

Islam and Science¹

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1. The question

"Can Islam be reconciled with science?"

This question was raised by the *Guardian*, London.² The question was *not* about reconciling Christianity or "religion" with science; it was specifically aimed at Islam.

The *Guardian* clarified that this question arose from another: why is the Muslim world lagging behind the West in science? There might be a host of reasons for this, such as colonisation, so the full question really was this: have some aspects of Islamic belief systematically retarded the growth of science in the Muslim world?

2. The Western critique of Islam

Three people responded to this question.

The first, Riazat Butt, of the *Guardian*, opined that science contradicts Islam, but Muslims were simply in a state of denial: "I heard Muslim scientists and academics say that...there was no contradiction between their religious identity and their day job. One did not exclude the other because the two were kept separate. It got a little depressing, not to mention wearing, to hear over and over how the two were not incompatible..."³

The second response,⁴ entitled "Islam's arrested development", was by Pervez Hoodbhoy, a Pakistani physicist, and author of a book on *Science and Islam*. He maintained that, despite a good start, science did not take off in Islam because contradictions developed between science and Islamic theology. He pinned down these contradictions to two key issues. He claimed that Islamic theology denies two key premises needed to do science: "To do science, it is first necessary to accept **the key premises underlying science – causality** and the absence of divine intervention in physical processes, and **a belief in the existence of physical law.**" [Emphasis added.]

1 Keynote address at the meeting on "Islam and Multiculturalism", University of Malaya, Kuala Lumpur, 6 Jan 2013. This is a substantially revised exposition of an earlier paper with the same title published in the *Indian Journal of Secularism*, **15**(2) (2011) pp. 14–29.

2 <http://www.guardian.co.uk/commentisfree/belief/2009/nov/23/religion-islam>

3 <http://www.guardian.co.uk/commentisfree/belief/2009/nov/23/religion-islam-science>

4 <http://www.guardian.co.uk/commentisfree/belief/2009/nov/25/islam-science-muslims-religion>

That is, Hoodbhoy maintained that belief in “causality” and “laws of nature” is essential to do science. This is denied by Islam. Hence Muslims have fallen behind in science.

The third response was by Britain-based Usama Hussain,⁵ a Cambridge trained astronomer, and also an Imam. He concurred that denial of causality was a key factor responsible for the decline of science in Islam and squarely pinned the blame for that on al Ghazali, a key Islamic theologian of the 12th c., who represents the current orthodox (Sunni) view.

These arguments are not merely the opinions of the *Guardian* or its respondents. The *Guardian* was systematically *publicising* a long-held Western critique of Islam.⁶ It is important to address that critique, which has never before been correctly addressed by Muslim scholars.

This Western critique of Islam spreads not only through newspapers but also through the education system. As a Senate member of the Univerisiti Sains Malaysia I objected to a course on the philosophy of science which heavily emphasized exactly these two issues of “causality” and “laws of nature”.⁷ Why? The devout Christian teacher, who framed the syllabus, could not explain, since he knew no science, having primarily trained in divinities. But Cambridge had given him a PhD in history and philosophy of science (presumably because of its strong overlap with divinities). Anyway, the fact remains that our budding philosophers of science are brought up on this Western critique of Islam.

3. Causality and al Ghazali

Let us set aside this Western critique, for a moment, and first try to understand al Ghazali's real position. The Islamic philosophers, like Ibn Sina (Avicenna), were typically also medical doctors. (Indeed, the word *hakim* means both a wise man and a medical doctor.) They thought that to treat an ailment one must understand its cause. Hence, they subscribed to the belief in causality.

The meaning of causality

The word “causality” means many things, and is hence a rich source of confusion,

5 <http://www.guardian.co.uk/commentisfree/belief/2009/nov/27/islam-science-ghazali>

6 On the Western scholarly representation of al Ghazali as occasionalistic, see, e.g., Richard Sorabji, *Time, Creation and the Continuum*, Duckworth, London, 1983.

7 For the minutes of the meeting, see <http://ckraju.net/usm/PSc-minutes.html>. Note how no one was able to provide a concrete example of an (eternal) “law” of nature.

since these meanings may be diametrically opposite each other. Accordingly, for the purposes of this discussion, concerning science, I will use it the way it is used in present-day physics, to mean “mechanical causality”. Namely, causality here refers to the belief that the present state of the world is the effect of (or is decided by) its past and is the cause of (or decides) its future. More generally, “causality” refers to the belief that past (together with present) decides the future.

Thus, the “laws of physics” such as Newton's laws of motion or Maxwell's equations (or Schrödinger's equation) are differential equations. The mathematical theory of such equations tells us that the future (*and* past) is *decided* by the present (“initial data”). Therefore, a natural consequence of the belief in “laws of nature” is that there can be no novelty in the future, for future can be calculated from the past. With differential equations, past decides the present (or vice versa) and present decides the future. The more general sense assigned above to “causality” includes the reformulation of physics using *retarded* functional differential equations, where past and present together determine the future (but not *vice versa*).

Causality and mundane creativity

This understanding of “causality” should not be confounded with “mundane causality”, where, say, we punish a criminal on the grounds that he is the *cause* of a crime. “Mechanical causality”, or causality as understood in physics, is incompatible with and excludes mundane causality or human agency.⁸ The differential equations of physics which connect present to future have (as yet) no factor for human intervention. Traditional physics does *not* recognize humans as something special or exceptional or capable of any sort of creative action.

Indeed, this was exactly al Ghazali's problem. In his book, *Tahafut al Falasafa*⁹ (“Incoherence of the Philosophers”), he argued against the Islamic philosophers and their doctrine of cause. Al Ghazali's argument was against an extreme form of the doctrine of cause (as found in current physics). Causality corresponds to the idea that a cause lies in the past and fully determines its effect. But if it is asserted that *everything* has a cause (as in present-day physics) there is no room for Allah to do anything or create anything.

8 C. K. Raju, “Mundane time”, chp. 8 in *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994, Fundamental Theories in Physics, vol. 65. The mounds of theological Western literature claiming that “free will” and determinism are entirely compatible, is not something that I will again go into, here.

9 Al Ghazali, *Tahafut al-Falasifa*, trans. S. A. Kamali, Pakistan Philosophical Congress, Lahore, 1958.

Continuous creation and mundane creativity

Note that the understanding of creation in Islamic thought is different from the Christian view of creation as a one-time affair. On the Islamic view it is believed that Allah creates the world afresh at each instant.

The Western educated may find the thought odd, but continuous creation is something we commonly observe, and this mundane experience is repeated thousands of time each day by billions of people. We plan our lives (and each action) on the belief that the future depends (in some small way) on *our* actions. We do *not* believe the future is entirely decided by the past through the differential equations of physics. If we see a car headed towards us, we do not start solving the equations of physics, we simply move out of the way. We believe a tiny bit of the future world is decided by *us*.

Indeed the very philosophy that science may be tested by means of observations and experiments rests on this mundane belief in our ability to create a novel experiment (in the future) to test a theory. Even an infant can understand through observation that a tiny bit of the future is decided by his actions. (The long-held Western theological position that “free will” and “determinism” are entirely compatible, or its more recent articulations that “free will” is some sort of illusion generated by chance, chaos, complexity, or quantum mechanics,¹⁰ is *not* relevant here. We are here speaking of simple everyday observation, not how that observation may be reinterpreted as consistent with some dogma, for Christian theology can obviously reinterpret any observation as compatible with any of its dogmas.¹¹)

To say that *our* actions create a bit of the future (and that is a key premise underlying the way even scientists conduct their lives) involves the idea that the world is created afresh at each instant. Continuous creation in this mundane and constantly observed sense has nothing whatsoever to do with the (bad) theories of continuous creation proposed by Bondi, Gold and Hoyle and later developed by Hoyle and Narlikar. Continuous creation in this mundane sense is a matter of everyday experience, not cosmological speculations. It relates to the notion of mundane time, as I have explained elsewhere in detail.¹²

10 C. K. Raju, “Chance, chaos, complexity”, chp. 5 in *The Eleven Pictures of Time*, Sage, 2003.

11 This is a well-known principle of the philosophy of science: any theory can be defended against any observation for any length of time by piling on enough hypotheses.

12 C. K. Raju, “Mundane time”, cited above.

Continuous creation and immanence

Note, further, that al Ghazali believed in immanence (God *in* man) as in the sufi tradition. This is quite distinct from the transcendent understanding of God in the West (after post-Nicene Christian theology¹³). Al Ghazali's understanding was that Allah was the real agent, and the human being only manifested the will of Allah. This is much like saying that the true cause of writing is not the pen or the hand but the will of the writer (who hence gets the credit for the writing, not the pen). Thus, in al Ghazali's understanding, human creativity was only a manifestation of the creativity of Allah so that denial of human creativity (as observed through continuous creation) also amounted to a denial of the creativity of Allah.

Habits and induction

In this process of continuous creation, al Ghazali said Allah was free to choose what he wanted to create. Allah creates smoke with fire as a matter of habit. He is not *compelled* to do so. To be sure we have long observed that smoke occurs with fire. But from a long series of past observations that smoke occurs *with* fire, we can only infer that it is *likely* that fire will be accompanied by smoke; induction is *not* certain. (And certainty, or *invariable* concomitance, is needed to establish the relation of cause and effect.) Those trained in Western philosophy will recognize this as the unanswerability of Hume's objections. (Even Aquinas had read al Ghazali, so Hume's arguments are copied from al Ghazali, but to hide his own lack of creativity, and promote his racist thesis he did not acknowledge his source.)

Since causes can only be established by observation, and induction, one can never establish a cause with certainty. There is no way around this argument, despite Popper's claims to have resolved the problem of induction.¹⁴ Al Ghazali's opponent, Ibn Rushd (Averröes), highly rated by Westerners, ranted and raved against him, but could not give any substantive argument; *hence* the *Guardian* respondents could do no better than quote some polemics from him.

13 Pre-Nicene Christian theology believed in immanence. Origen said "God will be...all and *in* all". (Origen, *De Principiis*, 3.7, <http://www.newadvent.org/fathers/04122.htm>. Transcendence, however, conferred greater importance on the priest, hence the church chose it.

14 In his *Postscript to Logic of Scientific Discovery*, Popper incorrectly claimed to have solved the problem of induction by using Kolmogorov probability. He was right that (axiomatic) probabilities are not ampliative, but overlooked that observation only gives us *estimates* of probabilities, never the probabilities themselves. See, C. K. Raju, "Probability in Ancient India", *Handbook of the Philosophy of Science*, vol 7: *Philosophy of Statistics*, Elsevier, Amsterdam, 2010, pp. 1171-91.

Al Ghazali and logic

Al Ghazali's arguments are *not* illogical¹⁵ (he wrote a book on logic, and allowed that even Allah was bound by logic). To the contrary, as I have explained elsewhere,¹⁶ al Ghazali inaugurated a novel point about logic imitated (without acknowledgment) by later-day formal logicians like Tarski and Wittgenstein, namely that empirical truth is *contingent truth* (true in some possible worlds), unlike deductive truth which is *necessary truth* (true in all possible worlds).

The only difference is that where al Ghazali spoke of possible worlds that Allah can create, in Tarski-Wittgenstein formal semantics one speaks of possible logical worlds in the sense of Wittgenstein! It is on this belief that logic binds God (who hence cannot create an illogical world) that the West concluded that deductive truths are stronger than empirical truths (for empirical truths relate to this world, and God might have created another sort of world). Hence, inductive truths being empirical, they can never provide the (believed) certainty of deductive truth.

Summary

To summarise, (a) al Ghazali believed in habits not laws. The difference is that habits can be broken, laws cannot be. (b) He believed in the creativity (of Allah), not causal necessity. This is a simple matter of everyday observation, for al Ghazali attributed observed human creativity (or our ability to create a bit of the future) to the divine element within man. (c) Al Ghazali's beliefs are logical (and are used in present-day formal logic).

To better understand this point of view, let us look at its anti-thesis in church theology after the Crusades.

3. Crusades and the “laws” of nature

By way of background, the real objective of the Crusades was to try and bring Muslims under church control by force, the way (the rest of) Europe was Christianised by force (through military conquests by Christian emperors such as Charlemagne). But the Crusades failed militarily beyond Spain. In fact, all Crusades

¹⁵ In fact, as a logician, al Ghazali drew a distinction between *logical* necessity and *causal* necessity, similar to the distinction used today to discriminate between the *logical refutability* of a scientific theory, and its *empirical refutability*. So, what al Ghazali said was that it is not *logically* necessary for cotton in contact with fire to burn; even though we have always observed this to happen, we can *conceive* that it may not happen. For a more detailed exposition of al Ghazali's arguments, in this vein, using Western terminology, see C. K. Raju, *The Eleven Pictures of Time*, Sage, 2003, pp. 222 et seq.

¹⁶ C. K. Raju, “The religious roots of mathematics”, *Theory, Culture, and Society*, **23**(1–2) Jan-March 2006, Spl. Issue ed. Mike Featherstone, Couze Venn, Ryan Bishop, and John Phillips, pp. 95–97.

after the first were military failures. Hence, the church now shopped around for ways to persuade Muslims to convert, without the use of force.

Since, Muslims did not accept the authority of the Christian scriptures, but accepted reason, the church adopted reason as the tool of persuasion. But reason first had to be turned into a Christian tool (considering that the church had earlier banished the philosophers who championed reason). For this purpose of appropriating reason, the church accepted the theological solution proposed by Thomas Aquinas and the schoolmen. (Aquinas sided with al Ghazali's opponent Ibn Rushd, or Averröes.)

The essence of this solution was to modify Islamic rational theology (*aql-i-kalam*) and adapt it into post-Crusade Christian rational theology.

The theological difficulties

This adaptation involved two theological difficulties. First, the Christian God was *transcendent* (ever since post-Nicene theology¹⁷). Second, creation (as described in the Bible, not as based on experience) was a one time process, not a continuous process.

Since the church viewed creation as a one-time event, it was now obliged to answer the question: what did God *do* after he created the world? Did he just sit idly by twiddling his thumbs, so to say, and watch all the evil playing out?

Aquinas' solution

There were two prevalent answers to this question. First, that God intervened personally to sort things out, e.g. an “act of God” like lightning striking church towers to punish evildoers. This solution was championed in Christian theology by the followers of John Duns. The second solution, proposed by Aquinas, was that, like a king, God ruled the world remotely with the help of laws— the laws of nature.

Now, the real theological problem, specific to Christianity, was this: a transcendent God who made repeated personal interventions in the world, was *too* powerful.¹⁸ This damaged the doctrine of sin; if God was all-powerful and also intervened every now and then, but yet did not intervene to prevent evil, why should man be blamed for it, and cast eternally in hell?

17 To reiterate, the pre-Nicene Origen had different beliefs in an immanent God. See Origen, *De Principiis*, cited above.

18 C. K. Raju, “Benedict's maledicts”, Zmag <http://zcommunications.org/benedicts-maledicts-by-c-k-raju>. Reprinted in *Indian Journal of Secularism*, **10**(3) (2006) 79-90.

The doctrine of sin, however, had long been a useful instrument for the church, for, by making people feel guilty about the simplest natural acts, it brought them under the control of the priest. To retain the “useful” doctrine of sin, post-Crusade Christian theology abandoned the belief in providential interventions, and switched to the belief in “laws of nature”. That is, the same debate (about providential interventions) was settled¹⁹ differently in Islamic and Christian theology.

Accordingly, Aquinas stated his grand conclusion that God ruled the world with laws.

“a law is nothing else but a dictate of practical reason emanating from the ruler...the whole community of the universe is governed by Divine Reason. Wherefore the very Idea of the government of things in God the Ruler of the universe, has the nature of a law. And since the Divine Reason's conception of things is not subject to time but is eternal, according to Proverbs 8:23, therefore it is that this kind of law must be called eternal.”²⁰

To summarise, the belief in eternal “laws of nature” governing the cosmos is a key aspect of *Christian dogma. This superstition originated during the Crusades and it antedates the same belief in science.*

4. Science and the “laws” of nature

The church technique of mind control made its beliefs so all-pervasive that these Christian superstitions infiltrated present-day science.

Newton's “laws”

Even Newton (who, as a passionate Christian believer, was a strong critic of the church) fell a victim. In his suppressed notes (which emerged only in the 1970's) he cancelled *hypothesi* and wrote *lex* (law).²¹ He thought the laws of God had been revealed to him. He believed in prophecy and thought of himself as a sort-of prophet, especially since he was born on 25 December (according to a wrong calendar).²²

This church dogma of “laws of nature” continues to be widely propagated by the

19 Typical of theology, the settlement was only partial, and contradictions and ambivalence nevertheless persist: for example, the church continues to accept prayer, for example, as a means of invoking divine intervention.

20 Thomas Aquinas, *Summa Theologica, First part of the Second Part*, 91,1, <http://www.newadvent.org/summa/2091.htm>.

21 Newton's attitude perfectly reflected the ambivalence of the church. Thus, he could not prove the stability of the solar system, and hence thought that God intervened for that purpose, in the manner of a clockmaker who winds up a watch from time to time. Later, Laplace proved the stability of the solar system, and claimed he had no need for God in his system. Hence his superior being came to be known as Laplace's Demon. For more details, see, e.g., “Benedict's maledicts” cited above.

22 For the full account, see C. K. Raju, “Newton's Secret”, chp. 4 in *The Eleven Pictures of Time*, Sage, 2003.

Western education system: the first lesson in science that children learn in school today is about Newton's "laws" of motion. Children are rarely told that those "eternal" laws failed over a century ago. This failure to inform results in confusion among common people who believe Newtonian physics must still be valid, since it is still taught in schools.²³ As the case of Hoodbhoy shows, even physicists not only retain those (wrong) dogmatic beliefs, but come to regard them as key premises of science!

Even more ironically, as we shall see later on, Newton's laws failed just because of the conceptual confusion arising from the Christian dogmatic belief in eternal laws of nature.

Belief in "laws" of nature as contrary to experience

Accordingly, it needs to be reiterated that the issue is not merely the failure of any particular "laws" such as those of Newton: the issue is the failure of the very belief in "laws of nature".

Thus, as already pointed out, this belief is manifestly contrary to experience. We live our entire lives according to the belief that (a tiny part of) the future is decided by *our* actions. (Scientists too do just the same, especially when applying for grants!) It is contrary to this mundane experience to assert that the future is entirely decided by the past through some laws (such as Newton's laws). That is, the belief in "laws of nature" is immediately refuted by common experience.

Belief in laws of nature as irrefutable, hence unscientific

This everyday experience of billions of people is replicable and repeated thousands of time each day. Can one dismiss it as an illusion? That would be a bad way to explain the disagreement between Western science and mundane experience. If this sort of thing were allowed, one could also dismiss as an illusion *any* scientific experiment contrary to one's pet theory.

That is precisely the escape route blocked by Popper's criterion of refutability. If everyday experience does not refute the belief in "laws of nature", what does? The onus of answering this question and establishing refutability is on those who believe (eternal) "laws of nature" are a scientific belief: they need to explain what experiments *can* ever refute the belief. No one ever explained that since Aquinas.

²³ Indeed, in a debate on decolonisation of education in the *Sun*, Malaysia, one correspondent argued that since Newton's "laws" are still taught in school, hence they must still be valid as science. The relevant clippings are archived at <http://ckraju.net/blog/?p=61>.

That is, denying that mundane experience refutes the belief in eternal “laws of nature” makes the belief in “laws of nature” irrefutable, hence unscientific.

If the belief in “laws of nature” is either refuted or irrefutable that makes it an unscientific belief. This conclusion stands Hoodbhoy et al exactly on their head. This is a position from which they seem completely incapable of responding, for they have not responded so far.

The fallibility of science

The typical theological reaction is to disprove by caricature, as in the caricature of al Ghazali as occasionalistic (a possible objection al Ghazali himself took into account²⁴). To avoid such theological sophistry, let us also note that to deny the belief in “laws” as unscientific is *not* to deny all regularity.

The belief in scientific *models, habits* etc. is fine, and is the essence of science, so long as we recognize that scientific models are forever *fallible*, and may change, like habits. Fallible scientific models, howsoever successful, cannot establish the existence of eternal “laws”. That is, al Ghazali's point of view (“habits” that can change) was more scientific than the Western theological viewpoint (eternal and unchanging “laws”).

Interim summary

To recapitulate, the belief in “laws of nature” was a part of Christian dogma since the Crusades. This belief antedated modern science and infiltrated it. It nevertheless remains an unscientific belief or a superstition, since (a) it is immediately refuted by common experience, and (b) attempts to save the belief from such refutation make it irrefutable hence unscientific. Thus, the authority of science is today being used to attack Islam with the help of these Christian superstitions passed off as key premises of science.

Creationism, laws of physics, and Stephen Hawking

There is nothing “medieval” about propagating Christian superstitions through science. The process certainly did not end with Newton's “laws”. To take a contemporary example, Stephen Hawking's singularity theory is nothing but creationism. Thus, Hawking claimed to have proved the existence of a cosmological

²⁴ Al Ghazali actually attributed the occasionalistic viewpoint to his opponent, and it is sad that Western scholars do not acknowledge this honestly.

“singularity”, which he interpreted as a beginning of time or the moment of creation. (Contrary to the naïve belief, the big bang theory itself does not establish creation, for it is conceivable that the cosmos periodically goes through a dense state, as may happen with a rotating cosmos, in Newtonian cosmology. That is the possibility that Hawking's singularity theory claims to have eliminated.)

This creationist understanding of “singularity” is quite explicit in Hawking's (scholarly) book *The Large Scale Structure of Space Time* the bottom line (or concluding sentence) of which is this:

...the actual point of creation, the singularity, is outside the scope of the presently known laws of physics.²⁵

At a more popular level, Hawking explained that this breakdown of the laws of physics, at the “actual” moment of creation, permitted creativity to God. This is asserted in his popular book as follows.

At the big bang and other singularities, all the laws [of nature] would have broken down, so God would still have had complete freedom to choose what happened and how the universe began.²⁶

Note the indirect admission that the “laws of physics” do constrain God's freedom to create the cosmos. Note, also, how Hawking's conclusion elevates the belief in one-time creation over the belief in continuous creation: for the belief is that the “laws of nature” have been in force ever since the time of creation.

The point of view has been taken to greater heights by Tipler, a professor of physics, who claimed that Hawking's physics has proved the truth of *all* Christianity and that

theology is a branch of physics, that physicists can infer by calculation the existence of God and the likelihood of the resurrection of the dead to eternal life in exactly the same way as physicists calculate the properties of the electron....the central claims of Judeo-Christian theology are in fact true,... these claims are straightforward deductions of the laws of physics as we now understand them. I have been forced into these conclusions by the inexorable logic of my own special branch of physics...the area of global general relativity...created...by the great British physicists Roger Penrose and Stephen Hawking.²⁷

25 S. W. Hawking and G. F. R. Ellis, *The large scale structure of space time*, Cambridge University Press, 1974, p. 384.

26 Stephen Hawking, *A Brief History of Time*, Bantam, New York, 1988, pp. 183-84.

27 F. J. Tipler, *The Physics of Immortality. Modern Cosmology, God and the Resurrection of the Dead*. Macmillan, London, 1995

Tipler has published on this topic of singularity theory in the scholarly journal *Nature*, and this viewpoint is further propagated by the Hollywood film, *Matrix*. I will not go into more details here, since the mathematical weakness of Hawking's arguments, which mirror Augustine's, has been dealt with extensively in my earlier writings, especially *The Eleven Pictures of Time*.

As regards Hawking's latest position, it is a merely a belated attempt to resolve the contradiction in Aquinas' theological claim: if the "laws of nature" break down at the moment of creation (to permit creation to take place), how can they be called eternal?²⁸

Metaphysical creep through the mathematics of infinity

The cases of Newton and Stephen Hawking are only examples of how Christian metaphysics has crept into science. In general, this happens because metaphysical assumptions are always present in science, for it is impossible to formulate science entirely in operational terms.

Briefly, the common route by which church metaphysics has crept into science is through mathematics, and particularly the mathematics of infinity, related to the church metaphysics of eternity.

Newton's problem was with the infinite series of the Indian calculus, as I have explained in detail elsewhere.²⁹ With regard to the infinite series for π , the naïve European objection³⁰ was that such infinite series could not be physically summed (since that would take an infinity of time) and summing only some of the terms would result in something imperfect, not eternal truth, *hence* not mathematics. Note the emphasis on perfection and eternal truth, for Clavius had long ago recognized the *practical* value of the Indian infinite series (for navigation) and published (in his name) the high-precision trigonometric tables derived in India using infinite series expansions.³¹

Newton needed the calculus for the formulation of his "laws" (the second "law" needs the derivative with respect to time) and was concerned that the calculus was

28 C. K. Raju, "The Christian propaganda in Stephen Hawking's work", *Daily News and Analysis*, 16 Jan 2011, p. 9. http://www.dnaindia.com/lifestyle/review_the-christian-propaganda-in-stephen-hawkings-work_1495047. Archived at <http://ckraju.net/press/2011/Hawking-review-dna-16-Jan-11-p9.gif>.

29 For a full account, see, 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.

30 For a quick and easy account, see C. K. Raju, "Towards Equity in Math Education 2. The Indian Rope Trick", *Bharatiya Samajik Chintan* 7 (4) (2009) 265–269. <http://ckraju.net/papers/MathEducation2RopeTrick.pdf>.

31 Christophori Clavii Bambergensis, *Tabulae Sinuum, Tangentium et Secantium ad partes radij 10,000,000...*, Ioannis Albini, 1607.

not “perfect”. (How could the “eternal” laws of God be stated in an imperfect language?) He thought (on his theory of “fluxions”) that calculus (i.e., the time derivative) could be made “perfect” by making time “flow”. (His confusion is obvious, for while things may flow *in* time, it is meaningless to assert, as he did, that time itself flows.) Anyway, he rejected physical time (as measured by ordinary clocks) as imperfect and chose “mathematical” time (which, he asserted, “flows on without regard to anything external”). That is, to make the calculus “perfect” he made time metaphysical, or known only to God. Alas, physicists too need to know how to measure time in order to do physics! That is, Newton's concern for perfection (of the laws of God) led to his failure to define a physical clock,³² and that was the cause of the failure of his physics.³³

Similar remarks apply to Stephen Hawking. Singularities are nothing but infinities of some sort arising from a bad³⁴ understanding of the calculus (and specifically the wrong assumption that the metric tensor must remain twice continuously differentiable, to keep the equations of general relativity meaningful).

More generally, the attempts to handle the infinities of the calculus in a “rigorous” way culminated in set theory and the formalist doctrine of Russell and Hilbert (used to axiomatise set theory). Formalism has made mathematics 100% metaphysics. Empirical proofs are deprecated in the manner of Plato, or regarded as contingent truths, compared with logical truths regarded as necessary truths.

It is amazing how so many people, who are otherwise intelligent, have swallowed the church line that (its conception of) rationality is universal and so is this metaphysics of eternity (and the resulting mathematics of infinity). If metaphysics were universal, why would we need science?

Indeed, the slightest commonsense, or the most superficial acquaintance with other cultures, shows that this Western metaphysics is *not* universal. For example, *all* Indian systems of philosophy, without exception, accept the empirical as the first means of proof, while the Lokayata (similar to Epicureans) reject the validity of inference as a means of proof. (This is the exact antithesis of the Western philosophical position that deductive truths are certain, compared to empirical truths.)

32 C. K. Raju, “Time: What is it that it can be measured?” *Science&Education*, **15**(6) (2006) pp. 537–551.

33 C. K. Raju, “Einstein's time”, *Physics Education* (India), **8** (1992) 293–305.

34 C. K. Raju, “Distributional matter tensors in relativity”. In: *Proceedings of the 5th Marcel Grossman meeting on general relativity*, ed. D. Blair and M. J. Buckingham, World Scientific, Singapore, 1989, 421–23. arXiv:0804.1998.

Further, there is no question of logic binding God (so that logical truths become necessary truth, true in all possible worlds) for we need to ask *which* logic binds God? Thus, in Indian tradition, where there was no hegemonic organization like the church to declare the universality of rationality, several different systems of logic prevailed. These include the Buddhist system of *catuskoṭi*, the Jain system of *syādvāda* and the Nyāya system (similar to, and probably the origin of “Aristotelian” logic).³⁵

This issue of Christian metaphysical creep into mathematics is further explained for the layperson in my recent book *Euclid and Jesus: How the church changed mathematics and Christianity across two religious wars*.³⁶

6. What should be done?

Under these circumstances, where Christian superstitions have infiltrated science at the highest level, and the authority of science and of much-glorified scientists is then used to attack Islam, what ought to be done?

Change Islam or science?

Westerners in general (and the *Guardian* respondents in particular) advocate the conclusion that, since science is universal, a conflict between science and Islam means Islam must change (or else Muslims must abandon Islam).

But if science is indeed universal, then surely it is Christian superstitions which must be eliminated from science, irrespective of which Western scientific authorities support those dogmas in science. Therefore, it is science which must be changed; it must be de-theologised. That is, science must be reformulated to eliminate the Christian superstitions that have crept into it. (Note, the term: “reformulate”, not reject, for it is definitely *not* my contention that all of science is wrong.)

How to change mathematics

The good news is that this reformulation has already been done.

In mathematics, the new (realistic) philosophy of zeroism is superior to (idealistic) formalism.³⁷ Since logic is not unique, deductive proofs are of no special value, they

³⁵ C. K. Raju, “Logic”, article in *Springer Encyclopedia of Non-Western Science, Technology, and Medicine*, 2009. Available from <http://ckraju.net/papers/Nonwestern-logic.pdf>.

³⁶ C. K. Raju, *Euclid and Jesus: How and why the church changed mathematics and Christianity across two religious wars*, Multiversity and Citizens International, Penang, 2012. <http://ckraju.net/Euclid>.

³⁷ C. K. Raju, “Teaching Mathematics with a Different Philosophy. 1: Formal mathematics as biased metaphysics”. *Science and Culture* 77(7–8) (2011) 275–80.

carry no certainty, and the value of mathematics relates to calculation, not proof. Zeroism suits the idea of mathematics as a practical tool for calculation (i.e., an auxiliary physical theory).

Indeed, zeroism better suits present-day mathematics which makes heavy use of computers which have so greatly enhanced the ability to calculate. From the viewpoint of formalistic metaphysics, computers cannot handle infinity, hence involve “errors of computation”. These “errors” are commonly related (in text books) to the use of floating point numbers instead of the (metaphysical) continuum. However, calculus with zeroism avoids the continuum and hence also the objection (raised by Naqib al Atas) that the continuum is contrary to the atomistic beliefs of al Ashari and al Ghazali. Indeed, the calculus developed in India with similar atomistic beliefs (used in the Nyāya system).

The Christian theology in mathematics is what has complexified mathematics and made it difficult, as I have explained elsewhere,³⁸ so eliminating it makes math easy.

How to reformulate science

As for science, given the massive empirical evidence against the belief in “laws of nature”, it is clear that this Christian dogma ought to be abandoned by science. Physics must be reformulated to allow room for living beings to create a bit of the future. Clearly, also, this requires that we abandon (mechanical) causality.

What would the resulting physics be like? We already know this, for physics has already been reformulated thus.³⁹ Rejecting (perfect, mechanical) causality corresponds to what I have called a tiny “tilt in the arrow of time”. Mathematically, this means that the equations of physics become mixed-type functional differential equations. Such a reformulation of physics permits an element of spontaneity: future is *not* entirely decided by past, so there are spontaneous and unpredictable events which cannot, in principle, be traced to any prior cause. (In the case of gravity, my existing reformulation of Newtonian gravity⁴⁰ as yet only involves retarded functional differential equations, but it is now quite clear how to proceed, to admit a tiny component of advanced interactions.)

Once again, this leads to a better science for it improves physics in a variety of ways.

38 C. K. Raju, “Teaching Mathematics with a Different Philosophy. 2: Calculus without limits”. *Science and Culture*, 77 (7–8) (2011) 281–86.

39 C. K. Raju, *Time: Towards a Consistent Theory*, Kluwer Academic, Dordrecht, 1994.

40 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-rio.pdf.

- (1) This new physics is time asymmetric and consistent with the mundane experience of aging (unlike Newtonian gravity or general relativity, which is time symmetric, and contends that aging is an illusion to be explained by thermodynamics).
- (2) The new physics explains galactic rotation curves without assuming dark matter *or* its peculiar distribution as a halo around luminous matter.
- (3) The new physics explains the flyby anomaly of NASA spacecraft. This is replicable, and the physics can even be tested in the laboratory.

However, I will not go into further details, since the objective of this address is not to defend my physics qua physics.

The object was to point out that science has been used to attack Islam as especially anti-scientific. However, this attack involves Christian superstitions which have crept into science, like the beliefs in “laws of nature” and “causality”. The church promoted these superstitions from Crusading times, so these superstitions are naturally hostile to Islam. Therefore, the right course of action is to eliminate these Christian superstitions from present-day mathematics and science.

This difficult task of setting up a religiously neutral mathematics and science has already been accomplished. Secularists should welcome this, and those who seek an Islamic science should also welcome this, for it is the much-needed first step. Of course, anyone should feel free to check the reformulation against further experiments.

Nevertheless, there is a further difficulty.

7. The problem of colonisation

The further difficulty is due to colonisation.

First, colonisation was not simply a military conquest. It involved capture of the mind through Western education. Western education was initiated by the church and designed to produce missionaries.⁴¹ Hence it aims to capture the mind through a variety of myths and superstitions. The Western educated end up with a strong sense of their own superiority (which missionaries obviously required), and this false sense of superiority led to the moral justification of racism as I have explained

⁴¹ C. K. Raju, “Decolonisation, time for change”, GlobalHigherEd blog.
<http://globalhighered.wordpress.com/2011/09/11/decolonising-our-universities-time-for-change/>.

elsewhere.⁴² Hence, Western education induced the colonised to identify with the “superior” colonialists, became loyal to them, and learn to look down upon their own people as inferior.

Our immediate concern, however, is with the way this attitude affects the issue of science and Islam. On the above analysis, it is science which must be reformulated. This has been done, and the reformulated science has many desirable features, and is consistent with everyday experience. But the colonised mind is unwilling to accept or even contemplate any change which is not Western approved. Why?

First, the vast majority of Western-educated people are scientifically illiterate. *Why* is $2+2=4$? Few people know. (Note: the issue is that of *knowledge*, not guesswork.) Even scientists are super-specialised and hence only semi-literate; thus, most scientists too cannot answer the above question.

Thus, most people are *forced* to rely on a trustworthy authority. But *who* are the trustworthy authorities? The first lesson that Western education drives home is that only Western authorities can be trusted. (This misplaced trust in the West is what enabled the West to systematically con and exploit people during colonialism, perhaps better called con-all-ism.) Thus, Western education makes the vast majority of people dependent upon Western authority to tell them the truth about science. Obviously, their belief that the West will tell them the truth is pathetic.

Thus, in the case of the above reformulation of physics, the supposedly best Western mathematician (and a former President of the Royal Society) claimed credit for it, as his own suggestion, on the centenary of Einstein's relativity paper, in 2005. This shows that the above reformulation of science has support, at the highest level in the West. However, the immediate issue is that of trustworthiness. A belated acknowledgment to this author's work was eventually published,⁴³ but the editor of the *Notices of the American Mathematical Society* maintained the pretence that this was an innocent oversight, for he did not allow it to be pointed out that the attempt to grab credit had happened *twice*, the second time long *after* the said mathematician had been personally informed.⁴⁴ This shows how naïve it is to trust Western scientists even at the very highest level. Indeed, organized falsehood was the technology by which colonialism was established.

42 C. K. Raju, *Euclid and Jesus*, cited above.

43 For this belated acknowledgment, see, M. Walker, “Retarded differential equations and quantum mechanics”, *Notices of the American Mathematical Society*, April 2007, <http://www.ams.org/notices/200704/commentary-web.pdf>. (Scroll to the second page.)

44 The full details and the original correspondence may be found at <http://www.ckraju.net/atiyah/atiyahcase.html>.

What about non-Western scientists? Most non-Western scientists and academics are even more firmly in the grip of Western mind-control. Sadly, even the governments of Islamic countries have agreed to measures which ensure that that mind control stays in place. Thus the ISI norm of publication, adopted by the OIC countries,⁴⁵ makes the careers of all university academics in those countries dependent upon Western approval. Thus academics in OIC countries dare not accept anything new, until it is approved by the West. Naturally, such people who cannot decide on their own between good and bad science, cannot possibly be doing any sort of science, even if they are professional scientists. They are merely aping the West in the wrong belief that such aping makes them “superior”, as Western education teaches.

Even before the ISI norm, colonialism implanted the idea of that an “expert” must be judged by marks of Western approval (such as a degree from Cambridge, irrespective of actual knowledge). Therefore, non-Western “experts” in math and science always had a Wested interest in such approval which they pursued. Furthermore, any fundamental change in mathematics and science, today, may wipe out their past “achievements”, so they have a further vested interest in opposing any change.

In view of these factors, colonised intellects (especially mathematicians and scientists) suffer complete mental paralysis when confronted with something contrary to Western authority. Thus, for example, I pointed out long ago that the text book account of the Michelson-Morley experiment is fundamentally wrong. Physics texts wrongly proclaim that experiment as fundamental to special relativity. Now special relativity is a first year undergraduate subject in physics, and so does not require much technical knowledge. However, in the last twenty years no one altered the texts, since changing texts (and diverging from Western texts) is taboo, for that is what science has been reduced to in practice: blind subordination to Western authority. On the other hand, if anyone felt that what I was saying was incorrect, they should have contested it. But they have not done so in twenty years. Neither accepting nor contesting something so elementary is nothing but a state of mental paralysis.

Certainly, in the matter of Islam vs science, Muslim scientists, whether as good Muslims or as good scientists, ought to take a clear stand in the matter (either way). But that too has not happened so far. Even debates are avoided for they can quickly lead to exposure. Naturally, Hoodbhoy too remains silent about my critique that he

45 C. K. Raju, “Benchmarking science: a critique of the ISI (Thomson-Reuters) index” (USM-Prince Songkla Univ. conference in Hat Yai, Oct, 2011, in Proc.)

has wrongly identified Christian superstitions as “key premises” of science.

While matters like the philosophy of mathematics, or singularity theory, or even functional differential equations may be beyond the ken of the ordinary physicist, the same cannot be said for the history of science. Indeed, as I have pointed out elsewhere,⁴⁶ Western education (so essential to the colonial capture of the mind) was imposed with the help of a false⁴⁷ history of science. Therefore, the remedy is to eliminate that falsehood from the curriculum.

For example, it is a completely false Western myth (as restated by Hoodbhoy) that the development of science was “arrested” in Islam after al Ghazali. Thus, the famous Copernican revolution was achieved by translating into Latin the works of Ibn Shatir (and the Maragha school of Khwaja Nasiruddin Tusi) from Greek and Arabic. And Tycho Brahe copied his masonry instruments from the famous observatory of Samarkand headed by al Kashi.

Let us see what happens if one tries to remove such myths from the curriculum. For example, everyone has heard the myth that mathematics began with the Greek called Euclid. To challenge this myth, I have offered a large reward for any serious evidence that Euclid even existed. No one has claimed that reward. Yet no one is willing to change the texts or even the terminology falsely glorifying Euclid, as in “Euclidean spaces” or “Euclid's division algorithm” etc.

Clearly, more than knowledge, what is needed is the courage to stand up to the West, and Western-trained non-Western intellects all too often lack that courage: their entire Western education (which, they think, made them “superior”) took away that courage to be able to speak truth to the West. The mere thought terrifies them the way superstitious Europeans in medieval time were terrified at the thought of confronting the church. Since they can neither accept nor reject, the non-Western intellect just hangs, like computers used to hang because of the internal glitches in one of those famous operating systems. Any amount of tapping on the keyboard won't help; they have to be rebooted!

8. Recap

Science flourished in Islam until the 16th c., and Islamic scientists saw no conflict between Islam and science. The supposed special conflict between Islam and science

46 C. K. Raju, *Ending Academic Imperialism*, Citizens International Penang, <http://multiworldindia.org/wp-content/uploads/2010/05/ckr-Tehran-talk-on-academic-imperialism.pdf>.

47 C. K. Raju, *Is Science Western in Origin?*, Multiversity, Penang, 2010.

(as highlighted by the *Guardian*, London) is actually a conflict between Islamic theology and Christian superstitions which have infiltrated (Western) science due to the long church control over Western education.

The right way to resolve these conflicts, and to make science more universal, then, is to eliminate these Christian superstitions from both mathematics and science.

This has already been done, and both mathematics and physics have been reformulated accordingly.

However, colonialism (which lingers on) obstructs the acceptance of this reformulation, and its incorporation into the education system (which inculcates the “trust the West” attitude). Thus, the real conflict is between Islam and colonisation. Colonialism seems to be winning the battle: not only are intellectuals still colonised, they are becoming more dependent on the West, partly because of wrong measures (such as the ISI norm) accepted by the OIC countries.

This situation can be reversed and the battle can be won only by exerting some other form of authority to counterbalance Western authority, to enable the truth to be decided in a level playing field.

9. Islam and other cultures

In this seminar on Islam and multiculturalism it would be appropriate to say something about Islam and other non-Western cultures. (These concluding remarks are relevant to both Malaysia and Japan.)

The above critique, analysis, and solution all concern *the nature of time*: which is fundamental to both science and religious beliefs of all kinds.

This insight allows us to connect Islam to other cultures too.

Thus, the Moghul prince Dara Shukoh wrote *Sirr-i-Akbar (The Great Secret)*. He translated the Upanishads into Farsi to point out that Hindu beliefs were very similar to sufi beliefs. We can see this immediately from the fact that both sets of beliefs are based on the notion of quasi-cyclic time. This thesis has been elaborated in *The Eleven Pictures of Time*.

Further, this methodology also allows us to see a parallel which has never before been spotted or explored. Al Ghazali's beliefs in habits + continuous creation is very similar to the Buddhist belief in *paticca samuppada* (coorigination of the future,

conditioned by the past). Both are good verbal descriptions of physics with a “tilt in the arrow of time” (or with mixed-type functional differential equations), where future is conditioned by past but not fully decided by it. The two views are definitely not identical, but there is greater similarity between them than has earlier been noticed, because both are based on the same everyday experience.