

# The Conceptual and the Empirical in Science and Technology Studies

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## Abstract

It is the purpose of this special issue to acknowledge the shifting definitions and uses of the conceptual and empirical in the field of Science and Technology Studies (STS), and to explore the constructive potential of this condition. In this introductory essay we point to four formulations in STS for the relation between the conceptual and the empirical which do not figure them as binaries or opposites: (1) the empirical as a path to the conceptual, (2) the conceptual as practical and empirical, (3) the empirical as an instantiation of the conceptual (and the dangers of that view), and (4) a conceptual minimalism. We then point to some inspirations in contemporary thought for engaging creatively with the conceptual and empirical, and conclude by summarizing the contributions to this issue.

## Keywords

conceptual, empirical, theory, method, STS

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## Introduction

The conceptual and the empirical are two sought-after virtues of contemporary Science and Technology Studies (STS). On one hand, we aim to develop insights that contribute in novel ways to our understanding of the thorniest issues confronting today's theory: epistemology, ontology, agency, technopolitics, sociotechnical order, objectivity, or the nature of expertise. But we also consider ourselves to be grounded, detail-oriented, historically minded scholars who examine the content *and* context of science and technology, the practices of research and design, and the lived experience of technologies in use.

It is the purpose of this introductory essay, and of the special issue as a whole, to acknowledge the shifting definitions and uses of these terms in STS and to explore the constructive potential of this condition. As a starting point, we do not wish to overburden the terms conceptual and empirical. However, in broad stroke, *the conceptual* points to the ideal, the invented or the cognitive, and thus to intellectual projects ranging from grand theory building to developing sensitizing concepts in grounded theory. *The empirical*, on the other hand, denotes data, the observable, the experienced, the tangible, and in studies of science, stretches back to classic formulations of verification, falsification, or reproducibility.

However, rather than standing alone, the conceptual and the empirical are often defined in contrast to each other. This special issue explores oppositions between the conceptual and the empirical and examines the various ways STS has characterized their relationship. Each contributing author approached the topic in a distinct manner, and we found that making the conceptual–empirical an explicit matter of concern had an evocative effect, as it seemed to summon other binary pairs. In tandem with the conceptual–empirical opposition, the articles in this special issue have challenged additional oppositions, such as empirical–theoretical (Jensen), concrete–abstract (Vertesi), contingent–universal (Zhan), as well as the binaries between description–conceptualization and observer–observed (Morita), and theory as clean versus empirical as mess (Jackson and Buyuktur).

If the empirical and the conceptual are defined as an oppositional pair, then it is not surprising that as a figure it evokes, almost spontaneously, reflections about the implications of binaries more broadly (Strathern 2011). Both specific binaries and binaries as such have been rejected, criticized, and bypassed in the history of STS. But they have also been explained, even embraced, as ordering devices and methods for purification. Not to be ignored, such binaries sometimes have effects in both the settings we study

and in our own academic work. So, too, with respect to the empirical–conceptual distinction. How can we appreciate such binaries without being naive about their structuring effects in analytic work? How might we rethink and respecify a discussion of concepts and empirical matters at once?

A common accusation from without, and a preoccupation from within, is that STS leans too far to one or the other pole of the conceptual–empirical binary. Instead of attending to the conceptual and the empirical as a (political, epistemological, etc.) matter to be resolved or balanced, the purpose of this issue is to acknowledge and exploit the creative potential that can be found—sometimes in unruly tension—between these terms. In the sections that follow, we discuss four formulations of the relation between the conceptual and the empirical in STS that do not figure the two as binaries or opposites: (1) the empirical as a path to the conceptual, (2) the conceptual as practical and empirical, (3) the empirical as an instantiation of the conceptual (and the dangers of that view), and (4) a conceptual minimalism.

## The Empirical as a Path to the Conceptual

Several STS classics did not cast the empirical and conceptual as opposed tendencies in need of continuous rebalancing, but rather weaved them together in creative ways. For instance, early debates around social constructivism in science (Bloor 1976; Barnes 1981), laboratory studies (Knorr-Cetina 1981; Latour and Woolgar 1986), and feminist science studies (Haraway 1989) were in close dialogue with “grand” philosophical debates, particularly about epistemology. In the STS contributions to these discussions, constructivist arguments and an empirical ethos went hand in hand. Consider, for example, the empirical program of relativism (Collins 1981). Here, rationalist assertions about science were diffused in the face of detailed ethnographic and microsociological studies of lived activities within natural history museums, institutional halls of science, or laboratories.

The early laboratory studies were thought provoking precisely because they were both empirically rich and able to challenge important Western and modern theoretical constructions and idealizations of science, nature, and the human condition. It was by getting empirically “closer” to the lab, to instruments and to practitioners, that STS scholars were able to exhibit how nature is at once consequence of and contributor to scientific investigation, rather than a singular source of objects for research. In general, these analyses proceeded without either debunking or rejecting the importance of science or nature. Here, STS was successful in *respecifying* the most holy grails of modern society without dismissing them.

This achievement was facilitated by both conceptual and empirical vigor, not cast as oppositions, but rather as addressing intellectual problems by engaging in both activities at once. For example, one of STS's most successful export goods, the concept of the "boundary object" (Star and Griesemer 1989), was formulated through a historical account of scientific archives and classifications. Conducted in the traditions of grounded theory and symbolic interactionism, this study was empirically rich, even as it conceptually challenged (and arguably, reshaped) an early formulation of actor-network theory.

## **The Conceptual as Practical and Material**

A significant analytic thrust in STS has been to recast the conceptual as a matter of practical work and material arrangement, or, in short, just as empirical as anything else. STS has learned from ethnomethodology, anthropology, and feminist theory, among others, that concepts and processes of cognition can be investigated empirically. Studies of the performativity of conceptualizations show that the conceptual and the empirical are tightly interwoven. It is through models, machines, and even paperwork that the labors of conceptualization and representation are carried out (Bowker 1994). That theories and models may perform, sometimes even mimetically, that which they represent (MacKenzie, Muniesa, and Siu 2007) is a vibrant demonstration of the bond between the conceptual and empirical.

A concern with the empirical and the conceptual and how they interrelate is thus of broad interest to STS and can be attended to as "theoretical"—a reflexive matter to be considered in our own work; "methodological"—a challenge to the doing of research; or "empirical"—a topic of our own investigations.

## **The Empirical as an Instantiation of the Conceptual**

Several STS scholars have recently expressed a concern that the empirical is no longer a fount for the conceptual, but is at risk of getting reduced to a mere example of the conceptual (Wyatt and Balmer 2007). Of course, there is nothing inherently wrong with the application of theories or methods derived from sound analytic work in one area to help understand another. More worrisome, perhaps, is the prospect of this becoming the dominant mode of analysis in STS. STS might have fallen into the trap of repeatedly demonstrating, or reenacting, its findings through new case studies. Undoubtedly, an institutionalization of analytical frameworks has occurred;

and there are detailed case studies that choose not to engage the broader conceptual and philosophical issues that gave STS much of its initial impetus and controversial vigor.

For example, Michel Callon's (1986) famous "Some Elements of a Sociology of Translation—Domestication of the Scallops and Fishermen of St. Brieuc Bay," advocated an abstinence from blindly recycling sociological concepts and using explanations developed in one setting to explain another, a methodological principle he labeled "agnosticism of the observer." It is to some extent ironic, then, that this very text became a prototype for a plethora of other studies that have crystallized, for instance, Callon's four moments of translation from his specific empirical material, and applied them elsewhere.

The challenge is therefore to keep alive the discussions about relations between the conceptual and the empirical, which means neither engaging in "pure conceptual speculation" nor doing just "another case study" (Beaulieu, Scharnhorst, and Wouters 2007). Instead, STS needs to work simultaneously in the empirical and conceptual registers and to promote an open-ended exploration of both. We may then look to approaches that have, until recently, been less favored within STS, but which may offer promising avenues for empirical reinvigoration, such as hybrids of actor–network theory and social network analyses (Cambrosio, Keating, and Mogoutov 2004), comparative studies (Ribes and Finholt 2009; Gad and Jensen Forthcoming), or distributed ethnographies (Beaulieu 2010; Geiger and Ribes 2011; Jensen and Winthereik 2013).

## Conceptual Minimalism

There is within STS an enduring, perhaps even mounting, inclination to be suspicious of any form of the conceptual that appears too detached from the empirical. It is not uncommon to hear at European Association for the Study of Science and Technology (EASST) and Society for Social Studies of Science (4S) conferences, even after the most eloquent of presentations, the question "yes, but what is specific about what you are studying?" This question is not usually meant to be innocent, it is often meant to "cut down" the extravagantly conceptual to fit the size of the empirical. It often implies that too much has been glossed over, that a particular scientific field or technique has been excessively generalized as, for instance, "science" or "technology."

This insistence on the specific is central to some of the dominant theoretical traditions at the heart of STS. For example, we might refer to

ethnomethodology's insistence on the inspection of concrete circumstances, grounded theory's emphasis on theory generation from empirical material, or actor-network theory's principle of irreducibility (Latour 1988).

However strong our commitment to empirical work and the specificity of case studies, STS also needs space for conceptual experiments because playing with concepts has the potential to open up new horizons in unpredictable ways. Thus, we offer no judgment on whether a specific tradition or specific kinds of studies are inherently inclined to be overoccupied with either the conceptual or empirical. Instead, this special issue simply aims to open discussion about *how* both can be done inventively and to mutual benefit.

## The Special Issue

In this special issue, we explore the role of the conceptual and the empirical in STS, not only to balance a tension but also to understand the roles taken by each in various investigations. We were inspired to do so by the recent "turn to ontology" (Woolgar and Lezaun 2013), the advent of "empirical philosophy" (Mol 2002; Thompson 2005), and the ubiquity of "performativity" (MacKenzie, Muniesa, and Siu 2007; Callon 2010). At the intersection of STS and anthropology, there are other examples of how the relationship between the empirical and the conceptual can be reshuffled in many original and interesting ways (Riles 2000; Maurer 2005; Helmreich 2011). Each of the articles in this special issue contributes to that project.

Casper Bruun Jensen unravels the empirical and conceptual from their conservational form and argues for an acknowledgment that they exist in "continuous variation." Discussing the history of packages of the conceptual and the empirical in STS, he suggests that STS has entered a phase of Kuhnian "normal science." Consequently, he offers a series of arguments through which he intends to relieve us from the current "burden" of thinking representationally about concepts, realistically about the empirical, and dualistically about the relation between them. Atsuro Morita shows us how, when we are relieved from this "burden," we are able to locate specific versions of the empirical and conceptual in surprising places. Studying Thai engineers tinkering with imported Japanese harvest machines, he shows that comparisons between Japan and Thai (agri-)culture can be located within the machine itself. Drawing on anthropologist Marilyn Strathern, Morita discusses what it means to think of the empirical and conceptual as mutual contexts for one another and what it might mean to imagine ethnography as another kind of machine.

Mei Zhan also draws on Strathern (2011) to suggest that binaries, such as the empirical versus the conceptual, create points of bifurcation, moments where “the analysis could go down different routes.” Dealing with the conceptual and empirical raises questions about how to relate to reoccurring instances of the very binary figures that we might think we had left behind. Zhan shows how Chinese medicine, STS, and anthropology might learn from each other by juxtaposing their distinctive versions of the conceptual and the empirical. Janet Vertesi draws our attention to the conceptual and empirical challenges STS researchers face when studying high-tech scientific research projects. Today, scientific work is distributed across several divergent and more or less virtual sites, enabled by a range of different communication technologies. Here, it is particularly impossible to simply “follow the actors” in order to study science and technology, as they “seamfully” integrate heterogeneous infrastructures. As STS are digitalized and materialized, STS is confronted with nontrivial conceptual, empirical, and methodological challenges. Similarly, Steven Jackson and Ayse Buyuktur discusses how to handle both empirically and conceptually the complexity of studying “big science.” This includes how to conceptualize the failure of a large-scale scientific research project, as the reasons for such failure are not empirically self-evident and cannot be mapped easily onto a single rational explanatory model.

Together, these contributions give us a taste of what it might mean to pay explicit and simultaneous attention to the empirical and conceptual when doing STS research. We hope the issue will inspire others to invent creative ways of attending to both and keeping alive the experimental spirit of STS scholarship.

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