Vedic Maths' : facts and myths

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One often hears these days about a "system" of calculation, supposedly of ancient origin, called Vedic Mathematics (VM). Going by the propaganda reports it is an "amazingly compact and powerful system of calculation" and "once you have learnt the 16 sutras by heart, you can solve any long problem orally". Incredible hyperbole indeed, but many people seem to take it seriously nevertheless, for want of authentic information. At the heart of the "system" is the book 'Vedic Mathematics' authored by Swami Sri Bharati Krishna Tirthaji, who was the Shankaryacharya at Puri from 1925 until his passing away in 1960; the book was published posthumously in 1965, but Tirthaji had been giving lecture demonstrations on it earlier, for several decades according to the Preface. In the book the Tirthaji presents some "sutras", claimed to be from the ancient Vedic lore, and describes some procedures, supposedly coming from the sutras, for solving certain arithmetical problems. A closer look shows however that neither the so called sutras nor the procedures described in their name have anything to do with the ancient Vedas. The "system" is in essence a loose compilation of some tips which can help expedite computations in certain special situations. It is being bloated far beyond its actual significance, by passing it off as some mysterious wisdom from the ancient past, and exploiting the weakness of the popular mind for such things.

The Vedas have been well-documented and their contents have been studied assiduously by many scholars, both foreign and Indian, and the science and mathematics involved in them has been thoroughly discussed for well over a century now. There is nothing akin to VM in the genuine Vedic literature. It may of course be argued that the known Vedic texts may not be all, and some manuscript which was hitherto unknown could surface somewhere. While that is indeed a possibility, such a manuscript would naturally have similarities in style of language, presentation, overall contents etc. to the extant Vedic texts. No such text containing the sutras of VM has emerged. Indeed there isn't any text in Sanskrit containing them; the sutras, which add up to barely about 50 words in Sanskrit, first made their appearance in Tirthaji's book, which is in English. Furthermore Sanskrit scholars readily recognise the style of the language of the sutras to be modern Sanskrit, which is substantially different from Vedic Sanskrit. This point was made already by the General Editor Dr. V.S. Agrawala in his Foreword to Tirthaji's book, concluding further that it "points to their discovery by Sri Swamiji himself". Besides, Tirthaji himself never mentions having discovered any new manuscript or source. Typically he made vague allusions to Parishishta (Appendix) of the Atharvaveda and when once confronted by Prof. K.S. Shukla, a scholar of ancient Indian mathematics, to show the sutras in the Parishishta he said that they were only in his own Parishishta to the Atharvaveda. It appears Swamiji believed that he could write new things into the Vedas; it is sometimes argued that this may be justified on account of his pontifical authority, but surely the whole point of antiquity of VM sought to be made out by its purveyors is lost in that case.

All in all it is quite clear that the so called sutras in VM have nothing to do proper Vedic texts, whether extant or otherwise. What then is the source of the sutras? It would be easier to answer this question if one considers them together with what is described by Tirthaji in their name. One of the sutras, for example, is "*Ekadhikena purvena*". In English this translates to "by one more than the previous one". Tirthaji tells us that this sutra is for writing the decimal expansions of numbers like 1/19, 1/29 etc.; he

then describes a procedure for doing it, and the only connection with the sutra is that it involves, in the process of writing the successive digits, multiplication by "by one more than the previous one", like for example by two which is one more than the previous one in 19, namely 1. It is absurd to imagine that such elaborate "meaning" involving so many contextual details could be gleaned from an innocent phrase like "by one more than the previous one". On the other hand notice that if we find the particular procedure for writing the decimal expansion, which is actually an exercise contemporary mathematics, we may think of attaching to it a title like "by one more than the previous one", for convenience in referring to it. While this is just an example, the interrelation between the various sutras and the procedures described in their name is similar. It is an unmistakable inference then that the computational tricks came first, and the sutras were attached to them like titles or names. The sutras being in Sanskrit signifies nothing more than that Tirthaji knew Sanskrit.

Like the sutras the mathematical contents of Tirthaji's book are also alien to Vedic sources. This is obvious just from the fact that the book involves all kinds of concepts like decimal fractions, derivatives, integrals etc. which were unknown in Indian mathematics until the modern era. Then where did they come from? The procedures involved can be explained easily in terms of well understood algebraic principles. On the other hand it is known also that Tirthaji had passed M.A. examination in mathematics, with flying colours. Under the circumstances it is well within the realm of possibility that he could have discovered the methods himself. It is interesting to note in this respect that the terminology involved in Tirthaji's book has a close correlation with what would have featured in his education (though the depth of the contents does not go beyond the school level). Tirthaji mentions in the Preface "eight years of concentrated contemplation in forest solitude" in respect of VM. While Manjula Trivedi, Tirthaji's disciple who was instrumental in the (posthumous) publication of the book, says in her account of the genesis of the book that the Gurudeva "reconstructed" the sutras during that period "from material scattered here and there in the Atharvaveda", in the context which I have explained that would correspond to the period when he worked on the formulae, the former being only a way of expressing the latter in the devout circles.

The conclusion that VM is not old, while it demolishes a propaganda pillar, does not by itself mean that it is not useful. However, viewed from a wider perspective VM involves no essentially new idea or principle. This fact is often concealed by the mystical aura created around it as "ancient wisdom". The whole "system" only consists of a few isolated tips, totally lacking in coherence and conceptual unity. Each of the sutras is an elaboration of some simple observation, fairly routine from the standpoint of conventional arithmetic. Here is an example. If you have to multiply 98 by 3, say, then you can observe that 98 is 2 less than 100, so the desired product should be 3 times 2 less than 300, which is 294. This would of course be quicker than by the usual way to multiply two arbitrary numbers, but applies only in the specific context of one of them being close to 100. A more elaborate version of this is in fact the basis of one of the sutras "*Nikhilam Navatashcharamam Dashatah*" that many propagandists rave about; unlike in the very special example, application of the principle becomes increasingly cumbersome as we move away from reference numbers like 100. The crucial point is that any tip of this kind which can make computation any bit shorter, compared to the conventional procedure, depends on recognising one or other pattern in the data. However, typically in practical computations there may not be any useful pattern or it could be hard to recognise one; this latter aspect would also depend on the individual's ability, and those who are not good at mathematics in the first place may find it harder. So the utility of the tips is rather limited. It should be

remembered that it is not memorising or reciting the sutra that gives the idea of what is to be done in a given situation. That one has to learn through hard work.

Admittedly Tirthaji's procedures can be of some help to those interested in computation as a hobby; in a hobby every extra bit counts. There are also some methods due to Trachtenberg, who ran a Mathematical Institute in Zurich in the fifties, and also by other authors that could be used. There has however been no scientific study, in any of the cases, correlating the benefits to the time and effort involved, and it is far from clear whether it would benefit everyone who pursues it, especially those who are not already equipped with facility with numbers. Incidentally, one should be careful not to get carried away by the demos, which deal with only well-chosen situations, or success stories of someone or other, which are mostly presented out of context, omitting various details that would be relevant for a proper assessment.

Though methods such as VM are of interest from a recreational point of view, they are not of much significance from the point of view of professional mathematics or practical utility. There seems to be an idea that proficiency at computing products of big numbers and such other functions to which VM applies, is important for career development, competitive examinations etc.. While some ease with numbers as one acquires in the normal course is indeed needed, there is hardly any occasion in professions to use isolated extra tidbits by way of techniques, especially in our age of abundant computational aids. The challenging mathematical tasks in today's professional life (in areas such as engineering, computer science, finance etc.) concern advanced concepts, and mathematical aptitude is gauged by the ability to grasp and handle them, and not by the ability to multiply big numbers, or the like.

It is often claimed that VM is well-appreciated in other countries, and even taught in some schools in UK etc.. In the normal course one would not have the means to examine such claims, especially since few details are generally supplied while making the claims. Thanks to certain special circumstances I came to know a few things about the St. James Independent School, London which I had seen quoted to have adopted VM. The School is run by the 'School of Economic Science' which is, according to a letter to me from Mr. James Glover, the Head of Mathematics at the School, "engaged in the practical study of Advaita philosophy". The people who run it have had substantial involvement with religious groups in India over a long period. Thus in essence their adopting VM is much like a school in India run by a religious group adopting it; that school being in London is immaterial. (It may be noted here that while privately run schools in India have limited freedom in choosing their curricula, it is not the case in England). It would be interesting to look into the background and motivation of other institutions which are supposed to have adopted VM. At any rate, adoption by institutions abroad is another propaganda feature, like being from ancient source, and should not sway us.

We should be proud of our genuine heritage, like for instance the geometry of Shulva-sutras (from the Vedanga period), the works of Aryabhata, Brahmagupta, Bhaskara, Madhava, and many other ancient mathematicians. Vainglorious outbursts armed with fabricated 'heritage' however only exhibit a collective inferiority complex. We should do what is good for us and future generations, with due deliberation. Indulging in things chiefly on account of their supposed association with our forefathers is a sure prescription for moving backward in history.