Science and the ethics of curiosity

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It is commonly believed that the capacity for curiosity is essential for doing science. Curiosity is also the one notion that allows science to keep ethics at bay. While there have been efforts to develop an ethics of science, they have largely been directed to 'applied' sciences. But the fundamental ethical problem is about curiosity itself. Should curiosity be restrained? The concept of curiosity has a long and interesting history, and the birth of modern science is concurrent with attempts to modify the meaning of curiosity. This paper discusses how the scientific community rehabilitated curiosity in order to negate ethical challenges to the practice of science and also suggests ways to inquire into the ethics of curiosity.

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The troubled relationship between science and ethics

WHAT does ethics have to do with science? After all, for over centuries there has been a sustained belief that science is not answerable to ethical concerns. Science as a specific kind of activity (and discourse) is often seen to be independent of ethics. This belief is so much ingrained into the science community that even today prominent scientists as well as students of science echo the belief that science only discovers truths, and the ethics are only in the context of how the products of science are used or misused. The most common example is that of the knife: a knife is used to kill but it is also used for other useful purposes. When used to kill, one should not blame science (as far as the knife is seen as a product of science). This is an oft-repeated argument for shifting the ethical responsibility from science to the larger set of users of science – this might include the ordinary citizen as well as governments. In doing so, what is reiterated is the fact that the truths of science are transcendental truths, outside human interests and therefore, outside ethical concerns.

The philosophers supply ammunition to this position by distinguishing between facts and values, a distinction that has a long intellectual history. This philosophical distinction offers one possible way to argue for science's independence from ethics. Science is a discourse of facts – facts about the universe. Ethics is about values – values held by humans. Scientific truth and facts are not human-centric. In fact, their exalted status arises primarily because they are thought to be independent of human subjects and thus it is reasonable to expect that they are not concerned with ethics. This distinction is reinforced by what is called the 'naturalistic fallacy' by philosophers. This is the fallacy of confusing the world of facts and values, the 'is' with 'ought'. The world of 'is' is the world of facts and the world of 'ought' is the world of normative ethics. How one ought to behave is an ethical question whereas how the world is a matter for science.

But, even if we subscribe to the view that facts and values should not be conflated, there is still a problem for the science–ethics relation. Science is not merely a descriptive enterprise. It does not just list out the facts of the universe. Science is as much about intervention as it is about description[1]. In fact, explanation, which is an important category for modern science, is privileged in science because it affords a greater control over intervention in the world. In other words, science understands the world in order to intervene in it, to 're-form' the world to suit our needs and desires. Many contemporary discussions on ethics and science – for example, the ethics of cloning and stem cell research – centre around this interventionist strategy of science.

By intervening in the world, scientists deflect the question of ethics from the 'pure' to the 'applied' domain. The creation of these two categories of the pure and applied is itself an interesting move within the sciences. Pure science is often placed in 'opposition' to applied science (including engineering). The privilege given to pure sciences has had significant impact on the growth of scientific institutions. The hierarchy in which the pure is 'above' the applied is commonly reflected in the practice of science even today.

How is this distinction tenable? One way to understand this distinction is by invoking the idea of 'disinterestedness'. This idea has been used by philosophers in effective ways. For example, Kant uses this idea as a defining marker in his definition of art. Disinterestedness is another way of expressing the absence of human interest in any belief or claim. It also suggests lack of prior moti-

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vation, 'ulterior motives', in doing something. The claim is that pure science reflects this disinterestedness. Its discoveries are about the way the world is and therefore cannot be influenced by human interests and desires. Pure science captures this character of science that it uncovers a set of human-independent truths. Applied science is application of these discoveries and scientists do not have much trouble in accepting that such applications can be influenced by individuals, state, religion and so on.

The very distinction of the pure and applied is already value-laden. The usual opposites of pure are 'impure', 'contaminated', and so on. Applied is not exactly contrary to pure but has elements of these contraries. The value given to the image of pure is indeed very significant – purity is associated with the mind in certain states, to austere practices of the body, to high ethical action, to individuals who perform certain heroic acts and so on. Pure has high ethical value in religious systems. It has similar value even in areas such as chemistry where the isolation of the pure substance can be a worthwhile challenge. Racially, the idea of the pure has significant connotations and has spawned various fundamentalist challenges to society. It is in this larger world of the 'pure' that 'pure science' should be located. Given this trajectory of the pure, the word 'applied' in 'applied science' may have pejorative connotations. Applied is somewhat 'impure' – the taint or the contamination comes from the mixing of human interests in what is pure knowledge. The value to the applied is the value of materiality and not the value of disinterested inquiry. This also means that pure in the pure sciences does an important job for science – it keeps pure science out of the concern of ethics. Pure science is seen to be above ethical challenges. It is not that the claims of pure sciences are ethically sound or unsound; it is that they are not answerable to ethics first of all. If ethics is applicable to science at all then it must be in the domain of applied science – this is the commonly voiced claim about science in the context of ethics. This argument is so pervasive that scientists commonly use this for ethical questions on a whole range of issues ranging from uses of knife to nuclear energy/bomb.

It is striking that even in an essay published as recently as 2006 (and republished in an edited book in 2007) a scientist, Mario Bunge, rehashes the same argument. For example, the first section in this essay is titled 'Do not blame scientists: Frisk technologists'. Here Bunge continues the problematic distinction between basic and applied sciences and notes that 'basic science, which is the attempt to understand the world, was mistakenly attributed the power to change it' (ref. 2, p. 29). He continues to echo the most prevalent cliché about science and ethics in saying that 'technology can be used by industry or government for either good or evil . . . nuclear engineering, which is based on nuclear physics, can be used either to design nuclear plants or nuclear bombs'. He goes on to title the next section as 'The ethics of basic science' where he reiterates the convenient distinction by noting that 'basic scientists' (who work on basic science) need have 'no such scruples' (ethical ones which might afflict the technologist) because 'his work is unlikely to have practical uses' (*ibid*., p. 30). He also notes that basic science is characterized by a particular ethos. Following Merton, he lists the elements of this ethos as consisting of 'intellectual honesty, integrity, epistemic communism, organized skepticism, disinterestedness, impersonality, and universality' (*ibid*.). All these are virtues which underlie basic or pure science. The interchangeability of 'basic' and 'pure' is explicitly expressed by him when he notes that 'basic science is pure, but individual scientists may get corrupted' (*ibid*., p. 33). These scientists get corrupted 'when given the opportunity to double as either technologists or policy consultants'! He further goes on to add that '[B]asic research is the search for truth, not for wealth, justice, salvation, or beauty' (*ibid*.).

Bunge is not alone in his beliefs about basic/pure science and its ethos. Countless scientists place enormous emphasis on these beliefs although it seems obvious that there is little that is pure about pure science. The rewards of doing pure science is also material – witness the human drama around claims of originality, authorship, politicking for getting prizes and so on. None of these motivations are disinterested! But the reason why this distinction continues to be so important today is that there is an underlying ideology in insisting on this distinction as well as celebrating the ethos of the pure. I believe that this distinction and the invocation of the pure is primarily the most effective way of deflecting ethical concerns addressable to science. Scientists take this position so that they can escape from the ethical imperative and in doing so are exhibiting their political agenda of safeguarding their work against pressures of the larger society. The fact that they have managed to escape from answering to the ethical challenge so far illustrates the effectiveness of this ideology.

In this paper, I will consider one essential catalyst for this distinction. While disinterestedness and other such characteristics are markers of pure science, they are all based on a human capacity, the capacity for curiosity. Many influential narratives on science by scientists describing why they do science identify the nature of curiosity as a primal characteristic of the scientific attitude. Curiosity is a special faculty of the mind. Curiosity is not reason; rather, it needs reason to sustain it. Curiosity is what is common to the child and to the scientist, leading psychologists and philosophers to find parallels between a scientist and being a child[3]. This is a position that finds strong resonance among practising scientists and contributes to the distance between ethics and science for children can be excused from ethical excesses. Science uses the notion of curiosity to build a wall against ethical criticisms. Therefore, I believe that a proper ethical foundation for science can be developed only if we first

understand the ethics of curiosity. But before we do that, we need to consider the ways by which science and ethics are coming together in recent times.

Putting science into ethics: naturalized ethics and the use of scientific method in ethics

The shift in ethics towards science has two dominant paths. One is through biology and this is by situating ethics in biological foundations. That is, we can understand our moral impulses as biological imperatives. Just as the natural processes of our body are dictated by the 'laws' of biology as well as explained by biological processes, so too can we understand morality as somehow related to biological traits and processes. In a sense, this makes morality 'natural', which counters an excessive dependence on culture as the driving force of morality. Central to this biological understanding of morality is the argument that ethics is a product of a 'long evolutionary process' (ref. 4, p. 21). The claim that ethics is part of evolutionary process implies that ethical principles and rules will help us in survival and adaptation. This belief that ethics can be traced back to biological and evolutionary roots is often called the naturalistic approach. Kurtz, for example, goes to the extent to say that the potentialities for good and evil have a genetic basis but goes on to note that what an individual eventually becomes depends on various influences. Some biologists have argued for viewing morality as a biological process. For example, it is suggested that human evolution has led to the capacity of human intellect. Calne, speaking from the perspective of biology, suggests that our capacity for reason and morality are biological products of evolution. He argues that reason (equivalently for him, science) and social behaviour (equivalently morality) 'evolved together as the primate brain enlarged' (ref, 5, p. 329). He points out that damage to the frontal lobes can impair both rational activity as well as moral decisions.

There is another way of approaching the science–ethics relation. Once again this has been championed by those who believe in the epistemological primacy of science. The basic idea in this view is as follows: Moral principles and values are often dictated by religion, politics, ideologies and so on. There is a fundamental difference in these activities when compared to science. What distinguishes science is the scientific method, one which opens every belief to 'rational' evaluation. Thus, moral values should also be 'open to scientific evaluation' (*ibid*., p. 13). What can scientific evaluation do to values? Kurtz argues that moral knowledge justified in this scientific sense will lead to 'wiser decisions', those based on 'scientific evidence'. The basic argument here is that we should use scientific method to help us make ethically 'reasonable choices'. Given a moral rule on how we should act, that rule should be subjected to a scientific analysis, meaning that the statement should be answerable to evidence and reason, understood in the scientific sense. Ethical knowledge should thus be evaluated like scientific knowledge and therefore is open to change if needed. As Kurtz notes, for the naturalists, 'scientific inquiry enables us to revise our values and principles, if need be, and/or to develop, where appropriate, new ones' (*ibid*., p. 20).

Kurtz accepts that there are 'general principles of right conduct' drawn from our cultural experiences, including basic norms in societies. The challenge in ethics has been to interpret general rules in specific contexts. So, even a statement that one shall not kill has to be interpreted in various contexts: that one can kill animals, can kill in self-defence, can kill in war and so on. Kurtz believes that scientific inquiry comes into play when we consider general ethical principles in specific contexts. How we should deploy these principles in 'practice depends on the context at hand, and the most reliable guide for mature persons is cognitive inquiry and deliberation' (*ibid*., p. 21). He concludes by noting that 'ethical naturalism attempts to solve ethical questions, not by faith or feeling but by empirical methods and cognitive inquiry' (*ibid*., p. 22).

But such a view is possible only if there is a limited interpretation of both science and ethics. Kurtz wants inquiry to replace faith but understanding ethical judgements as based on faith alone is to be ignorant of a large philosophical tradition of ethics. Trying to suggest that 'education and persuasion' (as part of this scientific ethics) should replace 'violence' is once again to gratuitously associate ethics with violence. Once again this is a complete misreading, for anybody who has studied the history and sociology of violence will remember science's essential involvement with violence in diverse ways. Such a view also negates very important ethical theories developed in other parts of the world, which have found an intrinsic connection between non-violence and ethics. For example, the Buddhist and the Jaina traditions exemplify ethics based on non-violence. In contemporary times, Gandhi stands out as the most important thinker whose ethics is based on the idea of non-violence. Moreover, the strength of naturalistic ethics, namely, the use of inquiry, rationality, evidence, contextual deliberation and so on are integral parts of these traditional ethical theories based on non-violence and sacrifice. The fact that Kurtz seems to completely negate these ethical movements is only evidence (in the scientific sense!) that these ideas of science and ethics are completely localized to a specific Western mindset. Such selective misreading of ethics as well as of the nature of science is definitely not part of the ideal scientific methods which Kurtz and others espouse.

Kant's attempt to ground morality in rationality is well known. In fact, in an essay in the same collection, diCarlo and Teehan argue that for Kant our 'essential nature as rational beings is the foundation for the moral force' (ref. 6, p. 314). What Kant is doing is to base the imperative of moral action on our essential rationality. Kant's rationality is also one that has significant overlap with (and influenced by) scientific rationality. I mention this

only in order to point out that claims that ethics needs inquiry is not new to the discourse on ethics nor is it necessary that science is needed to do this job. Moreover, the scientific notions of evidence and reason, for example, are not universally valid across all domains. These notions which underlie scientific inquiry have specific characteristics which do not allow their easy access in other disciplines including ethics. Their use even in the disciplines constituting social sciences has been very contentious.

Another possibility to find a science–ethics relation is by choosing a different metaphysics. Rottschaefer[7] offers an analysis of how a 'scientific naturalistic ethics' is possible. For him, this means the acceptance of moral facts 'that partially explain what makes action morally right' (*ibid*., p. 285). The idea of moral facts or moral properties is similar to that of scientific properties. Among other things, scientific properties describe a causal sequence of some phenomena. In the same way, if there are moral facts or properties, then they can be used to causally explain a moral action. Those who insist that ethics and science are essentially distinct would find the invocation of moral properties and facts to be problematical.

Rottschaefer accepts that science is not only about facts. He distinguishes science and ethics by pointing out that science is 'concerned with cognitive values and ethics with moral values' (*ibid*., p. 286). For the separatists, these values are distinct and thus ethics and science are essentially separate. The integrationists deny this separation of these values associated with the cognitive and the moral. The denial of the distinction leads to two distinct streams: one in which the methodological distinction itself disappears leading to the 'subjectivization of science' and the other in which the methodology common to both ethics and science is based on cognitive values thus leading to 'objectivization of ethics' (*ibid*., pp. 286–287). Rottschaefer identifies seven hypotheses relating ethics and biology (and psychology). These hypotheses are about how biological and psychological correlates provide facts, explain moral action, generate normative moral principles, justify moral beliefs and so on. His motivation is to establish a naturalistic account of moral values, that is, to ground moral action in natural moral values as facts which have explanatory capacity to explain moral action, leading to the view that 'ethics is a moral science' (*ibid*., p. 289). This ontological approach where the role of moral facts is important, as well as the epistemological approach of explanatory structures, are brought together in order to argue for a naturalistic ethics.

Virtue epistemology

A philosophical response to the above problems illustrates yet another way of relating science and ethics. Over the last two to three decades, there is increased interest in a new approach to epistemology which is called as virtue epistemology[8]. The basic insight in this approach is that epistemology and virtue theory are intrinsically related. Terms such as duty (epistemic duty), responsibility, good, etc. are an essential part of epistemology and these terms are derived from the discourse of morality. The distinction between fact and value is challenged in these approaches. Typically, virtue epistemologists – and there are different strands within them – focus on values and virtues. They understand the evaluation of an epistemological claim by not restricting themselves to acts or belief states but to virtues in the person who is involved in the process of knowing. By bringing back the notion of 'intellectual virtue' to prominence, the virtue epistemologists expand the ways by which we understand the notions of justification, belief formation and so on.

An implication of such an approach is to accept that epistemology is not just about abstract belief or propositional states but to see it as essentially socialized. This means that the knowing subject and the environment in which the subject functions are essential parts of evaluating knowledge claims. Traditional epistemology – especially where modern science was an exemplary model – was based on the negation of the knowing subject in evaluation of knowledge claims. Virtue epistemology brings back the knowing subject and the sociality of this subject as an important element of the knowing process. Virtue epistemology claims that intellectual virtues such as impartiality, intellectual sobriety, courage, curiosity, being truthful, sensitivity to detail, intellectual humility, fairness in evaluating the arguments of others, intellectual perseverance, etc. are essential to the process of knowing[8,9]. Moreover, analysis of problematical but crucially important concepts, such as understanding and wisdom which are problematic for traditional epistemology, is central to virtue epistemology.

Bringing virtues into the heart of knowledge is to erase the distinction between the 'is' and 'ought', between fact and value. It is to say, albeit in a different way than some other arguments which make similar claims, that facts are value-laden and values are fact-laden. This distinction between fact and value has often been used to negate any ethical questions addressed to science, since science was seen to be the domain of facts and ethics the domain of values. Virtue epistemology, without being as scientistic as naturalistic ethics, allows us to understand that scientific knowledge shares a common space with ethics.

One of the most important intellectual virtues is curiosity. It is interesting to note that this idea of curiosity is also one that is specially privileged by scientists and mathematicians. The heart of science, as scientists have often told us over the centuries, is curiosity. A scientist is defined by her capacity to be curious and in so doing embodies the virtues of a child. The virtue epistemologists' emphasis on curiosity as an intellectual virtue as well as the scientists' emphasis on curiosity as an essential catalyst (and marker) of science marks an interesting conjunction of ideas. This is ironical since the scientists' use

of curiosity, as we will see below, is primarily to escape any ethical responsibility whereas for the virtue epistemologists, curiosity as a virtue should be understood within the discourse of virtue ethics. Much harm has been done by science in the name of curiosity and thus, if there has to be any legitimate ethical response to science, it has to begin with curiosity. To really establish any useful ethical interrogation of science we have to begin by understanding the nature of curiosity.

Science and curiosity

Why does one do science? Why do scientists say they do science? What attracts them to that activity as compared to other activities? In popular discourses on science, particularly by scientists, there is much emphasis placed on the excitement of doing science at the individual level. The description of this excitement is often in terms of notions such as awe, the pleasure of discovering something new, satiating curiosity, engaging with something beautiful and so on. Many of these characteristics are derivative to a primary characteristic of the human mind, one which is very influential in the original drive towards doing science. And this characteristic is that of human curiosity. One begins to do science merely because one is curious, where curiosity is seen to be a very important element of being human. However, although ubiquitous, it is not easy to understand the nature of curiosity.

Curiosity is seen to be the catalyst that creates knowledge. Because we are curious, we think. Because we are dissatisfied with the answers we get, we come up with new ways of thinking. Because we are curious, we discover methods. We discover science. We can distinguish – loosely – different types of curiosity. We may be curious about what something is – for example, I see an object I have not seen before and I am curious to know 'what' the object is. We are curious to know why something is the case – why is the sky blue? Why is the neighbour's door locked all the time? We are curious about how something works. Experimental science is based so much on the character of curiosity – our first engagement with tools and technological objects is often one of curiosity. For example, an experiment was conducted in Delhi which involved keeping a computer in a hole in the wall in a locality where slum children lived (see http://www.hole-in-the-wall.com/). Rather than teaching them computers formally, these children were exposed to the computer to do what they wanted. Remarkably, the children learnt many aspects of the computer and they did so because they were driven by curiosity.

Curiosity is so pervasive but there is often a suspicion attached to excessive curiosity. The phrase 'curiosity killed the cat' is widely used. Often we caution children not to be 'over-curious'. Children exhibit a stronger sense of curiosity which seems to diminish as we grow older. This trend often fails in the case of good scientists. The image of the ideal scientist is one who is eternally curious – this should remind us of the pervasive view that scientists are 'child-like'.

The beliefs about science and curiosity are many and deeply ingrained in the scientific community. Some of these well-entrenched beliefs are: science begins from curiosity, curiosity is the catalyst for pure science, scientists even when they are old should not lose their curiosity, questioning attitude comes through retaining the spirit of curiosity, science is where 'curiosity is institutionalized' and so on. Einstein echoes what countless scientists say:

> 'The important thing is not to stop questioning. Curiosity has its own reason for existing. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery every day. Never lose a holy curiosity.'[10]

Curiosity is often seen as being synonymous with the questioning attitude. Here it is worthwhile to distinguish between curiosity and doubt. Doubt is an epistemological term – it is derivative to something more basic such as perception[11]. I see an object which looks like a man but because it is some distance away I am not sure whether it is a tree or whether it could be a tall man. This creates doubt in me and I have a question concerning that doubt. Doubt also can be classified into types of doubt – like curiosity, we have doubt about what something is, why something is the case, how something works and so on. But doubt is not a human trait that is basic in the way curiosity is seen to be. It is not because we doubt that we ask these questions – doubt is based on some judgements we make about our perception and inference. But doubt, like curiosity, is what leads us to questions and also to knowledge. However, curiosity is a psychological act and not an epistemological one. That is, curiosity is 'biological' – the fact that some people are more curious than others is like saying some people have better eyesight than others. But all have eyesight and all of us have the capacity for curiosity. Doubt is a higher order term in this sense.

But interestingly, curiosity was not always held in high esteem. Phrases such as 'nosy parker', 'morbid curiosity', 'curiosity kills the cat' captured the potential problems inherent in curiosity. Being curious is also to be too nosy, interfering in matters where one is not supposed to, not minding one's business, being too inquisitive and so on. Stories in different cultures often are unsympathetic to characters who are too curious. In Western thought, the impact of the myth of Pandora's box and what it says about curiosity are well known. The influential *The Golden Ass* by Apuleius illustrates the danger of being overly inquisitive which leads to disastrous consequen-

ces. Apuleius is, according to Walsh[12], responsible for the popular use of the word 'curiositas'. The main character in the novel is punished not only for being curious but also for insisting on satisfying his curiosity. A similar parallel occurs in the narrative of the folk tale of Psyche and Cupid. Psyche pays an enduring price for her 'rash' curiosity but eventually is saved by Cupid who says that 'Once again, poor girl, that same curiosity was your undoing' (*ibid.*, p. 77). In this case, curiosity as a means to knowledge becomes problematical when a person not eligible for a particular knowledge tries to attain it through his or her curiosity. (It is interesting that Indian stories do not seem to emphasize the negative aspects of curiosity as the Western traditions do. There are a few stories such as Kunti's curiosity which leads her to becoming an unwed mother but on the whole there is definitely a cultural difference in the way this idea has been used in these cultures.)

Walsh discusses various senses of the idea of curiosity starting from Plutarch, who discusses undue curiosity in individuals. Plutarch was worried about the effect of curiosity on social habits such as prying into the affairs of neighbours, 'their debts, and their private conversations' (*ibid.*, p. 73). Plutarch then goes on to distinguish two ways of responding to the impulse of inquisitiveness. One is to avoid temptation to be inquisitive when it comes to social behaviour. The other is to direct our curiosity towards nature – heaven, earth and sea. Plutarch's solution to the problem of curiosity is to distinguish 'vulgar' curiosity and the more lofty 'intellectual' curiosity. Thus, development of 'intellectual' curiosity, which later on becomes so important in the activity of science, should be cultivated against the tendency towards vulgar curiosity.

The emphasis on intellectual curiosity was also of great interest to Augustine. Seneca believed that curiosity about nature was a positive virtue and it is interesting to see why – for Seneca this kind of curiosity is justified because such curiosity towards the world adds to our understanding of the value of human life and therefore can be seen as a 'moral pursuit'. Curiosity of this kind, one which gets valorized in scientific curiosity, had this intrinsic moral character at least in the early Western tradition. (In contrast, such curiosity that characterizes modern science has completely been excluded from the ambit of morality.) As Walsh notes, the Aristotelian tradition supported disinterested inquiry whereas the Stoics argued that such curiosity was justified only if it increases virtue.

By the time of Augustine we can see an established ideological use of 'curiosity'. For the Christian tradition, curiosity was always problematic – even the fall of Adam and Eve is also due to their curiosity. For Augustine, attaining knowledge through means other than (and contrary to) the *Bible* was seen to be the work of 'misplaced' curiosity, 'abominable' curiosity, 'impious' curiosity and the like. Walsh suggests that *The Golden Ass* had a significant influence on Augustine's *Confessions*. A common theme of importance in both is the significance of curiosity. For Augustine, curiosity was part of the process which led him to follow false trails before 'submitting to Christian baptism' (*ibid.*, p. 82). For Augustine, the curiosity of vision is vulgar whereas that of the mind is disordered. Among the three vices he notes, curiosity is one along with pride and lust. Also, the suspicion towards the dark arts like magic was encoded in these arts being called as 'the curious arts' (ref. 13, p. 268). Augustine uses the image of lust to describe the acts of curiosity such as curiosity being a 'lust for experimenting and knowing.' He calls curiosity the 'lust of the eyes' but we should note the implications of a 'lust of the mind' which is inherent in this view.

Given Augustine's influence on theology and ethics, it should not be a surprise to discover the impact of his views on curiosity. The medieval theologians continued this distrust of curiosity and along with magic, pagan religions, necromancy, they attacked astrology (which was becoming popular) as an activity which was catalysed by curiosity. Even Aquinas, although accepting the study of nature, retained curiosity in the list of vices. The condemnation of curiosity was widespread, from the Renaissance and Reformation to the age of Puritanism in late 16th and 17th centuries in England. As Harrison points out, these views on curiosity were 'not restricted to moralists and divines, and allusions to this intellectual vice abound in the works of 17th-century poets, prose writers, and dramatists' (*ibid.*, p. 271). Similar to earlier views on curiosity, the strongest vice associated with curiosity was pride, the 'deadly sin'. Harrison notes how Downame (17th century) claimed that pride and curiosity were in a cyclic relation. Pride was the mother of curiosity and at the same time, curiosity led to vain knowledge which increased (or 'puffed-up', a term that begins to get used widely around this time) one's pride. By the 17th century, methods of inquiry were subjected to ethical analysis and thus each method of analysis came to be associated with virtues or vices as the case may be. If certain methods of knowing and inquiry were associated with vices such as curiosity, vanity and so on, then it also meant that knowledge acquired through such inquiry was contaminated by these vices.

Not only were astrology and alchemy seen to be the 'dubious fruits of curiosity' but so were subjects like mathematics and the mechanical arts in the Renaissance 'associated with the proscribed practices of witchcraft and magic' (*ibid.*, p. 277). There is a common structure that can be discerned in this suspicion towards curiosity. Dominant is the recognition that there is a dual aspect to curiosity – 'the moral status of the inquirer and the nature of the proposed knowledge' (*ibid.*, p. 278). This explicit invocation of the moral status of the inquirer and also the nature of knowledge derived from curiosity are important elements of any ethical response to curiosity.

This suspicion towards vain/pure curiosity and knowledge about the world, one can imagine, must have constituted a grave challenge to the birth of modern science where both these characteristics are essential. Francis Bacon is often referred to as a very important figure in the establishment of science. In this story of curiosity, he also plays an important role. Bacon begins by distinguishing knowledge about the world and vain curiosity which he relates to magic, alchemy and the like. He then argues for the usefulness of knowledge about the world by relating it to the ethical virtue of charity. Thus, he shifts the association of knowledge with pride, curiosity, etc. to a seminal Christian virtue, namely, charity. More significantly, he cleverly established the legitimacy of studying nature by two arguments – one, by showing how such effort is consistent with biblical interpretation and the other by denying that knowledge acquisition is not morally wrong if done properly. There is a moral connotation to this proper conduct and thus doing natural philosophy (science for us) necessitated 'certain moral qualifications' (*ibid*., p. 281). Consider some of these qualifications: purity of the mind with respect to motives, restricting intellectual lust and 'tendency to excess'. In place of 'lust and gluttony' (with respect to the mind) he suggests 'abstinence and chastity' for proper intellectual activity. As Harrison notes, this is an ascetic model of seeking knowledge, elements of which are present in today's narratives about working in science, which includes giving up (or at least have restrained indulgence in) the pleasures of the world, a disciplined and sustained mental perseverance and so on. For Bacon 'it is charity that must motivate the knower, not curiosity' (*ibid*., p. 282). Therefore, Bacon makes possible the pursuit of science in a way that is acceptable to the larger society by placing knowledge within the sphere of accepted morality as well as erasing negative views on curiosity.

From the 17th century positive values got attached to curiosity. Hobbes characterized curiosity as a 'morally neutral "appetite of knowledge" ' (*ibid*., p. 283). Hobbes also used curiosity to distinguish humans from animals and thus puts curiosity in a constellation of ideas such as rationality which served to make this distinction in Aristotle. For Hobbes and Descartes, curiosity was the origin of the search for knowledge. For Descartes, the problem was in unmethodological curiosity and so he constructed methods which will control 'blind curiosity'. Over the course of the 17th century, curiosity was established as something natural, something innate which characterizes human thought and action. It is not an accident that this period also saw the invocation of duty towards attaining knowledge. No longer was knowledge to be an idle pastime or even something belonging to the curious and evil arts but was now the beholden duty of the intellectual to pursue. But even when curiosity is accepted as a natural part of being human, it was also felt that its purpose was to 'seek out moral regularities in nature' (*ibid*., p. 287).

Harrison also briefly discusses how curiosity is legitimized by relating it to the Divine. Robert Boyle, among others, looked at nature as embodying various curious features. Curiosity is thus removed from being a particular human proclivity to being something which characterizes features in the world, features which excite our curiosity perhaps. (Something similar happens with various other subjective concepts such as beauty, which over time gets removed from a particular psychological response to a 'property' inherent in beautiful objects.) If curiosity now characterizes the world (so that we can talk about 'curious creatures', 'curious objects', 'curious features in an insect' and so on) and if the world is created by God then the negative value associated with curiosity is negated – this argument of Harrison (*ibid*., p. 287) has some force.

By the 18th century, curiosity was completely 'rehabilitated'. David Hume's definition of curiosity as 'love of truth' was part of this process where curiosity, like in the case of Descartes, was the genesis of knowledge. Moreover, Hume also claimed that not being curious leads to ignorance and 'barbarism'. So not only is curiosity a positive virtue, it is also one that is necessary for certain positive ends. As Harrison notes, '. . . if for Aristotle wonder was the beginning of knowledge, for Hume and his contemporaries that honor now fell to curiosity' (*ibid*., p. 287). Harrison concludes by suggesting that the trajectory of the idea of curiosity also indicates a shift in the way the relation between the knower and the known was understood – earlier the moral character of the knower was important but this role of the knower loses its significance as the notion of curiosity achieves its positive status. In other words, the morality of the knower becomes less important as curiosity becomes more important to the extent that in modern science the morality of the scientist is completely erased in evaluating scientific knowledge. Thus, an impersonal method replaces the subjective knower – a trend which Harrison discovers not just in Descartes but also in Bacon and others. And over time and with increasing distance between Christianity and science, the idea of method dominates the view of science.

The creation of modern science was also the creation of new meanings for curiosity. The rehabilitation of curiosity as a positive term was essential to the development of modern science. Peters[14] points out how the changing meaning of curiosity was part of the discourse on exploration and discovery leading up to Columbus. Legitimizing travel to distant places, as well as exploration of the world – including exploration for commercial purposes such as mining – was necessary because travel and exploration were not always seen as positive acts. The recreation of the meaning of curiosity was used to validate such explorations and discovery of the secrets of the world. Part of this programme of legitimization was related to the Church's attempt to take Christianity to the rest of the world.

Scientists were consciously aware of the changing discourse on curiosity and in fact worked towards promoting new meanings of curiosity. Perhaps the best illustration of this is in the way the Royal Society used curiosity in the 18th century[15]. For science, the validation of wanting to learn about new and strange phenomena rested on the idea of curiosity. The Royal Society in the first half of the 18th century contributed to the value of curiosity through various institutional means. In the communications presented to the Society, not only medical events but also astronomical ones were often described as being curious. As Costa notes, even the 'certificates of election presented to the Society also illustrate this 'language of curiosity' (*ibid*., p. 148). For example, a certificate presented to Henry Stevens 'described him as "gentleman of extensive curiosity" '. Costa argues that 'being curious' was promoted as an important trait of being a scientist and the 'pursuit of curiosities' as being a valuable act. The Society took it upon itself to promote this practice of curiosity – so there were 'regular exhibitions of natural and artificial curiosities at the meetings', members were encouraged to have their own collection of curiosities and it became a tradition for the Fellows to donate curiosities (Newton donated a 'small bird brought from Pennsylvania' (*ibid*., p. 159)).

Curiosities played an important role not only in the activities of the Society but also in framing definitions of knowledge and science in the 18th century. Costa concludes by noting that the 'place of curiosities of nature at The Royal Society therefore shows the variety and intricacy of elements involved in the making and diffusion of natural knowledge in the period' (*ibid*., p. 160). In the latter 18th century the preoccupation on curiosities decreased but by then curiosity had been completely rehabilitated. In fact, one can already see this influence of scientific curiosity in literature. The most notable example is that of detective fiction. The detective story is often modelled on the scientific and has various instincts of the scientific in it. Edgar Allan Poe is often credited as being the author of the first modern detective novel (*Murders in the Rue Morgue*) – this novel 'presents itself as scientific'[16]. Positive virtues of curiosity – including a passion for it as well as something which is a disinterested enquiry – have marked the history of the modern detective. The 'jargon of scientific enquiry' was a primary influence on fictional detectives (*ibid*., p. 54) and the rehabilitation of curiosity had an important role to play in this.

The discourse on pure and applied was also significantly changed in the changing history of curiosity. Justification of knowledge in the early phase was based on its moral and religious usefulness. But later the justification is in terms of practical use – a move which, Harrison argues, also establishes the distance between the morality of the knower and the known. Thus, the shifting notion of usefulness in the context of scientific knowledge meant that the moral status of the scientist is irrelevant to the claims of that knowledge – herein we can see the beginnings of the imposed expulsion of ethics from scientific practice. The very fact that we often use 'science' (as an impersonal discipline, a method) instead of 'scientist' even in contexts where human agency is clear is another indication of the success of this project of erasing the human from nature, the ethical from the scientific.

The trajectory of the development of the narrative about curiosity has important lessons about ethics and science. As Blumenberg[17] points out, curiosity for Augustine was a 'temptation'. Curiosity today has come a long way from this view but in doing so, has also divested any notion of responsibility. Among other positive virtues, it has come to be associated as a characteristic of children and also as a virtue related to innocence. It is this innocence of curiosity that science shares with children and it is this innocence that is often the bulwark against insistent ethical questions towards science. It is this presumed innocence that makes scientists claim that their only duty is to discover 'truths', whatever be the consequence of such truths. Blumenberg's argument is that scientific revolution, as exhibited in the case of observations made by Galileo with his telescope, liberated curiosity from the clutches of a religious morality. This leads to the escape from 'self-restriction' which, for Blumenberg, catalysed the enlightenment and the establishment of scientific method leading thereby to modern science. While this picture is perhaps too sweeping, it is nevertheless true that the removal of 'self-restriction' was and continues to be extremely important to the practice of science. The belief that there should be no fetters to scientific thinking has its origins in this complex history[18].

The ethics of curiosity – reinvesting responsibility in curiosity

The meaning of curiosity exhibits significant ambiguity. It has changed its meanings over the ages. There are a large number of terms that have been used synonymously and yet are not the same as curiosity: for example, in early modern period the following terms often overlapped the meaning of curiosity – wonder, marvel, admiration, interest, subtlety, rarity and so on (*ibid.*, pp. 2–3). Residues of this semantic spread are to be found even in contemporary uses of curiosity, particularly by science.

The scientific valorization of curiosity and the freedom it entails (or assumed to entail) needs to be questioned if a meaningful ethics of science is to be possible at all. To do this, we need to relook at the notion of curiosity and exhibit its multi-layeredness. If science continues to invest heavily in curiosity then it should be answerable to these multiple meanings of curiosity. The very idea of curiosity is culturally mediated. It is part of a social process and is constructed to suit various ends of dominant communities, be it religious or scientific. Curiosity itself

is value-laden with other virtues and vices. It is not restricted to the individual but is essentially social.

Curiosity is also a catalyst for action. We indulge in various kinds of acts because we are curious to see how something would feel, how a dish would taste and so on. The way children play with insects is a good example to understand how action is related to curiosity. Some children see an insect and might want to play with it. They are curious about various behavioural aspects of the insect. Inevitably, their curiosity gets the 'better' of them. They want to find out how the butterfly will fly if its wings are cut off, they are curious to see whether an ant will drown if dropped in a bowl of water, they are curious to see the reaction of dogs when they tie crackers on their tails and so on. To a great extent, these 'experiments' are driven by a sense of curiosity – a curiosity which is not regulated and which allows the children to do what they want to these creatures in the name of curiosity.

Scientific action is also many times significantly catalysed by curiosity. Scientists want to see at what temperature water will boil, they are curious whether a given element will conduct heat and electricity, curious about the melting temperature of objects and so on. Driven by this curiosity, they perform their experiments. They boil water, send electricity through an element and so on. The freedom to do as our curiosity dictates is the quintessence of doing science. In fact, we can see why the idea of pure curiosity is so essential to science because it is within this notion that the idea of freedom is contained. Pure curiosity is the scientific synonym for pure freedom, freedom without responsibilities, freedom without constraints. The model for this kind of freedom is the mind. While there are constraints on what a body can do or even what can be done to physical entities, there is nothing in principle to shackle our imagination, to regulate what the mind can think of.

However, ethics arises in order to control curiosity, among other things. When a scientist wants to test the limits of pain of a human being by subjecting the person to pain, we invoke ethics. We say that the curiosity of the scientist should be curtailed in this case. In modern ethical debates about science, particularly biology, the primary reason why ethics is invoked is because it involves human beings (or in some cases life forms such as animals). Where a life form is concerned, ethics is invoked to constrain curiosity and its consequences. But what about other areas of science? What about a physicist's curiosity of how the universe was born or how stars collapse or what fundamental particles there are? Should curiosity in these cases also be constrained?

The answer is an unequivocal yes. The ethical question in science first occurs when we ask what constrains curiosity of any kind. The recent drama about the experiment in CERN is an indication of the need to control curiosity. Scientists are obviously curious to know about the Higgs particle. This experiment in CERN, where particle collisions will create energy of enormous magnitude, is an important one for science. It has the potential to satisfy the curiosity of the scientists about the origin of the universe, the Higgs particle and so on. But at what cost? Before this experiment, there were accounts of how some other physicists had predicted that a small black hole (with potential consequence of destroying the world) would be formed due to the high energy collision. While this claim was dismissed by the CERN scientists, it leads us to wonder about the rights of a few scientists to explore their curiosity. Independent of the merits of the black hole argument, it nevertheless poses an ethical question to modern science. What price the curiosity of a small group of individuals? And who should pay for it? Should there be limits to what they can explore knowing well that their curiosity can potentially destroy the world? But on the other hand, the chance of it happening is very low. But the flip side is that we have to take their word for it! How does one decide then? How do the scientists themselves decide individually on whether their search is worth the potential price? The question here is an ethical one but an ethical question whose subject matter is curiosity itself.

It is not only scientists who see curiosity as a virtue. Even philosophers have taken this position. For example, I discussed virtue epistemology earlier where curiosity is discussed as a virtue. Baumgarten[19] discusses how curiosity can be seen to be a positive and moral virtue. He offers an interesting perspective on curiosity and its relationship to care. 'Curiosity bears a close relationship to, and is often bound up with, care and concern. Curiosity is rooted linguistically in the other-regarding activities of "care" and "cure" (from the Latin *curare*, to take care of)' (*ibid*., p. 2). In human interactions, this element of care makes curiosity not a morbid one but one which is an important part of friendship. Moreover, curiosity is necessary for deepening one's friendship. Baumgarten believes that a similar process of curiosity towards non-humans, such as ecosystem or another's culture, strengthens the understanding of that object of curiosity. Therefore, he concludes that 'curiosity is a distinctive virtue which, compared to attentiveness and "being interested", more fully expresses human autonomy, plays a distinctive role in caring relationships, and enables us to learn about things we would not otherwise know.'

Curiosity can also have a deontological status. Baumgarten believes that it is our duty to be curious, a claim which should remind us of the scientific narrative about curiosity. However, in the fourth section of the paper, he suggests that it is also a duty not to be curious in certain cases. Also, too much curiosity may be seen as a vice and not a positive virtue. So it leads him to consider morbid curiosity, debasing curiosity, voyeuristic curiosity as negative variants of curiosity. In the last section of his paper, he connects curiosity and living well: 'To say that curiosity is a virtue is to claim, most importantly, that it helps one to live well.' This is indeed a problematic addi-

tion to the idea of curiosity because what defines 'living well' is extremely contentious, particularly in the context of modern science and the development that it has entailed. Curiosity also does the job of supplying meaning in life and thus has an existential role. Baumgarten concludes by contrasting the religious suspicion towards curiosity as against secular notions of curiosity that emphasizes certain positive virtues but ends by saying that the richest life is one that combines the two.

This ambiguity present in any positive rendering of curiosity is but a natural consequence of the ambiguity present in the concept of curiosity. Trying to relate it to 'well-being' and 'caring' as Baumgarten does is very problematic, particularly for science's appropriation of curiosity. If curiosity towards nature is a fundamental impulse for science, then how is this curiosity related to the notion of care towards nature? On the contrary, curiosity in science often manifests itself in the most extreme forms of the exploitation of nature. Furthermore, attempts to salvage curiosity by considering it as the element leading to well-being are also problematical because the definition of well-being is so different across different communities and cultures.

Thus, the fundamental problem is to come back to the ancient and medieval question about curiosity: how does one regulate it? For science which is very much dependent upon the idea of 'pure', unfettered curiosity, a regulated curiosity is undesirable. Regulating curiosity cannot just be a normative process. It cannot be regulated by religion or by the State. There has to be a self-regulative process in science, a self-restraint, if these ethical concerns are going to have any impact. And any 'self-ethical' move within science must first of all begin by asking what constitutes the boundaries of curiosity. About what are we allowed to be curious? At what point should we desist from being curious? And so on.

Interestingly, other cultures illustrate possibilities of understanding curiosity differently. Consider the Indian philosophical and religious tradition. Unlike the Western tradition, curiosity as a concept is not easily discovered either in ordinary language, or in myths or even in philosophical traditions. It is difficult to find a consistent narrative about the evil effects of curiosity like in the Greek and the Christian tradition. Doubt as a concept seems to be more prominent in Indian philosophical systems as compared to the notion of curiosity. Indian theories develop quite sophisticated analysis of doubt and doubt as a category is often associated with the origin of knowledge.

It is also quite difficult to find examples of pure curiosity. This is consistent with the general pragmatic and empirical worldview that influences various Indian traditions, including the traditions of philosophy and logic. Even mathematics in India did not make the shift to the kinds of formal, non-empirical systems that arose in Greek mathematics. Indian mathematics was essentially grounded in various empirical and practical concerns. Thus, a regulative element seems to be universally present in the Indian classical traditions. This presence of a regulative necessity places bounds on reason and desire – two elements so closely associated with curiosity. Even in the Western tradition, the criticism of curiosity is fundamentally about 'pure' curiosity or 'intellectual' curiosity but this kind of a 'pure' act is fundamentally not possible in the Indian worldview. Indian mathematics is not pure mathematics since it is essentially engaged with the world and nature; Indian logic is not pure logic since there are demands of the empirical which logical analysis has to incorporate in inferences; Indian metaphysics is not pure metaphysics since epistemological categories often get 'mixed' up with 'pure' metaphysical categories and so on[11,20]. Bhattacharya[21] discusses how in Indian philosophy 'ethics and metaphysics are inextricably connected'. The Indian traditions therefore, exhibit the basic critique of the 'pure' in various activities. Perhaps this explains why the suspicion towards 'pure' curiosity was not so central to Indian thought as it was to the Christian tradition. But this also implies that the possibility of ethics is fundamentally ingrained into any activity since the normative is essential to every kind of physical, intellectual or spiritual act.

But given the hegemony of Western knowledge it might need lot more effort to make the case for alternate philosophical (including ethical) traditions to contribute to the discussion on ethics and science. In what follows, I would like to set out an argument which will allow us to establish an ethical critique of pure curiosity. First of all, a consequentialist approach will not help. One can argue that scientists should take ethical responsibility for the horrors of the nuclear bomb. Yet scientists rarely do so. The standard argument is that the bomb is not due to science but due to politicians and others who take the decision to produce and then use the bomb. So, negative consequences alone is not a sufficient reason for imposing ethical constraint on scientific activity since the scientists deflect the ethical component to other agents. In doing so, they also reify pure curiosity.

So what is the argument one can make about the dangers of pure curiosity – an argument that is not consequentialist alone? The first question we need to ask is this: who has the right to be curious? Under what conditions can we be curious? What can we be curious about? Who has the right to interrogate – whether it is other humans or nature? What are the necessary requirements before one can take on the role of an interrogator of nature?

We need to first recognize that various rights underlie every act that we do. And rights are granted to us (by the community) or taken by us (from the community). What we take to be an act of individual autonomy and personal choice is often one that is actually not only granted by social conditions but also enabled by these conditions. That is, when we perform an act it is not only that there are no constraining conditions stopping us from doing it but there are also positive, enabling conditions that allow

us to perform that act. And these enabling and non-constraining conditions are the contributions of other people, social structures and so on. Given that rights granted to us by others are an essential part of every act of ours then there is immediately a question of responsibility that is intrinsic to every act of an individual. Thus, social mores decide our behaviour in society and even in families. Everything that we do in a social setting is moderated and constrained by various factors.

Modern science – like art – reacts against this constant constraint imposed on us – whether they are constraints of nature or society. Morality arises in an attempt to curtail various desires of the body and as members of a community many of these constraints are accepted by scientists and artists also. What remained to be unfettered was the mind and while morality did attempt to find ethical constraints of the mind, it is far more difficult to regulate. For example, one could insist that it is wrong to think certain kinds of thoughts. But it is difficult to know when a person indeed indulges in such thoughts unless he or she acts in a particular manner that exhibits these thoughts. Here, it is pertinent to remember that while art privileges the notion of freedom and self-expression, the importance of curiosity for artists seems to be very different as compared to scientists. Artists do not invoke the idea of unfettered curiosity to justify their activities. Thus, they are able to engage with creativity without using curiosity as a bulwark to protect them against ethical challenges. In other words, they do not find a need to create an ideology of curiosity. Instead, as Akshara notes (pers. commun.), they create an ideology of pleasure to legitimize their work!

The freedom of the mind and therefore the freedom of the subject becomes a central issue for science and art. And among the first freedoms that are demanded is the freedom of expression and thought. But does freedom of expression mean that a person can say what he or she wants independent of the consequences? For proponents of freedom, this freedom is extremely important and even if one accepts a constraint on this freedom it can only be from the individual self. That is, there cannot be any external agent proscribing freedom of expression. But this means that at the same time there should be a sense of self-control in what we say. So even though we do not accept any external agent from stopping us in saying what we want, this full freedom of expression is then acceptable only if there is self-restraint.

What holds true for saying what we want also holds for thinking what we want and for being curious about what we want. Once curiosity is taken into the discourse of freedom and made a virtue of by science then it is indeed difficult to put external constraints on curiosity. Religion or philosophy cannot in principle put norms on the act of scientific thinking and doing. The constraints on curiosity have to come from within science. But the paradox is that science and scientists do not have the capacity or the interest to constrain their thoughts and actions especially since what justifies their activity are these ideological values they ascribe to notions such as curiosity and freedom. So how then is this self-restraint possible? This can happen only through a dialogic process with other communities. Let me set out the argument for this.

Scientists are members of a larger society. Even if they want to project themselves as a special set of people involved in a special kind of activity, there is no possibility of science without it being seen as a part of a larger society. In most countries, science still continues to be under the patronage of the State. Modern states invest huge amounts of money into scientific institutions thereby enabling the activity of science. So should scientists be answerable to the society they belong to and which sustains their work? In what follows, I will only consider one aspect of this larger issue.

Consider the right to interrogate. In a society not everybody has the right to interrogate – lawyers can do so but only in a courtroom or under accepted conditions, police can do so but only under constraining procedures, judges have the right but again only under certain conditions, parents want the right all the time with respect to their children but even they often have to follow certain said and unsaid norms.

In all these cases, nobody has the right to question without any accompanying constraints. Police, judges, lawyers, parents, colleagues – none of them have a right to be curious about another person without having inbuilt constraint on what they can ask, what they can explore and so on. In our society, everybody seems to have constraints – many of them being self-regulated – except for the scientists when it comes to curiosity about the world.

Thus, the first step in the ethics of science is to impose constraints on curiosity but this imposition cannot be done from outside, by other people but must be done internally, by the individual self of the scientist. There are many cases where this has happened. Individual scientists even today refuse to participate in certain kinds of research projects – for example, in defence projects, in nuclear projects and so on. These are constraints these individual scientists place upon the nature of their work. However, they do not take the next step of constraining their curiosity per se.

And this is exactly what the scientists resist. For example, Kurtz[22] points out that scientific inquiry has always been under challenge from religion, politics and so on. Today, he believes, the attempt to muzzle science comes in the guise of ethics. While he agrees that practical research and technology might need some kind of regulation he suggests that in the case of pure science there should be no such constraints. Thus, he says, in the 'area of knowledge and truth, I submit, *scientists ought, on utilitarian grounds, to be allowed to inquire as they see fit and to publish their results without the imposition of external standards of judgment as to the ethical worth of their investigations*' (*ibid*., p. 66). This statement betrays

the ideological grounds on which science is possible. There is no independent definition of knowledge and truth. There are no activities in a society which are not under imposition of certain constraints. Hiding behind pure science and pure curiosity will not help. Scientists cannot be allowed to inquire 'as they see fit'. I am not talking about potential use of their results but the very mode of legitimate inquiry.

This argument might be construed to imply that scientists have no right to be curious and that once they lose this freedom of curiosity, science will not be able to develop. It is not enough to say that scientists should not have unlimited freedom of curiosity. I would not want to take this line since it is then open to regulating intellectual activity by various vested interests. Instead, I suggest that the ethical basis of social communities lies in dialogue and negotiations. It lies in one set of people trying sincerely to convince the other members of the reasons for their action. Scientific curiosity has the most impact on society – whether it is curiosity about what new features can be added in a cell phone to curiosity about the origins of the universe. Both these extremes do have material impact on the world.

Scientists have taken the easy way out when confronted with this need to have responsibility. They have often projected themselves as an exclusive group and insist that the larger society cannot understand them. They are thus not only exclusive but also exclusionist. It is remarkable how so many scientists believe that they need not engage with society and establish a dialogue with the members of this larger society, which will include the religious, the non-religious, the skeptic and so on. Moreover, modern science has been dismissive of other different kinds of knowledge systems. It is dominantly eurocentric in character. Thus, very well developed empirical knowledge as in Indian medical systems or even theoretical insights from Indian logic have all been arrogantly dismissed by modern science and scientists. Hundreds of such examples abound from all cultures in the world. Moreover, science is also paternalistic and patriarchal. It has embodied a very male view of the world and knowledge, as extensive literature in science studies and feminist studies has so well illustrated. Science has not shown the capacity to be inclusive, to seriously engage with other systems of knowing, to even consider philosophy seriously particularly in themes such as truth and reality, and so on. Until it is able to do all this it cannot demand the right to have free enquiry. As constituents of a society it has to practise restraints which is present on all members of the society.

In other words, the freedom to be curious is not a freedom at all. Nor is unbridled curiosity innocent, nor is it really unbridled. There is nothing new in asking for responsibility in freedom. But what we should realize is that the first responsibility in science is not just towards specific scientific acts (such as whether there should be nuclear power, stem cell research and so on) but towards the very act of curiosity. There is little that is 'natural' about curiosity. Moreover, it is never restricted to the individual. If science proves anything, it is that curiosity is often manifested as a collective process. This is the curiosity related to research programmes in a broad sense. In this sense, scientific curiosity is always 'social' curiosity. An integral component of such curiosity is the role of the social and that role is one of responsibility towards the members constituting the social.

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