

Why Do Critical Science Studies? A Prologomena
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What does a critical study of science, otherwise known as critical science studies, mean, exactly? This is still an answer begging question I had wrestled with for three years, since my dissertation-writing days, in trying to position the work I am doing: a comparative, and humanistically inflected, interrogation of scientific epistemics, as well as its methods and values.

At the same time, one may ask as to whether the humanities, apart from philosophy or perhaps even the technical histories of science, could have any valuable contribution to the construction of scientific knowledge. Perhaps in the world of workaday science, the answer is: none whatsoever; in this case, even philosophy would be too esoteric and insignificant. But, what if the science viewed here is not about experimental setups, instrumental calibrations, or computation of select phenomena. What if it is about how the most foundational epistemics in science can be read against society, and in the process of that interaction, certain transformations, particularly of ontological perceptions, could affect our theorization of the science? Humanities most valuable contribution is at the level of critique, or creative vision, rather than in the maintenance of the mundane.

Maybe the impact on workaday science is still negligible, but the framing of that scientific paradigm, and even how we locate our scientific beliefs, could do with some expansion. This becomes much more than the incommensurability of two cultures, a dissolution of artificial distinctions stemming from the need to preserve one's epistemic turf, something which social epistemology has an interest in challenging (at least, the social epistemology I am invested in). The collective vision page is perhaps a good space to think aloud this question, especially since it would be part of overlapping conversations already addressed, or are in the process of being addressed, by the other authors, in both Part I and Part II.

Having first entered the field of science studies through literature and science (I a science geek in a past life, and a science geek to this day), although I have ventured quite far from the fold. I have also encountered an array of attempts at interdisciplinarity in the humanities and the sciences (or maybe, some might prefer to use the phrase, the arts and sciences), so much so that one may need to maintain a glossary of list just to keep track. Yet, all of these categories remain wedded to the disciplinary boundaries that determine a scholar's relation to science studies, which does make for interesting mud slinging among dissenting advocates of the field. Whether it is the cultural studies of science, philosophy of science (dominated by analytic philosophy, with the 'other' philosophy consigned to the margins), history of science, sociology of science, literature and science, art and science, or any other manifestation of a qualitative (and perhaps, even socio-empirical) analyses of science, the practitioners across these fields are so comfortably entrenched in their little corners to not have to have more than a passing acknowledgement of each other, while proceeding with business as usual. One sees that even in conferences purporting to be address interdisciplinary themes

Therefore, conventional science studies, which I put in opposition to my proposal of critical science studies, exists as a rubric of multidisciplinary silos that occasionally cross paths, and may engage in some timid collaboration, but with rare exceptions, transformative conceptualization is missing.

In fact, the continuous debates about realism, constructivism, anti-realism, nominalism, are among some of the outcomes of that reluctance to bring transdisciplinary engagement to full-term (what the transdisciplinary can look like, in this case), though there is a serious effort to that end in a recent (Sept-Nov 2015, vol 32, 5-6) issue of *Theory, Culture, and Society* called *Transdisciplinary Problematics*, in science and technology studies, producing its own form of collective vision that can be coherent but not homogenous.

However, the critical science studies proposed here is about going back to the foundation of how we think about scientific knowledge that is external to its institutional legitimation. This is not so much a call to return to the idea of science as natural philosophy, but more as a challenge to historians, philosophers, and sociologists of science, and even those in literary, visual, and cultural studies who purport an interest in bringing science into critical engagement with their objects of study, to consider their own personal stake and even level of ‘expertise’ they possess when engaging with scientific epistemology, and how that expertise is obtained and constructed.

The movement from amateur scientist and hobbyist to citizen scientist presents an opportunity for investigating not merely a one-way street of science communication from top down, but also confronts scientists, and those of us in the humanities and social sciences interested in the public presentation of science and technology, with a complicated question concerning what it means to do ‘real’ and ‘proper’ science, and if the crowdsourcing of scientific data is the deployment of an instrumental aspect of science towards loftier ontological goals. The question of authority percolates through the interaction between a citizen scientist and professional scientist, but is the professional scientist the only true authority in providing the benchmark for scientific knowledge production, or can an experienced and well-trained (even if largely self-taught) citizen scientist, who might want to propose an alternative to available methods, be still considered an expert agent?

What critical science studies offers, in the bridge between foundational concerns and socially infused paradigm, is a connection to foresight studies. Foresight studies have always been an interdisciplinary in nature, even if it has taken off more quickly in the fields of business, finance, and management studies. However, foresight studies has garnered increasing interests from technologist in the past five years, or more, and there are attempts to interface the pragmatic problem-solving predisposition of technology (though this is by no means any attempt at reducing the complex contribution and discourse on technology) with the more ambitious, yet cautious, goals of science. Even the citizen scientist has some contribution to foresight, through the availability of maker and hacker spaces, though some of these spaces had always existed as techno subcultures before they were mainstreamed.

Perhaps this is where we can develop the discourse of critical science studies, such as in aligning the practices of prediction and informed speculation in science to the still developing methodological practices of foresight. Perhaps I could be so bold as to venture that my exposition of critical science studies is informed by the Stieglerian (1998) notion of *tekhnē*, which is not the same as *phronesis*, the latter of which is a closer cousin to Bernard Stiegler's formulation of mechanology as the social-materiality of technology. *Tekhnē* is that fulcrum between the rarefied domain of science and the functionalism of technology, one that makes it less easy for an uncritical conflation of techno and science. The conflation of techno and science appears to be an act of abstruse nominalism of a Platonic variety that provides too easy an escape from the difficult question of ontological differences, including the shades of differences.

The question of what is science and what is technology outside what postcolonial theorists consider as Eurocentric exceptionalism requires science studies scholars to look inwards and outwards when confronted by a mixture of pre-colonial, colonial, and postcolonial legacies that signal multiple points of ruptures, disruptions, and what Fuller himself had characterized as inscrutable silences – except that it is much more than inscrutability but rather, a silence born of disenfranchisement, a disenfranchisement that grows with the incursion of modern globality that masks historical amnesia.

Warwick Anderson discusses this issue from the context of subjugated knowledge in his article (2009) when he describes Sandra Harding's attempt at global knowledge inclusivity through the deployment of feminist standpoint theory (one which some would consider as being epistemically more sympathetic to postcolonial discourse), and also attempts at regaining an 'indigenous' scientific identity through the development of ethnoscience (or its sibling, ethnomathematics) that seeks to redress the epistemic violence inflicted by coloniality upon a native intellectual heritage, or a violence that tears apart a network that had already existed prior to colonization.

Obviously, any form of Whiggish scientific program, or even history, creates tension not merely at an intellectual scale, but at the level of *realpolitik*, such as what one would find in the science and math education of many postcolonial countries, and the struggle for language hegemony when it comes to the medium of instruction. That said, what can critical science studies contribute, in terms of a critical framework, to addressing the question of science and technology within the context of subjugated knowledge, where scientific programs regularly confuse the scientific with the technological due to the abrupt manner in which these newly independent states became participants in the modernization process, after decades, and even centuries for some, of limited to non-existent self-determination.

Are champions of an ethnocentric approach (one can even question the theory-ladenness of the etymology of 'ethno') to science and mathematics, especially in STEM education, therefore running the risk of instrumentalizing knowledge to suit nationalistic or patriotic objectives, rather than to serve social justice, whatever the latter means? The problem of demarcation remains unresolved, or maybe one that will always be enthymematic for as long as the master-slave narrative persists, and discourse on transnational knowledge production tend towards exceptionalism (in terms of the tendency to over-localized

knowledge production as a negative reaction to what is perceived as a drive to universalism) rather than empathetic dialog.

I do not see it as a problem for critical science studies to begin at the level of textual confrontation, with the meaning of textuality here broadly construed to represent the medium or systems upon which concepts, knowledge, and belief-systems of any communities can be embedded. Further, even if we were to narrow the meaning of textuality to represent actual publications, notebooks, reports, hard-drives, and spaces of scientific observation (within the current conventions of scientific practice), it merely means that we are examining scientific interactions, or what we demarcate as scientific interactions, within a prescribed spatio-temporal bound.

What is needed is to develop critical science studies as a field infused with a transdisciplinary identity that transcends the idioms of philosophy, sociology, or history of science, while being aware of its epistemic debt to these fields. Perhaps critical science studies, in trying to serve also the goals of social justice, endeavors to give shelter to intersectional practices within scientific knowledge and technological deployment, given that critical analysis and interpretation of scientific practices and epistemology are inescapably entangled with the social and political despite conventional philosophy of science's insistence that such entanglements are epistemically impossible.

Going back in time to Fuller's 1988 *Social Epistemology*, I draw on his grounded discussion of realism across the different conventions of philosophy, history, and sociology of science to bring onboard the conceptualization, and demonstration, of the role of data, and what data represents, in the potential for novelty and discovery in the sciences, although my current interest are in selected fields of modern physics. The main question: how many forms of realism can data represent, is data always already pluralistic in nature, and how does one separate the ontological from the socio-epistemological representations (and is such a separation absolutely necessary)? Perhaps a datalogical approach to science studies,¹ which is not the same as an empirical approach to the sociology of knowledge thrives on tangible evidence-based epistemology, can shed some light on the question since such an approach will always be facing a contestation between logical-positivism and social turns.

The datalogical turn can be construed as an attempt at a more direct access to ontology. Data can be ideologically or non-ideologically specific, constituting the networks of potential information and knowledge that are already out there, waiting to be excavated and systematized. Datalogics could potentially generate some semblance of consensus between realism and constructivism through a holistic rather than piece-meal advocacy of sociology of knowledge. And datalogics can align social epistemology with the ontic, and provide another methodology for transdisciplinary intervention.

¹ There was actually a presentation by a group of sociologists at CUNY on this topic that I am not drawing from, but which offers some useful arguments for considering the social position of data. See https://www.academia.edu/5986819/The_Datalogical_Turn

Nevertheless, the practice of datalogics, through a hybrid of logics and the social, has potential in bringing together preoccupations that are seemingly divergent, by stripping away superficial differences and focusing on foundational questions, including the tools that are available, or not, for working out those questions. It is through this datalogical turn that critical science studies is required to confront its relationship to technology, to technicity. Perhaps what critical science studies can offer is a less eclectic presentation of Stenger's knowledge cosmopolis, but a grounded platform for the meeting of intellectual 'hearts,' with datalogics offering a methodological way forward.

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