that ultimate wisdom could only be attained through the Advaita Vedantic path of self-realization.

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[1] For details of Ramendra Sundar Trivedi's life the most authoritative source book is Asuthosh Vajpeyi, *Ramendra Sundar Jiban Katha*, Calcutta, 1330 BS. Other useful biographical accounts are Brajendranath Bandyopadhyaya, *Ramendra Sundar Trivedi*, Kolkata, 1355 BS, Dhirendranarayan Ray, *Ghare Baire Ramendra Sundar*, Calcutta, 1884 (Saka), and Buddhadev Bhattacharyya, *Pathikrit Ramendra Sundar*, Kolkata, 1966. Biographical information is also to be found in articles contained in Naliniranjan Pandit (ed.) *Acharya Ramendra Sundar*, Kolkata, 1365 BS and Srikumar Bandyopadhyaya (ed.) *Acharya Ranendra Sundar Shatabarshiki Smarakgrantha*, Kolkata, 1373 BS.

[2] For a discussion of Ramendra Sundar's science writings, I have drawn extensively on Santanu Chacraverti, "Ramendra Sundar Trivedi: A Pathbreaking Populariser of Science in Bengal", in Sehgal, Sangwan and Mahanti (ed.) *Uncharted Terrains*, New Delhi: Vigyan Prasar, 2000

However, for the young Ramendra, the road to wisdom passed only through knowledge—knowledge without borders and unbroken into compartments.

A keen student of philosophy, Ramendra was influenced by an empiricist positivism[3] that would later lead him to be fascinated by Ernst Mach and Henri Poincaré. What is germane here is the one aspect of positivism (later codified by the Vienna Circle) that seems to have influenced Ramendra from early on, namely, the unity of scientific method. He passionately believed that knowledge was one, and dividing it into compartments was artificial. The true mode of acquiring knowledge was the scientific method, and this applied across disciplines, whether physical, natural, or social in the objects of their enquiry. No wonder, Ramendra applied himself to a wide range of intellectual pursuits.

The second crucial element was his profound and deeply sentimental attachment to tradition, or what he understood to be tradition. In his understanding, the Indian tradition contains two basic elements:

- the Brahmanical tradition that has at its fount the Vedic corpus
- the *loka* or popular tradition that has non-Brahmanical sources

The first, he felt, was crucial for providing the basic philosophical framework of the Indian outlook. The second, he felt, had contributed to the more humdrum level of human existence, language, folklore, religious practices, and rites. However, Ramendra thought that the two components had blended to produce a seamless Indian culture. Further, the overarching principle of Indianness, according to Ramendra, lay in choosing the transcendental over the utilitarian and practical. (His deep attachment to tradition was closely related to his patriotism, which found expression in his lifelong service to Bengali language and culture—embodied most comprehensively in his outstanding contribution to the Bangiya Sahitya Parishat—and in his staunch commitment to writing in Bengali, covering an amazing spectrum of disciplines.)

The third crucial element was the importance he attached to *joy* as a governing principle in the acquisition of knowledge. In his mind, the scientific and artistic pursuits were not only similar, they were cognate. The artist sought beauty for the joy it brought. The scientist sought understanding, which was also accompanied by a sublime joy, very similar to that generated by experience of beauty. Moreover, the scientist, in trying to impose theoretical order on the chaos of phenomena, must indulge in creative construction, an effort closely related to the artistic enterprise. For, in creating a new master theory, the scientist creates a new manner of viewing the world, and, therefore, in effect, a world order. In many ways, this is astonishingly similar to the artistic or poetic enterprise, for that also seeks to create new worlds. No wonder, Ramendra connects the scientific and artistic creation to divine creation

[3] The term 'positivism' is widely touted but not often defined. In my understanding of positivism as a philosophical current, I have been decisively influenced by Leszek Kolakowski's *Positivist Philosophy: From Hume to the Vienna Circle*, London, 1972. Here, Kolakowski identifies four main aspects of the positivist stance, namely, the (1) the rule of phenomenalism, (2) the rule of nominalism, (3) the rule of not attaching cognitive value to normative statements and (4) belief in the basic unity of scientific method. See Kolakowski, op. cit. 11–19.

and links the joy of doing science to *bhumananda*—the joy of realizing the absolute.[4] Thus, Ramendra was fascinated by Western Science not for its practical technological achievements but by what Feynman would later describe as *the sheer pleasure of finding out how the world worked*.[5] Science, for Ramendra, was valuable because it brought the joy of understanding, provided free play to imaginative creativity, and introduced cosmic significance into the most mundane things. Science, thus, was spiritually elevating.[6]

Downplaying the utilitarian and pragmatic aspect of science in favour of its intellectual and spiritual side is organically linked to Ramendra's rejection of something that he identified as a crucial constituent of Western modernity, namely, the *cash nexus*. A social life governed by pecuniary values and the utilitarian calculus was anathema to him. As he grew older, he leaned more and more towards what he felt were the true Vedic-Vedantic values of the joys of renunciation, and of seeking beauty and knowledge for their own sakes rather than the possible material benefits these might enable one to procure.

In a significant sense, Ramendra's position embodies a *reversal* of the trend of social and educational modernization that began with Rammohun and Vidyasagar. For, admiration of Western science was usually associated with two things: first, great admiration for the Baconian virtues of science—worldly power and benefits,[7] and second, rejection of the bulk of Vedic-Brahmanical intellectual legacy, which, particularly in its immediate pre-colonial manifestation, was considered anti-scientific. Ramendra, as we have seen, attached much less importance to the utilitarian and pragmatic aspects of science. He also upheld the Brahmanical tradition in most, if not all, of its aspects. Interestingly, he even upheld the *yajnik* tradition lock, stock, and barrel. For, as he learnedly argued, the *yajna*, in both its Vedic and tantric forms, embodied into a ritual expression of self-abnegation and sacrifice, which had its ethical manifestation in the doctrine of *nishkama karma*. In fact, Ramendra stubbornly refused to accept that the Brahmanical tradition, in its post-Vedic and post-classical forms, indicated any decline in spiritual and ethical content. Rather, as previously mentioned, enmeshed seamlessly with other aspects of Indian culture, this Brahmanical tradition, Ramendra felt, continued to stand for a non-positivistic, non-utilitarian transcendental ethics of self-abnegation and the love of knowledge and beauty for their own

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[4] Ramendra believed that science created models that were essentially imaginative constructs. Good scientific models enabled humans to explain, predict, and thereby negotiate more successfully with nature. Thus, the models were pragmatically useful. However, Ramendra did not believe that the pragmatic achievements of science would necessarily lead to the reduction of violence, rivalry, and suffering in human society. He found no evidence to support any such supposition. The aspect of science that could contribute to consoling a spirit troubled by the ceaseless competition and violence of modern society was science's joy-engendering aspect. By its ability to discern order in the apparently untameable chaos of natural phenomena, science provides its practitioner, connoisseur, and student with a joy that approaches the ecstasy of the mystic. See, *Mayapuri*, Suniti Kumar Chattopadhya and Anilkumar Kanjilal (eds.) Ramendra Rachana Samgraha, Calcutta, 1371 BS., pp. 67–88, particularly pp. 87–88.

[5] Richard P. Feynman, *The Pleasure of Finding Things Out* (London: Penguin Books, 2001), xiv.

[6] In addition to *Mayapuri* (see previous note), Ramendra's views in this regard, in bits and pieces, occur in *Bichitra Jagat*, *Bichitra Prasanga*, and elsewhere among his essays.

[7] See, for example, Chacraverti, S., *The Western Scientific World-View and the Hindu Bengali Bhadralok—some Significant Moments of Response*, in Palit, C., and Bhattacharya, A. (ed.) Science, Technology, Medicine and Environment in India: Historical Perspectives, Bibhasa, Calcutta, 1998, pp. 37–54

sakes.[8] We cannot enter into more detail here and move on to Ramendra's dealings with Western Science.

Ramendra did not ***do*** science in the conventional sense of the expression. A renowned teacher of physics and chemistry, he never engaged in scientific research. At an early point in his career, he had decided that he wanted to read, write, and teach. Hence, he became a reporter and commentator of science. However, his explorations in the philosophy of science stand out. Nothing comparable in breadth and depth seems to have been accomplished in this country at that time, and perhaps, even today. However, we shall eschew this aspect in this presentation, and focus on something for which Ramendra was better known—his popular science writings.

In a way, popular science writing goes to the heart of Ramendra's vocation. He chose this genre to achieve four things:

- to bring to his readers the basic themes in contemporary Western science
- to bring to his readers a taste of what he considered to be the most important aspect of science, the joys of exploration, imagination, and understanding
- to demonstrate that one could use Bengali to meaningfully discuss the most abstruse concepts in science and in doing so empower Bengali and indigenize western scientific notions
- to produce literary beauty while discussing scientific themes, thereby reaffirming beauty as the overarching principle

We shall attend to Ramendra's popular science ventures in some detail.

His popular science writing

His first four articles, *Mahashakti*, *Bibartan*, *Mahataranga*, and *Jada Jagater Vikash*, appeared in Nabajivan between 1884 and 1885[9] and marked his debut on Bengal's literary stage. All of them suffered from teething trouble. Glibly verbose and relying too much on verbal imagery they served to be far less instructive than they could have been. The writer was after all only a young man of twenty years striving for literary effect (on the writer's own admission he had been impressed by the dramatic literary style of Kaliprasanna Ghosh; Bankimchandra's influence may also be discerned).

However, his fifth essay, *Srishti Tattva*, which appeared in Nabajivan in 1886, constituted a departure—not only from his own earlier writings but also from those of his predecessors in science popularization.

The article explored the structure and the possible origins of the solar system. It drew on contemporary astronomical and astrophysical knowledge to provide an easily comprehensible, interesting, and highly informative picture of the solar system. It discussed,

[8] Ramendra's detailed sociological, philosophical, and ethical analyses in this regard may be found mainly in the Yajna Katha, Karma Katha, and the Bichitra Prasanga.

[9] Compiled in the Sajanikanta Das (ed.), Ramendra Rachanabali Vol. VI, Bangiya Sahitya Parishat, Calcutta, 1957, pp. 459–88

among other things, the direction of the axial rotation of the planets, the Titius-Bode Law of planetary distances, Helmholtz's theory of solar heat, the Kant-Laplace Nebular Hypothesis, problems besetting the hypothesis, and Plateau's experiment and other evidences in favour of the hypothesis. This was a highly readable and informative popular representation of contemporary astronomical knowledge.[10]

The essay was not free from shortcomings. There were factual errors that were corrected in subsequent publications. However, in the latter, new stylistic problems crept in. We shall have to give these a pass for the sake of brevity.

With the Sristhi Tattva (1886), Ramendra was squarely launched on his course as a science popularizer. During the next two and a half decades he published a battery of popular science essays in the contemporary samayikpatras (*Sahitya*, *Sadhana*, *Bharati*, *Bangadarshan*, *Aryavarta*, *Punya*, *Pradip* etc.). Most of these essays were compiled in the first and second editions of the Prakriti and Jigmasa respectively (the two famous anthologies of Ramendra's popular science writings).[11] These essays were devoted to what were vital themes in contemporary Western science—electromagnetic waves,[12] non-Euclidean geometry,[13] debates concerning the age of the earth,[14] the theory of the continuity and variation of the germplasm,[15] the wave theory of visible and invisible radiation,[16] atomic theory,[17] the possibility of cosmic catastrophe,[18] gravitation,[19] light spectrum,[20] and the laws of thermodynamics[21] (the essay *Uttaper Apachay*,[22] devoted basically to the second law of thermodynamics, explained the principle of entropy increase in the universe and the intriguing thought experiment known as Maxwell's demon with captivating clarity. Leo Szilard's critique of the Maxwell's demon and the resulting controversy was, of course, still in the future).

Ramendra Sundar often utilized the historical approach in his popular expositions and some of his essays turned out to be popular discussions pertaining to the history of science. Splendid examples of this are the two essays entitled *Prachin Jyotish*,[23] one of which was first published in 1894, the initial publication date of the other being undetermined. These articles provide a lucid and engaging exposition of ancient Indian astronomy—its strengths

[10] The old information was corrected and new information added in the subsequent versions of the essay when it reappeared in the consecutive editions of the Prakriti during the author's life time.

[11] The two anthologies occur in the first volume of the Ramendra Rachanbali published by the Bangiya Sahitya Parishat: Brajendranath Bandyopdahyay and Sajanikanta Das (eds.): Ramendra Rachanabali, Vol. I, Calcutta, 1356 B.S.

[12] Ramendra Rachanabali, op.cit. Vol. I, pp. 14–19

[13] Ibid. pp. 53–56

[14] Ibid. pp. 20–26

[15] Ibid. pp. 72–83

[16] Ibid. pp. 107–14

[17] Ibid. pp. 115–37

[18] Ibid. pp. 138–44

[19] Ibid. pp. 251–61

[20] Ibid. pp. 293–307

[21] Ibid. pp. 343–52

[22] Ibid.

[23] Ibid. pp. 57–71 and pp. 84–83

and shortcomings—explaining clearly to the lay reader the concepts of latitude, longitude, zenith, horizon, celestial equator, ecliptic, the equinoctical points, and the precession of the equinoxes. Another article, the *Panchabhut*, illuminates the concept of the five elements—or five ideal elements or categories as Ramendra would have it— and its logical/empirical status vis-à-vis modern concepts.[24] Another article, the *Prakrita Srishti*[25] first published in *Paush* 1301 B.S. (Dec–Jan 1894–95), briefly and succinctly traced the evolution of contemporary European cosmological theories.

Another category in Ramendra Sundar's science popularisation efforts consists of essays on the scope, method and the spirit of science. In two articles, entitled *Atiprakrita–Pratham Prastab* and *Atiprakrita–Dvitia Prastab*,[26] first published in 1893 and 1904 respectively, he considers the problem of miracles or the so called violations of the law of nature and examines the concept of natural law. These essays, upholding the principle of a sceptical, critical, scientific method are well within the confines of positivism, but bring a lively commonsensical approach to the discussion. His analysis of the concept of natural law bore interesting fruit in his essay *Niyamer Raiatva*[27] (first published in 1899). The scientist, argues Ramendra, subsumes his observations under a summarizing description, and calls the latter a natural law. When facts come to light contradicting the above formulation, the latter is modified or rejected in favour of a new formulation which is able to subsume the new fact and is now in its turn elevated to the status of a natural law. Given this procedure, asks Ramendra Sundar, how could one ever hope to escape the realm of natural law? For if anything and everything that was observed to occur, was subsumed under a formulation, and the latter was proclaimed a 'law of nature', then, obviously, there could be no violation of the 'law of nature'. If science was concerned with describing what actually occurred, however strange such occurrence might be, and if the scientist was prepared to make suitable changes in the statement of natural law once a novel observation was confirmed, this perfectly explained the highly chequered career of natural law. And given the fact that it is the human mind which conceives a description of things and called it "law", need we be surprised at the existence of "law"? Need this fact throw us into raptures? And need this state of lawfulness prod us into imagining the existence of a cosmic lawmaker? [26]

All this is quite in the spirit of Hume, and more important, provided a hint of Ramendra Sundar's contention that scientific laws were no more than human constructs that helped humans negotiate successfully with their experience (an approach Ramendra appears to have imbibed from his reading of Karl Pearson and Ernst Mach). However, a discussion of these issues would take us too far afield into Ramendra's philosophy of science, a task for another day. It only needs to be mentioned that Ramendra Sundar touched upon the philosophy and

[24] Ibid. pp. 327–42
[25] Ibid. pp. 33–43
[26] Ibid. pp. 199–207 and pp. 208–218
[27] Ibid. pp. 359–69 ["Niyamer Rajatva" is a literal translation of 'The Reign of Law'. It and can be seen also as a quick critique of the eponymous book by George Douglas Campbell, the Eighth Duke of Argyll and first published in 1867.]

epistemology of science in many of his popular essays, most of which were compiled in the two editions of the *Jigmasa* that appeared during his lifetime.[28]

Now we must refer to *Jagat Katha*—the most elaborate of Ramendra's popular science expositions. Initial portions of the work had been published serially in the Sahitya during 1910–11. The rest had been completed and the printing commenced when Ramendra Sundar died (1919). The entire work was published posthumously in 1926 under the supervision of Jagadananda Ray, another of Bengal's famous science popularizers.

In the Ramendra Rachanabali published by the Bangiya Sahitya Parishat, the work runs into 290 pages.[29] Most of the chapter headings, *The Material World*,[30] The *Three States of* Matter,[31] *Size and Shape*,[32] *The Problem of Measurement*,[33] *Solids*,[34] *Liquids*,[35] *Gases*,[36] *Pressure in Liquids*,[37] *Elasticity*,[38] *Gravitation*,[39] *Electricity*,[40] etc. suggest a conventional physical science textbook, although chapter titles like *What is Matter*,[41] *Natural Law*,[42] and *Observation and Experiment*,[43] suggest a somewhat different flavour. In fact, if the chapters appear textbookish, they are only apparently so.

For, the work deals with the usual themes in a highly unusual manner. It is evidently addressed to the intelligent layman, who, while he may lack the necessary scientific equipment, is nevertheless prepared to think for himself. Thus, the chapter *Jada Kahake Bale* (What is Matter?) is not concerned at all with providing a ready reply to the question but indicating the conceptual difficulties involved in outlining an adequate definition of matter.

The point of this becomes immediately evident when we see what comes a little later, when the author delineates the concept of mass. He wholly eschews the standard nineteenth century definition of mass as quantity of matter and advances a more tangible operational definition of mass as the measure of inertia or a body's reluctance to accelerate[44] (in keeping with Ernst Mach's astute phenomenalist critique of Newtonian concepts). If this definition is less close to common intuition, it is also incomparably less vague than the one in terms of

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[28] Ramendra's most comprehensive discussion on the philosophy of science, which was amazingly up to date and mentioned issues like Lorentz transformations and Fitzgerald contraction, is the Bichitra Jagat. It is to this work that Girijapati Bhattacharya refers (see text below). The Bichitra Jagat occurs in Bandyopadhyaya and Das (ed.) Ramendra Rachanabali Vol-III, Calcutta, 1356 BS pp. 205–482

[29] Bandyopadhyaya and Das (eds.), Ramendra Rachanabali, Vol. IV, Calcutta, 1357 BS, pp. 209–499

[30] Jada Jagat

[31] Jader Tin Abastha

[32] Ayatan o Akriti

[33] Parimap Samasya

[34] Kathin Padartha

[35] Taral Padartha

[36] Anil

[37] Taral Padarther Chaap

[38] Sthhitithhapakata

[39] Madhyakarshan

[40] Tadit

[41] Jada Kahake bale

[42] Prakritik Niyam

[43] Abekkhan o Parikkhan

[44] Ramendra Rachanabali, Vol. IV, op.cit. pp. 255–58

the quantity of matter[45] —matter being a category notoriously difficult to define. As Ramendra hints in his discussion on Elasticity, rigorously defined scientific terms may often depart from the usual intuitive meanings associated with the same terms.[46]

Having defined mass in terms of inertia, Ramendra goes on to indicate the clear conceptual difference between inertial and gravitational mass.[47] The former he calls *bastu* and the latter *bhar*.[48] Having stressed on the distinction between them, he points out that logically there was no reason to expect their quantitative equivalence. Then he tells us that while reason does not imply the equivalence of these conceptually distinct categories, experiment does, and it was one of the great achievements of Newton, that he experimentally demonstrated their numerical equivalence.[49] (It is in fact one of the prime concerns of the *Jagat Katha* and indeed of the many popular science expositions by Ramendra, to clearly convey to the readers the distinction between what was empirically known—through observation and experiment—and what was conceptually developed or logically inferred. As a positivist and empiricist it was Ramendra's conviction that new discoveries in science could only follow from a procedure of observation-cum-experiment).[50] Ramendra goes to considerable lengths—both in his *Jagat Katha* and in the last essay[51] of the second edition of his Jigmasa—to show that this numerical equivalence of inertial and gravitational mass was a surprising fact of nature.

All this is pleasantly surprising, demonstrating Ramendra's feel for the fundamental and his ability to convey the latter in precise and lucid terms. His discussion of the equivalence of inertial and gravitational mass was published in 1910–11, when he had no way of knowing that it was the strangeness of this equivalence that had, sometime in 1907,[52] set Einstein on the path of his General Theory that would explain the equivalence in terms of the equivalence of accelerating and gravitational systems. At the time Ramendra was writing, few in Europe, let alone India, had any inkling of these momentous developments. Ramendra was merely being guided by the critical tradition in European physics and his instinctive grasp of the essential, which he felt important to convey to his readers.

The physical intuition and grasp of fundamentals is further evident in his treatment of Gravitation.[53] He took great pains in trying to dispel the notion that Newton or anyone else had explained the phenomenon of gravity which commonly manifested itself in the falling of things. Newton's great achievement, according to Ramendra, was his being able to link the terrestrial falling of bodies with the celestial motion of planets and satellites under the

[45] For Ramendra's stress on the need to eschew the definition of mass in terms of the quantity of matter in favour of a definition in terms of its inertia see his article *Baigyanik Paribhasha* in Sahitya Parishat Patrika, Magh 1301 B S pp. 149–51
[46] Ramendra Rachanabali, Vol. IV, op.cit. p. 223
[47] Ibid. pp. 256–58
[48] Ibid.
[49] Ibid. p. 262
[50] Ibid. pp. 230–36
[51] Ramendra Rachanabali, Vol. 1, op.cit. pp. 455–79
[52] Albert Einstein, *Ideas and Opinions*, New Delhi Reprint 1984, pp. 287-88; and Banesh Hoffmann, *Einstein*, London Reprint 1986, pp. 107–08
[53] Ramendra Rachanabali, Vol. IV, op.cit. pp. 263–73

universal principle of the tendency of bodies to accelerate towards each other, and of working out a formula for computing this acceleration in terms of the mass-values of bodies and the distance between them. But as to why bodies tended to accelerate towards each other, Newton could offer no satisfactory explanation. Postulating the action of a gravitational force or attraction was neither here nor there. For, said Ramendra, to say that bodies attract each other was no more illuminating then saying that they love each other or have passion for each other.[54] For this attraction or force was not an empirical fact; what certainly was an empirical fact was acceleration and the consequent pathways of objects in a gravitational situation.

All this was in the tradition of Berkeley and Mach,[55] but surprising nevertheless. Once again, Ramendra Sundar had no way of knowing that a theory was being developed that would account for the pathways of objects in a gravitational situation without taking recourse to the concept of attractive force.[56] Ramendra was only writing for popular consumption, clarifying for his readers what was exactly and empirically known and what was not and trying to purge their minds of what he considered unfounded and metaphysical notions.

In spite of the growing ill-health of his later years, Ramendra tried to keep abreast of the later developments in science and keep his readers posted. He did not always succeed. (For example, he does not appear to have been able to keep track of new developments in atomic theory—viz. the Rutherford-Bohr model, 1911–13). Nevertheless, we have the mathematician turned scientific-entrepreneur Girijapati Bhattacharya expressing surprise that Ramendra was able to keep tract of the notions of *Fitzgerald contraction*, *mass-velocity relation* etc. at a time when books on relativistic physics were not available in India.[57]

What had Ramendra Sundar achieved?

To put it in a single sentence—he, more than anyone else, had successfully created for the Bengali language a linguistic space that could accommodate scientific, philosophical, and epistemological themes without introducing any unnecessary artificiality or stiffness in the language.

This literary-linguistic revolution was related to his lifelong concern for Bengali language and literature and his studies in Bengali linguistics. Operating within the Vedic-Vedantic-Sanskritic approach, he attached great significance to Sanskrit, drew on it for generating scientific terms in Bengali, and, as Ramatosh Sarkar had aptly noted,[58] employed even rather less known Sanskrit words to succinctly convey images and meanings. But a nationalist venture seeking autonomy of intellectual expression could not afford to base its indigenity entirely on the Sanskritic legacy. Popularization could only succeed through a

[54] Ibid. For this argument, see Ramendra Rachanabali Vol. I, op. cit., p. 260. Pearson's influence is evident here. See Karl Pearson, *The Grammar of Science*, London, 1892, p. 145

[55] For Berkeley's and Mach's critique of Newtonian concepts see "A Note on Berkley as a precursor of Mach and Einstein", in Karl R. Popper, *Conjectures and Refutations*, London & New York, 1989, pp. 166–74

[56] Banesh Hoffmann, *Einstein*, London Reprint 1986, p. 120

[57] Srikumar Bandyopadhyay (ed.) *Acharya Ramendra Sundar Shatabarshiki Saarakqrantha*, Calcutta, 1373 B. S., pp.105–06

[58] Ramatosh Sarkar, *Ramendra Sundar Trivedi*, National Book Trust, Delhi, 1993, p. 19

comprehensible medium and Ramendra was prepared to respect the demands of the vernacular with its massive fund of non-Sanskritic words. As he asserted in one of his essays on Bengali linguistic questions, Bengali, though related to Sanskrit, was an autonomous language with distinct claims of its own.[59] It possessed large fund of non-Sanskritic words and both usage and necessity required that such words be both investigated and employed.[60] He himself did so with freedom, employing at random words and expressions drawn from popular usage. As a result, his prose, imbued though it was with a Sanskritic flavour, never lacked the vitality and flexibility of popular idiom.

Joy and the sharing thereof

Ramendra never swerved from what he considered to be his main task, to bring the pleasure and delight of science to all intelligent and moderately educated Bengali laymen. As he wrote in his inimitable style and untranslatable prose:

> *Madak drabyer ekta sadharan lakhya ei je, aparke na bilaile anander purnata hoi na. Bigyanamodio aparke anander bhag dite chan; na dite parile tahader ananda purna hoi na. Aparke mataite prabritto hoile takhan ar adhikari-anadhikari bichar chale na. Bhairabichakre sakal barnai dvijottam hoia jai, takhan jatibicharer abashar ghate na.*[61]
>
> [A characteristic of narcotic-use is that the addict's pleasure is not complete unless he is able to share it. The science-addict also wants to share his joy with others. Without this sharing, the joy remains incomplete. As the ecstasy is shared, the divisions of 'deserving' and 'undeserving' disappear. In the orgiastic circle of tantric worship, everyone is deemed elevated to the highest ritual level; here, caste divisions become irrelevant.]

Within his classrooms he could introduce students to the delights of actual experimentation.[62] For the wider audience outside his classroom, he chose the medium of popular prose. However, the object of his prose was not merely the "teaching" of science fundamentals. *The object was to bring to the reader the delights of asking, analysing, arguing, and finally understanding*.

The devotee of intellectual delight wrote delicious prose. It is as if the writer had taken the oath of not allowing the reader to be bored for a second. But, not being boring is only half the story. The other half is that Ramendra's writings are superb literature that continues to influence long after they have been enjoyed.[63] This was clearly not only the result of ability but conscious intent. For, the production of literary beauty and excellence was for Ramendra

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[59] Bandyopadhyaya and Das (ed.) Ramendra Rachanabali, Vol. Ill, Calcutta, 1357 B. S., p. 129

[60] Bandyopadhyaya & Das (ed.) Ramendra Rachanabali, Vol. Ill, Calcutta, 1357 B. S., pp. 101–35

[61] Ramendra Rachanabali, Vol. VI, op.cit., p. 433

[62] For Ramendra's use of experiments in classroom-teaching see Prabodhchandra Chattopadhyaya's article in Naliniranjan Pandit (ed.) *Acharya Ramendra Sundar* , Calcutta, 1365 B.S. p. 136

[63] There were certain aspects of Ramendra's writing that might be viewed to have occasionally reduced their value as popular science essays. The chatty, rambling, and occasionally repetitive style, often studded with digressions, has been identified by some commentators as partly detrimental to precise and clear presentation. I have discussed these issues elsewhere, for example, in *Ramendra Sundar Trivedi: A Pathbreaking Populariser of Science in Bengal*, op. cit.

akin to the task than the pursuit of understanding, for both had their origins in the quest for sublime delight.

A few last words

With age, Ramendra' attachments towards tradition and his deep distaste for the materialistic and pecuniary aspects of modern western culture continued to increase, leading Ramendra to defend aspects of Indian culture that reformers in general found indefensible. [64] For example, the complete ritualization of ordinary life that characterized contemporary Hindu culture seemed to conflict with modernistic sense and sensibilities, which saw such customs as irrational, inhuman, and dehumanizing. [65] It is interesting that Ramendra developed a framework that would provide even these aspects of Brahmanical-Hindu life with rationale and justification. Satyendranath Bose, an ardent admirer of Ramendra's intellectual abilities and contributions to Bengali language and culture, found this over-fascination with tradition disturbing to the point of being detrimental to the interests of a developing nation.[66] However, we have avoided attention to these aspects of Ramendra's thought as these would have taken us beyond our main concerns in this essay.

The values that Ramendra stood for have not conquered. The society that we live in is vastly different from the one that Ramendra hoped for. However, his disgust with materialistic and pecuniary aspects of modern life continues to appear relevant and his brilliance and profound learning commands our appreciation. We hope that the sesquicentennial year of his birth would see some serious research into the man, his multifarious achievements, and his times.

[64] Ramendra's positing of the Hindu-Brahmanical world view as essentially representative of transcendental ideals was very much in line with Orientalist/Indological assumptions. His constant tendency to idealize and idolize traditional India often contrasts oddly with his numerous keen sociological analyses. However, Ramendra was not only uncomfortable about criticizing his own society, he was pained by such criticism.

[65] Hence, Vivekananda, often quick to defend Indian society against western and westernized critics, promptly declared "our religion is in the kitchen" and "our God is in the cooking pot".

[66] See "Acharya Ramendra Sundar", *Satyendranath Basu Rachana Samkalan*, Bangiya Bigyan Parishad, Kolkata, 1399 BS, pp. 176–89