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OPINION

Why does our society lack scientific temper and what can scientists do about it?*

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I am delighted to have the opportunity to participate in this panel discussion. Honourable Vice-President Shri Mohammad Hamid Ansari has very eloquently defined scientific temper and equally eloquently lamented the lack of scientific temper in the country. Thus he has made our job easy; the panel can straightaway begin its business of asking why scientific temper is lacking in our society, why are blind faith and superstition so prevalent, and what can we do about it.

I would argue that both scientists and 'non-scientists' are to blame. I am soon going to argue that the classification of people into 'scientists' and 'non-scientists' is absurd and should be done away with, but while I am still using that classification, let me make one more point. As a practising scientist I would prefer to reflect on the fraction of the blame that lies with scientists and how scientists can help change the situation for the better, rather than lay blame on non-scientists.

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In this regard I wish to make three points. The first is that we unfortunately project science merely as a body of knowledge. Science is a body of knowledge but in my opinion that is incidental. Science is primarily a set of methods, a tool-kit which we use to generate knowledge. In the method of science we make observations and experiments and use evidence, logic and internal consistency to make decisions. More importantly, we are allowed to question and re-question everything — there is no final authority and no final answer. Science is thus always a work in progress; all answers are tentative and can be called into question at any time and by anybody. This is the method of science but this is not what we are projecting as science. We do not teach the scientific method in our schools. Instead we burden our children with facts after facts, we burden their backs with bags full of books containing facts but we do not tell them how we came to know all these facts, or indeed any fact. If you ask a high school student who has passed class 10 or indeed ask his or her teacher, I think they will be hard put to define exactly what the scientific method is. This is where the problem begins. And the problem continues even when scientists discuss among themselves; we are mostly busy describing the products of our research and do not sufficiently emphasize the methods by which we did our research. I would argue that the process of science is far more important than the product because the product may be of interest only to a few specialists but the process should be of interest to a much wider group of people. If you ask scientists about what other scientists have discovered they will tell you a great deal but if you ask them how these discoveries were made, they will be able to tell you very little.

My second point which I already alluded to is that we must do away with the distinction between scientists and non-scientists. I am a Professor at the Indian Institute of Science. I have a Ph.D. in Science. I teach courses in science. I am the President of the Indian National Science Academy. So by all accounts I am a scientist. But is that always true? Am I a scientist 24 X 7? Do I use the scientific methods for everything? The answer is a clear No. I do not use the scientific method when I decide what music I would like to listen to, when I decide which restaurant I should go for dinner or what colour

of shirt I should wear. So-called scientists use the scientific method some time but not always. Similarly, so called non-scientists also should use the scientific method sometimes though not always.

This raises the question of when we should use the scientific method and when we need not? If we want to know whether smoking cigarettes increases the risk of cancer, we must use the scientific method, if we want to decide whether a little bit of red wine actually reduces the risk of heart disease, we must use the scientific method, if we want to decide to learn how to put a spacecraft on the moon, we need the scientific method and if we have to decide whether or not Indians practiced inter-planetary travel thousands of years ago, we must use the scientific method. It is perfectly alright for me to say I like Hindustani music more than Carnatak music without scientifically justifying it but it is not alright for me to say that genetically modified (GM) crops are bad for us or indeed to say that GM crops are good for us without scientifically justifying my claim. All of us should use the scientific method where it is needed, whether we are so called scientists or so-called non-scientists — the permanent distinction between scientists and non-scientists is absurd. Moreover this distinction creates an un-necessary and unhelpful hierarchy in the society. It is meaningless to say that scientists believe that GM crops are good and non-scientists believe that GM crops are bad. Our decision about whether GM crops are good or bad should depend on the evidence and not on belief. It will also be helpful to break down the presumed hierarchy between scientists and non-scientists if we boldly advertise the fact that even professional scientists do not use the scientific method 24 X 7.

All this leads me naturally to my third point which is that we must create a situation where everybody can be a scientist when it is necessary to use a scientific method and everybody can afford to unashamedly be a non-scientist when it is not necessary to use the scientific method. If we want everyone to make evidence-based decisions when necessary to do so, we must make it possible for everyone to have access to and be able to understand the evidence. And that is why we must teach science as a set of methods and not merely as a body of facts that

scientists have discovered by some kind of magic and happen to believe in. Only then can we create scientific temper in the society and remove blind faith and superstition.

Science education should empower a school child who is told that an idol of Lord Ganesha has begun to drink milk, to apply the scientific method — observation, experiment, logic, internal consistency and a questioning and disbelieving attitude — to decide whether what he or she has been told is plausible. Scientists can do a great deal indeed to foster scientific temper in society.