

(Re)setting Ties Between Scientists and Society

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The relationship between society and its scientists should ideally be deep and intricate. In spite of this, scientists and society are accused of being indifferent to each other. In this essay, I examine the reasons for this indifference and showcase efforts to bring scientists and society together.

Growing up as a science nerd in liberalization-fresh India, one of my most enduring memories was watching the animation series called Dexter's Laboratory on television. The comic series involved a boy genius, who shuts himself up in his room and invents the most fascinating of contraptions and devices with unexpected and hilarious consequences. Dexter, and several other such celluloid scientists, such as Flint Lockwood from the thoughtful *Cloudy with a Chance of Meatballs* and the delightful Victor von Frankenstein from Mel Brooks' film by the same name, faithfully convey a pop stereotype of a scientist: introverted and eccentric to the point of being misunderstood as arrogant, and dangerously indifferent to their surroundings. In turn, the stereotype, therefore, manages to expose a serious disconnect between the scientist, her or his science (interestingly, the stereotype also seems to be incompatible with the female sex), and society.

Let me elaborate with the example of Flint Lockwood. Flint starts with noble intentions, to create a machine that will transform water into food. The contraption flies into the sky and rains foods of all kinds. Without a conscious understanding of the demand and supply of food (parodying its overproduction and wastage in some parts of our planet), Flint keeps pressuring the machine to make more and more edibles. Finally, the machine rebels against its human master and wreaks havoc on the very town it was feeding. Flint's science is not guided by a necessity to seek a solution for a community problem: the town in which he resides does not suffer from lack of food as much as in its variety. Flint merely wants to be 'an inventor' and invent useful things. However, his disconnect from those who surround him nullifies his efforts to put his inventions to some social use. Townmates look upon Flint and his science with curiosity and pity at best and derision at worst.

In essence, if not in melodramatics, this mirrors the relationship between the scientific community and the rest of the society in the real world. How many of those who are not part of academia and scientific research, understand what scientists do and why they do it? On

the other hand, if they were to gather the courage and ask scientists about their research and whether it impacts the society in any way, how many get clear answers? The number is likely to be small. It is time to (re)examine and (re)explore the reasons for this disengagement between science and society, to think about what can be done to avoid it, or even if it needs to be avoided.

Let us start by asking what science is and who scientists are. Science can be conceived of as a process that helps understand the way material things (living and non-living) operate, and the body of knowledge so obtained about principles that work reliably and reproducibly in space and time. Scientists are those who employ these processes and principles; they combine an inordinate amount of curiosity about the world, its nature, mysteries and problems, with a great deal of painstaking diligence in arriving at answers to the questions they ask.

Of late, it has often been claimed that it is not enough for scientists to be producers of knowledge, but also users of the same, for the benefit of society. This trend is reflected by an increase in funding for ‘translational’ and technological research through collaboration between practitioners of pure and applied sciences. Science is, therefore, being (re)defined to involve improving the “quality, effectiveness and legitimacy of solutions to societal and environmental problems” [1]. If scientists themselves are asked what social roles they are expected to play, their answers broadly fall into five categories.

The first social function, wherein scientific activity is fervently expected to impact society is in healthcare. Biomedical research on vaccines, diagnostic tests, and medicines and interventional therapies are all aimed at decreasing the costs associated with illnesses in the long run. The second category is the contract of scientists with industry and agriculture, wherein the advancement of technologies and commercial products, aimed at enhancing human consumption and quality of living, requires constant inputs and upgrades from scientific research. The third category that is relevant in an increasingly restless world of competitive countries is security. In 1939, a letter written by stalwart Hungarian-American physicists, Leó Szilárd, Eugene Wigner and Edward Teller, with support from Albert Einstein, sought funding from the then president of the United States of America, Theodore Roosevelt, to initiate a research program of nuclear research [2]. The purpose of this famous letter was to strengthen national security, considering the discovery of nuclear fission by physicists and engineers in Nazi Germany. This is just one of the several examples of how ‘pure’ scientists have, through time, actively co-opted themselves into programs that seek to strengthen states against external threats. The fourth social role is envisaged in formulating policies: our society has advanced to such an extent that we are impacting, in significant and, often, harmful ways, our environment. It is thus necessary to actively include scientists in the formulation of policies to regulate social and technological activities [3]. Finally, the fifth role involves teaching science to students, supervising their

research and contributing to create the next generation of scientists, thinkers etc.

Having established the identity of stakeholders (such as doctors, farmers, engineers, policy-makers and politicians, etc.) with whom scientists can conduct socially relevant research, it is pertinent to ask if such cross-communication is happening. In the context of biomedical research, for example, it is obvious that a sustained conversation with clinicians and medical practitioners, patient advocates and survivor-caregiver groups can help scientists approach a disease beyond its molecular-cellular-genetic confines. Despite this, scientists and clinicians are often heard complaining about the lack of sustained engagement with each other. Scientists complain that doctors want immediate outcomes: the oft-asked question is “how will research help my present patients?” Doctors, on the other hand, note a lack of empathy in scientists, who look upon diseases as abstract problems, whose solutions can be found within laboratories and through publications and patents. Therefore, it is not surprising that a considerable proportion of biomedical research taking place in India does not involve any active participation from the medical community. Moreover, in the absence of a system set up to foster scientist-clinician collaboration, the onus of reaching out to the other profession is left to individuals.

Such disengagement is not restricted to biological-clinical research alone. If we consider the role of scientists and their research in industrialization, the contribution of scientists to industrialization in rural areas has lagged woefully behind the research directed towards urban and urban-directed industrial technologies. In a country, whose majority lives in villages, the lack of scientific and technological advancements towards improving the skills and output of artisans and rural workforce engaged in handicrafts and agricultural labor in the backdrop of the stark state of rural economy has resulted from the indifference of, and lack of dialogue between, policymakers, funding agencies and the scientific community and the rural populace, whose voices are not heard and needs not addressed.

In the sphere of policy making, the role of scientists and science, while considered imperative, brings with it, its own set of problems in the context of communication. Scientists in being able to bring their expertise to socially relevant problems requiring policy and structural solutions rely on ‘objectivity’. In other words, a scientist would come up with a set of alternative solutions and will exempt herself from the ‘real bargaining and decision making’. The ultimate choice of one alternative over the other is made by the elected representatives of the society – the state – which does not comprise practising scientists [3]. The problem is even more acute in the context of policies built to develop rural or indigenous contexts where communication of scientists with indigenous people, values and traditional knowledge systems is vital but rarely occurs.

What of communication with lay audiences: the public that funds the research of scientists?



Scientists are not institutionally trained in being able to communicate their observations, findings and ideas to lay audiences and non-experts. The fear expressed in such situations: whether it is prudent to provide a watered-down version of one's science, bereft of the rigour in experimental design, and the nuts and bolts of relevant controls, cannot be brushed away. On the other hand, to disregard the non-scientific sections of the society is to run the risk of their misunderstanding scientists as arrogant ivory tower dwellers. Such miscommunication may easily percolate to those who have been elected by the public for governance and affect policymakers who take decisions on educational and scientific research policies and activities.

Moreover, we are increasingly inhabiting a world where anything tangible is being treated as a product with a value label attached to it in the market. Humans are increasingly comfortable thinking of themselves as purchasers and consumers. Within such a worldview, scientists' efforts are being misunderstood as something that could be measured through consumable deliverables. Delivery is by nature, time-bound. Such a view is dissonant with the very foundational nature of scientific research, where paradigm-shifting research takes generations of scientists working together on important problems over extended lengths of time. Therefore, the society and the state need to understand that applied research that significantly impacts their quality of life was built upon a large body of 'pure' research that did not have the same deliverable mandate, to begin with. Thus, patiently supporting the scientific movement, without immediate expectations of translatable products and technological outcomes, will automatically (also) result in the latter, if not now, then in the future. There are added benefits to a society that patiently engages with its scientific community: the inculcation of a sense of curiosity about what we do not understand, a scepticism about what we are told, and a rational way of thinking that will foster freedom of thought, unshackled by superstitions and supernatural presumptions.

On the other hand, sections of society, by working together with scientists, can help sharpen the focus of the work scientists do, allowing additional prisms through which the scientist can view her own work. The re-engagement with society will allow its non-scientist members to better appreciate the social functions of scientists and their ways of working, thereby ensuring a sustained appreciation and support of their activities.

Secondly, there is a strong need for scientists to realize that they are as much a part of society as practitioners of other disciplines and are, therefore, expected to contribute towards steering our society on the path of democratic and egalitarian progress in ways they are best suited to do so. Towards this, the participation of scientists in peoples' science movements and scientist networks has been notable [4]. Such movements began locally to propagate the value of scientific education among rural populations by translating scientific literature written in English into vernacular languages. Over time, such movements have also co-opted the aims of protecting natural environments, nurturing rational attitudes, and attacking pseudoscientific malpractices.



Within institutions, initiatives to bring scientists within spaces widely accessible to the public, such as public talks, museum gatherings, town hall meetings are increasingly getting popular. The opposite, creating transient public spaces within research institutions, such as immersion programs for school students from backgrounds that deny them the privilege of exposure, and family visits through ‘open days’ have been a success nationally and worldwide.

In order that such an engagement occurs between the scientists and society, there is an abject need to create more democratic spaces and fora that can host, incubate and chronicle such engagements. The Indian Academy of Science’s new journal *Dialogue: Science, Scientists and Society*, is one such forum (<http://www.dialogue.ias.ac.in/>). The journal provides the broadest base for the reimagining of the links science bears (or lacks currently) with society. Through rigorous peer review, *Dialogue* aims to be the space for informed debates on issues concerning the ethics and philosophy of scientific research. *Dialogue* is a platform for an informed understanding of how changing trends in scientific funding, institutional reorganizations and policies could impact the present and future of students. Informed critiques on policies pertaining to education and problems of its workforce will potentially find *Dialogue* their natural home.

There are two inherent limitations of such a journal-based forum. The usual process of submission, peer review, revision, acceptance, and communication does not allow for a discussion of issues as they ‘break’ in real-time. Secondly, the scholastic nature of communications that have to withstand peer review requires language of a technical nature, often comprising jargon that may be unfamiliar to non-scientific audiences. To work around these disadvantages, *Dialogue* is complemented by an open, web-based, inclusive communication platform called Confluence (<http://confluence.ias.ac.in/>). Confluence is not peer-reviewed but enjoys an editorially moderated mode of communication, and allows every individual to participate and discuss issues concerning science and society on equal terms. Confluence is meant for, and nurtures, discussion and constructive arguments made in a collegial spirit and in a lucid conversational style. In addition to original essays, Confluence also hosts relevant content from other digital platforms. It also features polls aimed to gauge the pulse of informed readers on current science-related news and events.

In conclusion, I would like to share a personal experience while writing this essay. I decided to ask two questions to a bunch of young women and men not associated with scientific research. The questions were “what do you think scientists do?” and “what do you think society should expect from the scientific community whose research it funds?” Their answer was surprisingly consistent: scientists should help understand the mysteries of nature/universe/world (and other analogous descriptors) and second, help solve “problems of human health/advance human civilization, etc”. I pressed further by asking a bit provocatively, “can the quest by scientists for understanding the world around us be undertaken even at the cost of tackling real-world prob-

lems such as hunger, national threats, diseases and so on”. The answer was again affirmative.

It is reassuring to know that the educated section of our society may be comfortable with the fact that the scientific community should (also) invest its time and resources on ‘pure’ curiosity-driven quests to understand natural and physical mysteries that do not promise immediate or tangible deliverables that the society can use. It would be presumptuous, however, to assume a similar degree of empathy would exist all the time and everywhere. The recognition by society of the importance of doing science can only be sustained through its active and continual conversation with its scientists..

Suggested Reading

- [1] E Turnhout, M Stuiver, J Klostermann, B Harms, C Leeuwis, *New Roles of Science in Society: Different Repertoires of Knowledge Brokering*, *Sci. Public Policy.*, Vol.40, No.3, pp.354–365, 2013.
- [2] Richard G Hewlett, Oscar E Anderson, *The New World, 1939–1946* (PDF), University Park: Pennsylvania State University Press, ISBN 0-520-07186-7, OCLC 637004643, 1962.
- [3] S Lenard, What Role, the Scientist? The Importance of Scientists and Collaboration in Environmental Policy formulation and the Roles that Scientists Play, Use of Joint Fact Finding in Science Intensive Policy Disputes, 2003, (<http://ocw.mit.edu>), J Buchanan, E Henig, M Henig, *Annals of Operations Research*, Vol.80, p.333, 1998.
- [4] K P Kannan, Secularism and People’s Science Movement in India, *Economic and Political Weekly*, Vol.25, No.6, pp.311–313, 1990.

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