Climate Change, Energy Justice, and Geopolitics: STS Concepts in a Time of Crisis

1. Introduction

The title of this conference, "Undoing the Crisis," reflects the organizers' goal to understand the potential for science and technology studies (STS) to contribute to resolving the numerous planetary crises that the world faces today. The conference organizers aim to go beyond technocratic solutions to open up a creative conversations about "solutions, particularly those that arise from non-dominant perspectives and/or which reimagine existing frameworks instead of merely applying technical solutions to existing conditions."

The papers presented at the conference developed STS perspectives on multiple crises, among them health care (psychiatry drug orientation, emergency, the covid pandemic); water quality and toxic exposure; surveillance, data gathering, and data justice; racial justice and colonial legacies; and the challenges of artificial intelligence. Students made use of a wide range of concepts associated with STS research, including citizen science, the politics of artifacts, knowledge construction, actor-networks, lay knowledge, technoscientific governance, surveillance, the co-construction of data and state power, boundary objects, and technocracy. The papers were a positive sign of a new generation of STS researchers who are showing deep concern with the world's problems and finding opportunities for creative research that may help to identify creative new solutions.

In this presentation, I will begin with a triad of intersecting crises that have interested me increasingly in recent years: the environment and climate change, global geopolitics, and social justice. I will begin with a few background comments on the intertwined crises, then I will provide a perspective on the question, "How can STS-informed research contribute to thinking about the crises, including thinking about solutions?" I will approach the question in very broad terms that I hope will appeal to a broad range of people, especially of a younger generation, who identify themselves with STS research. I will take three of the concepts that I have found most fruitful in the STS literature, at least in my own thinking and my own way of finding something that is identifiably STS: interpretive flexibility, strong objectivity, and a sociotechnical perspective. But I will also expand or develop the concepts for the context of twenty-first century politics by thinking about them as embedded in knowledge conflicts, governance conflicts, and design conflicts.

2. Interconnected Crises

The problems of environmental change and degradation, international conflict, and social justice are endemic to human societies and have been so for millennia. It is perhaps arrogant to argue that one generation's version of these problems is greater than that of another, but it is also the case that each generation confronts its own configuration of these problems. The triad of crises that I discuss here is suggestive, but others mentioned by the students today also indicate that there is no shortage of global problems that may be amenable to STS perspectives. Starting with the environment-geopolitics link, despite decades of talk about energy transitions, we still live in a geopolitical order that is dependent on fossil-fuel power and enforced by military power. The clearing of major international energy transactions in a small number of currencies has also been crucial to maintaining financial hegemony and the advantages of a reserve currency. Energy politics were part of multiple wars, including World War II and the Gulf War during the twentieth century, and the Iraq War and now the Ukraine War during

the last twenty years. The Ukraine War is currently framed in terms of Russia's geopolitical ambitions of restoration, but there are also deep energy connections as well. Although it could be a simplification to overemphasize Ukraine's natural gas and Black Sea oil resources as a deep competitive threat to Russia, it is much less controversial to point to the fossil-fuel dependencies of European countries on Russian sources and the implications for war and economic sanctions. With respect to justice, we are seeing increasing levels of climate-related migration and unequal effects of climate change, just as we see continuing inequalities of the effects of fossil-fuel extraction and generation. And on the justice-geopolitics links, the intersections of war and climate migration feed into protectionist sentiment that strengthens authoritarian and racist politics.

With problems so large, it would take remarkable hubris to think that STS, or any research field, can provide solutions. Even if it did, what political or economic influence does a relatively small, interdisciplinary field of knowledge workers have in a global economy dominated by multinational corporations, illiberal democracies, and outright authoritarian politics? But if you are a researcher who is concerned with global (and local) crises and problems, an important if not central question is how to conduct research in a way that can be of value to those who wish to bend the arc of history away from ongoing crisis and catastrophe. This question is not meant to deny the importance of research that makes intellectual contributions to one's research field; instead, it is a challenge to conduct research that can do double duty as an important theoretical or empirical contribution that advances a field while also providing valuable knowledge to advance the decision-making and strategic action of mobilized publics that seek to find solutions to global problems. In this sense, I am pointing to a type of STS that is not just a critique of problems but instead is oriented more to the difficult task of evaluating solutions, strategies, and tactics. With my long interest in both social movement studies and STS, I am particularly oriented to research that can be of value for those in progressive social movements. Just as advocates and activists struggling for a more peaceful, just, and sustainable world often point to the gaps in

existing research fields that I have called "undone science," so it is also necessary to point to the forms

of "undone STS" that your generation may identify.[1]

3. Interpretive Flexibility and Knowledge Conflicts

I will begin with the concept of interpretive flexibility. Of the many conceptual innovations of

the 1980s that became fundamental for the formation of STS as a field—that is, studies of laboratories,

historical controversies, actor-networks, social worlds, social fields, and technological systems—

interpretive flexibility was central in the science studies side of the field. I will focus here on sociology,

but during the symbolic revolution in social studies of science during the 1980s, there was a substantial

interdisciplinary exchange that involved historians, philosophers, and a range of other fields (although

anthropology was not very involved in the interdisciplinary conversations until the 1990s). Within

sociology, the research field of the sociology of science became displaced as the sociology of scientific

knowledge developed a set of methods for analyzing the social shaping or construction of knowledge.

This concept is still so widely misunderstood that it bears a pause and definition because it is not about

the unimportance of evidence but more about its interpretive flexibility. Data matter, but they are also

theory laden, and in any case when intense controversies arise, the closure of a controversy often goes

beyond arguments of evidence to network allegiances and politics. Whether it should do so or not is a

different matter, but empirical research has shown that the resolution of scientific controversies is often

a complex process that involves arguments of evidence and logic, but behind these arguments were also

assessments of social position and network allegiances.

Today, as much of STS has turned toward publics and the circulation of knowledge claims in the

public sphere, interpretive flexibility is not an obscure methodological principle designed to bring about

more accurate ethnographic or historical interpretation. Rather, it has become weaponized in the

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[1] Hess, David J. 2016. *Undone Science: Social Movements, Mobilized Publics, and Industrial Transitions*. MIT Press.

ongoing contestations of knowledge conflicts, that is, epistemic conflicts in the public sphere of media

and government debate over truth claims. In this world, the sociology of scientific knowledge (or, to be

more interdisciplinary, social studies of knowledge) becomes an inverted project. As it passes from the

study of knowledge claiming and vetting in scientific fields to expertise at large, the research field of STS

also shifts to the importance of non-knowledge or ignorance.[2]

I would argue that a diagnosis of post-truth politics and a conclusion that the world has

descended into anti-science populism and industry suppression is too easy. Instead, one of the tasks of

an STS of crises is develop an analysis of where facts matter for mobilized publics in general. I will give

an example from a recent paper.[3] In this paper, we examine a social movement against a pipeline in the

eastern United States. We build on theories of frame analysis but add an STS dimension by including the

analysis of "claiming" along with "framing." To do so, we analyzed thousands of media reports, and we

identified about 50 studies produced both by the social movement and the gas and utility industry.

These studies included documentation of environmental justice and risk (or fairness and safety), political

influence and corruption (or political support), and economic harm or benefit. Thus, different types of

knowledge and research projects were advanced in the framing and claiming conflicts.

If one leaves the analysis at the level of framing in the public sphere, it is possible to arrive at a

diagnosis of post-truth politics. But we also investigate how the claims are adjudicated. There are

multiple fields where adjudication can occur: editorials by journalists, independent science commissions,

elected government officials, regulatory agencies, and the courts. In this case, the media claims tended

to cancel out and approximate post-truth politics; the elected officials were polarized; and there was no

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[2] Hess, David J. 2020. "The Sociology of Ignorance and Post-Truth Politics." *Sociological Forum* 35(1): 241-249.

[3] Hess, D.J., and Belletto, K. 2021. "When do Facts Matter? Knowledge Conflicts, Mobilized Publics, and Social Fields," Society for Social Studies of Science, October. Currently under review.

scientific commission that is called to weigh in on the competing claims, as can occur in prominent national cases where a national scientific advisory board may be convened. But the adjudication did occur in the regulatory agencies and the courts. Although the regulatory agencies were largely captured organizations, the federal courts were more independent, and in some cases, we could find how the studies were picked up and referenced in the judicial decisions.

My argument is to suggest a way of thinking about now forty-year-old STS concepts and deploying them in a new context. In other words, I am focusing on the deployment of strategic interpretive flexibility in the knowledge conflicts of the public sphere with the goal of developing detailed historical and ethnographic analysis. However, I am also thinking about this issue through a social science lens of a comparative sociology of its patterns, mechanisms, conditions, and effects. The goal is not to arrive at a premature conclusion that science has lost its authority or symbolic power but instead to ask where and when the loss of the effectiveness of scientific knowledge occurs and where it is still maintained. These types of questions can advance general STS questions about "science at large" and the decline of authority of science, but they can also address the second goal of a type of research that I support: to provide research that clarifies the strategy of mobilized publics that seek to advance the public interests of sustainability, justice, safety, and democracy. In this sense, STS researchers can do more than just combat false narratives and join the knowledge conflicts; we can help to identify effective tactical choices such as where investments of research may matter (e.g., for litigation and regulatory conflicts) and where other tactics may be more effective.

4. Strong Objectivity and Governance Conflicts

The second concept that I would like to highlight for an STS analysis of global crises emerges from a somewhat different narrative that points to a second symbolic revolution during the 1980s and 1990s. The concept of "Kuhn loss" has sometimes been used to describe elements of the older paradigm

that remain outside of its replacement, and in the case of the institutional sociology of science (such as the research of Robert Merton), one of the areas of Kuhn loss is the attention to the debate over universalism and particularism in science. The term "universalism" generally means values and decision-making processes that are linked to modern understandings of procedural justice, whereas "particularism" refers to decisions that result in unfair treatment of persons of different social statuses by race, ethnicity, gender, national origin, sexuality, and so on. The older institutional sociology of science, to which I devoted a chapter in my late-1990s book *Science Studies*, had brought attention not just to the problem of cumulative advantage in careers but also to the question raised by how much such processes were fair (in this sense, "universalistic"). In other words, this research asked questions about apparently universalistic processes in science, such as ranking assistant professor applications based on the reputation of the graduate school, and sought to understand if they merely translated misrecognized distinctions of social privilege into career advantages or if they reflected fair evaluations of intellectual capacity and work ethic. As I argued in a paper in *Social Epistemology*, the debate was connected with a policy and social debate over affirmative action or what today would be called "equity, diversity, and inclusion," and there was a group of quantitative researches who pointed to the failures of the institution of science on this issue, as with many other institutions, and the need for reform.[4]

The other symbolic revolution of the 1980s and 1990s in STS had some resonances with this lost agenda on particularism in science. This revolution was associated especially with feminist STS researchers but also connected with emerging currents of antiracist and post- or de-colonial STS research. The term "multicultural" was used at the time but has since, at least in some quarters, fallen out of favor, so if one is to reread these studies, it is important to understand the progressive

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[4] Hess, D. J. 2013. "Neoliberalism and the History of STS Theory: Toward a Reflexive Sociology." *Social Epistemology* 27(2): 177-193.

connotations of the terms at the time. Where gender had become central in some of the studies of the universalism-particularism debate in the sociology of science (such as career achievement for women scientists), it was largely irrelevant to the early laboratory and controversy studies of the sociology of scientific knowledge. In contrast, the currents of research in feminist, antiracist, and anti-colonial research took up this issues but repositioned the more institutional questions of hiring, promotion, and careers from a sociology of science to a sociology of scientific knowledge question. In doing so, they linked the social composition of the scientific field with its intellectual composition.

Among the many concepts in this area of STS, I have returned constantly to "strong objectivity" as developed by Sandra Harding.[5] I interpret "strong objectivity" broadly to mean that when the social composition of a research field changes, it is likely to encounter substantial biases in assumptions about the dominant packages of problem areas, theories, concepts, and methodological choices. Strong objectivity connects with the political sociology of science, which shifted the social construction problem from the analysis of how observations in laboratories became widely accepted textbook facts (the "ships into bottles" problem) to how and why research fields constructed the contours of what science became prioritized or ignored, that is, done or undone.

Again, I want to reposition this second STS concept somewhat toward the politics of knowledge and expertise in the public sphere in a time of multiple crises. In the context of social movements, expertise at large, and knowledge conflicts, strong objectivity can be a strategic resource for social movements to combat the "decide, announce, and defend" model of public communication used by political and corporate elites that wish to impose an infrastructure or technology on a society or community. Strong objectivity can become a valuable frame that can legitimate calls for public engagement and public consultation with the rationale that decision-making will be improved if diverse

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[5] Harding, S., 2015. *Objectivity and Diversity*. University of Chicago Press.

forms of knowledge, represented by diverse participants and standpoints, are included. It may include local and indigenous knowledge, citizen science research, occupational expertise (e.g., farmers and ranchers, health professionals, civil engineers), and credentialled scientific experts from neighboring fields or subordinate networks.

However, the governance conflicts involved in the vetting of diverse publics and knowledges can be complicated, and mobilized publics that are rooted in subordinate positions in the social structure and social fields need to be careful about the potential for neutralization. Processes of public participation and inclusion of diverse participants can also be used to exclude social movements from consultations of the public by defining the public as the individualized lay public rather than a field of mobilized publics that struggle to create public opinion. Thus, the consultative and participatory processes can be manipulated to legitimate public approval of decisions made elsewhere and thus to discredit the capacity of mobilized publics to claim to represent the public interest because another public (an individualized lay public) has already been consulted. Thus, the application of strong objectivity to decision-making of the governance of infrastructures and new technologies implies careful attention to how the public is defined to avoid such pitfalls of democratic governance. It also requires more fundamental attention to the development of institutions that have the autonomy to adjudicate the diverse knowledge claims of challengers and incumbents and the authority to implement decisions. The lack of such autonomy and authority is a constant theme in the literatures on public participation in policy, citizen science, and deliberative models of governance.

So my second approach to adapting or expanding a central STS concept is to think about how the concept of strategic strong objectivity—that is, embedded in the governance conflicts of social movements that are responding to crises—becomes connected with a democratic politics of technology. Just as I was connecting interpretive flexibility to design conflicts, so I am suggesting that strong

objectivity in a time of crises is connected to governance conflicts in the democratic politics of technology.

5. Sociotechnical Systems and Design Conflicts

The third concept for an STS perspective on crises and solutions emerges from the often neglected or secondary field of technology studies. Even though the "T" of STS is centrally embedded in the field's name, technology studies has always tended to be secondary in comparison with science studies. Nevertheless, during the formative years of modern STS, there were important, field-defining research innovations, including perspectives developed in *The Social Shaping of Technology*, *The Social Construction of Technological Systems*, and *Feminism Confronts Technology*.[6] Unlike some of the science studies of the period, several of the essays in the volumes were much more directly in conversation with problems and solutions keyed to social justice and structural inequality.

These studies were widely divergent theoretically, and they included terms such as heterogenous network, assemblage, actor-network, sociotechnical system, large technological system, and complex web. The research tended to focus on the development and change of large sociotechnical entities, such as infrastructure-based systems associated with energy, transportation, water, communications, information technology, buildings, and so on. From this work a "sociotechnical perspective" emerged that brought a focus to the mutual shaping, co-constitution, coproduction, or co-construction of the social, cultural, technological, and natural worlds. In developing these studies, STS researchers also examined design choices as having both social causes and effects, thus developing a

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[6] MacKenzie D, Wajcman J. 1985. The social shaping of technology, Milton Keynes. Open University Press. Bijker, W.E., Hughes, T.P. and Pinch, T., 1987. The social construction of technological systems. MIT Press. Wajcman, J., 1991. *Feminism confronts technology*. Penn State Press.

parallel intellectual project with the concept of interpretive flexibility but for the analysis of material objects and systems.

Because of the S-centrism of STS, the analysis of sociotechnical systems, networks, or assemblages tended to be developed elsewhere in other fields where STS approaches and sensibilities were taken apart, reconfigured, and reassembled with other theoretical frameworks. One of the most prominent, and arguably the most relevant for the type of inter-related crises that I sketched at the outset, is sustainability transition studies. This field drew on technology studies in STS, especially the idea of technological systems, as well as institutional theory and innovation theory, and it recentered the study of technological change to the question of transitions, that is, major changes in such systems. Unlike the STS studies of technological change during the 1980s and 1990s, the focus was much more problem-oriented and solutions-oriented, and it tended to have an applied readership of government and civil society officials who were implementing sustainability programs and policies. Like the symbolic revolution described as STS in the 1980s, this field also had a largely northern European origin, with participation from other Western countries. Like STS today, the field has also made ongoing attempts to become both more global and more diverse. In this sense, the current changes in transition studies are very similar to ones that are appearing in STS as the fields become more globalized and as they show increasing attention to issues of justice, inequality, political processes, and power.

One approach that can nudge these sociotechnical perspectives toward analytical questions and frameworks that are oriented toward crises, social movements, and social justice is to embed sociotechnical analysis in the broader analysis of design conflicts.[7] Here, the analysis goes beyond the black-box question of "to build or not to build" the infrastructure, to the range of ways in which infrastructures and technological systems can be constructed or modified. Even when the communities

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[7] Hess, D.J. 2018. The Anti-Dam Movement in Brazil: Expertise and Design Conflicts in an Industrial Transition Movement. *Tapuya: Latin American Science, Technology, and Society* 1(1): 256-279. 10.1080/25729861.2018.1548160.

and mobilized publics do not achieve their goals, there is a third layer of design conflicts involving the configuration of remediation programs and of the governance of the systems. This general approach brings an often missing or forgotten sociotechnical perspective to these multi-layered design conflicts by examining so-called technical decisions—the size of a dam, the length of a power line, the route of a pipeline, and the remediation program's scope and parameters—and their political causes and effects. Again, this sociotechnical way of thinking about problems can be quite valuable to advocates, activists, and mobilizing communities that seek more just, democratic, and sustainable outcomes but may lack the expertise or background to open the black boxes of the politics of design.

6. Conclusion

I have taken three STS concepts that I have, over the years, found to be particularly helpful — interpretive flexibility, strong objectivity, and sociotechnical analysis—and repositioned them in the context of mobilized publics that are attempting to think about solutions to global crises. This approach leads to a parallel set of questions involving knowledge conflicts, governance conflicts, and design conflicts. The approach nudges STS researchers, especially those of a younger generation immersed in a generation-defining set of global crises, to think about research projects that can be not only problem oriented but also solutions oriented. I encourage students not to fall for the false choice of theory-oriented and practical-oriented research. Rather, the challenge is to think about research that moves the field forward with new empirical projects, conceptual development, or even the social science project of identifying patterns based on comparative or quantitative research. But this project for STS research in a world of crises and emergencies is not enough; researchers can also can orient their studies to the analysis of problems and solutions associated with the strategic interventions of activists, advocates, communities, government leaders, and others who wish to identify and implement more just, peaceful, and sustainable solutions to our current crises.