Explanatory note

Petition to teach religiously neutral mathematics in public schools

C. K. Raju

AlBukhary International University
Alor Setar, Malaysia

Executive summary: Colonial education mimicked Western education set up by the church to produce missionaries. Long-term church control put persistent pressure on Western knowledge to conform to church dogmas. The resulting religious biases in present-day education are clear from two easy examples. (1) The Christian calendar is inferior and unscientific, it promotes religious biases, and damages our practical interests, but our secular festivals and dates of birth are defined only on it. (2) The superstitious and unscientific belief in "laws of nature" is taught as the first lesson in science, and then used to attack Islam as unscientific.

These religious biases particularly apply to mathematics which the West conceived of in religious terms, first as mathesis, and then as related to rational theological persuasion or metaphysical proof. The non-West conceived of mathematics differently as a means of practical calculation. The two differ in the means of proof. Formal or Western math rejects empirical proofs as inferior though such proofs are accepted by *all* other religions *and* science. But why is this Christian metaphysics superior to the empirical? Church myths are the only grounds for believing that. Turning math into metaphysics, as in present-day school math, brings in further religious biases: (a) in the logic used to prove mathematical theorems, and (b) in the postulates which involve a notion of infinity aligned to the church theology of eternity (even to prove 2+2=4). Historically, most school mathematics—arithmetic, algebra, trigonometry, calculus, and probability—went from the non-West to the West for its practical value; but was given a coating of church metaphysics, and a false history, to make it theologically correct, and returned and globalised during colonialism. Rejecting this religiously-biased metaphysical coating does not affect any practical applications of math.

An alternative way of teaching secular math has been demonstrated in teaching experiments in several universities across 3 countries. This also makes math easy and allows students to solve harder math problems. However, our education system is still controlled by the West through a handful of co-opted "experts", who neither permit any change, nor engage in public debate since it negatively impacts their vested interests. This "expert raj" is a church technique of mental slavery. To achieve real independence, and to uphold the secular principles in our constitution, it is necessary to overthrow this "expert raj", and teach mathematics in a religiously neutral way.

Introduction

Colonial education copied the Western model of education. Western universities such as Bologna, Cambridge, Paris, were set up by the church (to produce missionaries) and tightly controlled by it for centuries. Hence, there was constant pressure to ensure that all knowledge in Western universities conformed to church dogma. Initially, this meant burning or torturing to death anyone who dared to dissent on even the most minor dogmatic issues. Later techniques were less brutal, and involved ostracising dissenters, abusively attacking them or censoring and suppressing them.

All Western knowledge had to be theologically correct since subservient to the church. This enabled church dogma to intrude even into mathematics. Before explaining that, let us begin with some simpler examples of how the present-day education system systematically spreads religious biases because it uncritically imitates the West.

The calendar

For children, their birthday is a big event. But the Indian state defines their date of birth only on the Gregorian calendar, named after pope Gregory. This policy means anyone using this calendar is forced to recite AD and BC just to state a date, which is a frequent need. This amounts to reciting the belief that Jesus is their lord (AD, Anno domini) and saviour ("Christ", BC), though people may not know the full implications of the Latin involved. Through constant repetition they start believing 1 AD relates to the "birth of Christ". This further promotes the church interest in depicting Jesus as a real historical person when, in fact, Jesus is just a 4th hand symbolic myth borrowed, like the calendar, from Egyptians (Isis) via Greeks (Bacchus) and Romans (Serapis), and then reinterpreted.[1] Further, it is well known that the zero point of the calendar has nothing to do with *any* historical event, since it was fixed in 536 by a back-calculation related to the ritual of Easter.

The state use of the Christian calendar is improper since it systematically encourages a bias against non-Christian beliefs: most colonially educated do not know how to calculate the dates of key festivals of other religions, like Diwali or Holi, or Eid, or Buddha Purnima or Mahavira Jayanti, which are all "moveable" on the Gregorian calendar, unlike Christmas which is fixed. This alienates people from their own tradition, so much so that they confound the Christian with the secular: hence the key secular festivals of India (Independence Day, Republic Day) are defined solely on this Christian calendar.

Further, the Gregorian calendar is unscientific. Thus, the months on it vary in length since they are related to the vanities of Roman emperors (Julius, Augustus), and not to the natural lunar cycle as in the original Egyptian calendar (which the Greeks copied) or the Indian calendar. This regress happened because the Greeks were superstitious and did not permit astronomy (Socrates and Anaxagoras were condemned to death on the charge that they did astronomy which was regarded as an act of impiety by early Greeks). Julius Caesar reformed the calendar with great fanfare, but did not manage to get even the length of the year right. This happened for a peculiar reason: both Greeks and Romans were so bad at arithmetic that they had no systematic way to represent fractions, hence they could not even *articulate* the correct length of the year! Because the colonially educated learn by blind imitation, they still use that innumerate way, and say that the length of the year is 365 and a quarter days. This is a clear case of dramatic regress through blind imitation of Western practices, because Aryabhata 1500 years ago had a better length of the year. (We emphasize that the issue is not just about what some scientists know; the issue is education, which concerns what people at large know. Western education turns the common man into an ignoramus.) Further, even after the Gregorian reform, the length of each year is not right, for equinox still does not come on the same day each year, for the Gregorian reform fixed only the date of Easter the sole ritualistic concern of the church.

Using the Christian calendar not only helps spread church superstitions, and alienates people from their cultural roots, not only does it promote unscientific temper, but it damages our practical interests. Thus, the accurate and scientific Indian calendar (which gets both month and year right) served a very important practical purpose, for it determined the months of the rainy season: *sawan* and *bhadon*. Determining the rainy season is critical to monsoon-driven agriculture in India, on which Indian prosperity still depends. However, there is no concept of the rainy season on the Gregorian calendar. Consequently, blind imitation of Western practices has repeatedly led to false anticipations of drought, and crop failure, even in the last decade.[2] However, the colonised elite are unconcerned with the plight

1 For details, see C. K. Raju, *Euclid and Jesus: how and why the church changed mathematics and Christianity across two religious wars*. Multiversity, 2012, chapter 1, "The devil's parody". See http://ckraju.net/Euclid/.

2 More details in C. K. Raju, "A tale of two calendars", http://ckraju.net/hps-aiu/ckr-calendar.html, paper presented at the

of millions of farmer, because their overriding anxiety is to get approval from their Western masters by copying the "international standard". Their education taught them the foolish belief that ignoring local conditions, and blindly copying the West makes them superior, exactly like wearing suits in the Delhi summer or speaking Hindi with a British accent.

Laws of nature

As our second "warm-up" example, consider the first lesson in science taught in our schools. This concerns Newton's Laws. Why are these called "laws"? Because of the belief that there are "laws" of nature. But is the belief in "laws of nature" a scientific belief? Let us apply the usual criterion: the way to separate science from non-science (or physics from metaphysics) is to use Popper's criterion of refutability. So, is there a way to refute the belief in eternal laws of nature? Is it refuted by our mundane experience that *our* actions often decide a tiny part of the future? No such empirical test was ever proposed, and the fact is that science keeps changing. Did the refutation of Newtonian physics disprove the belief in laws of nature or can we duck by saying that the true laws of nature are yet to be found? If the former, the belief is refuted. If the latter, then the belief is unscientific and metaphysical.

Further, this metaphysics is related to Christian theology. Long before Newton, the Crusading theologian Aquinas said that God rules the world with eternal laws. (This Christian superstition is unrelated to the Bible, but relates only to the political ambition of the church to dominate the world.[3]) In his suppressed notes, Newton cancelled *hypothesi*, and wrote *lex* ("law") because he thought of himself as a prophet to whom God had revealed those laws (because he was born on 25 December according to a wrong calendar). All this is, of course, never told to school children, as it ought to be.

Third, once this religiously biased metaphysics (i.e., Christian superstition) has infiltrated science, it makes it possible to leverage the authority of science to attack other religious beliefs as inferior. As recently as 2009, the *Guardian*, London, ran a series of articles claiming that Islam is fundamentally flawed since opposed to science, since it does not accept the belief in laws of nature! This is discussed in detail in the paper on "Islam and Science".[4] At the moment, the point is only this: Christian superstitions have crept into the content of even hard science, as taught in our schools today, and these superstitions naturally involve a religious bias.

Math is not universal

Let us now turn to mathematics. First, mathematics is *not* universal, for it did not develop everywhere the same way. What is taught in schools today is formal math, or Western math which differs from the ordinary math which developed historically in the non-West for practical reasons.

International conference on traditional knowledge, AlBukhary University, October 2012, to appear in Proc.

3 C. K. Raju, "Benedict's maledicts", *Indian Journal of Secularism*, **10**(3) (2006) pp. 79-90. http://ckraju.net/papers/Benedicts-Maledicts-by-c-k-rjau.pdf.

4 C. K. Raju, "Islam and Science", Keynote address at International Conference on Islam and Multiculturalism: Islam, Modern Science and Technology, Asia-Europe Institute, University of Malaya, 5-6 Jan 2013, http://www.ckraju.net/hps-aiu/Islam-and-Science-kl-paper.pdf. In *Islam and Multiculturalism: Islam, Modern Science, and Technology*, ed. Asia-Europe Institute, University of Malaya, and Organization for Islamic Area Studies, Waseda University, Japan, 2013, pp. 1-14.

Math as mathesis

A key reason for the difference is that the West always connected math to religious belief. The very word "mathematics" derives from mathesis. Plato explained that mathesis means arousing the soul to make it recollect the knowledge of its past lives. Mathematics was thought especially suited to this purpose since it was believed to involve eternal truths which most readily aroused the eternal soul by the principle of sympathetic magic that "like arouses like".[5]

In Plato's story of Socrates and the slave boy,[6] Socrates demonstrates a slave boy's innate knowledge of mathematics and concludes that he has thereby demonstrated the existence of the soul! Plato thought arousing the soul makes people virtuous and advocated that mathematics must be taught for its spiritual value, and specifically not for its practical value.[7] What is the practical value of this mathematics? When asked this question today, formal mathematicians make the same point as Plato, but in a roundabout way, by talking of mathematics as an aesthetic ("soul-moving") experience ignoring the rather obvious fact that it is an ugly nightmare for millions of school children, a nightmare which recurs each year. Plato's notion of soul was part of early Christianity, but was later cursed by the church which hence initially banned mathematicians and philosophers in 532 CE during its religious war with "pagans", because it wanted to promote a different and politically more convenient notion of the soul.[8]

Math as rational persuasion

Centuries later, the church launched the Crusades, a religious war against Muslims. It aimed to convert Muslims by force, the way the rest of Europe was earlier converted to Christianity by force. But all Crusades (after the first, and beyond Spain) were military failures. Therefore, the church looked for a means of persuasion. Since Muslims did not accept the authority of the Christian scriptures, and could not be conquered by force, a new method was needed to persuade them. Since Muslims accepted reason, the church accepted "universal" reason as a means of persuasion, and changed its own dogma to Christian rational theology, which was a modified from of Islamic rational theology or *aql-i-kalam*.[9]

To this end of persuading Muslims, the church accepted back mathematics, but reinterpreted it as a doctrine of rational persuasion or rational proof, and gave it a false ancestry among early Greeks to make it theologically correct. The earlier mathesis notion of math as eternal truth lingered on. Thus, Europeans superstitiously believed that their god had written the supposedly "eternal" "laws of nature" in the "perfect" language of mathematics which contained "eternal truths". They further thought that this "perfection" could only be achieved through metaphysics and hence mathematics *ought* to be metaphysical.

Difference between Western and non-Western math

Thus, while the non-West saw mathematics as a means of calculation, and Plato saw it as a means of mathesis or spiritual upliftment, the church regarded mathematics as concerned solely with

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5 C. K. Raju, "The religious roots of mathematics", *Theory, Culture & Society* **23**(1–2) Jan-March 2006, ed. M. Featherstone, C. Venn, R. Bishop, J. Phillips, pp. 95–97. http://ckraju.net/papers/religious-roots-of-math-tcs.pdf.

6 Plato, *Meno*, In: *The Dialogues of Plato*, trans. B. Jowett, Encyclopedia Britannica, Chicago, 1994, pp. 179–180.

7 Plato, *Republic*, VII.526. In: *The Dialogues of Plato*, trans. B. Jowett, Encyclopedia Britannica, Chicago, 1994, p. 394.

8 C. K. Raju, *The Eleven Pictures of Time*, Sage, 2003, chp. 2 "The curse on 'cyclic' time".

9 C. K. Raju, "Benedict's maledicts", cited above.

metaphysical proof or a means of persuasion. Many ignorant or motivated Westerners today assert that proof was missing in non-Western mathematics. This is completely false. The correct situation is that non-Western mathematics accepted physical or empirical means of proof. The acceptance or rejection of empirical proof is a key difference between Western (formal) and non-Western (ordinary) math.[10]

To understand the difference, let us ask, exactly *why* is 2+2=4? You probably learnt in Kindergarten to line up two oranges with another two oranges to make four oranges. That is an empirical proof. Empirical proofs were accepted in non-Western math. However, Western or formal math rejects such a proof as erroneous. Western mathematicians claim empirical proofs are fallible, and that their own metaphysical proofs are "superior" or "perfect" and infallible, like the pope.

Metaphysical proof and religious bias

Before examining the fallibility of such metaphysical proofs, let us reiterate that the rejection of empirical proofs is *not* universal. Therefore, this kind of mathematics too is not universal, but is a specifically Christian form of ethnomathematics. Teaching this already introduces a bias against other religions and even science. The bias arises because Hinduism, Islam, Buddhism, Jainism, all accept empirical proofs. These religions are thus declared as inferior. On the other hand, this metaphysics of rejecting empirical proofs agrees with the post-Crusade Christian theology of reason which is declared as superior. Therefore, teaching formal math in schools indirectly teaches that Christianity is reliable, and that all other religious beliefs are unreliable.

Science too accepts experiments, which are empirical proofs. Using formal math to teach that such empirical proofs are "inferior" amounts to teaching that math (or rather Christian ethnomathematics) is superior to science. Why should we believe this claim of superiority? Plato deprecated the empirical on religious grounds. However, Church metaphysics deprecates empirical proofs for a good reason: accepting empirical proof would immediately expose numerous church beliefs as falsehoods. The church *therefore* demands faith. But why should we be obliged to believe what benefits the church?

We cannot accept this claim of "superiority" just as a matter of blind faith the way church followers and formal mathematicians do. If the justification for teaching formal math is based solely on the religious beliefs of Plato or the church, we cannot accept that. Teaching such beliefs amounts to religious propaganda. Therefore, it is unconstitutional to teach formal math as a compulsory subject in public schools. In a secular country like India, we are constitutionally bound to do the exact opposite of what Plato recommended, and the West practised for centuries under church domination. That is, we must teach mathematics in a secular way solely for its practical value.

The myth of Euclid and the fallibility of metaphysical proofs

Westerns have long boasted of their "superiority" on the silliest imaginable grounds like the color of the skin. So we need to ask: is this sort of metaphysical proof really "superior" and infallible? Of course not. Indeed, the fallibility of these metaphysical proofs can be seen in a very easy way. On Western mythology, this sort of metaphysical proof supposedly originated with Euclid and the book *Elements* he supposedly wrote. (This Euclid is a typical church concoction, and no one has claimed my

10 C. K. Raju, "Computers, Mathematics Education, and the Alternative Epistemology of the Calculus in the YuktiBhâsâ", *Philosophy East and West*, **51**(3) (2001) pp. 325–362. http://ckraju.net/papers/Hawaii.pdf.

prize of Rs 2 lakhs for serious evidence about Euclid.[11]) For centuries, the West regarded the book *Elements* as the model of metaphysical proof.

Laughably, Western academics (all clergymen then) were so blinded by this faith that none of them noticed the elementary fact that the very 1st proposition of the *Elements* uses an empirical proof. The *Elements*, as its name suggests is an elementary book, and its 1st proposition is the most elementary of all. Therefore, this persistent error made by Western academics shows that metaphysical proofs are completely unreliable, and are far more fallible than empirical proofs, since it is a fact that errors in the most elementary deductive proofs have gone unnoticed for 700 years. And this is just one example. In fact, the book *Elements* is a book on mathesis which was just crudely reinterpreted by the church as a book about rational persuasion.

A chain is only as strong as its weakest link. The 4th proposition of the *Elements* too uses an empirical proof, and is critical to the rest of the book. So if empirical proofs are weak but are used in one place why not use them everywhere? Why not prove the Pythagorean theorem empirically, as the first proposition, as was done in non-Western mathematical texts, instead of requiring 46 intermediary propositions as in the *Elements*?

This question leads us to the real story of the birth of formal mathematics which is even more hilarious. At the turn of the 20th c., Bertrand Russell and David Hilbert found a new way to answer this question. They clung to the myth of Euclid and his faith-friendly intentions of metaphysical proof, and just rejected the actual facts! They did so by the stock church technique of telling yet another story! The empirical proofs in the *Elements* were declared as "errors" made by Euclid. Accordingly, to fulfill that fictional person's purported intentions (actually the intentions of the church) they rewrote the book. This marked the hilarious birth of formal mathematics. (Ironically, Russell was a non-believer, who was tripped by church mind-control, like Nietzsche.) What is taught today in schools since 1960's is Hilbert's ("synthetic") reinterpretation of the *Elements*, where the 4th proposition (side-angle-side theorem) is turned into a postulate. This formalist reinterpretation, like the Crusading reinterpretation of the religious geometry in the *Elements,* again does not fit the actual book.[12]

Further religious biases through metaphysics

Logic

Anyway, Russell and Hilbert made math fully metaphysical and formal. This metaphysics is *not* universal, as already noted. On the contrary, once we make math fully metaphysical this allows many other sources of religious bias. For example, a second source of religious bias in formal math is the logic underlying mathematical proof. There are an infinity of possible logics, but the rational theologians of the Crusading church wrongly declared two valued "Aristotelian" logic as universal. This is factually false: the Buddhist 4-fold logic of *catuskoti* and the Jain logic of *syadavada* are NOT two-valued. Thus teaching that 2-valued logic is universal, through math, amounts to teaching a religious bias against Buddhists and Jains.[13]

11 C. K. Raju, "Towards Equity in Math Education 1: Goodbye Euclid!', *Bharatiya Samajik Chintan* **7**(4) (New Series) (2009) pp. 255–264. http://ckraju.net/papers/MathEducation1Euclid.pdf. For a video of the repeat of this announcement in front of the Malaysian Deputy Education Minister, see the video "Goodbye Euclid!" http://ckraju.net/videos/gbe1.html, and http://ckraju.net/videos/gbe2.html, http://ckraju.net/videos/gbe3.html

12 C. K. Raju, *Cultural Foundations of Mathematics*, Pearson Longman, 2007, chp 1, "Euclid and Hilbert".

13 For a non-technical account of non-Western logics, see "Postcript on rationality", chp. 9, in C. K. Raju, *The Eleven*

Can we say we choose 2-valued logic because that is the case in reality? We can, but that would not help the case for formal math. For if empirical facts are used to decide logic itself, that would make empirical proofs superior to metaphysical proofs so they can no longer be rejected as is done in formal mathematics. (Incidentally, even empirically, 2-valued logic is not the only possibility as in natural language. Even in current science, quantum logic is not 2-valued.) If we change the underlying logic, the theorems of mathematics would change: for example, with *catuskoti* or quantum logic some proofs by contradiction may fail. Therefore, proving formal mathematical theorems is a mindless activity, for the theorems of mathematics are hardly eternal truths as Europeans superstitiously believed them to be: on the contrary they are at best cultural truths, relative to both logic and postulates.

Postulates and the metaphysics of infinity

A third source of religious bias in formal math is in the postulates. To prove even a simple thing like 2+2=4, formal math brings in Peano's postulates. Those postulates involve a metaphysics of infinity, in the attempt to make math "perfect" (since "eternally true"). Hence, a computer, which can only do finite things, can never do Peano arithmetic. The postulates for formal real numbers involve a bias against the atomistic beliefs of Naiyayikas and al Ashari, for example.

In principle, formal math could begin with any postulates, but students are never told this, nor allowed to use their own postulates: they are forced to follow what influential Western mathematicians have decided. Now, infinity can be conceived of in infinitely many different ways, but the particular metaphysics of infinity used in formal math is aligned to the church theology of eternity. Indeed, this was the source of the first creationist controversy. "Pagans" like Proclus thought that eternity must be cyclic, as in the symbol for infinity, ∞, which represents quasi-cyclic time or the uroburos or a snake eating its own tail. This "cyclic" view of time conflicted with the church view of creation a finite time ago; it interfered with the metaphysical notion of soul the church promoted. This led to the first creationist controversy over infinity, in the 6th c., with John Philoponus trying to refute Proclus.

More recently, this metaphysics of infinity has been used to reassert creation as in Stephen Hawking's singularity theory, which claims a singularity (an infinity of some sort) to assert the Christian view of one-time creation. As elaborated by Tipler, this "singularity" allows "physicists to prove the truth of Judeo-Christian theology by calculation". It is incorrect to dismiss Tipler as a crank since he has published on this very issue in the journal *Nature*, the publishers of which also published his book. On the contrary, this is clearly a case of organized church propaganda through the medium of science.[14] The demand to trust publishers as the benchmark of science lays the foundation for such propaganda. This propaganda also involves the related "science fiction" as in the Hollywood film Matrix.

Interim Summary

To summarise, mathematics is not universal and was done empirically in the non-West. The West conceived of mathematics in religious terms since Plato, and turned it into a metaphysical means of persuasion after the Crusades. The metaphysics of formal math is not universal, but is religiously biased because (a) it rejects empirical proof (accepted by science and all religions except Christianity), (b) it uses only 2-valued logic (rejected by Buddhists and Jains), and (c) it uses a biased system of

Pictures of Time, Sage, 2003. Another quick account is in the article on "Logic" for the *Encyclopedia of Non-Western Science, Technology, and Medicine*, Springer, 2008, available at http://ckraju.net/papers/Nonwestern-logic.pdf.

14 C. K. Raju, *The Eleven Pictures of Time*, Sage, 2003. For a quick popular account, see "The Christian propaganda in Stephen Hawking", *Daily News and Analysis*, 16 Jan 2011, p. 9, archived at http://ckraju.net/press/2011/Hawking-review-dna-16-Jan-11-p9.gif.

postulates involving infinity even for a simple thing like 2+2=4. This infinity is conceptualised in a way that agrees with the church notion of eternity, and can and has been used for religious propaganda through the work of "reputable" scientists. Rejecting formal math only means rejecting the religious bias. This has nil implications for any practical applications of mathematics.

The Western misunderstanding of math as inferior

Actually, the formalist or Western understanding of mathematics is *inferior* like the Gregorian calendar. Most school math originated in the non-West for its practical value and was transmitted to the West also for its practical value. For example, arithmetic went from India to Europe via Arabs because it was better for commerce than the clumsy Roman numerals. Similarly, calculus went from India to Europe in the 16th c. because it was used to derive precise sine values useful for navigation, then the biggest scientific challenge in Europe.[15]

The math of non-Western origin which went to Europe includes most of the math taught in schools today—arithmetic, algebra, geometry, trigonometry, calculus, probability, and statistics. The hilarious story, of how Europeans persistently misunderstood the most elementary imported math, is told by the very words still in use today like zero, surd, sine and trigonometry. For example, according to OED, the word surd derives from the Latin *surdus* meaning deaf. Today the word is applied to square roots that cannot be finitely represented. So why is $\sqrt{2}$ deaf? Because the diagonal of a square was the square root, and the Sanskrit word for diagonal, *karna*, was also the word for ear. So "bad diagonal" was mistranslated as "bad ear" or deaf root! Again, "zero" comes from the Arabic "sifr" or cypher meaning a mysterious code. The word sine comes from the Arabic word for pocket (*jaib*) a misreading of *jiba* from the Sanskrit *jya* (meaning chord).

These howlers of translation were accompanied by conceptual blunders, as in the "infallible" pope Sylvester's foolish construction of apices (abacus) for the "Arabic" numerals when they were first imported from Cordoba in 976. ("Arabic" numerals were more efficient just because they used the place-value system which permitted easy ways of doing addition, subtraction, multiplication using "algorithms"; constructing an inefficient abacus for them defeated that ability to use algorithms.)[16] Similarly, the "superior" Western geometer Descartes' foolishly declared that it is "beyond the human mind" to compare curved and straight lines, a comparison needed even to measure an angle in radians.[17] Today students are hence taught the wrong definition of an angle as "something" between two straight lines. Similarly, the word "trigonometry" suggests that the notions of sine and cosine are related to the triangle (as they are taught today in schools) when, in fact, they relate to the circle. The conceptual blunders related to calculus and probability are subtler, since they relate to the metaphysics of infinite sums, called limits. These blunders are explained elsewhere.[18]

As in the case of geometry, this conceptual misunderstanding of imported math was compounded in the West by making imported math "theologically correct" *both* as regards its historical origins and its

15 C. K. Raju, *Cultural Foundations of Mathematics: the nature of mathematical proof and the transmission of the calculus from India to Europe in the 16th c.*, Pearson Longman, 2007. http://IndianCalculus.info/ . For a quick summary see "Cultural Foundations of Mathematics", *Ghadar Jari Hai*, **2**(1), 2007, pp. 26-29. http://ckraju.net/papers/GJH-book-review.pdf.

16 For a picture of Sylvester's abacus, see *Euclid and Jesus*, cited above.

17 R. Descartes, *The Geometry*, trans. David Eugene and Marcia L. Latham, Encyclopedia Britannica, Chicago, 1996, Book 2, p. 544. See also, C. K. Raju, "Towards Equity in Math Education 2. The Indian Rope Trick", *Bharatiya Samajik Chintan* (New Series) 7 (4) (2009) pp. 265–269.

18 For a quick account see C. K. Raju, "Teaching mathematics with a different philosophy. Part 1: Formal mathematics as biased metaphysics." *Science and Culture* **77** (7-8) (2011) pp. 274–279. http://www.scienceandculture-isna.org/July-aug-2011/03%20C%20K%20Raju.pdf.

content. “Euclid” was hardly an isolated case of history being falsified by the church. For example, students today are taught that the calculus was invented by Newton and Leibniz, when the church itself was directly instrumental in translating and sending calculus texts from India to Europe through its first mission in India in Cochin. Similarly, the *content* of mathematics was aligned to church dogma. For example, the infinite sums in calculus were given a metaphysical coating to make them “perfect”, and bring them in accord with the European superstition that mathematics contains eternal truths and hence must be “perfect”. This was initially done in some foolish ways like fluxions which Newton thought were the answer to Descartes' objection.[19] Then, in the usual manner of the church, which declares everything it does as “superior”, Macaulay used this false history (e.g. of Newton) to declare the Western achievement in math and science as “immesurably superior”. It was this wrong and inferior (but “theologically correct”) understanding of mathematics which was given back to us as a “superior” form of math, and globalised by colonial education which enslaved us. Today we are told to follow this “international standard” to perpetuate colonial domination of the mind.

Some people have the doubt that “it works” so why change it? What “works” in mathematics today is the imported practical techniques, not the metaphysical coating which was added to it in the West. For example, elementary arithmetic works for commerce, as it did thousands of years ago, and Peano's postulates or set theory are completely irrelevant for this practical purpose. Again, to send a man to the moon, ISRO and NASA still numerically solve differential equations, as Aryabhata did 1500 years ago (though with some refinements) and the notion of limits “taught” in school texts is an irrelevant superstructure. The demand is for a critical rejection: if something does work better, in the sense of offering better practical value, we should accept it.

Specifically, we cannot say that “it works” therefore we should maintain *status quo*. What works is the practical mathematics which went from the non-West to the West not the church metaphysics which was imposed on it in the West. We are not obliged to accept a package deal of metaphysics with practical value: we can keep the practical value and reject all the useless metaphysics. Thus, most students study math for its practical application to science and engineering, etc., all of which accept empirical proofs, so accepting empirical proofs in math would not harm any of its practical value. This one step of accepting empirical proofs is sufficient to reject all formal mathematics.

Is there an alternative? (and what difference does it make?)

An alternative which does exactly that has been demonstrated through teaching experiments. Incidentally, this alternative has nothing to do with the so-called “Vedic mathematics” (which has nothing to do with the Veda-s). Nor does it involve advocacy of any ethnomathematics. Rather, since formal mathematics is just an offshoot of Christian ethnomathematics, the demand is to stop teaching formal mathematics by falsely declaring it universal or superior.

As simple examples of alternatives, recall Descartes’ confusion that it is beyond the human mind to measure the ratio of curved and straight lines. This confusion is strengthened in the minds of school children today, by the rituals associated with mathematics teaching. Thus, the length of a curved line cannot be measured with any instrument in the ritualistic compass box thrust upon children in school. (This is ritualistic because most people don’t even know the function of various implements in it, such as setsquares.) The length of a curved line can, however, be measured with a flexible string, as taught in India since the days of the *sulba sutra* (aphorisms on the string). The string, incidentally, is an eco-friendly substitute for the entire compass box: but current education is all about teaching students to

19 For as more detailed account of the European debate over fluxions, see *Cultural Foundations of Mathematics*, cited above, chp. 9, “Number representations in calculus, algorismus, and computers”.

blindly imitate the West, therefore no change can be made in it against the West.

Similarly, there is increased conceptual clarity in arithmetic. To know that 2+2=4, one is no longer required to know a particular metaphysics of infinity wrapped in Peano's axioms. One can understand the number 2 empirically in the ordinary way, just as one understands abstractions like the word dog by pointing to several instances of dogs. This is made quite precise using the philosophy of zeroism which accords with everyday practice: one orange is *never* an exact replica of another, but we don't care about the fine differences in practice. When we do care (e.g. if one is big and the other is small) we adopt a different empirical model (such as weighing them, and changing the mathematical model from integers to fractions). There is no need anywhere for the church myth of "perfect" mathematics.

This ease and conceptual clarity in math becomes even more pronounced with more advanced topics like calculus, probability and statistics.[20] The alternative here is again built around zeroism, a realistic philosophy, which is a slight refinement of the traditional philosophy of non-Western math (and accepts empirical proofs). It also handles infinity in the usual mundane way. Thus, some algorithms, such as the square root algorithm, need not terminate in a finite number of steps, but the mundane way of dealing with this "infinity" is to carry out the *process* of square-root extraction only as far as is practically needed. Zeroism accepts imperfect representations. (The diagonal of a square is something visible and empirically measurable.) Zeroism rejects, as *erroneous*, the claims of formal math which seeks a "perfect" (but metaphysical) representation of this entire infinity, and does so by permitting mathematicians to metaphysically perform supertasks (infinite tasks, infinite sums). Eliminating that erroneous metaphysics, eliminates the religious bias in math. This also makes math easier and hence enables students to do harder math problems.[21] This has been demonstrated through teaching experiments on "calculus without limits" with 8 groups in 5 universities in 3 countries.[22]

Making math easy means that students can learn *more* than is usually taught in, say, present-day calculus courses. This increase in mathematical skills too has been demonstrated, such as the ability of high-school children to work with non-elementary elliptic functions or solve complicated problems of ballistics with air resistance.

Secondly, and less obviously, the religiously biased metaphysics of infinity in formal math has crept into the content of science. Hawking's predecessor Newton attempted to make the calculus "perfect", and that was the very reason why his physics failed.[23] Correcting the misunderstanding of calculus by people like Newton and Hawking leads also to an improved physics[24] but that cannot be readily

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20 For the problem with the current definition of probability (where the notion of limits fails), see C. K. Raju, "Probability in Ancient India", chp. 37 in *Handbook of the Philosophy of Science, vol 7. Philosophy of Statistics*, ed, Dov M. Gabbay, Paul Thagard and John Woods. Elsevier, 2011, pp. 1175-1196 (http://www.ckraju.net/papers/Probability-in-Ancient-India.pdf.

21 C. K. Raju, "Time: what is it that it can be measured", *Science and Education* **15** (2006) pp. 537-551. http://link.springer.com/article/10.1007%2Fs11191-005-5287-z#page-1 and http://ckraju.net/papers/ckr_pendu_1_paper.pdf.

22 C. K. Raju, "Teaching mathematics with a different philosophy. Part 2: Calculus without limits", *Science and Culture* **77** (7-8) (2011) pp. 280–85. http://www.scienceandculture-isna.org/July-aug-2011/04%20C%20K%20Raju2.pdf. See also, "Calculus without limits", paper presented at the 2nd People's Education Congress, HBCSE, Mumbai, 2010. http://ckraju.net/papers/calculus-without-limits-paper-2pce.pdf.

23 C. K. Raju, *Time: Towards a Consistent Theory*, Kluwer Academic, 1994. Fundamental Theories in Physics, vol. 65.

24 This is a complicated issue, but see, however, C. K. Raju, "Decolonising math and science". In *Decolonizing our Universities*, ed. Claude Alvares and Shad Faruqi, Citizens International and USM, Penang, 2012, chp. 13, pp. 162-195. http://ckraju.net/papers/decolonisation-paper.pdf. Video is first 34 minutes of the one at http://vimeo.com/26506961. This must be read together with, say, C. K. Raju, "Retarded gravitation theory", in: Waldyr Rodrigues Jr, Richard Kerner, Gentil O. Pires, and Carlos Pinheiro (ed.), *Sixth International School on Field Theory and Gravitation*, American Institute of Physics, New York, 2012, pp. 260-276. http://ckraju.net/papers/retarded_gravitation_theory-

explained in a non-technical way. This improvement is true not only for physics but for all fields where math is applied, for instance to social sciences like economics, where the use of an ideologically corrupted math similarly brings in various other ideological distortions in a hidden way.

What should be done? (And why it was not done till now)

This religious bias in Western/formal math (and calendar) has been exposed for the last 15 years, and the objections published in two books, and numerous scholarly and newspaper articles.[25] An alternative method of teaching mathematics differently, without its religious bias, has been evolved and tested on various groups included post-graduate math students, undergraduate students of both pure and applied math, as also non-math and social science students. Accordingly, what should be done is clear: one should go by the constitution and teach a religiously neutral mathematics.

However, that has not happened. The school texts have not changed one bit. Formal mathematicians treat this the way the church treated heresy, and remain absolutely silent on it. That is because of the power-structure in education which is stronger than the constitution! Recall that colonial education is modeled on Western education which was controlled by the church for centuries. The church had to control knowledge, since church dogma was so full of miserable falsehoods, and so easily exposed. The method of control was simple: it forced the educated to trust others, and taught them to trust the wrong people. It did that by (a) systematically instilling ignorance among the educated (so those "educated" would lack basic knowledge and be forced to seek the opinion of others, for every little thing), and (b) teaching them whom to trust (that they should trust the opinion of only Western-approved authorities and distrust all others including themselves). This way, the educated missionaries became zombies controlled by a few authorities.

That is also what colonially "education" does to people. In the case of mathematics, most colonially "educated" people feel they are too ignorant to take a decision on their own. Their "superior" education in math did not even teach them *why* 2+2=4! As students they just trusted their teachers. The teachers too don't know why they teach the math they do, they just trust the government. The ministers don't know either, they just blindly trust Western experts. This applies also to the learned judges of our constitutional court: when it comes to mathematics, they fear to pass a judgment on their own knowledge, and tend to rely on experts. Instilling this chain of blind trust allows the education system of a huge country like India to be controlled by a handful of "experts".

Just who are those experts and why should we trust them? The colonially educated are too ignorant to assess the expertise of "experts" theselves. They just blindly trust Western certification. Hence, even after supposed independence, no change can be made in our education system without Western approval. We can see this empirically: there is not even a single case in the past 50 years, where Indian texts have criticised the West, or taken the lead and departed fundamentally from a line taken in the West, or even mentioned any critique of the West in the texts. The colonised do even elementary math and science only by blind imitation. This is empirical evidence of zombification through colonial education.

The Western certified experts are easily controlled. Anyone who knows these "experts" personally can testify to their sickeningly servile behaviour towards their Western masters who certify them, and pay

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rio.pdf, and "Functional differential equations: a new paradigm in physics", *Physics Education* (India), *29*(3), July-Sep 2013, http://physedu.in/uploads/publication/11/200/29.3.1FDEs-in-physics-part-1.pdf and *Physics Education* (India), **29**(3), July-Sep 2013, http://physedu.in/uploads/publication/11/201/29.3.2FDEs-in-physics-part-2.pdf.

25 See a more detailed list posted at http://ckraju.net/papers/Reading-list-on-history-philosophy-of-math.html.

them incentives. Is there any objective proof that they have contributed anything of practical benefit to the people of this country,[26] and are not simply the worst sort of paid traitors? These experts never even bother to explain anything publicly, because while they are servile to their masters, they accept no answerability to the vast mass of people they are instrumental in controlling.

See what they taught you! To feel ignorant even about such a simple thing as 2+2=4, and to run to the experts for intervention. Is that what you desire for your children or grandchildren: that education should instill ignorance of even why 2+2=4, and just fill them with misplaced trust in the wrong sorts of people? That the colonially educated zombies have misplaced trust in their masters is clear from the dishonest responses of some of the top-most scholars from the most "reputable" Western universities.[27]

Indeed, this church method of knowledge control ensures that any challenge to the existing system of knowledge never enters public discourse beyond the cosmetic level. For example, the EPW, a respected journal in India, participated in the debate on de-colonisation, but refused to publish an article on the need to teach religiously neutral mathematics.[28] Was the refusal justified? No, for the EPW was unable to provide even a single academic reason for rejecting the paper despite repeated requests to do so. It did not even explain whether it had referred the matter to appropriately qualified referees. It is clear, therefore, that the unstated reasons for rejection are political. It should be equally clear that those (unstated) political reasons are *not* secular, but are aligned to the same missionary position which confounds narrow Christian doctrine as somehow universal and secular, as in the way our secular Republic Day is fixed exclusively on the Christian calendar. This missionary position comes naturally to the colonially educated. That is what colonial mind control means.

The millions of students who have to suffer that religiously-biased math need to understand these church tricks of thought control and suppression which ensures that they continue to receive religiously biased instruction in church dogma along with the compulsory subjects they study during their school education. The aim of that indoctrination is not to convert students, but only to half-convert them and create a large pool of people extra-sympathetic to the church and its falsehoods. As students, they cannot contest the authority of their teachers. It is for you to intervene. If "experts" had an easy response to this critique, they would have articulated it long ago. Remaining silent for so long, despite the large cash rewards offered, is a clear sign of an inability to respond. It actually indicates dishonesty: an unwillingness to accept the truth, an unconcern for millions of students, and a concern for the hidden interests of the "experts" themselves. If they have no valid responses they should just accept the truth.

It is for you to intervene and demand honesty and transparency among the "experts" who decide your own mind set and that of your children and grandchildren. The larger interests of millions of students must be made to prevail over the narrow interests of these "experts" and their Western masters. The teaching of math in public schools should be related directly to the practical value that the student derives from that instruction: it is for you to demand that this be explained publicly. It is for you to demand transparency by forcing these "experts" to declare their conflict of interests.

If you keep quiet now, you have no one to blame except yourself for continued mental slavery. You must act now for your own freedom and that of future generations.

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26 This question of the practical contribution of formal mathematicians was publicly raised long ago, but was never answered. C. K. Raju, "Kosambi the mathematician", *Economic and Political Weekly*, **44** (20) May16–22 (2009), pp. 33–45. http://ckraju.net/papers/Kosambi-the-mathematician.pdf.

27 For more details, see "How the West lied and lost", http://ckraju.net/petition/How-the-West-lied-and-lost.pdf.

28 http://ckraju.net/papers/Teach-religiously-neutral-math.pdf.