

Homage to the Cosmos

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Introduction

At the outset I confess that I feel diffident in expressing my views in a collection of articles by distinguished scholars. It is diffidence born out of the knowledge that I do not possess the intellectual maturity to speak authoritatively on the topic I have chosen. What I have to say, therefore, arises from the many questions I have in my mind—questions that I do not have answers to. As a student of science I have progressed far enough to realize how little I know. The subject of cosmology, which deals with the origin and evolution of the universe, tells us how small man is, how limited his experience on this tiny planet is in comparison with the physical universe he can observe. To quote the British cosmologist A.S. Eddington:

Man in his search for knowledge of the universe is like a potato bug in a potato in the hold of a ship trying to fathom from the ship's motion the nature of the vast sea...

Eddington said this more than five decades ago. In 1970, Fred Hoyle, another astronomer who occupied the same Plumian Professor's chair at Cambridge, had this to say:

...I think it is very unlikely that a creature evolving on this planet the human being, is likely to possess a brain that is fully capable

of understanding physics in its totality. I think this is inherently improbable in the first place, but even if it should be so, it is surely wildly improbable that this situation should just have been reached in the year 1970 ...

When these great minds have expressed their humility, what can I say except to repeat after Kalidasa:

mandaha kaviyashprarthi gamishyamy-upahasyatarm

pranshulabhye phale mohadudbahuriva vamanah.

[Being dim-witted but aspiring for the success of the wise, I will end up in ridicule, like a dwarf raising his hands towards a fruit can be reached only by a tall person.]

But having written these lines, Kalidasa went on to produce the masterpiece of *Raghuvansha*. I hold out no such hope! I am here to air my ignorance.

The occasion, however, is such that I do not feel out of place in a seminar that is commemorating the seventh centenary of Sant Jnaneshwara, whose works have continued to influence and guide people through their practical and pragmatic philosophy. For, in those works and through his discourses, Jnaneshwara had emphasized the note of tolerance between the many approaches in search

of the universal truth. In those seven hundred years science has made remarkable progress. Its powers, both benign and destructive are abundantly clear today as are its numerous influences on society. Many therefore see it as a challenger to established religions.

In my brief discussion I wish to highlight some aspects of the science vs. religion debate from my own somewhat narrow vantage point. I hope that I will be able to generate a discussion—hat will bring in issues I might well have omitted.

Common Goals...

Both science and religion are guided by man's search for the truth. Their approaches are different, even their concepts of what they mean by 'truth' are different. Let us consider science first.

Science as a subject took shape out of man's curiosity about nature, about the various natural events going on around him, about the sun, the moon and the stars and planets about lightning and thunder, about the living things great and small and about the origin of the universe. Although it took several centuries for the scientific method to get established, once it did take shape, it spread fast.

Experiment, observation, theory and predictions... the last to be tested by more experiments. And so the chain goes on. From a certain level of understanding of nature the scientist asks further questions. From his efforts to find their answers he advances to a higher level and there new questions occur to him which he could not have even thought of earlier.

Take an example about atomic structure. Why does the atom of hydrogen have the size of a fraction of a nanometre? This question could be understood and answered by the quantum physi-

cists of this century. In Isaac Newton's time this question would not have made sense at all. Likewise when in the 1920s, Eddington conjectured that the origin of sun's energy lies in the nuclear fusion process, he was ridiculed by nuclear physicists. Within a decade and a half the science of the nucleus had advanced to a stage where Eddington was proved right.

And so science goes on bettering its knowledge base and looking for truth at more and more sophisticated levels. The process is seemingly an endless one. But so far it seems unable to grapple with questions relating to the interior of the human mind, the feelings, the emotions and the urge to know which gave rise to it. Why is man created? Why are so many living species of different sorts in existence? What is the purpose of this creation? Why are there laws of science in the first place? Why do the laws discovered by man on this tiny earth seem to work on the much grander scales of stars and galaxies?

These are questions about cosmic truth which seem beyond the scope of science. This is where religion steps in. Different religions have provided different thought structures to answer such questions. Even the role of the Creator, or God, assumes different proportions in different contexts. There are hierarchies even in attempts to attain knowledge via religion too. In Geeta, for example, Krishna tells Arjuna

*Shreyo hi jnanamabhyasyat jnanat dhyanam
vishishyate*

*dhnyanat karmaphalatya gah tyagat shantir-
anantaram*

[Better indeed is knowledge than the practice (of concentration), better than knowledge is meditation, better than meditation is renunciation of the fruit of action; on renunciation (follows) immediate peace.]

In all religions there is an ultimate state of perfection that the individual may aspire to. This may be *Moksa* or *Nirvana*, or some other form. This state is one where basically all questions are answered and there is no need to ask any more.

In a sense, science would also like to reach that state but it is very unlikely that it ever will. Indeed, in contrast to the religions seeker who attains peace and contentment at the conclusion of his search with the above goal, the scientist may find the universe a very dull place to live in if all his questions are answered.

... But Different Approaches

The scientific truth is, however, very different from the religious one even when both are incomplete. Science insists on objectivity, on the repeatability of its experiments, on their validity on a universal scale. Thus if the claims of Mr X cannot be experimentally or observationally confirmed by Mr Y, they are not accepted. If Galileo found that the speed of a stone dropped from the Leaning Tower of Pisa grew in proportion to time after drop, the same result would have to be obtained by any Tom, Dick or Harry performing the same experiment.

But with religious experiences it is a different story. When Krishna showed Arjuna his 'Universal Form' he told him:

*na vedayajnadhyayanair na danairna cha
kriyabhirna tapobhirugraih*

*evam rupah shakya aham nruloke drashtum
tvadanyen kurupravir*

[Neither by the Vedas, (nor by) sacrifices nor by study nor by gifts nor by ceremonial rites nor by severe austerities can I with this form be seen in the world of men by anyone else but thee, O hero of the Kurus!]

Thus only Arjuna had been privileged to see it. No scientist can similarly get away with by saying 'Only I have seen the proton decay... others cannot see it happen.'

This is the main contrast between science and religion, in their perception of truth: the objectivity insisted on by science versus the highly subjective personal experiences of the religious. The conflicts arise when the scientists are asked to believe these unique personal experiences of the select few. They obviously cannot believe what they cannot themselves experience. On the other hand, a deeply religious follower of a seer who has had that experience, sincerely believes that the experience is real. Indeed, he may consider the scientist obdurate in his disbelief.

Secondly, the scientist, aware of the partial truths he has established, knows the difficulty of reaching the goal of complete knowledge. Most religions tell him, on the other hand, that they have the complete knowledge—again based on the experiences of the select few. This tone of certainty makes the scientist uncomfortable.

These differences are genuine and must be appreciated and respected on both sides in a science vs religion debate. There are, however, other issues which I will discuss now that complicate the matter further.

Most religions of the world started off or evolved into moral codes of conduct which are essential for a collection of human beings to live together as a society. Thus there are inevitably several do's and don'ts. For example, there are the ten commandments in the Bible. Moreover, the religions also evolved their methods of providing peace to a human mind, often in stress of living. These methods also gave do's and don'ts to shape human thinking.

Nevertheless, the problem arises when these

sincere and practical instructions get mixed up with rituals so much so that the latter eventually supercede the former. At some stage astrology also got into the game with the 'evil planets' having to be propitiated. Then there were the injections of miracles which continue to this day. It is as if, the teacher cannot establish his credentials through his/her wisdom but must resort to tricks to convince the would be converted that he/she must command respect. When these miracles of modern times are debunked by scientific scrutiny, when astrological predictive apparatus is demonstrated to be ineffective and non-scientific it is not surprising that the scientists develop an antipathy towards religion as a whole.

Just as these pseudo-religious practices bring a bad name to religion, so does fanaticism which today goes under the name of fundamentalism. Fundamentalism precludes any questioning of the tenets and hence it is totally contrary to the scientific outlook. Moreover, religious fundamentalism finds scientific facts unpalatable and therefore resists them and resists science itself.

Having passed these critical remarks on the present religious ambience, let me hasten to add that the slate is not clean on the scientific side either. It is a measure of the social pressures on scientists that one notices a dimming of the objectivity that is the hallmark of science and one also sees the emergence of what I call *scientific fundamentalism*. Copernicus and Galileo suffered from this fundamentalism when they tried to propose the heliocentric theory as an alternative to the geocentric theory. One could complacently argue that the fundamentalism they encountered was of a religious nature. This argument is only partly true. For, even intellectuals not belonging to the Catholic Clergy opposed the heliocentric theory—and on the Protestant side Martin Luther was not friendly to it either. One may say that

for fear of losing social prestige and secure positions, the intellectuals of the sixteenth and the early seventeenth centuries were reluctant to take public positions in favour of the heliocentric theory.

Today scientists have come to rely increasingly on public funding for their research. So they have evolved a supposedly fair and democratic way of deciding which projects to fund. The method is based on peer review but it works in a very conservative manner. Only those projects are funded which are 'safe', i.e., where the idea has been proven to be workable, or at least acceptable to a large majority. While this seems a reasonable way of disbursing public money, it is totally alien to new ideas and new developments in science. All moderately good scientific discoveries would fall within the above conservative net, but all exceptionally good radically new ideas would slip through it. And a look at the history of science is enough to convince any reviewer that it is the latter that have maintained the vitality of scientific progress. In this connection I may quote the story told by Eddington.

In ancient days two aviators procured to themselves wings. Daedalus flew safely through the middle air and was duly honored on his landing. Icarus soared upwards to the sun till the wax melted which bound his wings and his flight ended in fiasco... The classical authorities tell us, of course, that he was only "doing a stunt"; but I prefer to think of him as the man who brought to light a serious constructional defect in the flying-machines of his day.

So, too, in science, Cautious Daedalus will apply his theories where he feels confident they will safely go; but by his excess of caution their hidden weaknesses remain undiscovered. Icarus will strain his theories to

the breaking-point till the weak joints gape. For the mere adventure? Perhaps partly, that is human nature. But if he is destined not yet to reach the Sun and solve finally the riddle of its construction, we may at least hope to learn from his journey some hints to build a better machine.

Perhaps carried away by the conformism, many distinguished scientists often delude themselves that their 'tried and proven path' represents the real and ultimate facts about the universe so much so that the end of their quest is near. In fact the reverse is true: a feeling of complacency is an indication that the tried and proven method has reached the end of its usefulness and something very different is needed. A hundred years ago, the rapid advances of gravitation theory, electromagnetic theory and thermodynamics led many scientists to believe that the 'end of Physics' was reached. These prophecies were belied by two major revolutions of this century, viz., the theory of relativity and the quantum theory: both these inputs came during the first two decades of the present century. It is interesting to see history repeat itself with a scientist of the stature of Stephen Hawking saying in 1980 that the end of Physics is round the corner. That corner already seems to be receding.

Thus, given these departures from the cherished image of science, the layman is justified in questioning the infallibility of science and the wisdom of putting all one's intellectual eggs in the scientific basket.

Complementarity and Synthesis

Given these difficulties that separate the reality from the ideal, what can we do to bridge the gap?

First, it is necessary to recognize that religion

and science fulfill complementary urges of the human mind. The problems come when there is a trespass of the area of either one by the other. Thus scientists should avoid passing value judgments on religious thoughts without appreciating their different contexts. And religious thinkers should not try to look for justification of their thoughts in the findings of science.

Thus scientists are often asked if they believe in 'God'. Now the notion of 'God' is so variable from person to person that an answer of the yes/no type will be grossly misleading. Is the scientist expected to 'Prove' the existence of God by demonstrating how well-ordered the working of the universe is? Does it help him in understanding why there are laws of science? Judged purely by scientific logic, a fresh postulate that simply justifies only what is already known is no advance in one's understanding. Surely the 'God' that the seers from different religions experienced was different from the above scientific postulate. In other words, in my opinion putting the above question to a scientist (because he is a scientist) is unfair.

To achieve a synthesis or at least a coexistence of science and religion several different steps are possible. First the religions can be pragmatic enough to adapt their philosophers to the new facts of the universe, large and small, revealed by science. The religious concepts and beliefs must be such as to be consistent with the scientific facts. The scientists, on the other hand must be always aware of the incompleteness of their knowledge and hence receptive to new ideas and concepts. They have the future possibility of understanding the operations of the human brain. Their researches may very well add to the philosophers' thoughts on reality, consciousness, purpose of existence etc. Above all, the scientists should constantly remind themselves that there are per-

haps a few concepts and experiences which their laws do not reach.

Conclusions

At this stage I would like to conclude with a few thoughts from Swami Vivekananda. In his Chicago address of 19 September 1893, Swamiji said:

...Science is nothing but the finding of unity. As soon as science would reach perfect unity, it would stop from further progress, because it would reach the goal. Thus chemistry would not progress further when it would discover one element out of which all others could be made. Physics would stop when it would be able to fulfill its services in discovering one energy of which all the others are but manifestations, and the science of religion become perfect when it would discover Him who is the one life in a universe of death, Him who is the constant basis of an ever-changing world. One who is the only Soul of which all souls are but delusive manifestations. Thus is it, through multiplicity and duality, that the ultimate unity is reached. Religion can go no farther. This is the goal of all science...

Throughout his various addresses Swami Vivekananda was emphasizing this essential goal of unity of religious approaches, even if they look very different at their starting points *Ekam sat, vipra bahudha vadanti* that which exists is One; sages call it by various names. He had emphasized the tolerance needed to accommodate diverse points of view if such a search for unity is to be carried out, highlighting the fact that this tolerance had always been part of the Indian tradition.

Dr. S. Radhakrishnan, in his book *Eastern Religions and Western Thought*, defined toleration as 'the homage that the finite mind pays to

the inexhaustibility of the infinite'. This remark profoundly expresses the importance of tolerance not only in religion and philosophy but in science also. For, I have said enough to underscore the limitations of present-day science and the need for a many-pronged approach towards the search for the ultimate truth. Scientific theories that became dogmatic ultimately reached the dead-end and could proceed no further. Theories that were pragmatic and open to a critical appraisal and revision progressed further.

To a scientist like me this latter approach finds an echo in the teaching of Swami Vivekananda when he said in his lecture on My Master in New York in 1896.

...This is the message of Sri Ramakrishna to the modern world: 'Do not care for doctrines, do no care for dogmas, or sects, or churches, or temples; they count for little compared with the essence of existence in each man, which is spirituality; and the more this is developed in a man, the more powerful is he for good. Earn that first, acquire that, and criticize no one, for all doctrines and creeds have some good in them...

In the strife ridden world of today, how pertinent these words sound! This humanism is needed not only in the sphere of religion, it is equally relevant to modern science.

However, I can end this discussion no better than by drawing attention to *Pasayadan* of Sant Jnaneshvara. In this invocation expressing hope for the well being of the world, the seer talks of a universal religion that transcends the narrow boundaries of space and time and of culture. It is indeed remarkable that seven centuries ago when none of today's communicative modes available, a person could talk of a cosmic religion. This article pays homage to his wisdom and understanding.