



Dissent as a Demand for Assent

An Essential Lesson from the Existential Nature of Science

- S. Stephen Jayard

Abstract

We are thinking beings. Given the faculty of free will and the innumerable circumstances that we find ourselves in, there will always be infinite ways of thinking and reflecting. To curtail one's thinking and force one to act only in certain manner would actually be a great disservice, not only to the individual concerned, but also to the whole of humanity; applying the same mould of thinking and acting to everyone in society will lead humanity to a stunted growth and land it in stable waters. As long as we don't have the full picture of reality we cannot absolutize our perspectives, after all *we can never know how much we don't know and all that we know is what we know*. Silencing the spirit of dissent goes against the very spirit of being human as the lack of dissent, will block the ways for new insights and inspirations, inventions and discoveries. *Dissent, thus, is an essential property of our intellect*. The paper begins with a short description of dissent in various human fields and moves on to the fields of science to show how important dissent is for the field of science, and at the same time, unfortunately, how often it is silenced! Examples for suppression in four areas of scientific researchers are considered here to bring out this point: *Pesticides*, where the corporate companies attack the dissenters; *Fluoridation*, where the pride of the dental profession silences the protests; *Nuclear Power*, where the State agencies suppress the voice of the critics; and *Darwin's theory of Evolution*, where the conservatives dump the critics, including dissenting scientists, as

‘religious creationists’. Further the paper attempts to explain how dissent in science is essential because of the very nature of science, by focusing on three important aspects: *the nature of human reasoning*, *method of science* and *theory choice*.

Keywords

Democracy, Actual Practices of Science, Dissent, Openness

Introduction

Rational beings as we are, we all engage in the act of thinking and reflecting. Given the faculty of free will (though it may not be absolutely free as it can be conditioned by several factors, but sufficient enough to make us responsible for our actions) and the innumerable circumstances that we find ourselves in, there will always be infinite ways of thinking and reflecting. To curtail one’s thinking and force one to act only in certain manner would actually be a great disservice to humanity; applying the same mould of thinking and acting to everyone in society will lead humanity to a stunted growth and land in stable waters. As individuals are limited in many ways we cannot have a comprehensive view of reality, nor about our own selves. As long as we don’t have the full picture of reality we cannot absolutize our perspectives, after all *we can never know how much we don’t know and all that we know is what we know*. Silencing the spirit of dissent goes against the very spirit of being human as the lack of dissent will block the ways for new insights and inspirations, inventions and discoveries. *Dissent, thus, is an intellectual property.*

The paper begins with a short description of dissent in various human fields and moves on to the fields of science to show how important dissent is, and at the same time, unfortunately, how scornful it is sometimes projected. Examples for suppression in four areas of scientific researchers are considered to bring out this point: Pesticides, where the corporate companies attack the dissenters; *Fluoridation*, where the pride of the dental profession silence the protests, and *Nuclear Power*, where the State agencies suppress the voice of the critics; and *Darwin’s theory of Evolution*, where the

conservatives dump the critics, including dissenting scientists, as 'religious creationists'. Further the paper attempts to explain how dissent in science is essential because of the very nature of science, by focusing on three important aspects: *the nature of human reasoning, theory choice and method of science*.

1. Dissent in General

Dissent can be understood as an expression of an opinion different from a prevailing or official position; it is a difference of opinion or feeling; it is a disagreement or refusal to conform to the authority of any form.¹ Dissenting voices are silenced by various means like absorption, domestication and homogenization. The uniqueness and the otherness of the other are ignored so that one ideology and one set of practices can be imposed upon. Unity is a value, but not uniformity; different voices are needed to be aware of the limitations of a system. If these voices are stifled, a system may continue to be in its own ignorance and arrogance. This issue gains importance as in the recent past several incidents have taken place that stifle the dissenting voices.

Serious situation in India: In protesting against the recent attempts by the Central Government to polarize the people in terms of cultural practices and religious ideologies, several intellectuals of our nation returned their *Sahitya Academy* awards. For they fear the Government is ruining the multicultural and multi-religious fabrics of India. The intellectuals and the champions of preserving India's great heritage of multiple faces strongly protested against the killing of M. Kalgurgi, Narendare Dabholkar, Govind Pansare, and Mohamed Akhlaq;² all these were engaged in writing to criticize the

1 See: <http://www.thefreedictionary.com/dissent>; accessed on 17 May, 2016.

2 This note has been added, on 5 Oct, 2017, for the publication of the paper, not at the time of presentation. In the list of horrible and inhuman assassinations one more famous journalist has to be painfully added: Ms. Gauri Lankesh, 55, editor of *Gauri Lankesh Patrike*, a weekly newspaper, which she published from Bangalore, was brutally killed by the bullets from the close-range near her residence. It is widely

ruling forces and to conscientize the public masses on important issues. These killings are the heinous expressions of the brutal attempts to mute the critics and to manipulate the public opinion.

India has a great tradition of tolerance towards difference of opinion. The recent suppression of dissent is in fact an insult to this long cherished tradition of India. As Amartya Sen points out the great emperors of India, like Ashoka and Akbar, not only exhibited mere tolerance but also respected and encouraged the heterodox voices.³ India has always been and still wants, as Jonardon Ganeri, explains, to be “an open assimilative, and spacious one, sustaining a plurality of voices, orthodox and dissenting, of many ages, regions, and affiliations” and he invites the modern India to study the valuable ancient traditions, to deliberate and to learn from them to decide “who to be, how to behave, and on what to agree. That is a fundamental freedom, one which ought not to be surrendered in binding”.⁴

Pushpa Bhargawa is convinced that when informed dissent is denied of serious and attentive listening and if it is not followed by appropriate actions, it is in fact a mockery of democracy. He suggests that real democracy would always encourage informed dissent, as “a citizen has a right to dissent without fear of victimisation — as long as such dissent does not lead to inhuman or unconstitutional action”, while on the other hand, “dissent in an authoritarian, dictatorial or colonial regime could lead to the severest of punishments — loss of life — as happened in colonial India, Hitler’s Germany or Stalin’s USSR”.⁵

considered as the result of the intolerant attitude of the majoritarianism, as she was the outspoken and courageous critic of the BJP’s Central rule and its policies. A painful example for silencing the dissent!

3 Amartya Sen, *The Argumentative Indian: Writings on Indian History, Culture and Identity* (New York: Picador, 2006), p. 247.

4 Jonardon Ganeri, “Intellectual India: Reason, Identity, Dissent”, *New Literary History*, Vol. 40, No. 2, India and the West (Spring 2009), pp. 247-263, p. 263.

5 Pushpa M. Bhargawa, “The importance of dissent in democracy”,

An informed dissent is an essential feature of a democratic society. But the State takes up various measures to curb the dissent; usually they “buy” the media to twist the truth; they project even a peaceful protest as a violent and a criminal activity. This twisted story very often sounds more realistic than the real story. Unfortunately lies are often more appealing to reason than reality!

When there are organized attempts by the State or the powerful institutions in the society, dissent also becomes the duty of the citizens in order to protect the democratic nature of the nation. According to Hamid Ansari, “the right of dissent also becomes the duty of dissent since tactics to suppress dissent tend to diminish the democratic essence”.⁶ Going against the powerful structures and the

“
The history of the
progress of mankind
is a history of informed
dissent.
”

State is always projected as anti-nationalism or even betrayal of democracy and so on. But in fact when the State goes against the basic principles upon which the nation is built, it is the patriotic duty of every citizen to voice out their protest in acceptable manner; to dissent, therefore, is a “democratic right to object, oppose, protest and even resist”⁷. Ansari also meaningfully says, “the history of progress of mankind is a history of informed dissent”.⁸ Dissent is, understandably, cruelly unpleasant to the ruling class and the vested interests. Indian Constitution affirms and protects the right to free expression and this includes the right to dissent as well. This Fundamental Right, Article 19 (1) (a) protects the right to dissent.

<http://www.thehindu.com/opinion/op-ed/the-importance-of-dissent-in-democracy/article6123745.ece>; accessed on 17 May, 2016.

6 Hamid Ansari, “*The First Ram Manohar Lohia Memorial Lecture*” delivered in Gwalior on September 23, 2015. (see:

<http://thewire.in/11476/why-india-must-take-seriously-the-right-to-dissent/>); accessed on 17 June, 2016.

7 *Ibid.*

8 *Ibid.*

The Supreme Court of India that “the restrictions on the freedom of speech must be couched in the narrowest possible terms” that is, the restrictions have to be ‘reasonable’ and cannot be arbitrary, excessive or disproportionate.⁹

Our focus here is on how dissent is seen in the world of science. In the world of science the opposition to dissenting voices is done rather subtly. Among other things, the realization of our existential limitedness will be enough to develop a right attitude to dissent. Thus, *dealing with the right dissent in the right manner will result in growth in many factors*, like humility, tolerance, understanding, fraternity and equality.

2. Dissent in Science

Science, as any other human enterprise, also needs to take dissent seriously; however, as human as any other knowledge enterprise, there also we do find severe attempts to destroy dissent and silence the dissenters. However the issue of dissent in science has not unfortunately been explored much in the past. It was not given importance. But now there are some serious efforts to discuss and bring it to the public awareness the whole issue of suppression of dissent in the world of science; for example, Freeman Dyson, a well-known physicist, has brought out a collection of his own Essays, book reviews and lectures, which focus on these particular issues;¹⁰ and another example would be the edited work of Oren Harman and Michael Dietrich.¹¹

Dissent is silenced by power and authority. Power is generally exercised over people by the authority, derived not only from politics and religion but also by the possession of knowledge and understanding. Foucault explores this notion to show how this

9 *Ibid.*

10 Freeman Dyson, *The Scientist as Rebel* (New York: New York Review Books, 2006).

11 Oren Harman and Michael Dietrich, eds., *Rebels, Mavericks, and Heretics in Biology* (New Haven, Conn.: Yale Univ. Press, 2008).

latter power can be so very damaging.¹² Some authors mean by suppression on the restraints or inhibition without physical forces; by repression they mean physical violence too, like beatings, imprisonment, torture, and even murder. Often a category of people are suppressed because they belong to that category, like discrimination on the basis of gender, caste, creed or region. Censorship can be exercised by the authorities; sometimes self-censorship can also take place because of the fear of the authorities.¹³

We need to clearly distinguish between the actual ‘suppression’ and the actions taken for legitimate reasons. Given the situations there are no fool-proof tests to show that real suppression has taken place, Brian provides some clues and tests to show whether an action is a real suppression or just a corrective action taken for legitimate reasons.¹⁴

Double standard tests: this is to see whether the same actions have been taken upon other scientists also for similar performance, or only this scientist in question is unjustly treated so.

Commonly accepted standards of behavior: If the suppressor takes up the issue directly with the superior or the funding agencies, instead of issuing the matter with the concerned scientist first; it is an obvious attempt to pressurize the scientist to detest from being a critique from his or her own boss.

12 See: Foucault, Michael, *Madness and Civilization: A History of Insanity in the Age of Reason* (New York: Vintage Books, 1973) and also, *Discipline and Punish: The Birth of the Prison* (Harmondsworth: Penguin Books, 1977).

13 Brian Martin, “Suppression of Dissent in Science”, *Research in Social Problems and Public Policy*, Volume 7, edited by William R. Freudenburg and Ted I. K. Youn (Stamford, CT: JAI Press, 1999), 105-135, See:

<https://www.uow.edu.au/~bmartin/pubs/99rsppp.html>; accessed on 19 July, 2016.

14 *Ibid.*

The case of peer review: one has to see whether the peer group behaves out of jealousy or on the accepted norms of behavior; for example, blocking the publications of a paper in the journal.

Unknown to the general, public there have been several cases of severe actions to suppress the dissident scientists. There is also no elaborate and well-established literature on them either. For our consideration let us take Brain Martin's analyses of three case-studies and one more incident regarding the suppression over the Darwin's critics, narrated by Discovery Institute, a Seattle-based policy centre. The stories of suppression in the world of science are generally unknown to common people because often they are subtle and they pertain to only highly elite society of the intellectuals. But the investigations into such suppression stories are necessary, because as Brain Martin affirms, they "can provide a convenient probe into the exercise of power in science and more generally into the dynamics of expertise and legitimacy in a technological society."¹⁵

Case-Studies

1) Pesticides

Pesticides are chemicals produced for the purpose of getting rid of insects, plants, fungi, and other micro-organisms which are considered to be harmful for the common welfare of human beings and their agriculture. Supporters argue that these pesticides need to be produced more to protect human environment, while the critics argue that several of such pesticides are actually harmful to the environment and human health. The issue has been in hot discussion from 1960s.¹⁶ For example, (a) Dr. Melvin Dwaine Reuber, a research scientist, was a noteworthy critic of pesticides. He made elaborate studies to show how cancer is linked with cancer. In

15 *Ibid.*

16 See: George Ordish, *The Constant Pest: A Short History of Pests and their Control*. (London: Peter Davies, 1976); and Christopher J. Bosso, *Pesticides and Politics: The Life Cycle of a Public Issue* (Pittsburgh: University of Pittsburgh Press, 1987).

1960s and 1970s, he came up with more than 100 scientific papers. But all of a sudden, in 1981, when he was head of the Experimental Pathology Laboratory at the Frederick Cancer Research Center, part of the National Cancer Institute in the United States, he got a scathing attack on his performance and professional behavior from the director of the Center, Dr Michael G. Hanna, Jr.; surprisingly, the same Director had earlier appreciated his campaign. There were counter-writings to show that Reuber's findings were wrong, and there were widely circulated by the petrochemical industries. Reuber soon sued the journal of *Pesticide & Toxic Chemical News* and even he was paid substantial damages; but later on, after a decade or so, he lost his case when the case was taken up in a higher court. (b) Clyde Manwell, professor of zoology at the University of Adelaide in South Australia, coauthored a letter published in the local newspaper that challenged the reasons given by the government for spraying fruit fly; but he was severely attacked in the State parliament and the university initiated an attempt to dismiss him.¹⁷ (c) Frank Egler wrote an article criticizing pesticides in *Bio Science* in 1964. As a reaction to it, both the journal and author were censured in a motion at a meeting of the Entomological Society of America, a professional body supported by pesticide manufacturers, though many of those who were present there would not have even seen the articles.¹⁸ This whole episode can be seen *as the conflict between the dissenters and the powerful pesticide industry*.

2) Fluoridation

It refers to the process of adding one part per million of fluoride to drinking water as a means of preventing tooth decay in children. In some parts of countries, like Australia, Canada, New Zealand,

17 Baker, C. M. Ann. 1986. "Fruit Fly, Free Speech and Academic Justice in Adelaide." Pp. 87-120 in *Intellectual Suppression: Australian Case Histories, Analysis and Responses*, edited by Brian Martin, C. M. Ann Baker, Clyde Manwell, and Cedric Pugh. Sydney: Angus and Robertson.

18 Frank Graham, *Since Silent Spring* (Boston: Houghton Mifflin, 1970), p. 171.

and the United States it was already in practice. In 1950 the United States Public Health Service endorsed and promoted this practice. However there have been severe oppositions to this practice from certain quarters and some doctors and scientists did not dare to oppose it openly. But Dr. George Waldbott, a leading scientist, opposed fluoridation in the United States. He wrote extensively on the ill-effects of fluoridation, but certain journals regularly rejected his papers; he believed that the U. S. Public Health Service was behind this move. Similarly, John Colquhoun, of the Department of Health in Auckland, New Zealand, opposed the fluoridation's hazards publicly but he was formally warned to toe the official policy of the government. Another example of suppression would be the case of Max Ginns, who was expelled from his dental society in Worchester, Massachusetts in 1961, because he made public the petition of dentists and doctors opposed to fluoridation. We can quote a dozens of painful incidents of suppressing scientists and dentists for going against the policy of the government, though there were serious health issues pointed out by them. Very often they were threatened to derecognize from the official roster as dentists. But "The proponents of fluoridation have been highly successful in stigmatizing critics as reactionary, irrational, confused, and unscientific, and even in claiming that fluoridation is so well verified that there is no scientific debate".¹⁹ In some case the fluoridation supporters are so powerful that they could influence to grant more funds to increase the fluoridation process and even to make it compulsory for all the tooth pastes. Thus the industrial interests, especially of the aluminum industry, were behind the insistence of fluoridation. Even sugary food manufacturing industries were behind in curtailing the opponents of fluoridation, because fluoridation was projected to be the solution to tooth decay, hiding the established fact of link between tooth decay and sugary foods. These debates over fluoridation reveal the *conflict between the dissenters and the status interests of a profession that is dental.*

19 See: Brian Martin, "Suppression of Dissent in Science", *Op Cit.*

3) Nuclear Power

It refers to the process of producing electricity by tapping the energy that is released in nuclear fission. The supporters of this process praise it as the most safe and economical way of producing energy in the world, while the dissenters point out the possible dangers behind the whole process, like hazards of possible reactor mishaps, the safe disposal of radioactive wastes, increase of nuclear weaponaries, the division of the haves and have-nots, the misuse of economy, associated with producing and procuring the raw materials like plutonium. Though the US Atomic Energy Commission (AEC) initiated a detailed study in 1965 to find out the hazards of the nuclear power, it apparently was not ready to consider any results that would go against the nuclear power project. There are some clear evidences were the dissenting voices were summarily suppressed; for example, Ross Hesketh, a nuclear physicist at the Central Electricity Generating Board in Britain, in his writings pointed out the secret uses of civil nuclear power plants for military activities and he was continuously harassed and finally dismissed;²⁰ similarly, Jens Scheer, a leftist and critic of nuclear power, was a nuclear scientist at the University of Bremen; he was regularly harassed by the authorities and was threatened to be dismissed from the post;²¹ and another case from Japan; Atsushi Tsuchida, a physicist working at the Institute of Physical and Chemical Research vehemently critiqued and brought lots of awareness among the public by his extensive writings; but the salary increments were denied and he was prevented from lecturing outside the campus. The nuclear power is usually owned and run by the State; only in the USA some private agencies deal with it, and yet the State provides all possible assistance in their favour, like, going soft on them in case of nuclear reactor accidents, legal concessions and so on.

20 David Dickson, "Firing Spotlights Plutonium Exports." *Science* 221, 1983 (15 July): 245; and Rob Edwards, "A New Kind of Nuclear Victim." *New Statesman* 1983 (22 July): 8-10.

21 Allan Piper, "Anti-Nuclear Critic Faces Dismissal." *Nature* 257, 1975 (23 October): 636; and Dorothy Nelkin and Michael Pollak. 1981. *The Atom Besieged*. Cambridge, MA: MIT Press.

The above three cases are just a few examples from innumerable instances of such treatments over the dissenters. Great many numbers of individuals and even organizations go unnoticed and unheard, even in the present times, when they cry over the suppression of their dissenting voices. Very often suppression is used not only to silence the so-called rebels, but also to send a strong signal to those who are planning for some sort of rebellion, and to deter others from any such move. Sometimes suppression can become, as Brian Martin points out, counter-productive, “when it is grossly unfair, exposing the raw face of power and stimulating greater dissent”.²² He also further explains how in some genuine cases of reprimanding they are not actual suppression but legitimate actions of corrections. The authorities may take some actions purely for the greater good of the institute or industry or the State, without any prompting or vested interests from outside and such moves don’t obviously come under suppression of dissent.²³

4) Dissenters and Darwin’s Theory of Evolution

There are some serious objections against Darwin’s theory of evolution. But the supporters of the theory have always tried to hoodwink the general public saying that the objections come from the religious quarters and all scientists are in agreement with Darwin. Even if some actual scientists raise their dissenting voices against Darwin, they are also branded as ‘religious creationists’.

22 See: Brian Martin, “Suppression of Dissent in Science”, *Research in Social Problems and Public Policy*, Volume 7, edited by William R. Freudenburg and Ted I. K. Youn (Stamford, CT: JAI Press, 1999), 105-135, See:

<https://www.uow.edu.au/~bmartin/pubs/99rsppp.html>; accessed on 30 Nov, 2015.

23 For elaborate treatment of these themes, see: Julie Stewart, Thomas Devine, and Dina Rasor. 1989. *Courage Without Martyrdom: A Survival Guide for Whistleblowers*. Washington, DC: Government Accountability Project; George W Pring, and Penelope Canan. 1996. *SLAPPs: Getting Sued for Speaking Out*. Philadelphia: Temple University Press; and Brian Martin, 1997. *Suppression Stories*. Wollongong: Fund for Intellectual Dissent.

Discovery Institute, a Seattle-based public policy center, prepared a list of 100 scientists who sign a declaration that they are quite skeptical about Darwin's claims over random mutation and natural selection to account of the emergence of complex forms of life and so they demand a careful study of Darwin's theory and the evidence that it provides. Those who signed against Darwin's theory were the scientists from diverse fields, like biology, physics, chemistry, mathematics, geology, anthropology etc. and different countries. But the Television Channel (WGBH / Clear Blue Sky Productions) that aired a series of programmes on evolution tried to project that all scientists in the world strongly support Darwin and all those who question Darwin's theory were only 'creationists'. This write-up also mentions about a recent public poll survey shows that 80% of the people want the media to show and discuss also the scientific positions that challenge Darwin's theory.²⁴

The supporters of Darwinism go to any extent to argue for their case. Henry Schaefer, a chemist and five-time Nobel nominee, while demanding a serious debate over Darwinism, comments: "Some defenders of Darwinism embrace standards of evidence for evolution that as scientists they would never accept in other circumstances."²⁵ It is said that the number of dissenters against Darwin is steadily growing. But the attempts to silence them in various methods are also on the increase; legitimate dissents are intimidated and suppressed; young scholars and budding scientists are threatened with the termination of their tenure; and even they engage in 'ad hominem' attacks when there are no real arguments to challenge the dissenters.²⁶

Thus one can easily understand that silencing the dissenters would be a detrimental for the real growth and development of science. The ignorance or the mistakes can hardly be corrected and this blinds the eyes of humanity in its journey towards truth. It is

24 See: "100 Scientists, National Poll Challenge Darwinism" (2001) - http://www.reviewevolution.com/press/pressRelease_100Scientists.php; accessed on 17 April, 2016.

25 *Ibid.*

26 *Ibid.*

amply made clear, as Jed Macosko, a young scholar in the field of molecular biology at the University of California, Berkeley, puts it “Science cannot grow where institutional gatekeepers try to prevent new challengers from being heard”.²⁷

3. Areas of Concern in Science Necessitating Dissent

Let us discuss three areas of science where one can easily see the need for allowing dissent. Unless dissent is taken seriously the growth of science will be hampered.

1) Human Reasoning - Need for Science to Uphold Reasonableness

By the middle of 20th century Philosophy of Science, with its critical appraisal made humanity realize that the very understanding of science and its nature has to be revisited; it argues that even the notion of rationality has to be revised, as there is no one absolute rational framework to be imposed upon the activities of science in order to make it rational. The usual features of rationality don't seem to be sufficient to capture the picture of science. Rationality cannot be confined to logical consistency and justification; it cannot be equated to truth and therefore one can act in a perfectly rational way even on the basis of false beliefs.

Scientists have many assumptions that affect not only their beliefs and behaviours but also their scientific activities. A comprehensive understanding of rationality needs to involve in a very essential way **the agent** (the scientist). The role of the agent in the understanding of science is clearly brought out by Henry Harris. A scientist explores a hypothesis in her head first whether to proceed further or not. “Each scientist has his own mental store of facts, theories and associations, and a private set of value judgments about the relative importance of the different elements in that mental store”.²⁸ Scientists also go by faith, imagination, and intellectual bias and they also act like any non-scientist. The understanding of

27 *Ibid.*

28 Henry Harris “Rationality in Science”, in *Scientific Explanation*, ed. A. F. Heath (Oxford: Clarendon Press, 1981), p. 48

rationality has to involve *the context* as well. It can't be merely a rule-oriented activity. Rules are made for humans and not vice versa. Jesus Christ also reiterates the same, though in a different context, more than once the same point that the *Sabbath* is made for humans, and not humans for the *Sabbath*.²⁹ When we give due importance to the agent and the context in which she acts naturally rules take the back burner. I agree with Harold Brown in maintaining an account of rationality which necessarily acknowledges *the role of judgment*. Many like to recognize the role of judgment in rationality. Brown develops a model of rationality in which judgment plays a crucial role.³⁰ Our account of rationality has to realize *the role and importance of common sense* also. Being rational, in my opinion, can never deny or over-rule common sense. Of course, rationality should not be confined to mere common sense but it should never negate or violate it either. Rationality involves going beyond mere rule-following. Of course, Rationality does play a role in science but that is not everything. "Rationality helps", as Henry Harris

“
Our account of
rationality has to realize
the role and importance
of common sense.
”

29 The Jews were strict about following the religious rule of the *Sabbath*, which is observing the holy day without doing any work. On one such day, a man with a withered hand came to Jesus for miraculous healing. The narrow and legalistic mentality of the Jewish religious leaders objected to Jesus' healing because they took it to be doing some 'work', which is to be avoided on the *Sabbath* day. Jesus clarifies to them, saying that doing something good out of a genuine human concern cannot be considered as a violation of the rule of the *Sabbath* and he boldly declares, "The *Sabbath* was made for humankind and not humankind for the *Sabbath*". (See: The books of Mathew 12:9-14 and Mark 2:23-28, in the Bible).

30 Harold I. Brown, *Rationality* (London & New York: Routledge, 1988).

has it, “but it is not a prescription for making discoveries”.³¹ As Putnam asserts, “‘Scientific’ is not coextensive with ‘rational’. There are many perfectly rational beliefs that cannot be tested ‘scientifically.’”³² Popper also shows that “poetic inventiveness” and “the invention of criticisms”³³ are also main component of rationality.³⁴

As one has to consider all these elements in understanding science, and since diverse opinions and interpretations are bound to occur, it is necessary for science to give heed to dissent.

2) Methodology of Science

Another reason why dissent has to be taken seriously is the very nature of scientific methodology. There is no one absolute method, fit for all sorts of scientific practices and occasions is available.

31 Henry Harris. 1981. ‘Rationality in Science’, in *Scientific Explanation*, ed. Heath. Oxford: Clarendon Press, 46.

32 Putnam, Hilary. 1979. “The Place of Facts in a World of Values”. In *The Nature of the Physical Universe*, ed. Douglas Huff and Omer Prewett, New York: A Wiley-Interscience Publication. p. 115.

33 Popper, K. R. *The Myth of the Framework – In Defence of Science and Rationality*. (ed.), (London: M.A. Notturmo, Routledge, 1994), p. 40.

34 However, one can still use the term of ‘Rationality’ in science, provided that account of rationality includes all these features of reasonableness that are explicated here. Those who are convinced of the short comings of the traditional views of rationality, look for an alternative account of rationality. Philosophers like, **Hilary Putnam** (‘Integrated View of Rationality’), **Stephen Toulmin** (denial of over-reliance of rationality), **Christopher McMahon** (‘Collective Rationality’) and **Stephen Nathanson** (‘Reasonable form of Rationalism’) propose alternatives to the traditional accounts of rationality, which captures the notion of rationality in a much more adequate manner. I have elaborated their details and the characteristics of reasonableness in science elsewhere: *Towards a Theory of Rationality in Science – A Plea for Reasonableness* (New Delhi: Global Vision Publishing House, 2012).

The very notion of scientific method needs to be explored. There are certain methods that are obviously unscientific; for instance, **a) Tenacity** – a rigid adherence to one's own beliefs without making sure whether one is justified in holding onto it; it even implies laziness to check and readiness to remain indoctrinated). This is naturally unscientific because no convincing or reasonable explanation of one's position is given; **b) Authority** – It is the most popular form of unscientific method. Authority may be of a book or a person(s) or the State or religion. By its very nature, authority resists the use of reason, any change and free thought and thus brings in a great stagnation in the growth of knowledge. The State may exercise authority for political reasons. (E.g. A capitalist country will ridicule socialism and vice versa); **c) Intuition** – Though it has a role to play in the process of acquiring scientific knowledge, in itself it is considered unscientific because no explanation can be given for intuitively known principles. It does not emerge out of any mediate sources, like sense-experience, rational discourses etc. Intuitive knowledge is immediate and inexplicable (e.g. The whole is greater than its parts). Observations alone will not be science; it very much involves assumption and imagination of the scientist too. This intuitive presupposition leads one to have a hypothesis. So the beginning of an assumption may be intuitive (non-rational), but its acceptance or rejection must be rational.

Basic Steps in Scientific Methodology

Contrary to the general thinking, the method of science does not start with observations and experiments. There are other steps prior to observation: **Stating the Problem** - A clear understanding of the problem at hand is therefore remarkably important; **Forming a Hypothesis** - A hypothesis is a tentative solution to the problem. It is only provisional and it is not yet proved experimentally. With the data available the scientist formulates a hypothesis for further investigations. The scientist has to use his imagination and assumption in formulating a hypothesis; **Observing and Experimenting** - Observation is the act of apprehending things and events, their attributes and their actual relationships. An experiment is basically observing and studying a certain complex phenomena under varied conditions, controlled by the investigator.

It is here complicated instruments and equipments come to help in the process. When two different hypotheses explain the same event equally well crucial tests are conducted to decide the right hypothesis. A procedure is designed to find out the right one from the fake one; ***Interpreting the Data*** - The results of the experiments are obtained in different forms – as figures, pointer readings, graphical representations etc. We need to interpret to make them intelligible and useful. Interpretation is done by means of analysis, synthesis, comparisons, analogies, models, one's own experience and expertise etc.; and finally, ***Drawing Conclusions and Inferences*** - This process of making judgments and opinions on the basis of observation and experiment is very important as it opens up new horizons of further researches. There are also several 'mental devices' are also used in science, like, logic, classification, comparison & analogy, models, mathematics and so on.

Thus, we are given to understand that the method of science is not just a simple straightforward procedure; it is not just a small framework within which the whole of science can be fitted in. The very process of the methodology itself involves possibilities of diverse opinions, interpretations of the experimental results and conclusions. Then how can we overlook dissent in science?

3) The Need and Relevance of Values in Theory-choice

In the recent decades, especially with the critique of Thomas Kuhn about the nature and functions of science, there emerges a strong view that science is a social enterprise; it is not purely a rational or logical enterprise that is not affected by the social or ethical considerations. Kuhn has convincingly argued that because science is a social enterprise to the core, and because science is for humans and by humans, all that affect humans will have to be seriously considered in the domain of science as well. For instance, Kuhn analyses the very process of 'theory-choice' in science. When the scientific community has to choose a theory from many available theories, the process that they undertake is not purely rational or logic, in the traditional sense of the term. Rather the process involves not only some objective criteria but also some "idiosyncratic factors dependent on individual biography

and personality”.³⁵ This process is, he is totally convinced, of great philosophical importance. The exercise of theory-choice involves *accuracy, consistency, scope, simplicity and fruitfulness of the theory*, which are individually important and collectively sufficiently varied to indicate what is at stake”.³⁶ Unfortunately, there is no one final understanding of what all these factors actually mean and still more challenging is that different scientists might give different degrees of importance to each of them. Thus the theory-choice, at the final analysis, involves their personality straits, value-orientations and belief systems.³⁷ From here it is not difficult to conclude that science cannot wash its hands off from values or belief systems of human society. Due to lack of concern for morals and values, science has done blunders in the past. As Youngson puts it, “Some of them are the result of carelessness; some arise from plain, stubborn wrong-headedness; some from arrogance... some arise from willful and culpable ignorance; some from spectacular bad luck; and some from human moral frailty”.³⁸

This kind of thinking makes it obvious that how science is not merely a rational enterprise, where everything goes on for specific logical reasons. Science has to unfortunately face crisis, with many blunders, precisely because there was a lack of openness and care to listen to diverse opinions and see the “other side” of a story. This again makes it necessary to listen to the dissenting voices within the scientific community.

35 Thomas Kuhn, “Objectivity, Value Judgment and Theory Choice”, in Yuri Balashov and Alex Rosenberg, (eds.), *Philosophy of Science: Contemporary Readings*, (London & New York: Routledge, 2002), p. 429.

36 *Ibid.*, p. 422.

37 For more elaboration on this one may see my paper: “Are Values Valuable in Science? - A Kuhnian Perspective”, in *Omega – Indian Journal of Science and Religion*, 9 (2010), 7-24.

38 Robert Youngson, *Scientific Blunders* (London: Constable & Robinson Ltd., 1998), p. ix

Conclusion

With all these analyses one can comfortably reiterate that any form of informed dissent is to be given due attention and sincere listening; every form of well thought-out reasoning, though it goes against the prevailing authority and the vested interests, can contribute towards a better understanding of science in particular and humanity at large. The best way to deal with dissent is to have a dialogue, with trust and open mind, in a sincere and friendly atmosphere. It will therefore be an injustice to humanity if that reasoning is strangled.

As Galileo Galilei puts it, “In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual”³⁹ and therefore we can comfortably conceive that dissent is a demand for ascent in science.

Dated Received: 02 July 2018

Date Accepted: 07 October 2018

No of Words: 6386

“The “idea of India” is indeed an open, assimilative, and spacious one, sustaining a plurality of voices, orthodox and dissenting, of many ages, regions, and affiliations. ... That is a fundamental freedom, one which ought not to be surrendered in binding oneself to narrower, constricted understandings of what India is” - Jonardon Ganeri

“Blind belief in authority is the greatest enemy of truth.” - Albert Einstein

“If you are neutral in situations of injustice, you have chosen the side of the oppressor. If an elephant has its foot on the tail of a mouse, and you say that you are neutral, the mouse will not appreciate your neutrality.” - Desmond Tutu

39 See: <https://www.brainyquote.com/quotes/quotes/g/galileogal387486.html>; accessed on 7 October, 2016.