

Design Worlds and Science and Technology Studies

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Abstract: Design is a notoriously ambiguous word in English. Similarly, it is also an ambiguous research field for Science and Technology Studies (STS). Introducing the special section *A Matter of Design*, the paper discusses the place of design in the overall context of Science and Technology Studies, with an emphasis on relevancies and difficulties in making two different epistemic cultures meet.

Keywords: Design; epistemic cultures; cross-fertilization; objects; artefacts; technoscience.

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I. Designed Objects and Designing Subjects

Design is a notoriously ambiguous word in English. Similarly, it is also an ambiguous research field for Science and Technology Studies (STS). Despite its high relevance, it has only been partially investigated.

In a sense, design has always been a pivotal issue for STS. In fact, STS arose when science scholars realised that no satisfying comprehension of technoscientific processes can be achieved without considering nonhuman actors, artefacts included. A rich STS contribution to the growing field of studies about objects (Shove *et al.* 2007) originated from that turn and has continued ever since. It has included the consideration of the role nonhumans play, for instance, in maintaining a stable collective existence (Latour 1992), in moving power and knowledge (Law 1986), in defining the epistemological framework of a scientific effort (Knorr Cetina 1999), and even in configuring the human-machine interface (Suchman 2007). Objects entail artefacts, namely things that have been designed. They have not necessarily been designed by an acknowledged professional de-

signer or through a conscious and institutionalised process of design. Most of them are the result of anonymous design (Bassi 2007), folk tinkering (Archipov 2006), or 'design by society' (Woodhouse and Patton 2004). Nevertheless, they are the outcome of a design process; they bear a script (Akrich 1992) that is a consequence of their origin from a social world; they are 'designed design'. In this framework, designed objects commonly appear in the descriptions provided by studies in design and technology.

On the other hand, design as a social setting, what we could call the 'designing design' (product design, architectural design, etc.) has rarely been researched through an STS approach. With some eminent exceptions, mainly originating in the sociology of culture (see for instance Molotch 2003; Vinck 2003; Storni 2012), the social worlds of design have not been subjected to a thorough inquiry. Although they are complex social settings involving a broad collection of people far removed from the drawing board (Woodhouse and Patton 2004) and they appear to be places where the interaction between humans and nonhumans strongly comes to light (Parolin and Mattozzi 2013), they do not seem to have attracted the same widespread STS interest as highly technological settings like, for instance, health care or energy production and distribution.

In a very general way, this could depend on a double mental bias. On one side, the concept of technoscience, which has been introduced in the STS debate to underline that 'science and technology' does not coincide with science and technology alone, is often used just as a visual expression of how strongly technology is bound with science (alone). Bruno Latour originally adopted this term (coined by Gaston Bachelard) to summarize "all the elements tied to the scientific contents no matter how dirty, unexpected or foreign they seem" (Latour 1987: 174), i.e. to underline that there is no scientific enterprise without the participation of technological devices, inscription devices, ordinary objects, professionals, laymen, political institutions, organizations, animals, and other contributors. That is to say that science and technology are always associated with non-scientific and non-technological actors, if they are to occur. Nevertheless, (see for instance Hackett *et al.* 2008) the same term has often been used afterwards just to implicitly point out that new scientific knowledge is produced through technological enterprise, underlining a growing trend of innovation processes (Etzkowitz 1990). This use of the term involves the idea that there is no science without technology, and that technology, conversely, is tightly bound to science. I suspect that this apparently tight relationship with science, which is closely reminiscent of the economic concept of R&D (research and development), alienates the designers' interest for a genuine STS analysis of technology.

On the design side, a similar but reverse bias is the effect of the half-hidden opposition between design and technology. It becomes visible in academic settings through the antagonism between design and engineering, which are conceived as two different cultures, and in economic set-

tings through the contrast between the designers' creativity and the engineers' and managers' technological innovation (Gold 2007). Such everyday life frameworks induce an attitude in the field of design to legitimize the profession by means of juxtaposition to sheer technology (like, for instance, in Brown 2009 and in Verganti 2009). In this respect, long-time opposition between the fields of design studies and technology history has been part of the culture (Katz 1997). Such opposition is related, I suppose, to the conventional association of several design fields (like product design, architecture, urban design), in some cultures, with the fine arts rather than with science and technology (Moore and Karvonen 2008).

As a consequence of these biases and for many other reasons as well, technology studies and design studies have often looked in opposite directions. Although objects are pivotal ingredients in technoscientific processes according to STS, a deep and wide consideration of the design processes that underlie the emergence, the form-and-function, the biography of artefacts is often missing in the studies of science and technology. The very concept of design finds inadequate consideration in the reconstruction of the networks, alliances, and controversies in which those artefacts are involved. Equally, although technology is a key ingredient of design (product design, service design, communication design, etc.), social studies of technology are not housed within design research, not even in the frame where they should appear, what Frayling (1993) calls 'research for design'.

To integrate what I have said above, the cautious emergence of a new interest for STS theory in the field of design studies must be emphasized. It came to light principally in the decisions of some key institutions of the field in the last decades. In Summer 2004, *Design Issues* published a special issue titled 'Science + technology studies', edited by the Department of Science and Technology Studies at Rensselaer Polytechnic Institute. In September 2008, the Design History Society invited Bruno Latour to give the keynote lecture at the conference *Networks of Design* (Latour 2009). In 2014, the journal *CoDesign* released a call for papers about 'Intersections of Co-Design and Actor-Network Theory'.

In this general framework, STS Italia, the Italian Society of Science and Technology Studies, decided to dedicate to design its fifth conference, titled *A Matter of Design: Making Society through Science and Technology* (Politecnico of Milan, 12-14 June 2014). *Tecnoscienza* has the privilege now to publish the keynote speeches of that conference¹. The talks have been revised or redrafted for the written medium by the authors.

¹ A wider selection of papers presented during the conference is contained in the book *A Matter of Design. Proceedings from the V STS Italia Conference*, edited by C. Coletta, S. Colombo, P. Magaudda, A. Mattozzi, L.L. Parolin and L. Rampino, Milano, STS Italia Publishing, 2014. The book is an open access publication and it can be downloaded from www.stsitalia.org.

The videos of the live speeches are available on the association's website (www.stsitalia.org).

To tackle the issue of design in a conference does not just mean to discuss design among STS scholars; this is even more germane if the conference is held at a School of Design, as happened in Milan. It means rather experimenting with creating a convergence between two very disparate and distant disciplinary groups. Not an easy job. From this point of view, the STS Italia conference and the present special issue of *Tecnoscienza* represent a new setting with respect to customary situations where one community deals with the other or gently hosts it at some event.

Actually, meeting other communities and taking advantage of their perspectives is a fundamental characteristic of the STS approach, especially of actor–network theory. Accordingly, the self-awareness of designers about their own work, their practices, and their attitudes is pivotal to reconstruct a reliable view of their worlds and networks. Paraphrasing Latour (2005: 97), we have to study the design worlds *up* instead of studying them *down*.

But such encounter of communities is not that easy, especially when real people have to meet in real places carrying out real practices, as happens at a conference. As a matter of fact, in organizing the conference in Milan, we soon had to tackle the problem of mediating between two different epistemic cultures (Knorr Cetina 1999). An epistemic culture is not a collection of thoughts or theories on how to produce knowledge, rather it is a set of practices, a series of action chains, a network of players, and a sequence of situations. These situations convey the actions, thoughts, and knowledge claims made by those social players toward a certain idea of how things are to be done, of what makes for good research, what makes for good design, what makes for a good paper, and what makes for a good conference. Karin Knorr Cetina (1999: 3) described these epistemic cultures as machineries, specifically as knowledge machineries composed of practices. She stressed that epistemic subjects, i.e. knowledge producers, are essentially mere derivatives of these machineries. So, there is an epistemic culture of STS and there is an epistemic culture of design, and the task of enabling them to meet and communicate appears to be much harder and more important than those of studying design worlds *outside down* or absorbing STS theories into design theory. It is about a task and an opportunity for cross-fertilization between worlds that are not well mutually acquainted, except for some rather marginal fringes. As Michèle Lamont (2009) quite ably showed in her discussion of the American academic evaluation system, it is when academics find themselves having to draw equivalences between their standards for how things are to be done – in highly interdisciplinary contexts, for instance – that situations arise that provide the greatest cognitive yield and intellectual satisfaction.

2. On This Special Section

The articles collected in this special issue do not presume to outline an overview of the STS interest for design, nor to document the designers' interest for studies of science and technology. They rather tackle in different ways some issues that are topical discussions in this field. In this way they advance into the above cross-fertilization. I will try now to highlight the dynamic background of each contribution.

A recent and very lively debate concerns the issue of design ethics. This is an increasingly discussed issue in design studies in the 21st century, although an ethical problem is implicit in the very origin of design itself. As a matter of fact, design grew out of the industrial revolution and the rise of a capitalistic system of production. However, only in recent times have the designers started systematically questioning their relationship with industry's needs and developing new attitudes under the concepts of user-centred design (Norman 2013 [1988]) and lately, human-centred design (Cooley 2000; Norman 2005; IDEO 2011). Designing, they mean, is not engaging with objects but with human lives. It is as a consequence of this focus on the human being that the issue of design ethics has come to the fore. In this context, STS has offered a useful conceptual framework for design scholars. In a way, in fact, STS has historically provided some basic elements for a moral examination of technology itself. Focussing on controversies, and therefore criticizing technological determinism, STS could bring to light the multiplicity of subjects that are engaged in innovation processes; consequently, it could highlight that technoscientific processes have wide social and political implications, and basically generate new awareness for issues like risk, user–technology relationship, and public participation in technology policy decisions. For this reason, design studies often draw on STS reasoning to discuss the fundamentals of design ethics (see Verbeek 2006; Shilton 2012; Steen 2014).

From the point of view of design history, this growing interest for ethical issues is echoed with new excitement for sustainable design history. This is the matter tackled by Kjetil Fallan in his article *Our Common Future*. He focuses on the interdisciplinary common ground between design history, design studies, history of technology, and science and technology studies. Pivotal for the inception of a history of sustainable design are the changes that have taken place in recent years in the environmentalist culture. As long as environmental awareness had privileged issues related to the protection of wild nature, no room for an appropriate consideration of design was available. Indeed, to design is equivalent to modifying the environment, altering nature. However, the sustainability turn produced a change of perspective and paved the way to historical studies of sustainability in design discourse that in turn require engaging with studies of science and technology. It does not matter, according to Fallan, that historians are interested in settled traces from the past, whereas STS scholars

in practices and networks-in-action. The artefact is an object of research to which both historians and ethnographers can meet and relate.

In the article *On "The Design of Everyday Life"*, Elizabeth Shove also deals with the interdisciplinary common ground among STS, design studies, and other fields of interest. Particularly, she draws insight from the sociology of consumption, theories of material culture, and her own concept of social practice (Shove, Pantzar and Watson 2012). Putting forward some practical examples, like varnishing or digital photography, she draws attention to the competences that they require and discusses where such competences are located. This opens a critical view upon some traditional ideas in design theory and STS as well. Her main target is the concept of 'the user', that is still predominant in design studies, notwithstanding the impetuous development of design forms in the last decades. Actually, this is an opinion that can be shared since even in the concept of participatory design is still implied the idea that two subjects, a professional designer and a user, collaborate in producing a designed result. Participatory design implies the idea that competence lies in the person, even if the person does not necessarily coincide with the designer. STS has shown instead that competence is a quality that emerges from hybrid situations, not being part of the object or the user. It descends from contingent connections of 'objects' and 'users' (and 'designers'), all of them contributing to the production of a meaning.

However, Shove suggests focusing not on the hybrids but on the practices embedded in the artefact and embodied in people. Practices are not something that can be decided at any one moment. Many times we are carriers of practices rather than real actors. Practices set constraints to our behaviour. The relationship between designers and clients is mediated not by the artefact but by the practice. Practices, though, are not steady. People are not just carriers of practices, they are also performing them and through such performances changing them at any moment. This draws attention to the role of design as an intervention in practice rather than upon an artefact. I think that this approach could help design in conceptualising the idea of a design-driven innovation (Utterback *et al.* 2006; Verganti 2009). What representatives from the influential design consulting firm IDEO usually repeat in their discourse — namely that after the transition from designing products to designing services, a further transition to designing entire customer experiences with products and services must follow — could find a sound theoretical basis here.

The last contribution, Charis Thompson's article titled *Designing for the Life Sciences*, deals with the buildings where science is carried out. Consideration for the physical places where science-in-action happens is at the very origin of STS (Latour and Woolgar 1986 [1979]; Knorr-Cetina 1981); and architecture has been a special issue in STS for a long time (Brain 1993; Aibar and Bijker 1997; Galison and Thompson 1999; Hommels 2005; Yaneva 2005 and 2012). Nevertheless, science buildings as 'physicalized architecture of knowledge' (Galison 1997: 785) remain to be

studied in detail. The fundamental laboratory studies do not thoroughly consider the lab's architecture while describing the contextual location of scientific action. They instead focus on social contingencies and on material culture. However, a relationship between the building design and a certain idea of science will not be surprising. It could be expected, for instance, that some typical features of physics laboratory buildings, where theorists are usually accommodated on the upper floor (Palmer and Rice 1961), are connected to a recurring social stratification structure in the related community where theorists are considered a sort of physicists' 'upper class' (Volonté 2003). Evidence should be collected about how design processes, as well as science practices, reflect interests, values, and expectations of implicated social groups and stakeholders.

In this context, Thompson discusses how very recent buildings for the elite life sciences reflect shared ideas about science at the beginning of the 21st century. The analysed buildings materialize the transition from an old idea of science as a detached sphere ruled by its own ethic and own imperatives to a new vision where science is deeply involved in social life and widely open to social issues. This occurs for the increasing importance that entrepreneurial science (Etzkowitz and Webster 1998) plays with respect to 'big science' (Price 1963) as well as for the growing commitment of nonexperts in decisions that regard fostering research and assessing its outcomes (Bucchi and Neresini 2008). Reading elite life science real estate, concludes Thompson, is a conceptual tool to follow the evolving epistemology of science, the changes in science policy, and the development of the public understanding of science.

As a whole, this special issue does not aim to only reinforce a particular research area in science and technology studies. Nor does it simply want to bridge the gap between two epistemic cultures and provoke cross-fertilization. It strives to strengthen an 'open' approach to STS. Despite its name, science and technology studies is not characterized by its subjects, science and technology. Quite the opposite. What distinguishes STS is its specific *approach* to the sociotechnical world; that is to say, the idea that human actors and technological structures, nonhuman objects, and political institutions contribute in an intimately connected fashion to building the world we live in. Such an approach is promising when applied to several different subjects. Making it available to multiple communities and spreading it wider is the main task for an STS community. Accordingly, it can be said that this special issue is ultimately aimed at fighting the corruption of STS by the deleterious hyperspecialization typical of mainstream science.

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