

A Call for Reason

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In a companion article titled '*A Historic Choice*' I have outlined the significance of the Maharashtra Ordinance XIV of 2013¹ against black magic, and the need for concerted efforts of citizens to make sure that it is passed into a law. This emergency ordinance was cleared by the cabinet of the state of Maharashtra in the wake of the assassination of Dr. Narendra Dabholkar on August 20. Dabholkar had campaigned tirelessly for such a law for over a decade, and had led the Maharashtra Andhashraddha Nirmoolan Samiti (Committee for Eradication of Superstition, or ANiS for short in Marathi) for over two decades. The essential purpose of this law is '*to bring social awakening and awareness in the society and to create a healthy and safe social environment with a view to protect the common people in the society against the evil and sinister practices thriving on ignorance.*'

A persistent misunderstanding even among well-intentioned citizens is that somehow the provisions of this law are anti-Hindu, anti-Swadeshi, and anti-religion. Part of this misunderstanding is based on genuine misconceptions and part is a result of a false and aggressive propaganda. This article intends to address some of these misconceptions and to explain that there is a coherent philosophy that underlies the program followed by ANiS and in particular the spirit of the law under current discussion.

The philosophical position of ANiS is not one of 'evangelical scientism' but is more nuanced.

Hopefully this discussion will make clear the essential nature of the conflict at hand.

It is not a conflict between religion and science.

It is a conflict between reason² and ignorance exploited by vested interests.

A Universal Struggle

The choice that we face in Maharashtra connects to a universal struggle against ignorance. Denial of reason is not specific to India nor to a particular religion. In the United states, it takes the form of strident creationism which seeks to deny the overwhelming evidence for evolution by appealing to the Bible. Or, it takes the form of death threats to climate scientists, which seeks to deny the very substantial evidence for global warming, in the service of the interests of oil

¹ [Complete text of 'Prevention of Black Magic Ordinance'](#)

² *The word 'reason' is used in this article as a translation of the Marathi word 'vivek' of Sanskrit origin which has a richer meaning that connotes reason, wisdom, and practical sense.*

companies. In some Islamic countries, it takes the form of talibanization, which seeks to deny the basic human rights of women, in the service of the interests of patriarchal control.

It is for this reason that the news of this event struck a chord in the minds of many of my scientific colleagues around the world even though they were unfamiliar with ANiS or this law.

A group of scientists from the Institute of Mathematical Sciences in Chennai immediately recognized the importance of this bill on the national stage in their statement issued in 'The Hindu'³: *''... Finally, we note that an ordinance on superstitious practices, along the lines of the bill proposed by Dabholkar, has been passed by the Maharashtra cabinet on August 22. We hope that this ordinance, after adequate debate of its provisions, will become law in Maharashtra, and that similar legislation will be pursued in other states — particularly in Tamil Nadu, where the rationalist movement has a long and respected history."*

It was comforting to receive an email from a colleague in Paris, Edouard Brézin, an eminent physicist and a recipient of the Dirac medal, who wrote: *"I am very sorry to read what happened to M. Narendra Dabholkar, a remarkable man.I know that Indian names are often shared between many different families and thus I had hoped that this had nothing to do with you, except that the fights that Narendra Dabholkar led, raise clearly a lot of empathy in scientists minds."* Later the 'Union Rationaliste,' founded more than 80 years ago in France to promote rational thinking, science and secularism, and which counted scientists of the stature of Langevin and Joliot-Curie among its past presidents, issued a statement condemning this crime.

This expression of solidarity from international scientific community contrasts oddly with the opposition that ANiS has faced throughout its existence and in particular in getting this law passed. A major part of this opposition stems from a sentiment that somehow science is inherently antithetical to religion and by implication to broader human values. In this worldview, an atheist is a hedonistic mercenary without values. And the method of science is a form of cultural colonialism ravaging the native traditions. These are widespread and common misconceptions shared by a section of well-meaning and reasonable citizens. This anti-science view has now been made fashionable also in some academic circles. It is therefore important to address these apprehensions adequately.

A focal point for this discussion is usually the relation between religion and science. A related question is the relation between beliefs and superstitions.

Religion and Science

³ [The Hindu 24 August 2013](#)

At the organized level, the apparent conflict between religion and science has arisen most often because of vested interests. For example, the opposition that Galileo faced from the Church had more to do with protecting the interests of Papal authority and little to do with the teachings of Jesus. In contrast to the static Christianity of the middle ages, early Christianity was an agent of revolutionary change for the emancipation of the powerless and the poor before it got incorporated as the state religion of the Roman empire.

Religion operates in the realm of values. What a person uses to make her inner life meaningful is often a result not of reason but of her psychological needs and personal history. Moreover, religious ideas are so elastic that personal interpretations of the same religious text can be diametrically opposite for different individuals. For this reason, I believe, even as a scientist and as an unambiguous atheist, that religious beliefs are a deeply personal matter.

Many values of modern humanism such as the notion of intrinsic and equal dignity of all human beings as 'children of god', and the notion of justice that follows from it, can be traced back to early religious pioneers. The deep compassion of a Buddha, a Jesus, a Vivekananda, or a Gandhi, and their efforts to alleviate human suffering in an unjust social order are an inspiration for believers and nonbelievers alike.

Science operates in the realm of facts. It is truly remarkable that our brains which evolved to pick berries have the ability to comprehend in such detail the inner workings of nature from atoms, cells, galaxies, all the way to the universe itself. The magnificent edifice of science that has woven this hard-won knowledge into a coherent whole should be regarded as the most precious and luminous heritage of humankind.

The striving of science to understand the laws of nature could itself be viewed as an expression of a 'deep religiosity' as for Einstein, who says "*...a person who is religiously enlightened appears to me to be one who has, to the best of his ability, liberated himself from the fetters of his selfish desires and is preoccupied with thoughts, feelings and aspirations to which he clings because of their super-personal value.*"

A person may seek meaning in super-personal goals be in the pursuit of science or of music, or in the love of her family, or in the ideals of a religion. She may get inspiration by carrying a kunkum tilak, or a copy of the Quran, or a paper of Darwin, or a locket of her mother. This '*liberty of thought, expression, belief, faith, and worship*' is protected by our constitution.

But, one cannot ignore well-established facts and common logic in the name of a personal faith. Nor can one use such personal beliefs and outmoded customs to limit the freedoms of others. In such cases, when religious ideas encroach in the realm of facts or on the liberties of others, a

conflict becomes inevitable.

For example, while one may take inspiration from the Mahābhārata, one cannot continue to advocate Sati because, in the Mahābhārata, Mādri immolates herself after the death of her husband Pandu. Similarly, while one may take inspiration from the teachings of Jesus, one cannot advocate slavery because Saint Paul states in the Bible that *'slaves be obedient to your masters'*. Using the Bible to defend slavery is of course convenient for the slave-masters because it helps them to make honorable what is indefensible.

To this extent, the opposition faced by climate scientists about global warming is not dissimilar in that it also stems from the vested interests of oil companies. This was the kind of opposition that ANiS has had to face most often for example in dealing with 'spiritual enterprises' of fraudsters, or in conflicts over customs that enslave women within a patriarchal hierarchy.

From this perspective, one can view religion as a 'social technology'. Like every technology, it can be used either for emancipation or for exploitation. Like every technology, it should evolve and reorient in response to new knowledge and changing social conditions. These examples make it apparent that the real conflict is not between religion and science but between reason and ignorance in the service of vested interests.

In the articulation of ANiS there were some variations within the organization and some evolution over time, but the broad message is not very different. In an interview with the Agence France-Presse two years ago, Narendra had clearly stated, "*In the whole of the bill, there is not a single word about God or religion. Nothing like that. The Indian constitution allows freedom of worship and nobody can take that away. This is about fraudulent and exploitative practices.*"⁴

This position of ANiS is markedly different from that of other rationalists such as Richard Dawkins or Shriram Lagoo who launch a frontal attack on God and religion. The difference is of fundamental importance both for understanding the substantial public reach of ANiS and for confronting the misconceptions that have been the basis of the opposition to ANiS and this bill in particular. At the same time, the common thread that connects all rationalists is a call for reason against forces of superstition and exploitation.

Reason and Ignorance

People often ask how one can distinguish between beliefs and superstitions and where one draws the line. One could answer it by saying that a superstition is a belief that is in conflict with facts and common logic. Thus, an implicit question here is how a belief attains the status of a

⁴ [BBC News 21 August 2013](#)

fact. The answer to this question is very important and is the very basis of science.

A belief is essential for every human endeavor including science and need not always have a rational foundation. Especially at the forefronts of science where one is exploring new territories, it is often necessary to proceed on the basis of a belief or a good 'hunch'. While this is acceptable, and even essential, not every belief is accorded the high status of a fact. The rigorous process by which this happens through unsparing criticism and experimentation is the reason for the immense success and prestige of science. Much of the confusion about this process arises because it requires *statistical* reasoning which does not come naturally to most people.

Science does not (and cannot) speak with absolute certainty but only with varying 'degree of confidence'. To put it simply, it is like determining how favorable are the odds for a bet. For example, a doctor may believe that quinine cures malaria. This belief is accepted as a fact only after rigorous clinical testing and only to the extent that the evidence supports it. You may find that quinine cures thousand cases of malaria for every one that fails (in comparison with a control group of patients who take no quinine). With this evidence, you would be willing to bet on quinine with the odds of thousand to one. Such high odds indicate a high degree of confidence in the fact. By comparison, for treatment of cancer with chemotherapy, these odds could be as low as two to one.

In my own field of high energy physics, substantially higher odds are required to declare something as a fact. For example, at the particle accelerator at CERN in Geneva, a particle called Higgs boson was 'discovered' last year. Now, the belief in the existence of the Higgs boson was widely shared by most particle physicists for close to fifty years. It was based on deep and compelling theoretical arguments from symmetry and logical consistency for which a Nobel prize was awarded just recently. However, it was accepted as a fact only after this excruciatingly difficult experiment involving thousands of scientists and decades of arduous work. And only after the data accumulated to a point when the odds in favor were as high as *million to one*.

It is noteworthy that even after CERN physicists were sure of the discovery with odds as high as *thousand to one*, they still waited for more data before declaring victory. This extraordinary care is essential for the integrity of science. As the physicist Feynman put it, '*the first principle is that you must not fool yourself and you are the easiest person to fool.*' In a complex experiment like the collider at CERN, there are far too many ways to fool oneself and to draw false conclusions through erroneous beliefs or reasoning. The only way to protect against such errors is a painstaking analysis of a large statistical data.

Thus, the difference between a belief and a fact is a question of statistics and degree. Because it is statistical, it does not follow that it is subjective. It merely means that we are not absolutely

certain but only *sufficiently* certain. After all, you can be pretty certain that jumping from a cliff will kill you and it is not necessary to be absolutely certain to avoid any precipitous action.

As more data accumulates, a belief may or may not turn out to be a fact. For this reason, facts are dynamic and beliefs of even the most revered individuals or scriptures or scientific theories can become obsolete. For example, it is no longer reasonable to believe that the universe is only a few thousand years old as stated in the Bible, or that the earth is supported by the great snake Shesha as stated in the Purānās, or that we can travel faster than the speed of light as implied by Newtonian physics. It often takes great mental effort to rid ourselves of long held beliefs in the light of new facts, as in the case of Newtonian physics. Evading this difficult process is what leads to superstition.

This abstract discussion has a direct bearing on the concrete issues at hand. For example, item 9 in the schedule of this ordinance is against offering miracle cures for snakebite. One might think that such unproven remedies are a thing of the past, and a problem only in the remote corners of rural India. But unfortunately this is not the case. For example, the late Rajiv Dixit (a vehement critic of ANiS and a popular figure in a 'Swadeshi' movement with a large urban following) offers in this talk a homeopathic drug Naja as a remedy for poisonous snakebite⁵. Now, this is a claim that poses very grave danger to public health and is no longer a question of just personal belief. Independent of one's attitude towards the speaker, it is essential to question the evidence behind this extraordinary claim to see if it corresponds to facts.

An instructive example of how science proceeds from belief to fact concerns a much less fatal claim that vitamin C cures common cold. This was advocated by none other than the brilliant and pioneering chemist Linus Pauling based on various hunches and arguments. He believed in it so fervently that he even wrote a book about it. But the enormous prestige of Pauling or the fact that he was a Nobel laureate was not sufficient to convince the scientific community to accept his belief as a fact. Subsequent clinical tests have not found much evidence to support this claim⁶. If Pauling continued to believe in the efficacy of vitamin C even after several years of evidence to the contrary, such a belief could only be called a superstition. Indeed, even today this belief persists as a modern superstition.

This example makes clear that superstitions have nothing to do with religion per se but with how evidence is assessed. Any belief which pertains to factual matters is subject to the same level of scrutiny whether it stems from religious or scientific reasoning. If the evidence does not support a belief then it is simply wrong whether it is advocated by Pauling, Sankarāchārya, Dixit,

⁵ [Dixit offering a homeopathic drug Naja as a remedy for poisonous snakebite at 8:05](#)

⁶ [C.W. Marshall in 'Quackwatch' on Vitamin C and how scientific facts are determined.](#)

or the Pope.

It is thus quite simple. If there is plenty of evidence with high odds in favor of a belief, then we regard it as a fact. If there is plenty of evidence with high odds *against* a belief, and we *still* continue to believe in it, then it is a superstition. Moreover, if a belief is in contradiction with the enormous body of carefully verified facts interwoven by well-tested scientific principles (such as the law of conservation of energy) then such a belief is highly suspect even without doing an experiment. Everyone is entitled to their own beliefs but not to their own facts.

It is worth noting that the position as articulated here is very different from that of some of the noted rationalists. Paul Kurtz in his inaugural address on the occasion of the golden jubilee of Indian Rationalist Society quotes the statement of Clifford⁷ as a basic rationalist principle : *“it is wrong always, everywhere, and for anyone to believe anything upon insufficient evidence.”* Even if one agrees with Kurtz on much of what he has to say, it is difficult to agree with this principle. The correct formulation ought to be *“it is wrong always, everywhere, and for anyone to continue to believe in something **even upon sufficient evidence to the contrary.**”*

This distinction is of crucial importance. Many critics of this bill such as the Hindu Janjagruti Samiti have labeled this bill as ‘anti-faith’ rather than ‘anti-superstition’. But this is not true. One would have to really stretch imagination to construe any of the 12 items in the schedule as being anti-faith. Narendra fully recognized that there is surely an important place for beliefs in all human endeavors. But he also recognized that there is no place for superstitions that are in flat contradiction with facts and which are used for exploitation. The main philosophy of ANiS has been ‘a call for reason’ and that is what underlies the provisions of this bill. As Vivekananda has said, *“superstition is our great enemy...throw off superstition”*⁸.

What is Anti-Swadeshi?

Some organizations have criticized ANiS as ‘agents of west’ from the standpoint of Swadeshi. The criticism is leveled more broadly against Indian rationalism that basic ideas of scepticism and rationalism are somehow borrowed western concepts relying on ‘western’ science. This point of view has found support from quite different quarters among some post-colonial writings which characterize the reliance on ‘western’ science as a form of ‘mental colonialism.’⁹

⁷ Page 290 in ‘Disenchanted India: Organized rationalism and criticism of religion in India’ by Joannes Quack, Oxford University Press (2012)

⁸ [Swami Vivekananda](#)

⁹ See ‘ANiS in context’ and ‘Epilogue’ in ‘Disenchanted India,’ *ibid*

While I share the anti-colonial impulse underlying these criticisms coming from almost opposite ends of the political spectrum, it is difficult to agree with the reasoning because it ignores the robust tradition of scepticism that has always existed in India. Moreover, it is based on a fundamental misconception about the history and content of science.

In the Indian tradition of scepticism, the Lokāyata philosophy dates back to the first millennium BCE. In the Chārvāka system *“in addition to the denial of god, there is also a rejection of the soul, and an assertion of the material basis of the mind.”*¹⁰ These philosophies are as much a part of the Hindu and the Swadeshi Indian identity as the Vedas and the Mahābhārata. Even in the Rigveda, what is striking about the hymn of creation is that it expresses an attitude of questioning wonderment rather than one of revealed certainty: *“Whence this creation has arisen -- perhaps it formed itself or perhaps it did not -- the one who looks down on it, in the highest heaven, only he knows -- or perhaps he knows not.”*¹¹

Similarly, a historical view of science makes it clear that it should be viewed as a heritage of all humankind with contributions and strands of ideas mingling from several different civilizations. The eurocentric writing of history prevalent until recently has tended to paint a picture which can evoke strong reactions against this bias.

A striking example concerns the contributions of the great Indian mathematician Mādhava of Sangamagrāma¹² and the Kerala School of mathematics and astronomy from 1400 to 1600 CE. Motivated by astronomy, Mādhava invented the infinite series for inverse trigonometric functions two centuries before his European counterparts. It is only now that they are properly being attributed to him as Mādhava-Gregory, Mādhava-Leibniz, and Mādhava-Newton series¹³. He also *“took decisive steps onward from finite procedures of ancient mathematics to treat their limit-passage to infinity”*¹⁴ and thus towards formulation of calculus two centuries before Newton and Leibniz. These are monumental achievements considering the central importance of calculus in modern physics and mathematics. The fact that they are not so widely known gives one a pause to think about the possible causes.

¹⁰ From *‘The Argumentative Indian: Writings on Indian History, Culture and Identity’* by Amartya Sen, Picador (2005), page 24

¹¹ [Carl Sagan at 1:35](#); Rigveda 10.129 in *‘The Rig Veda: An Anthology’* by Wendy Doniger O’Flaherty, Penguin Books, pp. 25-6 as quoted in *‘The Argumentative Indian,’* *ibid.*

¹² [Madhava of Sangamgrama](#)

¹³ *‘The Crest of the Peacock: Non-European Roots of Mathematics’*, by George Joseph, Princeton University Press.

¹⁴ C. T. Rajagopal and M. S. Rangachari (June 1978). [“On an untapped source of medieval Keralaese Mathematics”](#). *Archive for History of Exact Sciences* **18** (2): 89–102.

The revival of this tradition of science in modern India is naturally influenced by advances made elsewhere which came to India through the British. But this can no longer be called a mere 'borrowing'. For example, the contributions of Raman, Chandrasekhar, Bose, or Saha have been foundational for entire subfields of physics. The uncommon genius of Ramanujan is celebrated around the world and continues to inspire researchers at the very frontiers. In my own field of string theory, very significant recent contributions from India are widely recognized.

To dismiss this heritage as something 'western' or 'colonial' amounts to turning our backs on the remarkable achievements of our ancestors and of our contemporaries. Indeed, what is anti-Swadeshi is this ahistoric and parochial view of science that buys into a false narrative of science as a western creation.

It is also very important to separate the sociology and history of science from the content of science and facts of nature. A stone dropped in Mumbai is going to fall as it would fall in London, subject to the laws of gravity of Newton and Einstein, described most effectively using the mathematics of calculus. Whether calculus was invented by Mādhava, Newton, or Leibniz cannot change this fact. Whether Mādhava was a Hindu and Newton a Protestant also cannot change this fact. The same is true of medical treatments perhaps with a lesser degree of confidence.

This last point is especially important in the present context. One cannot accept unproven treatments for serious medical conditions simply by invoking respect for local traditions and vague references to Ayurveda or by glibly declaring science to be a social construct. This can result in deaths. It is curious that the dubious remedy for snakebite offered by Dixit mentioned earlier uses a *homeopathic* drug which is a piece of European medical superstition from the nineteenth century. He then goes on to refer to the homeopathic idea of 'like cures like' as an ayurvedic principle--importing european superstitions in the name of Swadeshi.

A genuinely Swadeshi attitude towards early Indian medicine would perhaps be to take some of the traditional drugs arrived at by trial and error as a starting point for investigating their therapeutic value using methods of modern pharmacology.

I would agree whole-heartedly with the advocates of Swadeshi and post-colonial critics in their protest against the enormous euro-chauvinism that is deeply ingrained in the reporting of history in general. There is little doubt that during the dark centuries of colonial plunder, a form of cultural imperialism dominated the writing of history. A well-known example is the tendency, prevalent until very recently, to portray the 1857 war of independence¹⁵ (which had a broad popular support and resulted in mass-killings by the British) merely as a 'sepoy mutiny'. Another

¹⁵ [Irfan Habib in The Tribune 10 May 2007](#)

example of 'anglocentrism' is the near-worshipful attitude towards Churchill even among Indian intelligentsia, oblivious of his appalling record¹⁶ of words and actions towards the colonies.

In the writing of intellectual and cultural history these biases are subtler. An example is discussed by Romila Thapar¹⁷, "*European historians working on this period (of ancient India) had been brought up on the classical tradition of Europe, believing that the greatest human achievement was the civilization of the ancient Greeks - le miracle Grec. Consequently, every newly discovered culture was measured against the norms set by ancient Greece and invariably found to be lacking. Or, if there were individual features worth admiring the instinct was to try and connect them to Greek culture. Vincent Smith, for some decades regarded as the pre-eminent historian of early India, was prone to this tendency. When writing of the murals of the famous Buddhist site at Ajanta..unconnected with Greece both artistically and historically, he states, '..it suggests the possibility that the Ajanta school of pictorial Art may have been derived from Persia and ultimately from Greece.'*"

These were evidently patronizing attempts to undervalue the contributions of non-European origins or to trace them back to the Greeks and hence to Europe and thereby undermine the confidence of the colonies. Indeed, claiming the 'Greek miracle' as a pinnacle of European civilization is in itself a good example of eurocentric appropriation of history, for surely, the point of reference for the Hellenistic Greeks was Asia and Africa and not north-western Europe.

Tracing everything back to the glorious Hellenic past is not very different from tracing everything back to the glorious Vedic past. Both would equally distort facts and come in the way of a truer perception of history. It is a huge task for serious post-colonial scholarship to reassess history, and intellectual history in particular, from a more objective perspective.

These are worthy goals for the Swadeshi movement as long as they are carried out responsibly. Little would be gained by replacing euro-chauvinism with indo-chauvinism, or by a pretentious concern for 'subaltern' knowledge systems that overlooks facts of nature. Such attitudes are particularly detrimental to popular movements like ANiS that are engaged in a serious battle to bring the light of scientific enquiry into the darkness of superstition that still engulfs modern India.

A Call to Action

Our constitution exhorts the citizens to their fundamental duties 'to develop scientific temper,

¹⁶ [*The Independent, 28 October 2010*](#)

¹⁷ 'Early India: From the Origins to AD 1300,'
by Romila Thapar, University of California Press (2001) pp 17-18

humanism and the spirit of inquiry and reform’; *to abjure violence...to promote harmony and the spirit of common brotherhood amongst all people*’; and *to renounce practices derogatory to the dignity of women.*’ It guarantees *liberty of thought, expression, belief, faith and worship.*’ Anyone who has looked at this ordinance will agree that enacting the law will advance these goals of our constitution in very significant ways. Very concretely, it will have a huge positive impact on the lives of thousands of people for years to come. It is important that we as citizens stand firm in our demand for this law and do not allow spurious philosophical arguments or misleading propaganda to derail this important legislation.

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