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The Future of Science Studies

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I

Some years ago, Derek de Solla Price, the historian of science, described his discipline as a first-rate subject of second level importance. Price felt that his subject was a vicarious one. He emphasized the primacy of science as a creative act and considered the historian of science as merely someone who reconstructs the formal act. This “priceless” perspective also marks the professional sense of many literary critics. George Steiner remarked that every time the literary critic looks back, he sees the eunuch’s shadow. He adds that he would rather forge one paragraph of Tolstoy or Dostoevsky than write critical comments on them. This sense of voyeurism has marked both disciplines, a sense of secondariness which literary criticism has at least abandoned after the emergence of Barthes and the discovery of Bakhtin. Literary criticism today is a creative act in its own terms. Science Studies, I am afraid, has still not arrived at this twice-born state.

There is an absence of the unitary or the integral about it. It lacks the intellectual heritage of a university subject, the classical sense of history, philosophy, law or even a newcomer like sociology. It is the joker in the university pack. One can talk of science as a vocation but it still feels premature to talk of science studies as a vocation. Or at least a trifle pompous. It is like a salad bowl pretending to be a classic cuisine though one will not deny the nutritious value of some of its contents. Science studies as a subject is a collection of hyphens. It is a quilt patch of history of science, philosophy, psychology, sociology of science, science policy, management, and economics, a cross-cutting alliance of quarrelling subjects. Science studies at one level seem as discourse, but at another is only a space where different perspectives on science unravel its primacy. A geneology of science studies as an academic discipline always begins with this invocation of inferiority, of secondariness or a sense of an acephalous set of analysts. But, if we move beyond the narcissism and navel gazing of the academe to a wider sense of the politics of knowledge, a different view of the discipline emerges. A range of inane debates shrinks to size. For instance, the piety of interdisciplinarity disappears. Critiques of knowledge which cut at the very core of science regress when they eventually celebrate interdisciplinarity as a solution. It is only an excuse for a goulash of subjects.

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This essay would like to contend that science studies is not an adjunct subject but a creative mediation on the relation between knowledge and power. The psychologist, Ashis Nandy, would call it “a street-fighters art” [1].

To capture this concretely one has only to contrast the emergence of science policy and science studies in India. Science policy emerged as an adjunct to the flag and the Indian nation-state. India, like many Third World countries, felt that it was science policy that legitimized the state, giving it a passport to modernity. The future, as Jawaharlal Nehru said, belongs to those who make friends with science [2] and science policy made the future even friendlier. Science policy took science as granted merely wanting to increase its velocity and circulation. Science policy was a culmination of the Baconian spirit, where citizens were supposed to acquire “the scientific temper” as if it was a vaccine, which when inoculated gave immunity from a wide variety of superstitions. When prime minister Indira Gandhi declared the Emergency in 1975 and suspended civil liberties, she did so in the metaphor and language of science. The Emergency was virtually conceived as a scientific project, a “disciplinary” act which had even obtained the imprimatur of the astrophysicist S. Chandrasekhar. The tyranny of scientific projects like family planning and urban planning brought in its wake, the emergence of science studies as a series of resistances to tyranny. Science studies in India was thus an act of revolt, an insurrection against a dominant knowledge by groups in civil society. It was not an act of academe, created by a college of scholars but an output of political struggles seeking to create a new vision of democracy and knowledge. It was not created through a syllabus committee and nor did its first products get a Ph.D. But, the equation, usually simplistic, held. Science studies is to science policy as civil society is to the nation-state. Stated this way, science studies appears within the dialectic of resistance and hegemony, adding to the imagination of a democracy. It also emphasized the crucial point that many intellectual subjects are not born within the groves of the academe but within the broader social movements. In fact, epistemology is not an esoteric word but an aid to the democratic imagination. Years ago, I was at a seminar at Harvard Institute of International Development (HIID) when I happened to use the word epistemology. A well-known World Bank consultant asked me, “Why do you use the word epistemology? The World Bank President can’t understand it.” I replied, “That is precisely why. The movements do”. It can be a life saving word allowing the possibility of new thought-experiments.

This essay thus becomes not a bibliographical essay on Constructivism, Naturalism and other academic fixations, but an effort to locate science studies back in the politics of knowledge.

II

The British scientist and sociologist of science John Ziman once observed that a scientist knows as much about science as a fish about hydrodynamics. Ziman’s statement is both banally obvious and profoundly true. It raises the question, the irony that the proverbial curiosity of science does not extend to itself. Science virtually creates by black-boxing itself. Ziman, however, seems to suggest that you don’t need a lecture in hydrodynamics to swim. But, when the waters get choppy and the scientist ill, then hydrodynamics can come to the aid of the scientist. Science studies in that sense is a reflexive act, a form of self-consciousness. Too much of self-consciousness can destroy the creative act or one can meet the scientist who does extraordinary science but banal science studies. Oppenheimer and Leo Szilard come immediately to mind as examples. But a self-reflective science does this much. It tells each scientist that while he does not need to be a

sociologist of science, his work carries a sociology and an epistemology with it. In that sense, science is no longer immaculately innocent or value neutral. Arthur Koestler has dubbed the myth of value-neutral science one of most pernicious myths of this century.

In fact, one realizes that with the likes of Ludwig Fleck [3], Evans Pritchard [4], Thomas Kuhn [5], Paul Feyerabend [6], Georges Canguilhem [7] and Oliver Sacks [8], science studies had become post-modern long before the word became popular. But this post-modernity, or “post-normal” science as Jerome Ravetz called it in *Futures* [9], was a grounded one. When the post-modern arrived, it stopped at the Gulag and the concentration camp, but science studies had to follow the truth of science into these very structures and discover that the concentration camp was a sibling to the research laboratory.

There is also a ludic quality to these studies which has possibilities of the subversive. In fact, if communism had to be saved or even conceptually composted, science studies was the ideal site for the thought experiment. If science studies had been more confident, the end of scientific socialism might have been more fruitful. One feels that a faith in science added to and abetted the faith in communism. In fact, Arthur Koestler’s *Darkness at Noon* [10] becomes in this context not just a fable of intellectuals believing in communism, but one of the great parables of science studies. I believe Koestler tried to unravel the same enigma through his studies in the history and psychology of science in his works on Kepler and Paul Kammerer, but these monographs lack a sense of evil which his fable on Stalinism captures. The irrational behaviour of Bukharin/Lubashov is partly similar to the behaviour of the scientist drawing another epicycle to save his paradigm even when it is ready to claim him as a victim. Conversely, one could suggest that Vaclav Havel’s critique of communism and his attitude to politics, stems from his philosophy of science [11]. Alexander Zinoviev’s works as a logician and philosopher is what makes *The Madhouse* a mordant critique of politics and science [12]. I think these are concerns that science studies must include within its vision of science, both utopian and dystopian.

III

Science studies in its search for identity and territoriality has moved across four axes of possibility. The most conventional of these have been interdisciplinarity and the science of science, the most fruitful, Transcience. But, the most exciting possibilities remain the search for alternative sciences and the plural frameworks of knowledge this exercise demands.

In a sense, it was the Soviet world that took *science of science* seriously, virtually inaugurating it as an official discipline (*nauka o nauka*). For all the imperiousness of its title, it functioned as a handmaiden of science and the State. The studies, which ranged from Science policy to the social roots of science *a la* Hessen [13], accepted the regime of science and sought its sustenance and continuity. Despite the dominance of science, its apologists suffer from the bathwater effect. They respond to every critique with “yes its true but why throw the baby out with...”. Science becomes an enormous baby that does not even fit the Brodbignagian world and then one realizes that if Bacon was a celebration of science and its anticipation, Swift’s

Gulliver's Travels was the progenitor of the other half of science studies through its lampooning of The Royal Society.

Whether Marxist or liberal, conventional science studies plays junior research fellow to the professorial of science seeking to create their world in the latter's image. They sometimes even function as a Rapid Action Force-cum-ambulance brigade when they feel science is threatened, reviving talk of the scientific temper. One would almost think that it was a vaccine that granted immunity from superstitions. At its best, science studies can produce a Bruno Latour or a Steve Fuller, but even the best lack the "scientific confidence". One recalls Emile Durkheim's statement about socialism. He claimed socialism is not a science but a cry of grief uttered by an animal in pain [14]. Durkheim had that imperious confidence about treating any social fact scientifically, Today, science studies lack that confidence in confronting science as a social fact. Science as a mode of thought and as a code of conduct, as belief and as ritual needs to be understood in complete detail. But, sadly social scientists have not confronted science within the same confidence and even "suspicion" that they have studied religion.

Science studies as it unfolds operates along three isobars of thought. First is the explication of science and its legitimation which encompasses acts of "Sanskritization". A lesser and "lower" scientific subject attempts to acquire the rituals and status of a higher discipline through rites of purification, rigor, abstinence or imitation. A favourite tactic of identity expansion and infiltration is interdisciplinarity.

Interdisciplinary science, which I often see as the liberal variant of the Soviet science of science, is at times like affirmative action. One creates a theory of nominal membership, of including one physicist and one sociologist in a department. Like official affirmative action, interdisciplinarity tends to be officiously correct and pious, pointing to this one "different" character like a prized albino in a pack of bronzed tribals. Actually, the difference makes no difference. Interdisciplinarity reflects a failure of the political imagination. It seeks to mix subjects without questioning, hyphenating differences by affably denying their incommensurability. By refusing to face the truth that classification is a social fact, interdisciplinarity offers a weak programme for science studies. At the most, interdisciplinarity can provide a riot of metaphors, or become a failed costume ball. What interdisciplinarity currently lacks is a full-fledged theory of knowledge. It gets reduced to a set of fragile factors of holding hands and pretending that a marriage has been consummated. Interdisciplinarity provides for a bad alchemy of knowledge because it fails to transform either the classificatory structure of knowledge or the consciousness of the agent. Its hybrids produce little surprise; its mutations are in reality only uneasy hyphens within the existing paradigm of knowledge that remains unquestioned. It usually ends in a sense of futility with most subjects realizing with Robert Frost that "good fences make good neighbours".

The more successful part of science studies has centred around a *transcience* perspective. A classic example is the Macy Conference on Cybernetics. The Macy class of 1952 included Margaret Mead, Gregory Bateson, Warren McCulloch, Kurt Lewin, Norbert Wiener, John Stroud, and Johnny von Neuman. Mathematics, Physics, Biology and Anthropology rubbed shoulders happily and unhappily. As Mead and Bateson pointed out in a dialogic memoir, it was

conversation at its best: inventive, autocratic, continuously challenging, frustrating and it virtually helped invent a new field and its applications—cybernetics [15]. It was metaphor and a method that allowed for a whole range of problems from missile control to schizophrenia to be read in terms of a structure of information. It created a metaphor threatening to be a metascience offering new perspectives on learning, pathology, violence, arms control. Transcience seeks to escape the parochiality and reductionism of a particular discipline by throwing an umbrella of concepts over the specific sciences providing fascinating critiques of scientific epistemology and method, while searching for a new unity for the sciences.

The final approach centres around the search for the *alternative sciences* [16]. As a project, this exercise suffered from the taint of Lysenkoism and Nazism. Even today, it can degenerate into a desperate adherence to fundamentalism. But the crisis of science has now revitalized this activity into a search beyond the quest for alternative medicines and medical systems. Both the feminist critiques of science and the Third World critics have proved that science contains its own grammar of violence ranging from its hegemonizing impetus, to vivisection to monoculture and reductionism. The search now is to alter the rules of this grammar or to provide alternative grammars. This ranges from a search for new energy systems, to new modes of mathematics, to theories of indigenous materials, space and architecture to a new heuristics for computer software. The esoterically epistemological and the immediately practical go hand-in-hand in these pursuits particularly as science becomes iatrogenic or even fails to deliver at several levels. Science studies sets out the theatre of these possibilities and in fact becomes a trustee of these alternative imaginations responsible for assuming that they are not museumized or stillborn. In fact, this becomes particularly important especially when science has come back in a resurgent way with globalization. The dominant science however is not physics which oozes quantum liberalism and spirituality but new management science along with information theory, systems management and bio-engineering. Science studies must seek to sustain dissenting imaginations and prevent the cooption and emasculation by these disciplines. The classic example is that of ecology, which began as a dissenting imagination, but has now become an ecocratic discourse seducing an entire generation of NGOs into become extension counters of the global regime.

This trusteeship is made difficult by the sense of being that science studies displays. It conveys a sense of betwixt and between. It stands as a liminal entity between the humanities and the sciences consumed by both but claimed by neither. It seeks connections, roots, geneologies but has not found a creative identity. It remains a liminal discipline. It seeks friends all around but often behaves like a child incessantly left out of a game of musical chairs. Science studies needs to enjoy its liminality. Liminality after all is the result of dichotomous thought, of being caught in the rituals of either/or. In fact, it is this dichotomy, this dualism that needs to be challenged at several levels—at the level of scientific thought and in terms of the dualism of the university.

One acceptable strategy would be Deleuze's notion of the rhizome [17]. Deleuze suggests that modern western thought is fundamentally binary and this is caught in the classificatory image of tree and taproot. "Binary logic", Deleuze claims, "is the fundamental logic of the root-tree" [18]. It sustains psychoanalysis, structuralism, linguistics and even information theory. The

danger lies in science studies mimicking this logic. What it needs are schemes for diversity and multiplicity, schemes to make a variety of connections. Science should not be seen as a “master language, with a master speaker and a model listener” [19]. It should not be seen as a homogenous language community but as “a heterogeneous language of dialect, patois, slangs and specialized languages”. Enacted this way, the first efforts of science studies might be comic or monstrous a bit “like the abominable couplings dear to antiquity and the middle ages” [20]. It is out of such experiments that a creative chemistry of knowledge or at least its ecology can be sustained.

IV

Science studies has to be conceptually ambidextrous. It needs both a theory of knowledge and of politics. More particularly it needs to locate itself within the archives of the democratic imagination. The Chinese had a clear-cut statement about this problematic. They spoke of the relation between Mr. Science and Mr. Democracy. If one removes the patriarchal prefixes, it embodies our sentiments. What exactly can science studies add to the democratic imagination?

Both modernity and democracy take knowledge basically for granted. For modernity, knowledge is progressive, superstition atavistic. For democracy, knowledge is good. It is seen as rational in a Weberian sense. Weber felt that even if modern man did not know how a machine or any other object operated he was at least confident he had access to that knowledge [21]. Every citizen, to Weber, was a potential expert. But it is precisely in its theory of citizenship, that democracy is at its most arid. Politics has focused on the citizen as voter and consumer but it has not looked at him as a man of knowledge. Ananda Coomaraswamy’s contention that a proletarian is a man disembedded and dislocated from his culture would have left both liberals and Marxists aghast [22].

Yet, it’s around some model of citizenships that democratic theory is constructing itself. If the nineteenth century political theory was a creation of exiles from Bakunin and Kropotkin to Lenin and Herzen, the twentieth century has centred around genocide and the refugee. The post-modern twenty-first promises to be less dismal and threatens to focus around the diaspora. The diaspora is the new exodus of migrants into the First World. It is a tale of travel from Third World marginality to successful modernity. The roll-call of Third World scientists and writers is an obvious celebration of it.

Modernity emphasizes mobility and citizenship but what it fails to discuss is the rapid obsolescence, decline and displacement of communities. It talks of rights but has refused to discuss the decline of the commons. International declarations celebrate citizenship but fail to understand that, in a real sense, it is a shrinking category. I would like to suggest that it is the hegemonizing role of modern science that has shrunk the possibilities of citizenship and added to its monotony and uniformity. The hegemonic construction of science in the service of the State corrodes citizenship both through its projects of displacement and incarceration. It devalues citizenship of millions by devaluing their knowledge or by deskilling them. The gypsy, the hobo,

the tribal, pastoral groups, many crafts are no longer seen as ways of life or livelihood and given the dignity of citizenship. Similarly madmen, old people, the very poor, homeless children are either ignored or condemned to incarceration. The scientific notion of adulthood and citizenship feels that the peripatetic, the unproductive, the very weak need to be triaged out of citizenship. Their knowledge is valueless, their skills unproductive. Whole ways of life are lost because their knowledge is condemned by science. The displacements of millions of tribals by dams is only the most visible of these displacements. Adding to the devaluation of citizenship is the celebration of the expert.

The opposition of expert and citizen is one of the most problematic dualisms of democracy. Present in it is the Orwellian reading that experts are more equal than citizens and laymen as citizens are one level above the mob. In fact two strategies centring around *the irrationality of the crowd* and the *superstitiousness of the folk* combine to immobilize a whole domain of citizenship. Science studies must lead in the recovery of the lost domains of citizenship and demonstrate that the citizen's role as scientist is as important for democracy as his role as voter and consumer.

But to do this one has to show how enabling notions of citizenship have withered away. It is not only a question of advertisements telling women that mother's milk is best. But this can't be done in a hierarchized manner. Celebrating ethnobotany or local plants only to rip them off or patent them is obscene. We appropriate the product but completely discard the process of creativity, of learning. Citizenship and knowledge both involve tacit knowledges, skills ingrained into the body through ways of living. It is these tacit knowledges of alternative systems that science studies must seek to sustain. Only then can the idiocy and imperiousness of regimes like WTO be fought. Merely editing a monograph or arranging a spectacle will not do. What it needs are movements, choices that keep these ways inventive and unapologetic. But there is a wider ambit within which science studies needs to perform this role. It must seek to distance itself both from the hegemonizing impetus of science and the coercive destructiveness of fundamentalism. Fundamentalism also freezes alternatives. What we need are not merely modes of knowledge but the life systems that sustain them with dignity. One has to realize how many modern terms carry such an implicit contempt built into them. Wes Jackson's words of wisdom come immediately to mind [23]. Jackson pointed out that today one thinks of America as a high information society. Correspondingly one tends to devalue the knowledge and information of many poorer societies. Also, we regard as information only that which can be formalized and disembedded. America may be rich in information but in terms of languages spoken, farming skills, home remedies, species of life it might be in many ways a monoculture. An agriculture process which cuts 165 varieties of apple to six diminished information and the tacit knowledges required to grow them. By widening the theories and possibilities of knowledge beyond the official science, studies creates a more enabling notion of citizenship. And in doing so, it has to add to the notion of rights, a theory of the commons as alternative gene pools of knowledge. It is this everydayness of alternatives that we need to create. Challenging the expert during the anti-nuclear movement is important. But such a protest gets framed and even becomes a spectacle. Citizenship to grow must recover control of the body, seeds, health, education from the hegemony of the expert. In deconstructing expertise and the hegemony of the professions and in creating inventive spaces for local knowledges, science studies in fact provides a new civics for citizenship. Ideally

syllabus and constitution, polis and laboratory must meet to invent new imaginations for the sustainability of democracy.

One problem, in particular, needs to be emphasized and this relates to the resolution of scientific controversies in a democratic society. A scientific controversy is not an issue to be resolved by science alone. In fact, science often adds to the problem. The challenge before Science studies is how can it add to the imagination of democracy when confronting such debates? Can it develop a common normative discourse?

There are a whole range of controversies whose public discourses need such moral and cognitive nuances. One thinks immediately of the Bhopal Gas disaster, the WTO and intellectual property rights, the Genepiasm controversy, energy debates and questions of sustainable development, lifeboat ethics and question of aid, the debates on biotechnology. Let me pick one issue--The Narmada Dam.

The Narmada dam is threatening to displace thousands of tribals. In fact, as this essay is being written, police jeeps are forcibly evacuating villagers in Gujarat. The publicity given to the author Arundhati Roy has made it a big issue. But, it is the idiosyncrasies of the personalities that come to the limelight, not the issues. The presence of media-lovelies hides the poignancy of the controversy or the methodological issues which need to be resolved. What is an audit of a dam? Is it only hectares of forest measured as paper, pulp and wood for construction and minor forest produce or is it more? Is it only calories of energy? What is the genocidal quotient of a dam? How do we express it? What is the democratic index of a dam given we forcibly displace so many people? How do we evaluate the commons of skills that disappears when a forest disappears?

There are different concepts of what is a good life and it might vary for the *Dalit*, the tribal or the middle class. For the *Dalit*, the factory might be a new lease of life. For the tribal, it might mean loss of ancestral lands. How does one adjudicate such controversies? How do we develop the assessments of technology to include aesthetics, rights, the future of nature? Science studies has a challenging role to play in developing methodologies for such controversies. In doing so, it has to deal with the uncertainties of scientific knowledge and create a wider forum of pluralistic knowledges in resolving such issues. Any methodology must take into account the following issues:

- (1) the right to information and the question of voice
- (2) the logic of choices and their language
- (3) the costs of each choice beyond cost-benefit and economics of resource use
- (4) nature of expertise and question of uncertainty
- (5) variety of *alternatives* and skills required to create them or sustain alternative forms of life and knowledge
- (6) social, ethical assessment of technologies including non-homocentric assessments

(7) adjudication beyond majoritarianism models

Linus Pauling often talked about how an axiomatics of suffering needs to be built into science and I believe this is one of the ways in which science studies can add to the democratic imagination.

V

I want to end with a story. A few days back, an old teacher of mine and one of India's leading sociologists of science, retired from the Delhi School of Economics. One of the speakers at the farewell party was the botanist, Mohan Ram. Mohan Ram began by admitting he had been associated with the sociologist for a long time. He claimed that he found it difficult to describe him. Like the sociologist, he too had spent a life-time tinkering with form and function. His colleague, he felt, reminded him of the *jamun* (*Cuminii Syzigium*) or hot plum, Like the *jamun*, he left a stain, a deep imprint on anyone he met. Like the *jamun*, Jit was tasty and great fun to eat. And like the *jamun*, his friend too was best when taken with a pinch of salt.

What was true of the professor is also true for the subject he wrestled with. Science too is fascinating. It too leaves a deep imprint on anything it touches. But it also needs to be taken with a pinch of salt. I see science studies as that pinch of salt. Like salt it has to be everyday, mundane, but provide the little bit that makes the difference. Like salt, it too may one day bring down an empire.

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