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Abstract

What was the influence of arithmetical traditions coming from India on the mathematics practiced in the mediteranean area? Answers to this question, often addressed to historians of science, still very much need to be investigated. Our ignorance of how the mathematical traditions of the Indian subcontinent have traveled may be due to a lack of available sources to write this history. This article will explore another reason for our ignorance: the story of exchanges has been invested with a number of political issues. In particular, this text will examine how Indologists and historians of science have qualified, during the XIXth century and the beginning of the XXth century, the arithmetical tradition in India. We will discribe how discourses have been understood and reconstructed in a way that still keeps them alive in today’s India.

Les traditions arithmétiques venant d'Inde ont-elles eues une influence sur les mathématiques pratiquées dans le bassin mediteranéen ? Les réponses à cette question classique d’histoire des sciences sont pour l’essentiel encore inconnus. Notre ignorance de la façon dont les traditions mathématiques du sous-continent indien ont voyagé peut être dû aux peu de sources disponibles pour écrire cette histoire. Mais elle vient également du fait que cette histoire a été investie par des questions politiques. Cet article abordera cette dimension en se concentrant particulièrement sur la manière dont indianistes et historiens des sciences ont qualifié, au cours du XIXème et du début du XXème, siècle la tradition arithmétique indienne. Nous observerons comment de tels discours ont été compris et reconstruits d'une manière qui les maintient toujours vivants dans l'Inde d'aujourd'hui.

Introduction[1]

How much has India contributed to the “European”, or “Greek-European” mathematics that children learn today in schools?

We know some answers to this question. The decimal place value system and its zero whose name would derive from the Sanskrit *sûnya*, or the sine, whose name derives from the Sanskrit *jyâ*, are some examples of “transmissions from India” that you may have already encountered. But they require more throughough and precise investigations.

The question of the transmission of scientifical knowledge from Asia to Europe has been raised almost three hundred years ago. It has given birth to voluminous amounts of literature. But very little hard facts have remained acceptable to historians of science today.

Why?

The question “what belongs to Asia” itself raises its own set of problems: When traveling didn’t these objects or practice change? And before that, how Asian were they in the first place, e.g. did they come from Mesopotamia, Greece? and how Asian are they after traveling? Can we really disentangle part of our practices, labeling it from its supposed birth place?

Concerning the mathematics practiced in the Indian subcontinent, very little sources attest a transmission. The most natural route of scientific exchanges would have been trough modern day Iran and Irak to the Mediteranean basin. However, no surviving translation of a mathematical text from Sanskrit to Arabic has been handed to us. If a close comparison of Arabic arithmetical texts and mathematical astronomical text may yield some new perspectives, such a work has not yet been thoroughly undertaken. Nonetheless, Latin and then vernacular Italian, Spanish or French texts have structures that strikingly resemble that of the Sanskrit *pati* (or board) mathematics, which raises then the question of exchanges. However, transmission of mathematical knowledge may not have taken place at the level of scholarly mathematics Latin and Sanskrit testify of. Maybe merchants, folk astrologers and doctors are those who imparted mathematical knowledge from India in new countries.

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[1] I would like to thank Lola Balager for giving me the opportunity to present this paper in Barcelona. I would additionally like to thank her and Maya Anderson for the discussion we had afterwards that have induced me to change some parts of this paper, I hope for the better.

The aim of this article will be to describe another reason why so little 'hard facts' on mathematical exchanges are known today: that of the different political issues that serve as a background in which the history of scientific exchanges is written.

To do this, some general facts on India and its scholarly history will be provided. Then some of the arguments on the origins of numbers that were exchanged across Europe, until the end of the nineteenth century will be described. How these disputes sparked answers from Indian scholars, giving birth to an Indian tradition in History of Mathematics deeply connected to the birth and growth of Indian nationalism will constitute a second moment of this text. This article will end by briefly evoking the case of new non academic claims on traditional Hindu science, taking for example the book *Vedic Mathematics*, to show that these disputes are still alive today. My aim here will be to underline that to ascribe a geographical or national label to scientific practices has political undertones and consequences that as philosophers and historians of science we should not ignore.

I Brief facts about India: On Vedic culture, mathematics and Sanskrit

The Vedas, a set of religious poems, are the oldest texts that have been handed to us in the Indian sub-continent. They were written in an archaic form of an Indo-European language, Sanskrit, and are said to have been transmitted to seers (*Rsis*) who had performed a number of mystical penances. The four poems of the Vedas testify of a society divided in different casts, the highest being that of priest, Brahmans. These texts are oral texts, and it is therefore difficult to ascribe to them a date of creation, even more since their antiquity is an issue (the older they are the older Indian culture would be). But we can assume that they have had a fixed form from the middle of the third millennium (2500) BC. onwards. As years went by, these texts gave birth to different commentaries: grammatical, ritual, philosophical auxiliaries (*vedângas*) whose aim was to explicit different aspect of the Vedas necessary to preserve them and execute correctly the rituals that should go with their recitation. Sanskrit acquired a classical form at this time (more or less 1200 BC.) with the formalisation of its grammar (Pânîni's *Âstâdhyayî*). The first astronomical texts (the *vedânga jyotisa* 1200 BC.) and the first mathematical texts (the *sulbasûtra*s from 600 BC onwards) were composed in this context. The subject of these mathematical texts is the geometry of altars. Procedures describe how to delimit, with cords and sticks, an area of a given shape and given area, how to transform areas of same value in different shapes, solve problems involving the construction of brick altars, such as the *syenaciti*, an altar representing an eagle with spread wings, composed of a fixed number of bricks of given size and shape. These are the mathematical texts known for what is usually called the "Vedic period" of Indian history.

By 500 BC. epigraphic evidence of writing appears in India as well as critical new religious movements: Buddhism, Jainism but also Hinduism. Sanskrit will become in the process a "cosmopolitan" language[2]. Sanskrit texts will thus circulate on a vast geographical area until the end of the XVIIth century roughly. Eventhought preeminently Hindu and Brahmanical, other casts and other religions will use Sanskrit to write scholarly texts. Traditions of scholarly mathematics will flourish in the midst of this Sanskrit cosmopolis. A gap exists in the transmission of texts between the *sulbasûtras* and the manuals of astronomy that were handed to us in the Vth century. The European scholars that this article will encounter, will often quote the *Âryabhatîya* (499 AD). An important text for Hindu scholarly astronomy, its mathematical part provides a definition of the decimal place value and gives numerous procedures of arithmetic, algebra, geometry and trigonometry. The Vth century will be but the beginning of an extremely rich tradition of mathematical texts in Sanskrit, which will not die off until the end of the XIXth century.

There would be much more to add. I've just briefly provided the facts that will be needed subsequently.

II XIX century debates

When in the XVIIth and XVIIIth century, Europe discovered the scholarly traditions of Asia and the Middle East, many saw them as testimonies of lost ancient biblical cultures, and hoped to find, by exploring them, the secret origins of European culture[3]. As colonial expansion spread during the XIXth century, this curiosity for "oriental" cultures will have to leave the stage to a well known despising attitude thoroughly described by E. Said, among others[4].

If a new trend of historiography of science has slowly tried to gather, in the last fifteen years, data on how Europeans have considered the scientific traditions of Asia, still very much needs

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[2] Pollock, S.1998 The cosmopolitan vernacular. *The Journal of Asian studies* 57: 6-37.

[3] Murr, Sylvia1983 Les conditions d'émergence du discours sur l'Inde au siècle des lumières. *Purusartha* 7: 233-284.

[4] Said, Edward W.1979 *Orientalism*. New York: Vintage Books. 1994 *Culture and imperialism*. New York: Vintage Books.

to be mapped out. In the following I will focus on a small aspect of this story, and consider that it is typical of the historiography of mathematics in India in the XIXth century.

D. Raina[5] and F. Charette[6] have shown that, discovering the scholarly Indian tradition, Europeans scholars, weather positive or negative about it, will insist on its "practical nature", an euphemism to state that it was essentially computational in contrast to the "abstact nature" characterized by Eucilidan Geometry. Thus, Léon Rodet wrote in 1878[7]:

> "Mais tandis que les Grecs étaient en géométrie d'une force qui nous étonne tous les jours, et en calcul les ignares que l'on sait (…) les Indiens, au contraire, ont été• peu habiles géomètres, même après les leçons qu'ils ont pu recevoir des Grecs, tandis qu'ils ont eu pour le calcul une disposition naturelle toute particulière, ainsi qu'il ressort des exemples bien connus de calculs compliqués effectués par eux •à des époques qui remontent jusqu'• à une antiquité légendaire »

Note that Rodet evokes Indians and not Hindus. He also gives voice to the idea of a legendary past tradition of arithmetical skills in India while considering that the little geometry known in India would have come from Grece[8].

The question of the Indian origin of the « Arabic numerals », from their script to the use of a positional decimal notation had already been raised during the XVIIth and XVIIIth century, and most scholars considered them to be of Indian origin. But by the middle of the XIXth century, this assertion was challenged. Looking at the articles succeeding each other from the late 1830's to 1907, date of a key polemical article by George Rusby Kaye, it is noteworthy to see a concert of conflicting opinions voiced by authors who do not always seem to know that their publications contradict each other. Whether in Paris, London, Rome or Calcutta people speculate on the Arabic, Greco-roman or Indian origins of the numeral system that we use today. The debate on the question of the origin of numbers was but one in the midst of others, such as the question of the origins of algebra, of Diophantine indeterminate algebra, of the origins of the signs of the zodiac or that of the lunar mansions. Obviously several social groups and separate networks where at play here. The way they interacted, the values they

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[5] Raina, Dhruv 2000 Jean-Baptiste Biot on the History of Indian Astronomy (1830-1860): The Nation in the Post-Enlightenment Historiography of Science. *IJHS* 35: 319-346.

[6] Charette, François1995 *Orientalisme et histoire des sciences, L'historiographie européenne des sciences islamiques et hindoues*. Mémoire de Masters. Université de Montréal.

[7] Rodet, Léon 1878 L'algèbre d'Al-Khârizmi et les méthodes indienne et grecque, Impr. Nationale : 12-13.

[8] Rodet also thought that the algebra practiced in Indian texts came from Grece, but this is again another story.

defended, all this still very much needs to be studied. How the arithmetical debate was articulated to these other questions, still also needs to be understood.
Most of the arguments circulating at the time have aged badly, not only because their knowledge is outdated but also because a series of fakes entered in the discussion.

II. 1 The Libri and Chasles debate

The most famous of these virulent arguments on the origin of numbers opposed in the late 1830's Libri and Chasles at the academy of science in France. This debate was provoked by an apocryphical manuscript of a « Geometry » attributed to Boece, that led Chasles to defend a Pythagorean origin for the « Indian » or « Arabic » numerals[9]. Libri disagreed with him: he knew many orientalists and the Sanskrit mathematical texts that had been translated in the first years of the XIXth century in English by Colebrooke, Stratchey and Taylor. To add a political flavor to this controversy, Libri was an Italian nationalist, a vocal republican in the France of the *restauration*. Chasles, on the other hand, was especially interested in Libri's seat at the academy of science in Paris[10]. Libri suspected the fraud. The debate ended in the midst of a great confusion: on the one hand the fact that Chasles had been sold many false ancient texts was made public, on the other Libri was accused of the theft of over 30 000 manuscripts in French public libraries. We see here, how this controversy on numbers is closely linked to institutional wars, stories of thieves and frauds, making it difficult to sieve what were the intellectual issues at stake. It also sheds a light on the network of scholars that fuelled the discussion on this subject. For instance, the debate inspired Joseph Toussaint Reinaud, a professor of Arabic at the Langues Orientales and member of the *Académie des Inscriptions et Belles Lettres*, who was a friend of Libri to include in the information he could compile from Arabic sources on India, all that he could find relating to numbers. He thus published in the mid 1840's information on Al-Bîrūnī, a Persian astronomer of the XI th century, whose testimonies on the numeration system used in India at the time were often discussed subsequently to defend the Indian origin of the decimal place value notation. Al-Bīrūnī's text

[9] C. Chasles, 'Sur le passage du premier livre de la géométrie de Boèce relatif à un nouveau système de numération', Bruxelles, 1836.
[10] Charette, op. cit. (7), .J. Pfeiffer, France, in *Writing the History of Mathematics, Its Historical Development*, J. W. Dauben and C. J. Scriba (eds.), Basel, Boston, Berlin, 2002, 20-22. K. Chemla, "Chasles", in *Dauben and Scriba (eds.) op. cit.*, 396-398.

is until today a landmark testimony on the history of mathematics and astronomy in India during the XIth century[11].

In a different way, a debate will oppose James Prinsep, once head of the Asiatic Society of Bengal and the indologist Edward Thomas (1813-1866) on the interpretation of numerical data on early copper plate inscriptions. James Prinsep published an article on this subject in 1834 to which Edward Thomas replied in 1848 and 1856. In 1858, after James Prinsep's death, Edward Thomas will compile a number of his articles, and include in his re-edition of James Prinsep's article on « Sanskrit Numerals » an extensive reply that goes beyond the ones he already published, in which incidentally he also provides quotations of Libri's work[12].

I have written elsewhere on the different threads of the debate, and its slow evolution from a naive search for very old inscriptions using the numeral scripts we know with a decimal place value notation and a zero, to intricate analysis of Brāhmī and Karo••i inscriptions, Gujara copper plates and the way they represent digits[13]. Let us note here that much of the confusion came from the fact that scholarly Sanskrit texts on mathematics devised techniques to note numbers that were not found in administrative inscriptions that epigraphy detailed, although all used a decimal positional notation.

II. 2 G. R. Kaye's booming opinions

In July 1907 G. R. Kaye, from the « Bureau of Education », Simla (North India) published an article in the Journal of the Asiatic Society of Bengal entitled *Notes on Indian Mathematics.- Arithmetical Notation*[14]. He will continuously publish on the subject of "Indian Mathematics" and "Hindu Astronomy" until 1927[15]. At the end of the 20's his opinions will prompt a

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[11] Charette, op. cit. (7).

[12] Prinsep, J."On the ancient sanskrit numerals." *Journal of the Asiatic Society of Bengal.* 1834

Prinsep, J., E. Thomas, et al. *Essays on Indian antiquities, historic, numismatic, and palaeographic, of the late James Prinsep, to which are added his useful tables, illustrative of Indian history, chronology, modern coinages, weights, measures, etc.* London, 1858.

[13] Keller, Agathe (à paraître) « Comment on a écrit les nombres dans le sous- continent indien, histoires et enjeux ». In: *Publications de l'Académie des Belles lettres et de la société asiatique* (ed.), *Actes du colloque d'hommage à Jean Filliozat.*

[14] Kaye 1907, op. cit.

[15] G. R. Kaye, "Notes on Indian Mathematics. no. 2. Âryabha•a." *Journal of the Asiatic Society of Bengal* **IV**(8): 111-141: 1908.

G. R. Kaye, "The Use of the Abacus in Ancient India." *Journal of the Asiatic Society of Bengal, New Series.* **IV**(6): 293-297. 1908.

vehement reaction from Saradakanta Ganguly and after that by Bibhutisan Datta and Avadesh Narayan Singh. G. R. Kaye from that time on will be, among others, a delightful reservoir of anti-Indian absurd quotations.

G. R. Kaye's aim was to show that the numerals and the decimal place value position did not come from India. His main argument rests on a misinterpretation of Āryabha•a's alphabetical notation. The *Âryabhatîya* contains two rules to note numbers, one "alphabetical" stated in its first chapter, the *gītikāpāda*, a second, which defines the decimal place value notation in its second chapter, the *ga•itapāda*. Curiously, Kaye will only concentrate on the "alphabetical notation", first omitting the second interpretation, and then referring to it, vaguely, as if it was not essential to his demonstration and didn't invalidate it.

Indeed, the 1907 article ends by stating vocally:

> « We can go further and state with perfect truth that, in the whole range of Hindu mathematics, there is not the slightest indication of the use of any idea of place-value before the tenth century A. D. »[16]

We are here in one of these strange but familiar moments that history of science encounters, usually in stories of science: the denial of facts. How can we understand G. R. Kaye's attitude? Is it that he had no first hand knowledge of the texts at the time? His later articles lead us to think that, on the contrary, he had indeed read the texts, at least the known English translations that had been published a couple of years before. But he seems to have done so gliding, systematically looking elsewhere, when evidence appeared that went against his convictions. Kaye's article will also assess a turning point: from being a general debate on "Indian mathematics", the statement now concerns "Hindu mathematics". Indeed the authors of scholarly treatises that Kaye quotes, such as Âryabhata, are Hindus.

G. R. Kaye's booming statements will prompt a new generation of Indian historians of mathematics to appear loudly on the scene.

G. R. Kaye, "A brief bibliography of Hindu Mathematics." *Journal of the Asiatic Society of Bengal, New Series* **VII**(10): 1911.

G. R. Kaye, *Indian Mathematics*, Calcutta & Simla, 1915.

G. R. Kaye, *Hindu astronomy*. Calcutta, Gov. of India Central Pub. Branch. Archaeological Survey of India: Memoirs; v.18: 1924. G. R. Kaye, "The Bhakhshali Manuscript." 1927.

[16] Kaye 1907, op. cit. p. 493

II. 3 Indians from background to foreground

As shown by Dhruv Raina[17] the first histories of Science in India, published at the end of the XIXth century and beginning of the XXth century were deeply connected to the values of the "Bengali Renaissance". This term refers to a movement of ideas that took place in Calcutta, and which saw impoverished Indian intellectuals develop nationalist ideas. This is the soil in which Vivekananda, a religious reformer and important figure of the Bengali Renaissance, will sow the seed of histories of Hindu Science. He will also transmit his ideas in Europe and in the United States. In Dhruv Raina's words[18]:

> "Vivekananda laid the foundations of a neo-Hindu apologia that not just found the most advanced speculative sciences as always-already there in Hinduism, but also presented India as the 'guru' who will teach the West how to use science in a spiritually meaningful manner."

So far the use of Indian informants, if any, had been only in the background of the writings of those who wrote on the history of mathematics in India[19]. For instance, James Prinsep tells us that he uses a Pandit, called Kamalākānta, but it is often difficult to know how much he participated and influenced his work. Prinsep for instance writes:

> "To aid in prosecuting my inquiry, I begged Kamalākānta to point out any allusions to the forms of the ancient numerals he might have met with in grammars or other works, but he could produce but very few instances to the point."

This is surprising as many Sanskrit texts are replete with very big numbers, and until today there is a vast literature listing the higher numbers quoted in ancient texts. Prinsep was obsessed with the alphabetical names for big numbers, is it then that he would only accept "alphabetical" names for big numbers as an " instance to the point"?

However in the period which brings us to Kaye's 1907 article, a certain number of scholars of Indian origin published in the *Journal of the Asiatic Society of Bengal* on subjects related to the history of Indian mathematics and astronomy. Their works where almost exclusively the

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17 Raina, op. cit. (20)

18 Raina, Dhruv 1997 Evolving perspectives on science and history : a chronicle of modern India's scientific enchantment and disenchantment (1850-1980). Social Epistemology 11: 3-24.

19 For a detailed account of the use of pandit scholarship in burgeoning indology, see the case study of Madhav Deshpande on Marathi pandits: M. M. Deshpande, "Pandit and Professor: Transformations in the 19th century Maharashtra", in *The Pandit, traditional scholarship in India, Axel Michaels (ed.)*, Delhi, 2001.

edition of Sanskrit texts and translations of these in other Indian languages. At first, there were some joint publications such as Bapu Deva Sastri, who translated in 1861 with Wilkinson two astronomical texts the *Sūrya Siddhānta* and *Siddhānta Śiromāni*, or Sudhakara Dvivedin who published in 1888 with G. Thibaut the *Pañcasiddhāntika*[20]. More often we find publication were they are the only author. The texts published by these Indian authors were so far very courteous and quite unlike the harsh debates that opposed there European counterparts, at least when they published in English[21]. So that slowly Indian scholars where entering the scene of the history of mathematics and astronomy in India, but without seemingly engaging in direct front headed debates with their European colleagues.

In 1927, with Kaye's last publication, an edition of the *Bhakshālī Manuscript,* things will change and a new set of Indian scholars, will challenge his claims, vehemently: pandits will leave the stage to professional mathematicians.

II. 4 Ganguly and Datta

Saradakanta Ganguly was a mathematics teacher at the Ravenshaw College in Cuttack. He published a 1932 an article in the *American Mathematical Monthly* entitled « the Indian origin of the modern place value arithmetical notation ». In this article he directly explains that he aims to counter Kaye's point of view[22] . When this article comes out he has already published several other articles, building his arguments in the *American Mathematical Monthly* and in *Isis*, that is from the United States. The vocal arrival of Ganguly traces the geography of a

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[20] G. F., Thibaut and S. Dvivedi, *Pañcasiddhāntika.* 1888. Reprint Varanasi, 1968.

[21] For a more detailed account on Indian scholarship on the history of mathematics in Sanskrit, in the second half of the XIXth century, see A. Keller, "Peacock in the land of the peacock ? On the posterity of Peacock's Arithmetic in the Indian sub-continent", Conference given in Beijing 2005, article submitted to the Indian Journal of History of Science. http://halshs.archives-ouvertes.fr/halshs-00149552

For harsh debates in Sanskrit, on questions of cosmology see Minkowski, C, "The Pandit as public intellectual: the controversy over virodha or inconsistency in the astronomical sciences.", in *The Pandit. Traditional scholarship in India.* Edited by Michaels, Axel,79-96, Delhi. 2001.

[22] S. Gānguli, "On the modern place-value notation in the Aryabhatiyam." *American Mathematical Monthly* **XXVII**. 1927.

S. Gānguli "The Indian Origin of the modern Place-value arithmetical notation." *American Mathematical Monthly* **XXXIX**: 251-256/389-393. 1932.

new network, including American historians of mathematics and indologists, challenging the anglicist Kaye from outside the European realm[23].

Ganguly's arguments are essentially based on Sanskrit scholarly texts. Thus he inaugurates a movement that will slowly push the epigraphical data in the background. The focus of history of mathematics will then be scholarly mathematics rather than the administrative uses of mathematics that inscriptions testify of. Thereofore, histories will emphasise the "Hindu" character of this history.

Ganguly's article was published 3 years before Datta and Singh's *History of Hindu Mathematics*[24]. This book was written aiming at providing a definitive reply to Kaye's arguments. It is until this day a reference manual because of its exhaustive and exact treatment of mathematical questions. It also inaugurates a new moment in the history of mathematics in India, giving rise to a tradition of technical history of mathematics, which argues priorities in a nationalist mode, that is still quite alive today.

We will follow now how these XIXth century debates still have a political dimension today.

III The End of the XXth century

In 2000, the Hindu Nationalist government at the head of the Indian state started a reform of the contents of public education in India. In an effort to re-Hinduize Indian Education (e.g. in its own words to eradicate traces of Marxist and British influence on it), it voted the opening of chairs of astrology and yoga in already much impoverish public Indian Universities. It had historical textbooks integrated in the curriculum of secondary education, discussing the life of the Hindu god Râma, and portraying the Moghol rule as having essentially persecuted Hindus. It also attempted to make the study of a book called "Vedic Mathematics" compulsory in high school.

"Vedic Mathematics" was published in1962 in Benares. It came out in one of these editions on the fringes of Benares Hindu Universtiy's Department of Vedic studies, with the help of a religious foundation based in Nepal, involved in Sanskrit editions. The posthumous author had been a religious figure, Bharati Krishna Thirtaji. The book has been an incredible commercial success. It was steadily reprinted 19 times. *Vedic Mathematics* exposes sixteen

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[23] Kaye had also interacted with American Scholars, since his 'Indian Mathematics' was initially to be published in Isis. The publication was temporarily stopped by the war, he thus decided to publish it in India, before having it re-published in Isis in 1919.

[24] Datta, B., and Singh, A. N. 1935 *History of Hindu mathematics, a source book*. Lahore: Motilal Banarsi Das.

Sanskrit *sûtra*s (or rules, in a very concise form) providing mathematical algorithms. They are commented upon in English.

The first pages of the book are made of a strange mixture of official prefaces mingled with small argumentative texts that shows that the book was published in the midst of controversies. These concern the origins of the Sanskrit verses the book contains.

III.1. *Vedic* mathematics?

One story is given by the author himself. From 1911 to 1919, while leading the life of an ascetic in the woods around Sringeri (Maharashtra), he meditated on a lost part of the *arthavaveda*- one of the four Vedas. This meditation, according to his own testimony, enabled him to recover what he calls a "Vedic system of mathematics" that had been contained in the text but had been lost. To describe this system, he wrote sixteen books. All of theses volumes were lost, along with this unique portion of the *Arthavaveda* he possessed. Vedic Mathematics was written just before his death, in an attempt to recall some of the lost achievements in a nutshell.

Having no textual evidence to such a historicity, the editor of the book, and some other disciples explain that the *guru* had after so many years of intense meditation a revelation, a mathematical and mystical revelation. "Vedic Mathematics" would then contain traditional Hindu mathematics in the sense that they were devised by a Hindu way. But they couldn't then be considered as "vedic" in the historical meaning of the word. The synthesis of both versions also attempted in the opening part of the book considers that by reading scattered parts of the *arthavaveda* and meditating, the author had a revelation, but then one isn't sure anymore of the historical value of the Sanskrit verses. And it is thus so, that "Vedic Mathematics" becomes a title where history and tradition are inseparably mingled.

There is an additional rumor to this story, which shows that India is not the only country involved in Vedic Mathematics. Some disciples explain that the 16 volumes and the *arthavaveda* recension were given to one of the guru's friend who had a German secretary. The secretary disappeared one day, taking the volumes along with her, probably to Heidelberg. Was the knowledge of the Vedic system stolen by the Germans just before the second world war (and the key to a certain scientific prosperity?).

Presented as part of the « ancestral tradition of mathematics in India », *Vedic Mathematics* has been read as a school-book who could re-Hinduize mathematical education. Promoted by the BJP (the Hindu nationalist party which was at the head of the Indian federation from 1997 to 2004) and tought in the Maharishi (the Beatles's guru who promotes Transcendental

Meditation and levitation) business schools in the US, Great Britain and Australia. The title of the book has become in India today a synonym for the whole of India's history in mathematics.

This story tells in a nutshell, with its mingling of facts, rumors, legends and mystical relevations a trend of "street" (by opposition to academic) historiography of science in India, which has a strong religious flavor, and some political undertones (nationalistic, anti-colonialist). It is by definition a nebulous trend in the sense that there are many topics and discourses held by many different people along such general lines. Vedic Mathematics is a peculiar case of this trend that we will try to follow up, looking at how it rests partially on the stories related previously.

III.2. Arithmetical tricks

Vedic Mathematics is essentially a book on arithmetical procedures, it treats, but briefly, of algebrical problems and even more briefly of geometrical ones.

Here is one of the algorithms given in the book: cross wise multiplication.

We will illustrate it through two examples given in Figure 1 and 2.

Figure 1: Multiplying 9 by 7.

Note 9 and 7 within a column

9

7

Note their difference with 10 in a column as well

9 -1

7 -3

Then you have four choices

Using the left hand column

(9+7)-10= 6

Using the right hand column

10-(3+1)=6

Crosswise

(9-3) ou (7-1) =6

A more spectacular case:

Figure 2 : Multiplying 998 by 997.

The system will be the same, only 1000		
will be the base, instead of ten		
The numbers are noted within a column		
998		
997		
Noting their difference with 1000		
998-002		
997-003		
Using the columns		Or Crosswise
1000-(2+3)	=995=	998-3
997+998-1000		997-2

Indeed, the algorithm is quick and fun if the numbers are close to powers of ten, much less interesting if they are far from it, say if you want to multiply 574 by 483. In fact most of the algorithms of Vedic Mathematics can be seen as tricks enabling quick mental computations. They do not testify of a "system".

III.3. Post-colonial reasons

In his introduction the author lists some of the reasons that made him investigate Vedic mathematics. The most important reason put forth is the despising attitude of past Europeans scholars[25]. The necessity of a history also springs from the fact that Vedic lore on mathematics would have been lost[26]. Additionally, the mathematics retrieved have a utility:

[25] As stated with a certain violence, p.xli:

"And the contemptuous or, at best patronising attitude adopted by some so-called Orientalists, Indologists, antiquarians, research-scholars etc., who condemned, or light heartedly, nay irresponsibly, frivolously and flippantly dismissed, several abstruse-looking and recondite parts of the Vedas as "sheer-nonsense"- or as "infant-humanity's prattle", and so on, merely added fuel to the fires (so to speak) and further confirmed and strengthened our resolute determination to unravel the too-long hidden mysteries of philosophy and science contained in ancient India's Vedic lore, with the consequence that, after eight years of concentrated contemplation in forest-solitude, we were at long last able to recover the long lost keys which alone could unlock the portals thereof." But he also quotes subsequently mathematicians whos gave Indian mathematics some recognition.

[26] p. xxxviii-xxxix: "And we were agreeably astonished and intensely gratified to find that exceedingly tough mathematical problems (which the mathematically most advanced present day Western scientific world had

they can be used successfully by mathematicians and children alike. The characteristics of "Vedic" mathematics are then constructed by opposition to "Western" mathematics, in what seems a description in fact of an industrialized society versus a Vedantic or Brahmanical vision of a pure mind. There is something here of the idea of a lost graal (mystery), because to recover this lost tradition, a very peculiar method is required, that of penances and meditations[27]. Promoting then such a mode of mathematical research can be seen as a direct attempt to subvert modernity's self-proclaimed methods of rational inquiry. This method is, in an off hand manner, put at par with religious discipline and mystic exercises.

The book continuously criticizes the academia but also attempts to take its prestigious attributes, as if the author longed to be recognized by it. Indeed, we often sense the marginal position of the author vis à vis academic institutions. Thus, the book is published within a University, but in its margins. The author quotes XIXth century historians of mathematics, but he is writing in the early sixties of the XXth century: there is a dated flavor to his remarks. The nature of the book itself seems to be written to convince a western or westernized reader that there was a Vedic (that is old, Indian and Hindu) way of doing mathematics, since it is written both in Sanskrit and in English.

The book contains sub-text historiographical affirmations. The claim of antiquity of its mathematics is important. If the mathematics presented in *Vedic Mathematics* are in the Vedas themselves, they predate the work of classical Greece! Furthermore, the mathematics described is essentially arithmetical. Vedic Mathematics then seems to have taken XIXth century despizing assessments of European Indologists on "hindu mathematics" investing them with a new, positive judgment.

Before the promotion of *Vedic Mathematics* as a "school-book" by the Indian government, associations of promotion, web lists and workshops were already at work. There is a *Vedic*

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spent huge lots of time, energy and money on and which even now it solves with the utmost difficulty and after vast labour involving large numbers of difficult, tedious and cumbersome "steps" of working) can easily and readily [be] solved with the help of these ultra-easy Vedic Sūtras (or mathematical aphorisms) contained in the Pari• •a (The Appendix-portion) of the Atharvaveda in a few simple steps and by methods which can be conscientiously described as mere "mental arithmetic".

[27]p. xxxix: "To unravel the too-long hidden mysteries of philosophy and science contained in ancient India's Vedic lore, with the consequence that, after eight years of concentrated contemplation in forest-solitude, we were at long last able to recover the long lost keys which alone could unlock the portals thereof."

Mathematics academy, with classes on the web maintained by Maharishis scholars[28], and a network of teachers in the Indian subcontinent that give classes. The fantastic financial success of the initial book, has given rise to a number of publications surfing on its wave. Part of the *Vedic Mathematics* movement, especially the one developed outside of India exploits the non-deductive aspect of *Vedic Mathematics*, as the title "Math or Magic" testifies of. From the incredible mind of the mystic who created these mathematics, to the techniques developed and that would be "natural" to the mind, the posterity of *Vedic Mathematics* then sees itself as promoting also a History of Mathematics of a new kind. It is not academic. The mathematics it brings to light has a political agenda: pre-industrial in its origin, its mode and its discovery, much more practical than the kind we use today, it had been lost or ignored. Recovering it, promotes the genius of Hinduism, and its ability with mystical means, to create good, modern science. It can thus be inserted in the larger movement of Hindu Science, integrated in a new age nebulae[29]. The Hindu Science movement itself participates in a general current, from the Christian creationists to those who believe that all science was already given in a coded form in the Coran or in the Talmud, of an attempt by religious fundamentalist to re-invest the scientific practices that modernity has taken away from them.

Conclusion

We have seen then that "Vedic Mathematics" can be understood as a post-colonial result of XIXth century indology and history of science. National labels were at that time given to scientific traditions in discourses that had often more to do with the ideology of expansive imperialism and national responses, then with the reality of the scholarship studied. These categories however are still at work today. In the case of Vedic Mathematics, the patriotic being mingled with a religious tone as well. The aim then of my article, is thus to invite us all, as we go back and forth from Europe to Aisa, to keep this in mind as we often too quickly evoke and "Indian" or "European" tradition in mathematics, "Hindu" and "Muslim" science.

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[28] http://www.vedicmaths.org/

[29] Nanda, Meera. 2003 *Prophets Facing Backward, Postmodern Critiques of Science and Hindu Nationalism in India*. New Brunswick, New Jersey: Rutgers University Press.