

## **“Euclid” must fall: The “Pythagorean” “theorem” and the rant of racist and civilizational superiority**

C. K. Raju

*Indian Institute of Advanced Study*

*Rashtrapati Nivas*

*Shimla 171005*

### **Extended Abstract**

The origin and evolution of the dogma of racist superiority is analysed: it arose from an earlier dogma of religious superiority, and further mutated into the dogma of civilizational superiority which accompanied colonialism, and still persists, for example, as part of current mathematics teaching. The same false history of science, with minor variations, was used to provide the secular justification for all three claims of superiority, which are hence organically linked.

Systematically false history was first used by the church as a psychological weapon, ever since the fifth century Orosius. During the Crusades this false history went ballistic. Many Arabic texts were captured by or imported into the Christian parts of Europe at this time, but the origin of all scientific knowledge in these Arabic texts was indiscriminately attributed to the early Greeks, real or imaginary, then regarded as the sole “friends of Christians” (religious superiority), later as Whites (racist superiority), and finally as West (civilizational superiority). While the use of the genocidal “dogma of Christian discovery” to appropriate land (three whole continents), and to appropriate labor (by morally/legally justifying slavery of Blacks), is somewhat understood, its use to appropriate indigenous scientific knowledge (e.g. “Copernicus discovered heliocentricity”, “Newton discovered calculus”), and erect a false history of science, is very little understood. Consequently, any attempt to fight racist superiority would be fruitless, without simultaneously contesting the claim of civilizational superiority, for which it is first necessary to demolish the related false history of science.

A key aspect of this false history of science is the false claim that the Greek Pythagoras proved a theorem, unknown to early Egyptians, Maya, Indians etc. This false history is tied to a bad philosophy: through the claim that the West invented a civilizational “superior” form of mathematics—formal mathematics—which too everyone else ought to imitate, as school children are currently taught to do throughout the world. (In reality, the early Greeks were superstitious, and could not have done any science also because they were pitifully backward in mathematics, as established by the non-textual evidence of their laughably inferior calendar. That inferiority arose from ignorance of elementary fractions, an ignorance which persisted into the 16<sup>th</sup> c., as evidenced from the inferior Gregorian calendar in current use worldwide.)

Regarding Pythagoras, there is nil evidence either for his existence or for the claim that he proved some kind of geometric theorem. This is not mere absence of evidence, there is ample *counter* evidence that Pythagoreans were *not* interested in formal proofs of theorems, but were interested in geometry (Egyptian mystery geometry), solely because of its religious connections, as described by Plato.

Western historians try to “save the story” using the technique of myth jumping: the myth of Pythagoras is defended by jumping to another myth, the myth of “Euclid” as “evidence”. There is, however, no primary evidence either for “Euclid”, or that he authored the text today attributed to him, or that the text was written anywhere near the date attributed to “Euclid”, or that the author was a white male. Once again, there is ample counter evidence, that the book *Elements* was authored by another person, 700 years after the purported date of Euclid, that she was a black woman from Alexandria, in Africa, and that she authored the book because of the religious connection of its geometry to the soul, involving a notion of the soul which was at just that time cursed and banned by the church.

When the myth of Euclid collapses, Western historians try to “save the story” by jumping to the myth of the book purportedly written by Euclid. According to the myth, the key feature of the book is its supposed use of “superior” axiomatic proofs (as distinct from empirical proofs accepted in all other cultures). Under church hegemony, all Western scholars gullibly believed this myth for seven centuries, without carefully reading the actual book. However, at the end of the 19<sup>th</sup> century, when church hegemony waned, it was pointed out by Dedekind, Russell, and Hilbert that the myth is

false: the book does not have a single formal proof in it, from its first proposition to its last. In fact, the most superficial reading of the book shows that it is full of diagrams which are irrelevant to formal proof, but are a characteristic feature of Egyptian mystery geometry. This points to the religious geometry of the book, as explicitly explained by Proclus.

In fact, the book, when it first came to the Christian part of Europe, around 1125, was just brazenly “reinterpreted” by the church in support of its Crusading “theology of reason”, which required metaphysical (axiomatic) reasoning (prohibiting the use of facts which are fatal to church dogmas).

It is over a century since the myth that the “Euclid” *book* has has axiomatic proofs was publicly exposed as false. Amazingly, however, Western historians like Needham, Gillings, and Clagett, will still not read the book, but keep re-asserting the myth that there are axiomatic proofs in the book, and offer this false myth as a sure proof of Western civilizational superiority! This qualifies them for the title of “Greedidiots”, people who steadfastly ignore facts, and stick to church and racist myths about Greeks. This applies also to Lefkowitz, who in *Not of Africa*, tries to save the myth of Greek origins by advancing mathematically laughable claims.

More importantly, however, though they rejected the *myth* of axiomatic proofs in “Euclid”, Russell and Hilbert along with all other Western scholars, kept believing in the *superstition* that axiomatic proofs are “superior” to empirical proofs. This purported mathematical “superiority” was never publicly debated, just as racist superiority was never publicly debated.

Actually, a mathematically proved formal theorem is INFERIOR, since it may not even be valid knowledge. For example, the Pythagorean theorem is NOT valid knowledge for triangles drawn on the curved surface of the earth, or for that matter anywhere in curved space (with the sides of the triangle being straight lines or the shortest distance between two points). It is a bad defence to say the theorem is “actually” an approximation: first the purported superiority of a “theorem” arises from the claim that it is exact knowledge, so this claim of “exact” knowledge, and the related claim of “superiority” must first be publicly trashed. Secondly, an approximation is of no use without an error estimate, and the theorem provides no estimate of the error (since it pretends to be exact knowledge). That a mere theorem is inferior knowledge came out clearly in the persistent navigational problem of Europe from the 16<sup>th</sup> to the 18<sup>th</sup> century, resulting in the loss of thousands of lives. As such, the two “Pythagorean” *calculations*, as used in ancient India (and probably also in ancient Egypt and Iraq) are superior, as I have earlier explained.

In fact, contrary to the church superstition that deduction is infallible, formal deductive proofs (minus facts) are certainly fallible: everyone from students to authorities can and does turn in erroneous formal proofs. The only way to validate these proofs is to check them repeatedly (induction) or else to rely on authority; in either case deductive proofs are MORE fallible than inductive or empirical proofs. The game of chess demonstrates that errors in a complex task of deduction occur very frequently (almost always), so that deductive proofs are inferior to empirical proofs.

To do away with the persistence of racism, and the related sticky claims of civilizational superiority, it is necessary to cleanse the minds of our children by revising both the teaching of history of science as also the teaching of mathematics in schools. This is not mere wishful thinking, concrete courses have been tried out and successfully tested both at the school and university level, in both the history and philosophy of science, and in alternative teaching of mathematics. Even a school text has been prepared on string geometry, as traditionally used in both India and Africa.

The question now is solely of the political willingness of the colonized to confront the West, over its racist beliefs, which will not go away without a reform of the church education system brought by colonialism.

## Introduction: false claims of superiority, and their roots in a false history of science

It took centuries to end the American tradition of black slavery, which was followed by segregation, and US support for apartheid, which ended three decades ago. But we keep witnessing periodic outbursts against racism, for it still persists. Why? Because racism has deep cultural roots in religious dogmas. The Bible defence of slavery<sup>1</sup> is no longer so explicitly asserted, as it was asserted from the 15<sup>th</sup> to the 19<sup>th</sup> c. Brazen assertions of racist superiority too have finally stopped after the fall of apartheid, a mere three decades ago.

However, the virus persists more covertly: the long held racist dogma of racial superiority is not dead, it has merely mutated into the colonial dogma of civilizational superiority. That latter dogma is still openly propagated by our colonial/church education system, through our present-day schools and universities, especially, and unexpectedly, through mathematics education, compulsory at school level, and deemed essential for science.

The dogmas of racist and civilizational superiority, connect organically to each other and to the earlier dogma of religious superiority. All three dogmas of superiority — religious, racist, and civilizational superiority — were propped-up using the same false and chauvinistic history of science, which appropriates all science to the West/Whites. On this false history, scientific knowledge supposedly dawned with the Greeks, and was then carried forward by post-“renaissance” Europe.

This false history was first systematically concocted as Christian-chauvinist history by the Crusading church, to support its claim of religious superiority. During the Crusades, no one questioned the extreme fantasy of a Greek origin of all scientific knowledge<sup>2</sup> in captured Arabic books. Since the “Greeks” were then regarded as the sole “friends of Christians”,<sup>3</sup> those Arabic texts were deemed a “Christian inheritance” and appropriated, and mass translated into Latin, starting 1125. In the 15<sup>th</sup> c., Byzantine Greek texts (together with some forged remarks added by the priests of the Greek church who copied them) were seen as proof of the Greek fantasy, in the absence of any primary sources or original Greek texts. Of course, it is well known that during the “Golden Age of Islam”, numerous texts were translated FROM Arabic TO Byzantine Greek, so that Byzantine Greek texts need have no relationship with any early Greek texts, for the knowledge in those Arabic texts came from far and wide including India and China, and was actively developed by Arabs.

Subsequently, in the “Age of Discovery”, the genocidal “Doctrine of Christian Discovery”<sup>4</sup> was used to appropriate both land, labour AND knowledge from around the world to Christians. While the appropriation of land (three whole continents North America, South America, Australia, from which the indigenous populations were exterminated), is manifest, as was the appropriation of labour from a fourth continent (slavery of African blacks), the appropriation of knowledge through this doctrine of “discovery” is still little understood, as in the claims that Vasco da Gama

---

1 Josiah Priest, *Bible Defence of Slavery: To Which Is Added a Faithful Exposition of That System of Pseudo Philanthropy, Or Fanaticism, Modern Abolitionism ... and Proposing a Plan of National Colonization* (W.S. Brown, 1851).

2 C. K. Raju, *Is Science Western in Origin?*, Dissenting Knowledges Pamphlet Series (Multiversity, 2009).

3 C. K. Raju, ‘Not out of Greece’, *Frontier Weekly*, 28 January 2014, <http://www.frontierweekly.com/archive/vol-number/vol-47-2014-15/47-25/47-25-Not%20Out%20Of%20Greece.html>; C. K. Raju, ‘Not out of Greece (5 Lectures)’ (University of South Africa, Pretoria, January 2017), <http://ckraju.net/unisa>.

4 C. K. Raju, ‘The Meaning of Christian “Discovery”’, *Frontier Weekly* 47, no. 29 (2015): 25–31, <http://www.frontierweekly.com/archive/vol-number/vol-47-2014-15/47-29/47-29-The%20Meaning%20of%20Christian%20Discovery.html>.

“discovered” India or that Newton “discovered” calculus.<sup>5</sup> The formal claim is still taught in African schools, while the latter is taught worldwide, and anything to the contrary is projected as chauvinism.

This claim of *religious* superiority, through Christian discovery, mutated into a claim of *racist* superiority after the transatlantic slave trade, when many black slaves converted to Christianity. This made it difficult to morally justify the continued enslavement of Blacks, on the earlier religious grounds that they were non-Christian, though the Bible defence of slavery persisted until the declaration of emancipation, along with claims such as the curse of Kam. Side by side, the false history which appropriated all scientific knowledge to Whites was used by philosophers like Kant<sup>6</sup> to provide a secular justification for slavery on the ground that Blacks were not creative. This involved a minor change in the earlier categories: the Greeks were now declared Whites as was the case with the post-renaissance Europeans. They are still depicted as white-skinned in Wikipedia images, as also in Indian school texts. The inconvenient fact that most purported scientific contributions of “Greeks” were traced to Black Athena: Alexandria in Egypt, in Africa, where the default skin color is black, was simply ignored. In fact, is it still taboo to assert, as I have done, that Euclid was a black woman.<sup>7</sup>

Colonialism replaced slavery since colonialism was more profitable.<sup>8</sup> The attempt to defend profits, led to various hypocritical moral outbursts against slavery. The hypocrisy is clear from the fact that there was no reparation of any kind ever done or even suggested. It was never even acknowledged that a long series of popes committed crimes against humanity by not rescinding earlier Papal bulls which enjoined genocide and slavery of non-Christians. To the contrary, slavery was followed by segregation, and apartheid. Anyway, even the secular defence of racism was undermined by the bogus Aryan race conjecture inspired by William Jones’ thesis of 1786,<sup>9</sup> which led to the widespread belief that many among the colonized were of the same race as the colonizer.

But colonizers recognized the earlier false history of science as a key source of (soft) power, which they needed to offset their military weakness. Accordingly, colonial historians retained that false history by a mere change of categories. The claim of racist superiority mutated into a claim of civilizational superiority: both early Greeks and post-renaissance Europeans were now depicted as part of the nebulous civilizational category “West”, though historians such as Toynbee<sup>10</sup> gave that “civilizational” category a religious core, linked to Western Christianity, prevalent in Western Europe which exclusively participated in colonisation.

So much for false history of science.

---

5 C. K. Raju, *Cultural Foundations of Mathematics: The Nature of Mathematical Proof and the Transmission of Calculus from India to Europe in the 16th c, CE* (Pearson Longman, 2007); C. K. Raju, ‘Marx and Mathematics. 2: “Discovery” of Calculus’, *Frontier Weekly*, 31 August 2020, <https://www.frontierweekly.com/views/aug-20/31-8-20-Marx%20and%20mathematics-2.html>.

6 Immanuel Kant, *Observations on the Feeling of the Beautiful and the Sublime and Other Writings*, ed. P. Frierson and P. Guyer (Cambridge: Cambridge University Press, 2011); C. Neugebauer, ‘The Racism of Kant and Hegel.’, in *Indigenous Thinkers and Modern Debate on African Philosophy*, ed. H. Odera Oruka (Leiden: Brill, 1990), 259–72.

7 C. K. Raju, ‘Was Euclid A Black Woman? Sorting Through The False History And Bad Philosophy Of Mathematics | Science 2.0’, 24 October 2016, [https://www.science20.com/the\\_conversation/was\\_euclid\\_a\\_black\\_woman\\_sorting\\_through\\_the\\_false\\_history\\_and\\_bad\\_philosophy\\_of\\_mathematics-180581](https://www.science20.com/the_conversation/was_euclid_a_black_woman_sorting_through_the_false_history_and_bad_philosophy_of_mathematics-180581); C. K. Raju, ‘Greediots and Pythagoras. 3: Was Euclid a Black Woman?’, 18 March 2020, <http://ckraju.net/blog/?p=189>.

8 Eric A. Williams, *Capitalism and Slavery* (University of North Carolina Press, Chapel Hill, 1944). There was also the issue that Europe needed to export its poor to prevent the revolts they threatened, such as the French Revolution. But, slavery depressed the wages of these exported poor people, ultimately resulting in the civil war in US.

9 Sir W. Jones, ‘The Third Anniversary Discourse, Delivered 2d February, 1786: On the Hindus’’, in *The Works of Sit William Jones*, vol. 1 (London: G. G. and J. Robinson, 1799), 19–34.

10 Arnold Toynbee, *A Study of History* (Oxford University Press, 1957).

## How false history connects to bad philosophy

A key trick which has gone unnoticed is that this false history results in a bad philosophy which asserts that only the Whites/West did something “superior” in mathematics and science. Since it is “superior” it is something which everyone else ought to imitate today. This claim of the “superiority” of Western ethno-mathematics is at the core of mathematics teaching today, and is the reason why mathematics becomes such an obstacle to learning, because of the confused philosophical beliefs underlying Western ethno-mathematics.

However, any public scrutiny of that false history or the related bad philosophy is taboo. In an article, a few years ago, I pointed out the bogusness of that history of science:<sup>11</sup> Greeks were manifestly inferior to black Egyptians in mathematics and science as shown by the non-textual evidence of the grossly inaccurate Greek calendar. Though Romans laughed at the Greeks for their inaccurate calendar, the inaccuracy persisted with the succeeding Roman calendar, and its Julian AND Gregorian reforms,<sup>12</sup> all because of ignorance of elementary fractions, well-known to the early Egyptians. No one responded intellectually to this argument, that early Greeks and Europeans even in the 16<sup>th</sup> c. were so mathematically backward that the Gregorian reform used the primitive technique of leap years instead of precise fractions.<sup>13</sup> Lacking an intellectual response to this compelling argument, and unable to accept the crash of their claims of superiority, the West applied authority: my article was censored in South Africa, and throughout the world, as the only way to contest it. Truth cannot be spoken if it is not approved by Whites/West.

One could laugh at the false history, except for the fact that it is still used to impose a bad philosophy of mathematics through our colonial education system which teaches everyone to imitate supposedly “superior” Western ethno-mathematics.

## “Pythagorean” “theorem” and myth jumping

Here I will first point out the utter bogusness of the oft-repeated claim that the Greeks had a formal proof of the “Pythagorean” “theorem” which Western historians assert was unknown to the Egyptians.<sup>14</sup> (Martin Bernal specifically asked me to examine this claim.) The claim that Egyptians were ignorant of the “Pythagorean” “theorem” completely ignores the non-textual evidence of engineering marvels like the pyramids. In fact, such non-textual evidence is far more reliable than the documentary “evidence” coming to us from the unreliable hands of Christian priests renowned for their manipulation of documents, through forgery and misinterpretation (e.g. “Award of Constantine” on which the Vatican is founded).

In any case, there are no contemporary primary sources establishing even the existence of Pythagoras, leave alone the claim that he proved some sort of “theorem” in some special way. This

---

11 C. K. Raju, ‘To Decolonise Math Stand up to Its False History and Bad Philosophy’, Conversation, 24 October 2016 [CENSORED]; in *Rhodes Must Fall: The Struggle to Decolonise the Racist Heart of Empire* (London: Zed Books, 2018), 265–70; also in *The Wire*, 2016, <https://thewire.in/history/to-decolonise-maths-stand-up-to-its-false-history>.

12 C. K. Raju, ‘A Tale of Two Calendars’, in *Multicultural Knowledge and the University*, ed. Claude Alvares (Penang: Multiversity, 2014), 112–19; *A Tale of Two Calendars - Dr C K Raju - India Inspires Talks* (New Delhi, 2015), <https://www.youtube.com/watch?v=MvpuC7Dg4e0&feature=youtu.be>.

13 As a consequence of this mathematical clumsiness of 16<sup>th</sup> c. Europeans, even the reformed Gregorian calendar gets the tropical year right only on a 1000 year average, and not from year to year, as required for a good calendar. Equinox still does not come on a fixed day on that calendar. How could people who didn't even know fractions do any science?

14 Richard J. Gillings, *Mathematics in the Time of the Pharaohs* (New York: Dover, 1972), 242 appendix 5, The Pythagorean Theorem in Ancient Egypt.

is not merely a case of absence of evidence, as apologists might assert. Rather, there is the counter evidence that Pythagoreans had nil interest in proving theorems and had only a religious interest in geometry. They linked geometry to the soul along the lines mentioned in Plato,<sup>15</sup> who follows Egyptian mystery geometry. But obviously, racism is all about double standards, and the mere “documented” myth of Pythagoras is “evidence” for Greek “achievements”. One can understand why the West has produced so many myths, because myths routinely substitute for evidence!

This idea of myth as a substitute for evidence is clear also from the typical tactic of myth jumping used by apologists to “save” this false Western history. When the absence of evidence for Pythagoras is pointed out, the “evidence” produced is just another myth: the myth of Euclid, plus the myth that he proved some kind of theorem in some special axiomatic way.

## The myth of Euclid

Once again, there is no evidence for Euclid,<sup>16</sup> nor any evidence that he was a white male, as is invariably portrayed in racist history everywhere from Wikipedia to Indian school mathematics texts. Indeed, my censored article was a response to the claim that mathematics was the creation of dead white men, and to the educational recommendations that followed from that belief.

Once again, it is not mere absence of evidence, as apologists will rush to assert: there is counter evidence from Byzantine Greek texts. Those texts state that the author of the *Elements* (attributed to Euclid) was someone else,<sup>17</sup> Theon of Alexandria or came after Theon, who comes some seven centuries after the purported date of “Euclid”. We are expected to believe that the then-prevailing social circumstances of a religious war against the Egyptian notion of soul, used in Platonic and Neoplatonic geometry, made no difference to the writing of the book. In all probability, the author of the book *Elements* on Egyptian mystery geometry was Hypatia, Theon's daughter. She was a black woman since Alexandria is in Africa, and in the absence of evidence one must use the default skin color which is black.<sup>18</sup> But, of course, the golden rule of racist history is that Western myth is the sole acceptable evidence, and any facts or reasoning contrary to Western myths must be rejected

## The myth of axiomatic proofs in “Euclid’s” Elements

There is a further act of myth jumping here which involves a deep subtlety. When confronted with the lack of evidence for both Pythagoras and Euclid, apologists will often argue that there is the book (and the author does not matter). Yes, indeed, there is a book, which comes to us from around the 10th century. This book came to Europe as a result of the Crusades and was translated from Arabic to Latin around 1125 CE.

The further fact is that the church claimed this book, and used it as a text book to teach axiomatic reasoning (or metaphysical reasoning divorced from facts). This kind of metaphysical reasoning was a key political church requirement then because the church needed reasoning to be able to convert Muslims, who rejected the Bible as corrupted, and could not be converted by force (the real purpose of the Crusades, which failed). However, reasoning with facts would be fatal to church dogmas: for example, Aquinas reasoned about angels,<sup>19</sup> but, obviously, there are no facts about angels. What the church realized was that the key conflict of its dogmas was not with reason (which conflict could be managed) but with facts. (This was the time that the church actually adopted the Christian rational theology of Aquinas and his schoolmen to compete against the Islamic rational theology, or *aql-i-kalam*, propagated by, among others, Averroes.)

15 Plato, *Meno*, trans. Benjamin Jowett, <http://classics.mit.edu/Plato/meno.html>.

16 C. K. Raju, *Euclid and Jesus: How and Why the Church Changed Mathematics and Christianity across Two Religious Wars* (Penang: Multiversity and Citizens International, 2012).

17 Thomas Heath, *A History of Greek Mathematics* (Dover, New York, 1981).

18 Raju, ‘Was Euclid a Black Woman?’

19 Thomas Aquinas, *Summa Theologica*, n.d., <http://www.newadvent.org/summa/1052.htm#article3>.

It is a remarkable testimonial to Western gullibility (due to prolonged church hegemony over Europe), and complete Western intellectual bankruptcy, that this claim about axiomatic proofs in "Euclid" was uncritically accepted by all Western scholars from 1125 until the end of the 19th century, which saw a temporary decline in church hegemony. Eventually, at that time, Dedekind<sup>20</sup> pointed out that there is no axiomatic proof of even the first proposition in the *Elements*, and tried to provide an axiomatic proof resulting ultimately in the theory of "real" numbers.

Later, Bertrand Russell wrote that the proofs in "Euclid" were "a tissue of nonsense",<sup>21</sup> and David Hilbert wrote a whole book on the *Foundations of Geometry*,<sup>22</sup> to supply the axiomatic proofs missing in the book *Elements* (though this rewrite involved great violence to the actual book *Elements*).

So, the fact is, there are NO axiomatic proofs in the book *Elements* attributed to Euclid, contrary to what was so long and so foolishly believed by Western scholars. So, saying, "there is the book" is another classic case of myth jumping, these apologists are just jumping from the myth of Euclid to the myth about the book *Elements*, and deeming the myth to be strong "evidence", even if the actual book, contrary to the myth, has no axiomatic proofs as was exposed over a century ago! Saying, "the book is there" must rank as the worst imaginable apology, for these apologists never read the book themselves but uncritically imagine that no one can tell such a brazen lie about the book.

The astonishing thing is that it took all Western scholars 750 years to understand that there are no axiomatic proofs in the *Elements* when so many read it, since it was a prescribed text. The most perfunctory reading of the book shows that it is full of diagrams, which, as Russell noted are irrelevant to axiomatic proof. The *Elements* is, therefore, NOT a book on axiomatic proofs, but is a book on Egyptian mystery geometry in the Platonic tradition, since Plato explained<sup>23</sup> the value of diagrams for mathesis, or arousal of the soul to make it recollect its past lives.

This understanding of the book, as a con mystery geometry, fits in very well with the time of its real author in the fourth century when the church was waging a violent war against that pagan (= Neoplatonic) notion of the soul, which therefore had to be defended. The best tool for that was mathematics (in the sense of mathesis). As is well known, Hypatia was a Neoplatonist and hence aroused the ire of the church which lynched her. The first commentator on the book, the Neoplatonist, Proclus<sup>24</sup> explicitly explains at great length that the book *Elements* (of geometry) is about mathesis and arousing the soul, to lead to "the blessed life".

## The church appropriation of Euclid

As already pointed out, when the *Elements* first came to Europe, during the Crusades, the church appropriated it, since the church then had a great political need for textual sources of "reason". As also already explained, the church political requirement was for reasoning without facts, or axiomatic reasoning. Through centuries of "adjusting" the Bible to meet their immediate political requirements, church priests had gained mastery over the manipulation and reinterpretation of texts.

Therefore, to fit the text to their political purpose, they simply reinterpreted the book *Elements*, as a book about metaphysical reasoning divorced from facts. The fact that for 750 years no Western

---

20 C. K. Raju, 'Marx and Mathematics-1: Marx and the Calculus', *Frontier Weekly*, 28 August 2020, <https://www.frontierweekly.com/views/aug-20/28-8-20-Marx%20and%20mathematics-1.html>.

21 B. Russell, 'The Teaching of Euclid', *The Mathematical Gazette* 2, no. 33 (1902): 165–67.

22 David Hilbert, *The Foundations of Geometry* (The Open Court Publishing Co., La Salle, 1950).

23 Plato, *Phaedo*, trans. B. Jowett, <http://classics.mit.edu/Plato/phaedo.html>.

24 Proclus, *A Commentary on the First Book of Euclid's Elements*, trans. Glenn R. Morrow (Princeton, New Jersey: Princeton University Press, 1970), 52.

scholar questioned this interpretation is a tribute to the church hegemony over the Western mind. Far be it from any Western scholar to be skeptical enough to ask due to what social circumstances anybody in the -3rd century CE would write a book which so well-suited the political requirements of the crusading church many centuries later. (And the colonized are told (officially by the nationalistic Indian government) that they must uncritically accept everything about the history of mathematics that is written in Western textbooks in mathematics.)

But perhaps there is something even more astonishing about Western gullibility. Though Dedekind, Russell, and Hilbert, all pointed out the (church) myth of axiomatic proofs in "Euclid's" *Elements*, they all accepted the church *superstition* that axiomatic proofs are infallible hence "superior" to empirical proofs, which are fallible. In fact, it is obvious that axiomatic/deductive proofs are far MORE fallible than empirical proofs, hence the people's philosophers from India rejected deduction as unreliable thousands of years before the church declared it as infallible!

Like all church dogmas, this one too is contrary to the most elementary observation. At any mathematics teacher knows students of mathematics frequently make mistakes in deductive proofs, I briefly explain my arguments<sup>25</sup> explaining why there are frequent errors in deductive proofs, of complex problems such as the Riemann hypothesis, or even a game of chess. These errors in deducted proofs are far more frequent than errors in empirical proofs. In fact, unlike the occasional error in an empirical proof a complex task of deduction almost invariably involves errors, since the human mind is more fallible than the human senses. It is no use saying that a valid deductive proof is infallible, since that is a tautology which applies equally to valid empirical proofs. The question is how does one know that a given deductive proof is actually valid. Correcting the manifest errors of deduction involves either induction (repeated re-checking) or reliance on authority, so that deduction is decidedly weaker than either induction or empirical proofs. And, of course, mathematical theorems, or deductions from metaphysical axioms about infinity, such as the Banach Tarski theorem of axiomatic set theory, are NOT valid knowledge, as explained in more detail below.

## Greediot

In fact, there is something decidedly more astonishing, about the extreme gullibility of Western scholars, and their colonial proteges. This is that, even after the public exposure of the absence of axiomatic proofs in "Euclid", "respected" Western historians like Heath, Gillings, Needham,<sup>26</sup> and Claggett,<sup>27</sup> right up to the late 20th century, and Indian school texts in the 21st century, continue to assert that the "Pythagorean" "theorem" is a formal mathematical theorem of "Euclid". The simple fact to the contrary is there was no formal mathematical proof of the Pythagorean theorem before the 20th century. Greediot is the only word for people who so persistently stick to myths about Greeks and sideline the counter evidence. This term "Greediot" certainly applies to Gillings, and Claggett, and it needs to be applied even to the most respected among them, namely Needham. Western historians will forever stick to this claim because repeating a known lie is their only way to establish the claim of civilizational superiority which substituted racism, and its claim of racist superiority.

But the ignoble prize for Greedioty should go to the historian Lefkowitz who is indignant that some people have been trying to demolish the myths about Greek achievements in mathematics and science. Accordingly, she has written a book, *Not out of Africa*<sup>28</sup> to contest some of the previous

25 C. K. Raju, 'Decolonising Mathematics', *AlterNation* 25, no. 2 (2018): 12–43b, <https://doi.org/10.29086/2519-5476/2018/v25n2a2>.

26 J. Needham, *The Shorter Science and Civilization in China*, vol. 2 (Cambridge University Press, 1981).

27 M. Claggett, *Ancient Egyptian Science: A Source Book, Vol. 3 Ancient Egyptian Mathematics* (American Philosophical Society, Philadelphia, 1999).

28 Mary Lefkowitz, *Not out of Africa* (New York: Basic Books, 1996).

attempts such as those of James,<sup>29</sup> Diop,<sup>30</sup> and Bernal,<sup>31</sup> against the myths of Greek achievement in mathematics and science. Her version of the technique of using "Western myth as evidence" is simplicity itself: she simply cites an "authoritative" Western historian who has already done that! This plays on the psychology of the colonized, who are persistently taught that *only* Western sources are reliable, a cardinal principle of Wikipedia even today.

For example, as Diop correctly pointed out, the volumes of the sphere and the cylinder were known to Egyptians and are found in the Ahmes (Rhind) papyrus,<sup>32</sup> which is long before Archimedes (who is credited with a book on the Sphere and Cylinder<sup>33</sup> based on 16<sup>th</sup> c. accretive Byzantine<sup>34</sup> sources!) Lefkowitz is anxious to assert Greek "superiority", and to establish that Archimedes did something "superior". To this end she cites the authority of Palter, and then goes on to assert (*Not out of Africa*, p. 153) that

"Archimedes determined that the volume of the cylinder was  $\frac{3}{2}$  the area of the sphere".

This clearly shows that Lefkowitz is mathematically and scientifically illiterate, and never even properly did her school math, for she is comparing volumes and areas! Noticeably, Lefkowitz's book has been highly praised by numerous closet racists, who are presumably equally illiterate, simply because it attacks Afrocentrism any which way.

This also shows the extreme extent of nonsense to which Western "historians" will go, to defend their absurd claim of the purported superiority of "Greeks", to whom the church method of metaphysical reasoning in mathematics has been wrongly attributed. That claim is an essential link in the propaganda of civilizational superiority, and the resulting globalisation of colonial education. Therefore, it is necessary to repeatedly trample on such claims, and expose them, for they are at the core of the beliefs which lead to the persistence of racism and colonialism.

## **"Pythagorean" theorem versus the "Pythagorean" calculations**

Finally, let note that the term "theorem" is critical to the propaganda of civilizational superiority, hence it is today asserted that mathematics is solely about proving theorems, as is the case in formal mathematics (Western ethno-mathematics). As explained above, formal reasoning, or metaphysical reasoning, without facts, is an invention of the crusading church to bolster its theology of reason. Since the church concern was solely with conversion, or with persuading people, hence with proof, proof was declared as the sole purpose of mathematics!

Formal, or church mathematics is confounded with Egyptian mystery mathematics of Plato, and Plato is cited to assert that the practical concerns of mathematics are of little value, a matter on which Hardy<sup>35</sup> dwelt at great length. This, of course, hides the fact that Plato was concerned with the effect of mathematics, like music, on the soul, but that notion of soul was cursed by the church,

---

29 George James, *Stolen Legacy*, ed. Molefi K. Asante (African American Images, 2001).

30 Cheikh Anta Diop, *African Origin of Civilization: Myth or Reality*, ed. Mercer Cook (Chicago: Lawrence Hill and Co., 1974).

31 Martin Bernal, *Black Athena: The Afroasiatic Roots of Classical Civilization.*, vol. 1: The fabrication of ancient Greece (London: Free Association Books, 1987).

32 Clagett, *Ancient Egyptian Science: A Source Book, Vol. 3 Ancient Egyptian Mathematics*.

33 T.L. Heath, trans., *On the Sphere and the Cylinder in The Works of Archimedes*, vol. 10, Great Books of the Western World (Chicago: Encyclopaedia Britannica, 1996).

34 D.H. Fowler, 'Logistic and Fractions in Early Greek Mathematics"', in *Classics in the History of Greek Mathematics*, ed. Jean Christianidis, Boston Studies in the Philosophy and History of Science (Springer, 2004), 367–80, 373.

35 G.H. Hardy, *A Mathematician's Apology* (University of Alberta Mathematical Sciences Society, 1940), <http://www.math.ualberta.ca/mss/>.

and has no place in formal (church) mathematics. As such, formal mathematics also has no relation to soul arousal (or aesthetic value): it is manifestly ugly metaphysics.

None of these facts are publicly explained to the vast number of colonized students who study mathematics solely for its practical applications, to science and engineering. But the practical applications of mathematics are often deprecated, as something inferior. So, what, then, is "superior"? Certainly political or religious value to the church is the least important thing to the colonized, anything else would be undoubtedly superior.

As such, it is important to discriminate between the inferior "Pythagorean" *theorem* and the superior "Pythagorean" *calculation*, required for practical applications. The Pythagorean theorem as stated in Euclid's Elements is no good for any calculation. In India long before the Pythagoreans, the proposition was stated for rectangle and its diagonal rather than a right angle triangle. We will use this form of the proposition for Gillings goes so far as to suggest that Egyptians did not know what a right angle triangle was, but as the Ahmes papyrus shows they certainly knew about the rectangle and its diagonal.

The Pythagorean *calculation* has two forms:

- (1) calculation of the diagonal from a knowledge of the sides of the rectangle
- (2) calculation of the sides from a knowledge of the diagonal and its angle with one of the sides.

The Pythagorean *calculation* is a truly superior, since one can deduce the "Euclidean" form of the Pythagorean theorem from (1), but not vice versa. To do the reverse we first need knowledge of square roots which is found in the Berlin papyrus, and in Iraq, and in India, but was unknown to early Greeks who did not have even a systematic notation for fractions.

In fact, the current mathematical term for the diagonal of the unit square is "surd" which term derives from the Latin *surdus* which means deaf and which derives from a bad translation of bad diagonal from the Sanskrit word *karna* for diagonal which also means ear, hence bad diagonal = bad ear = deaf. The second form of the "Pythagorean" calculation requires trigonometry which, too, Europeans learned from India, after the 12<sup>th</sup> c. This is clear from the fact that the word *sine* from the Latin *sinus* or fold is (as the OED informs us) from the Arabic *jaib* (=pocket) a misreading of *jiba* from the Sanskrit *jiva*.

I have already dealt with superiority of the Pythagorean calculation earlier,<sup>36</sup> and will only quickly recapitulate. Briefly, proving a theorem is of little use because a theorem is not an eternal truth as was superstitiously believed to be the case under the combined influence of Platonic and church mathematics. To the contrary, as the people's philosophers in India rightly maintained from long ago, and as formal mathematics admits, a theorem is at best a relative truth, relative to the axioms. "Relative truth" is a mere euphemism for invalid knowledge which is what a formal mathematical theorem really is. For example, the so-called "Pythagorean" theorem is NOT valid knowledge on the curved surface of the earth (and not in curved space, for that matter). Thus, it is assumed that we are speaking of a triangle consisting of straight lines, but it is impossible to draw straight lines on the curved surface of the earth: the shortest distance between two points is a curved line. Since the assumptions fail, the "truth" relative to those assumptions also fails.

The Western apologist will rush in with the apologia that the Pythagorean theorem is an approximation. But approximate knowledge is worthless without an estimate of the error: it is like telling a shipwrecked sailor in the sea that he is "approximately near" land where "approximately

---

36 C. K. Raju, 'Black Thoughts Matter: Decolonized Math, Academic Censorship, and the "Pythagorean" Proposition', *Journal of Black Studies* 48, no. 3 (2017): 256–78, <https://doi.org/10.1177%2F0021934716688311>. <http://ckraju.net/papers/Manuscript-Black-thoughts-matter-accepted-version.pdf>.

near" might mean anything from 30 m to 300 km! But the theorem provides no such error estimate. Indeed, the pretence that it is a theorem, some special and "superior" kind of knowledge is tied to grandiose myths of exactitude and eternal truth, and beauty, and that gradiosity precludes the possibility of spelling out the degree of approximation, for spelling it out would make it manifest that it is only approximate knowledge.

One practical use of the Pythagorean theorem, applied to triangles on the curved surface of the earth, was in the theory of plane navigation, extensively used by Europeans, until the 18th century. But to be able to estimate the error in the theorem, one needs to know the correct radius of the earth. In this department, too, Europeans were thousands of years behind others due to their inferiority in mathematics. Certainly Greeks and Romans were unaware that the earth is even round (despite tall claims about Eratosthenes based on some 19th century texts), and the documentary evidence for this ignorance comes from the fifth century Bible or even its later day versions. In contrast the fifth century Aryabhata, in India, stated that the earth is round, and the very name for earth in Sanskrit, bhagola, means a sphere. Aryabhata's disciple Lalla gave the simple reason for the sphericity of the earth: contrary to the Bible, far off trees cannot be seen no matter how tall.

Distant ships disappear over the horizon, and measuring the zam or distance to the horizon, enables one to calculate the radius of the earth, from the second (or trigonometric) Pythagorean calculation. This can be done very accurately as Indian astronomer's demonstrated long ago and as al Biruni verified while checking out khalifa al Mamun's physical measurement of  $1^\circ$  of the arc. The accuracy was better than 1%, as can be ascertained from the well established relationship from the Arabic mile and the English mile. This was because of the accuracy of angle measurements obtained by using the two-scale principle, incorporated into traditional navigational instruments (and attributed on the doctrine of discovery to Vernier). It is natural to believe that this ancient knowledge of the radius of the earth goes back also to ancient Egypt, though Westerners do not like such a claim because it exposes their extreme inferiority and backwardness in mathematics.

Westerners were and navigators even in the so-called "age of discovery". In the 15<sup>th</sup> c., Columbus underestimated the size of the earth by 40%, and recorded that he had reached China when he was at Cuba. This wrong idea of the size led to numerous navigational blunders ultimately resulting in Portugal passing a law in 1500 banning the carrying of globes aboard ships. Vasco da Gama was ignorant of navigation did not even know how to determine latitude, and was brought by an Indian navigator from Melinde in Africa to Calicut. But such is the extreme vanity of Westerners, that he derogatorily refers to him as a pilot! Recall that the Gregorian calendar reform of 1582 was needed just because an accurate calendar and the precise date of equinox is needed to determine latitude in daytime, by the age-old technique, from an observation of solar altitude at noon.

The famous longitude problem of European navigation was a problem for Europeans alone, just because of their persistently inferior knowledge of the mathematics of the Pythagorean calculation, up until the 17<sup>th</sup> c. In fact, as the seventh century Indian mathematician Brahmagupta (the inventor of algebra) remarked, "ignorance of the Earth's radius makes longitude calculations futile". And Europeans, therefore, had the longitude problem, just because of their inferior knowledge of the full Pythagorean calculation, and consequent ignorance of the radius of the earth.

One should not be misled by any related false history. Note that, on the doctrine of Christian discovery, the Jesuit general Clavius published in his name, in 1607 accurate trigonometric tables stolen by Jesuits from India, but the theft is given away by the fact that Calavius did not know enough trigonometry (second Pythagorean calculation) to calculate the radius of the earth. Though, Europeans claim to have measured the radius of the earth, at long last in the late 17th century, few believed it then. Combined with the mathematical illiteracy of European sailors, this ensured that the longitude problem persisted until at least the mid-18th-century, when it was officially declared

to have been half-solved, and the British board of longitude constituted by the British Parliament in 1711, finally gave away half its prize money in 1763.

The next time someone talks of the superiority of Greek mathematics, one should repeat this counter story of the persistent mathematical inferiority of Europeans until the 18th century, combined with their persistent failure to understand math from elementary fractions to the Pythagorean calculation. It was this persistent mathematical inferiority of Europeans that resulted in the European navigational problem, and the deaths of thousands of European sailors until the mid 18th century. Doubtless, the Cambridge mathematician Hardy would have lit his pipe, leaned back in his armchair and lectured one of those drowning British sailors how extremely boring practical mathematics was (unless he happened to be the one drowning).

But, it is not enough to tell counter narratives. The colonial education system, designed by the church, embeds propaganda in the impressionable minds of children by telling them propagandist stories from an early age. Children believe those stories without evidence at that age, and they have a hard time shaking them off at a later stage. In fact, they grow so protective of the first stories that they have been taught that they still do not demand evidence for the first story, but instead suspect the new story. The education system is a very effective means of propaganda, and influences a very large number of people.

Therefore, it is necessary to decolonise the education system, especially in mathematics, and in the history and philosophy of science, to stop these wrong beliefs from being perpetuated. How that can actually be done has been demonstrated through a long series of pedagogical experiments, in various university (and high schools), in three different countries, over the last decade.<sup>37</sup> These courses included both the teaching of an alternative history and philosophy of science, and an alternative mathematics.

Specifically, one can reject "Euclidean" geometry, not the original, but its brazen reinterpretation to suit the church political requirement of metaphysical reasoning, needed for Christian rational theology. Instead of that Egyptian mystery geometry, one can shift to Egyptian *practical* geometry.

The interesting thing is that this Egyptian practical geometry was done with the rope, as depicted on the eastern wall of the tomb of Djoserkaseneb. Though, there are no known records of how exactly this rope geometry (of harpedonaptae or "rope stretchers") was done, Indians had a similar tradition of string geometry, which is better documented in the texts of the *sulba sutra*. This documentation has already been used to create a school text in geometry.

The striking feature of the rope/string is that it is flexible, and can be used to measure the length of a curved line. This is in striking contrast to "Euclidean" geometry based entirely on straight lines. This dependence on straight lines is emphasized by the geometry box or compass box which is part of the paraphernalia of every school student. No instrument in the existing compass box can be used to measure the length of a curved line. This is what completely befuddled René Descartes who wrote in his *Geometry* that "the ratios of curved and straight lines are beyond the capacity of the human mind". Descartes was talking obvious nonsense, for one can easily measure a curved line with a string and then straighten the string to compare its length with that of a straight-line.

---

37 C. K. Raju, 'Decolonising Mathematics', *AlterNation* 25, no. 2 (2018): 12–43b, <https://doi.org/10.29086/2519-5476/2018/v25n2a2>; C. K. Raju, 'How to break the hegemony perpetuated by the university: decolonised courses in mathematics and the history and philosophy of science (Arabic)', in *Culturalisation of Humanities: Vision and Experiments*. (Proceedings of the International Conference on Culturalization of the Humanities, held in Beirut on 20-21 November 2018.) (Beirut: Al Maaref University, 2019), 77–114. (English version, (to appear) in *Studies in Humanities and Social Sciences*, <http://ckraju.net/papers/Beirut-paper%20for%20iiias%20journal.pdf>).

Measurement (whether with a string or straight-edged ruler) is an empirical process, therefore this string geometry admits measurement, and the related errors of measurement at a very fundamental level, without any foolish claims as to the exactitude and infallibility of mathematics.

Since one can directly measure the circle, defining angles in terms of radians makes perfectly good sense. The other great advantage of a string and the ability to measure the circle, is that apart from the value of  $\pi$ , well known to both Egyptian and Indian traditions, one can easily teach the second Pythagorean calculation.

The next question, obviously is how this way of teaching elementary geometry in school interfaces with the calculus needed for science, at the university level. In fact, it interfaces extremely well as has been demonstrated by pedagogical experiments over the last decade in teaching calculus without limits, the way it developed in India, instead of teaching it the way it was misunderstood in Europe by Newton and Leibniz, a misunderstanding which persists to this day.

Thus the way forward is clear. Now it is more a matter of political will: whether we actually want to *do* something about racism and colonialism, or merely to keep talking about them and complaining. To actually do something, the colonised must at least be willing to experiment with something different from the church education brought by colonialism. If not, they can keep complaining for ever, and it will not make the slightest difference to either the brutal racist or the equally brutal colonizer, who will only seek to derail the process of decolonization by exploiting the misplaced trust of the colonized in them.