

TIK PhD course 2005
Science and technology studies (STS)
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Introduction

In this paper, I will discuss why I am interested in STS and my reflections on how STS may be relevant to my research project. First of all, I will briefly present the project I am working on and why I am interested in STS as a possible approach.

Topic and statement of the problem

“Comparing digital documents at the National Libraries of Norway and China: policies, forms and development.” (working title)

The problem/challenge

Library has a long history in society. It is often regarded as one of the major social and cultural institutions of society. Its main function is to process, control, promote or exclude information by means of acquisition, cataloguing and access management. Together with other institutions such as schools, archives and museums, library plays a significant role in preserving, maintaining and developing the cultural heritage of a society. Of all libraries, the National Library in particular has the mandate of maintaining and preserving the national cultural heritage.

With the explosion of technology and the arrival of the digital era, libraries all over the world are challenged to cope with the rapid change and development of documents. I am interested in exploring how libraries deal with digital documents from a cross-cultural perspective. Since it is not possible to study all libraries, I intend to use a case study approach and to focus on the national library as an example of the library.¹ The challenge becomes how the national library faces the challenges of digitalization. Undoubtedly, all national libraries are using certain strategies to encounter this situation. What I am interested is not only what they are doing in terms

¹ The national library is selected as the focus mainly because of its distinct position in preserving a nation's heritage.

of digitalization, but how do cultural elements determine their strategies in digitalization. *Does technology standardize cultures and make them homogenous?*

The major reasons of choosing Norway and China is because of their explicit and fundamental differences: a western liberal democratic society and a Chinese communist non-democratic society. They are countries of great contrasts in terms of size, population, language systems, cultural roots, customs and traditions. It will be intriguing to identify the similarities underneath the apparent differences.

In terms of technology, these two countries can be said to be in different phases of technological development: a developed country (Norway) vs. a developing country (China). Are there technological differences because they are not in the same technological phase?² If technological developments are seen as a global issue, may be there are no major differences? May be both Norway and China are borrowing or transferring similar kind of technological solutions from the U.S.A. or Germany to deal with their challenges? If so, is it possible to identify significant differences even though both countries claim to use similar kind of technology? What are these differences? What are the factors that contribute to these differences?

Most of the research that I have come across in this area focus on the actual tasks and strategies that different national libraries employ with very little reflection on what kind of factors inform their decisions. If there are reflections, these are usually put forward as technical and pragmatic considerations such as in the case of selecting storage media and formats.

I have great doubts that digitalization in libraries is simply a technical issue. Rather, any technological changes in a social institution will involve social factors. The relationship between technology and social is complex and it is almost impossible to separate the social and the technological. This argument brings me to investigate what are the available approaches in studying the relationship between technology and sociology.

² I am assuming there is technological differences between a “developed” country and a “developing” country.

Technology determinism vs. Science and Technology Studies (STS).

From the very start, technology studies were very much approached as impact discourses and often with a determinist vein. One analysed social changes as an outcome of technical change in general and macro terms, usually based on a structuralist nature. For example, in Marxism, technology is understood as a force of production, which in the long run would undermine capitalism. Thus, the development of technology is seen as progressive. Even though machinery may be seen as a potential tool for the bourgeoisie to exploit the working class. This is regarded as a short-term evil that could be tolerated for the long-term gains.

However, there is also an obvious ambivalence and even pessimism among social theorists and philosophers³. Modern technology is often seen as a dangerous force, ready to undermine human society. For example, Habermas's view of a system world invading the life-world suggests that technology is a force out of control. Like the mighty robot or the almost omnipotent computer, technology is seen as a human creation that comes to haunt its creator. Human beings become the victims of the designs of the few. Such a view provides little room for human action except in terms of large collective social movement so as to turn the tide.

Science and technology studies (STS) seem to provide an alternative. By focussing on detailed studies of invention and innovation and working with actor-network theory and material semiotics, it opens up new possibilities of analysis. These analysis appear to be a more sensitive attempt to describe and understand the contradictions, complexities and contingencies of technological development. Instead of technological determinism which tends to become reductionist, STS claim to improve the understanding of the manifold roles that technology occupies in most societies.

The reductionist versions tell that either machines or human relations are determinate in the last instance: that one drives the other. However, though these reductionisms are different, they have two things in common. First, they divide the human and the technical into two separate heaps. And second, they assume that one drives the other. Actor-network theory does not accept this reductionism.⁴

³ The Frankfurt school, Gehlen, Mumford or Ellul are some examples.

⁴ Law, John (1992) "Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity." p.3 (On-line Papers, Centre for Science Studies, Lancaster University) (<http://www.comp.lancs.ac.uk/sociology/papers/Law-Notes-on-ANT.pdf>).

Since I am aware of the complexities of technology in society, I am therefore quite dissatisfied with most of the technological determinist approach to technology. STS seems to be an interesting option.

Thomas Kuhn and his legacy.

Thomas Kuhn began his enquiry with the question: “Perhaps science does not develop by the accumulation of individual discoveries and inventions”.⁵ He argues that there are two types of science: the normal and the revolutionary. Normal science is the activity that most scientists are involved in most of their time. The assumption behind normal science is that there is an objective world out there and the science community knows what the world is like. Often, the science community has to defend their positions and suppress fundamental novelties that do not fit into existing consensus. The reason the science community manage to hold up their stand is because “their research is based on shared paradigms” that “are committed to the same rules and standards for scientific practice”.⁶ This commitment and the consensus establish a research tradition. Those who are recruited into the tradition have gone through the process of intensive training and apprenticeship so that they also uphold the required rules and standards of that tradition. To him, normal science is like puzzle solving. He said,

One of the reasons why normal science seems to progress so rapidly is that its practitioners concentrate on problems that only their own lack of ingenuity should keep them from solving.⁷

In this way, problems that are outside the puzzle are being rejected and treated as non-scientific and not their concern. However, when there is a crisis, the scientists have to admit that existing theories cannot solve the problem. They then began to generate speculative theories and if successful, these theories will lead the way to a new paradigm. He comments that the man who embraces a new paradigm at an early stage is a man of faith because he has to believe that this new paradigm will succeed with the many problems confronting it.⁸

⁵ Kuhn, Thomas (1962/70) “The Structure of Scientific Revolutions.” in *International Encyclopedia of Unified Science* (2nd. ed.) vol.2, no.2, p.2. (Chicago: The University of Chicago).

⁶ Kuhn, Thomas, *op.cit.*, p.11.

⁷ Kuhn, Thomas, *op.cit.*, p.37.

⁸ Kuhn, Thomas, *op.cit.*, p.90.

In his concluding chapter, he questions if the objective truth is out there and argues for an alternative way of thinking about science and progress.

We are all deeply accustomed to seeing science as the one enterprise that draws constantly nearer to some goal set by nature in advance. But need there be any such goal? Can we not account for both science's existence and its success in terms of evaluation from the community's state of knowledge at any given time? Does it really help to imagine that there is some one full, objective, true account of nature and that the proper measure of scientific achievement is the extent to which it brings us closer to that ultimate goal? If we can learn to substitute evolution-from-what-we-do-know for evolution-toward-what-we-wish-to-know", a number of vexing problems may vanish in the process.⁹

By arguing that science can be seen as paradigms and questioning the notion of 'one full, objective, true account of nature' and that science is the way to bring us towards this truth, Kuhn opens up the possibility of seeing science as human practices and social construction.

If science is a human construction, there is no reason why it cannot be studied by sociologists. David Bloor in "The Strong Programme in the Sociology of Knowledge" argues that the sociology of knowledge should treat science as any other knowledge and investigate its content and nature.¹⁰ He argues that sociologists should not limit themselves in studying only the institutional framework and external factors regarding scientific growth and proposes a strong programme basing on four tenets.¹¹

These are:

1. Causality – concern about the conditions that bring about beliefs or states of knowledge.
2. Impartiality – both sides of dichotomies such as truth and falsity, rationality and irrationality should be examined.
3. Symmetrically – in its style of explanation.
4. Reflexivity – The pattern of explanation should also apply to sociology itself.

Bloor claims that with these four tenets in mind, sociologists will be able to study the scientific knowledge as part of the programme of the sociology of knowledge. "What is at stake is whether the strong programme can be pursued in a consistent and plausible way".¹² He therefore proceed to discuss how the strong programme can stand up to criticisms.

⁹ Kuhn, Thomas, *op.cit.*, p.171.

¹⁰ Bloor, David (1976) "Chap.1: The Strong Programme in the Sociology of Knowledge" in *Knowledge and Social Imaginery*. pp.1-19. (Routledge)

¹¹ Bloor, David, *op.cit.*, p.4-5.

¹² Bloor, David, *op.cit.*, p.5.

Barnes has also argued that there is a great need for a symmetrical approach to the analysis of beliefs. Scientific success should also be examined by sociological analysis just like the other kinds of knowledge.¹³

Many discussions have been around the “social” and “technical” factors informing scientific activities.¹⁴ Despite the general agreement that “technical and social issues are intimately linked”, questions are raised on the issue of balance between these two sides of the dichotomy.¹⁵ Bruno Latour and Steve Woolgar however argue that since the distinction between “social” and “technical” factors is drawn from the daily routines of scientists, sociologists should be very aware of using such concepts. Rather, they used an anthropological approach to study what was actually happening in a laboratory.

Bruno Latour, Steve Woolgar and *Laboratory Life*

From 1975 to 1977, Latour stationed at Professor Guillemin’s laboratory for a two-year study of the Salk Institute. As he mentioned in the Postscript to the second edition of *Laboratory Life*, his knowledge of science was non-existent at that time and he was not even aware of the existence of the social studies of science.¹⁶ His study focuses on two central questions:

How are facts constructed in a laboratory, and how can a sociologist account for this construction? What, if any, are the differences between the construction of facts and the construction of accounts?¹⁷

He plays the role of a participant observer, between the two extremes of a total newcomer and that of a complete participant. He has enough knowledge to understand the general purposes of scientific devices and arrangements but he does not have the subject knowledge to understand the terminologies used at the laboratory. Even though he was allowed to read the publications produced by the laboratory, he could not comprehend. The participants of the laboratory however claimed that the production of papers was the objective of their operations and

¹³ Barnes, Barry (1977) “Chap. 1: The problem of knowledge” in *Interests and the Growth of Knowledge*. pp.1-26 (Routledge)

¹⁴ For examples, Whitley, 1972; Mullins, 1972; Law, 1973; Mulkay, 1974.

¹⁵ Mulkay, M.J. (1974) “Conceptual displacement and migration in science: a prefatory paper” in *Social Studies of Science*, vol.4, p.114.

¹⁶ Latour, Bruno & Woolgar, Steve (1986) *Laboratory Life: The Construction of Scientific Facts*. (2nd ed.) p.273. (Princeton: Princeton University Press)

¹⁷ Latour, Bruno & Woolgar, Steve, *op.cit.*, p.40.

activities. After a period of time, the observer found a way to understand the existence of a laboratory – by means of literary inscription. He came to the conclusion that the scientists who claimed that they were discovering facts, were actually in the process of persuasion – convincing others and being convinced. So scientific facts are actually constructions, and by means of rhetorical persuasion, participants are convinced that the facts are not constructed. It is credibility that makes possible “the operation of black-boxing”.¹⁸ To conclude,

Scientific activity is not “about nature,” it is a fierce fight to *construct* reality. The laboratory is the workplace and the set of productive forces, which makes construction possible. Every time a statement stabilises, it is reintroduced into the laboratory (in the guise of a machine, inscription device, skill, routine, prejudice, deduction, programme, and so on), and it is used to increase the difference between statements.¹⁹

Latour and Woolgar further argue that their account of the laboratory is “no more than *fiction*”. It is “*neither superior nor inferior*” to those produced by the scientists themselves.²⁰ The crucial difference is that the scientists have a laboratory but Latour and Woolgar have only a text. In the postscript, they pointed out the value and status of any text depends not on its inherent qualities but rather on the others, because it is the readers who transform the text, incorporate it into their arguments, and make it more or less valid. The advantages of a laboratory is that they perform better because of the present unbalance of power. Latour and Woolgar present a final challenge,

How much further research, investment, redefinition of the field, and transformation of what counts as an acceptable argument are necessary to make this account more plausible than its alternatives?²¹

So the issue is political and Culture and not facts or Nature as the scientists claim.

Actor-Network Theory

If scientific knowledge is constructed and a matter of politics, then it is possible to study it with new perspectives. Actor-Network theory emerged as a new sociology of technology. “This theory – also known as the sociology of translation – is concerned with the mechanics of power”.²² It brings materiality into knowledge and claims that knowledge is a material embodied in diverse forms such as computers, apparatus,

¹⁸ Latour, Bruno & Woolgar, Steve, p.242.

¹⁹ Latour, Bruno & Woolgar, Steve, p.243.

²⁰ Latour, Bruno & Woolgar, Steve, p.257.

²¹ Latour, Bruno & Woolgar, Steve, p.258, 285.

²² Law, John (1992) “Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity.” p.1 (On-line Papers, Centre for Science Studies, Lancaster University)

skilled hands and so on. In addition, the ordering and patterns of these heterogeneous materials should also be studied. In other words, not only people form networks, but also all the other heterogeneous materials including non-humans should be part of the social networks.²³

Actor-Network theorists refuse to accept reductionism – the versions that separate the humans and the technical into two distinct categories and assume that one drives the other.²⁴ They argue that the relationship is a complex one. Callon, for example, emphasizes that even the elements bound together in networks are, at the same time, constituted and shaped in those networks.²⁵ This implies complex chains of actions and interactions, shaping and reshaping among elements.

Technologies, as Latour claims, do not have a momentum of their own that allow them to pass through a neutral social medium.²⁶ Rather, technologies are shaped and reshaped and technological changes are therefore contingent, evolving and emergent. He used the example of the door to illustrate how the non-human element is part of the network.²⁷

Actor-Network theory is essentially a relational and process-oriented sociology that examines the interactive effects among human and non-human agents. The objective is to explore how a pattern, an organization or an order is generated. It is known as the sociology of translation because

“translation” is a verb which implies transformation and the possibility of equivalence, the possibility that one thing (for example an actor) may stand for another (for instance a network).²⁸

The emphasis is on the relational effects and the mapping of the conditions and materials that generate these effects.

²³ Law, John, *op.cit.*, p.3

²⁴ For examples, Law, J. 1992; Callon, M. 1980; Latour, B. 1987.

²⁵ Callon, Michel (1980) “Struggles and Negotiations to Define What is Problematic and What is Not: the Sociologic of Translation” in *The Social Process of Scientific Investigation*, vol.4, pp.197-219.

²⁶ Latour, Bruno (1987) *Science in Action. How to follow scientists and engineers through society*. (Milton Keynes: Open University Press; and Cambridge, Mass.: Harvard University Press)

²⁷ Latour, Bruno (1992) “Where are the Missing Masses? The Sociology of a Few Mundane Artifacts” in Law, J. & Bijker, W. (eds.) *Shaping Technology/Building Society* p.227-231 (MIT Press).

²⁸ Law, John (1992) “Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity.” p.6 (On-line Papers, Centre for Science Studies, Lancaster University)

Translation, as Michel Callon, sees it, emphasizes on the displacements and transformations. To translate is to express in one's own language what others say and Callon argues that to translate is "to establish oneself as a spokesman".²⁹ In his article about the domestication of the scallops and the fishermen of Saint Brieuc Bay, he argues that the three researchers became the spokesmen of the scallops, the fishermen and the scientific community. At the beginning, there were no communication among these three groups. But by means of translation implying negotiations, transformations and adjustments, these groups were linked together and unified with one voice. Translation is first a process and also a power struggle. In this process, a few, namely the three researchers/scientists, claim the right to speak and to represent the majority, usually the silent actors, such as the scallops and the fishermen.

Feminist Material Semiotics

In response to Latour, Woolgar and the other science-studies scholar, Donna Haraway argues that it is not enough to be reflexive or "to follow the action in science-in-the-making".³⁰ She argues the necessity to bring semiotics, visual culture, feminist, postcolonial, and multicultural theories into the study of science and technology. To her, what is most important is to take responsibility and to make the world better. This can only be done by getting involved. "To do that, one must be in the action, be finite and dirty, not transcendent and clean".³¹ What feminists and scholars should do is to provide a richer description of the world and to address the inequalities and power struggles of visible 'bodies'. The 'body' is always an agent, an actor and not a resource, a background.³²

According to Haraway, knowledge is always situated. There is no objective knowledge out there. Anyone who claims so is only playing the "god-trick of seeing

²⁹ Callon, Michel (1999) "Chap.5: Some Elements of a Sociology of Translation. Domestication of the Scallops and the Fishermen of Saint Brieuc Bay" in Biagioli, M. (ed.) *The Science Studies Reader* pp.67-83. (Routledge)

³⁰ Haraway, Donna (1996) "Modest Witness: Feminist Diffractions in Social Studies" in Galison, P. & Stump, D. (eds.) *The Disunity of Science, Boundaries, Contexts, and Power* pp.428-441 (Stanford: Stanford University Press) p.436.

³¹ Haraway, Donna, *op.cit.*, p.439.

³² Haraway, Donna (1991) "Chapter 9: Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective" in *Simians, Cyborgs, and Women: the Reinvention of Nature*. pp.181-201 (Routledge)

everything from nowhere”.³³ This view of infinite vision is only a deception and an illusion. She attacks relativism and argues that relativism and totalization are ‘god-tricks’ that block the vision because they claim to see equally from everywhere and nowhere. She argues that it is by ‘splitting’ that the knowing self can be accountable. Splitting enables feminist to embrace the multiplicity and partiality of knowledge. By using the image of a cyborg, “a hybrid of machine and organism, a creature of social reality as well as a creature of fiction”,³⁴ Haraway proposes a way of breaking the boundaries of everyday life and the Western cultural narratives of white male dominations. The cyborg imagery opens a possibility of acknowledging the tensions and misfits in reality and also embracing the reconstruction of boundaries in daily life and networking.

Postcolonial STS

Helen Verran by reflecting on her experiences as a lecturer in a Nigerian university in the early 1980s, points to the Actor-Network theory as an alternative to the study of postcolonial technoscience. In her article about the Nigerian classrooms, she provided “three accounts of quantifying: a universalist account; a relativist account; and finally an account of quantifying as realized through embodied routines and repetitions”.³⁵ The last can be seen as an Actor-Network version. She argues that the problem with the universalist and relativist accounts is that they do not provide answers to the question of how to live.

By describing how Mr. Ojo, one of the students at the Institute of Education, teach the children about ‘Length of Our Bodies’, she argues that this story provides an answer to the how-we-should-live question.

In this version Mr Ojo and his fellow students heroically resist Western incursion and teach a Yoruba version of quantification in the school curriculum. Using Yoruba language, they resist and challenge the òyinbó (white) lecturer replacing her prescriptions with indigenous measurement.³⁶

³³ Haraway, Donna, *op.cit.*, p.187.

³⁴ Haraway, Donna (1991) “Chapter 8: A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century,” in *Simians, Cyborgs, and Women: the Reinvention of Nature*. pp.149-181. (Routledge) p.150.

³⁵ Verran, Helen (1999) “Staying true to the laughter in Nigerian classrooms” in Law, John & Hassard, John (eds.) *Actor Network Theory and after* pp.136-155. (Blackwell Publishers Ltd.) p.136.

³⁶ Verran, Helen, *op.cit.*, p.141.

Helen Varren's central criticism to the universalist account of quantification is that they take the physical world as natural and assume that there is an universal foundation for spatiotemporal entities. Her description of Mr. Ojo's teaching is to illustrate the differences in the conception of numbers because of the differences in languages and social practices.

The routine in Yoruba is to section first into units and then order the units imaging them as nested. In English, the ritual actions go in reverse: order first as an image of extension, and then section.³⁷

She argues that these 'concepts' are embedded in routines and repetitions and emerged as patterns and orders. They are materials as well as symbolic.

The difference is therefore ontological and not simply epistemological. Mr. Ojo's success is not purely a matter of choosing the appropriate methods. It is a matter of mixing and matching the routines of English and Yoruba language quantification. The focus is not on learning 'the concepts' but on working at 'routine actions'.³⁸ So the truth, the certainly lies in the routines, repetitions and rituals and not the abstract knowledge. By concentrating on these routines, repetitions and rituals, she claims that we will be able to provide a better picture in a responsible manner.

Following the same line of argument, Helen Varren in her article on land titles states that it is an ontological investigation. By examining the negotiations around this issue, it will enhance the comprehension of a new kind of politics that "waged over ontic and epistemic commitments".³⁹ She argues that recent work in science studies opens up the possibility of mixing epistemologies and ontologies. With the emphasis of the situatedness of all knowledge and knowledge making, the focus has shifted to the 'heterogeneous material-symbolic assemblages'. Her argument is that by 'clotting' the politics waged over ontic and epistemic commitments, we can answer the question that Latour asks 'what are we going to become? Can we aspire to Enlightenment without modernity?'.⁴⁰

³⁷ Verran, Helen, *op.cit.*, 149.

³⁸ Verran, Helen, *op.cit.*, 151.

³⁹ Verran, Helen (1998) "Re-imaging land ownership in Australia" in *Postcolonial Studies*, vol.1, no.2, pp.237-254; p.238.

⁴⁰ Latour, Bruno (1993) *We Have Never Been Modern*, Porter, C.(trans.) p.12 (Cambridge, MA: Harvard University Press)

In the case of land titles, she argues, the negotiations between the pastoralists and the Aborigines will not be possible to continue unless the pastoralists acknowledge the collective stories of the Aborigines about land is also an “ontic/epistemic resource” even though they are different from their laws and regulations. Both the pastoralists and Aborigines will need to accept that land title is a hybridity. Moreover, this process of negotiation and reorientation is not an easy one and the participants will need to have courage, determination and time to move forward.

By using the land title and the negotiations between the pastoralists and the Aborigines, Helen Varren argues that the next step to Latour’s answer is to develop ourselves as at least a partially connecting knowing/acting community.

My claim is that by restoring imaginaries to modern theories of knowledge, we will rediscover the capacity to re-imagine ourselves, and devise ways they can work with other communities – human and non-human.⁴¹

Relating STS to my present research.

After a brief summary of the major arguments of STS, I intend to draw out some reflections on how STS can be relevant to the project I am working on.

Technology and Society

I am studying about digitalization and the national library – the relationship between technology and social institutions. It may be simpler to follow the traditional technology studies by analysing how technology changes society or how society shapes technology. However, the relationship between society and technology should not be seen as a one-way street, one driving the other or vice versa. If this approach is taken, it will likely become a reductionist account since reality is certainly more complex than that. I agree with STS in the argument that neither society nor technology is a stable entity. And likewise, the relationship between them could not be stable. However, it is not easy to avoid being reductionist because often when one studies complex relations, one need to narrow things down or stabilize certain elements during the study. How can one avoid being reductionist can be a real challenge.

⁴¹ Helen Varren, (1998) “Re-imaging land ownership in Australia” in *Postcolonial Studies*, vol.1, no.2, pp.237-254; p.249.

Human and non-human actors

One of the intriguing elements of STS is that it brings materiality into knowledge. Instead of separating humans and non-humans into two distinct categories, STS tries to map the patterns and ordering of their interactions. As in Actor-Network theory, Callon and Latour argue that a proper and symmetrical analysis should not privilege the humans, but should consider the relations and interactions of all entities, be it humans or non-humans.⁴² If that is the case, digital documents as well as the machines that produce them such as scanners, cameras, photocopiers, computers and so on will need to be included as active agents and not just tools driven by humans. David Levy borrowed Latours' notion of delegation,⁴³ and argues that documents can also be seen as human delegation.⁴⁴ Like the door which is delegated to provide or deny access, documents are delegated by humans to perform different tasks. A receipt, a greeting card and a memo tell different stories. In short, documents are 'talking things' and they speak for us.

My question is actually a pragmatic one. How to include the non-human actors when conducting field research? The methods I am using are conventional: observation, open-ended interviews and analysis of documents. It will not be possible to interview the machines and documents even though they may play significant roles in the network. Although documents will be included and they will be analysed, they are analysed from the human point-of-view. How can they 'speak' for themselves and not us? If the relationships and interactions between humans and non-humans are so crucial, how can we researchers obtain the necessary empirical data to map them? Although my awareness of the materiality and non-human actors may be heightened by STS, I still do not have a clue of how these non-humans can be included in the study in a sensitive way.

Laboratory Life and the construction of documents

⁴² Callon, Michel & Latour, Bruno (1992) "Don't Throw Out the Baby with the Bath School: Reply to Collins and Yearley," in Pickering, A. (ed.) *Science as Practice and Culture* (Chicago: Chicago University Press.)

⁴³ Latour, Bruno (1992) "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts" in Law, J & Bijker, W. (eds.) *Shaping Technology: Building Society*. pp.225-264 (MIT Press).

⁴⁴ Levy, David (2001) *Scrolling Forward: Making Sense of Documents in the Digital Age*. pp.26-28. (New York: Arcade Publishing).

What strikes me most about *Laboratory Life* is Latour and Woolgar manage to develop the notion of 'literary inscription' as a way to understand the objectives, operations and results of the laboratory.⁴⁵ By means of 'literary inscription', the observer was able to *read* what is happening in the laboratory and produce a *text* that is now in the hands of the readers. It is up to the readers to interpret, to ridicule, to incorporate or to reduce the text. The account that they produced about the laboratory is a *story* although the scientists who work there claimed they are producing *facts with evidences* build by their tight procedures and routines.

To support their argument that scientists are actually engaged in the business of reading and writing and thereby persuasion, Latour and Woolgar point out the significance of documents and facts at the laboratory. By means of detail documentations in terms of records, figures, inscriptions, graphs, charts and other devices, the scientists manage to convince others that these documents are evidences of facts.

Scholars in documentation studies are also concerned about document, evidence and facts.⁴⁶ For example, Susanne Briet, a French librarian and documentalist, claimed that "a document is evidence in support of a fact" and it is "any physical or symbolic sign, ... to represent, to reconstruct, or to demonstrate a physical or conceptual phenomenon".⁴⁷ She implies that when considering a document, one should focus on the access to evidence rather than text. Her examples are: a star in the sky is not a document, but a photograph of it would be; a stone in a river is not a document, but a stone exhibited in a museum would be. Like the scientists and acting as a scientist, she is trying to convince others that *a document is not mere fiction because it has evidences and it is based on facts*.

During my visit to the National Library of Norway, I was surrounded by documents of all kinds. If one compares the National Library of Norway to a laboratory, an obvious similarity will be the predominant positions of computers, machines,

⁴⁵ Latour, Bruno & Woolgar, Steve (1986) *Laboratory Life: The Construction of Scientific Facts*. (2nd ed.) p.87. (Princeton: Princeton University Press)

⁴⁶ Otlet 1934; Briet 1951; Izquierdo Arroyo 1995; Lund 2003.

⁴⁷ Briet, Suzanne (1951) *Qu'est-ce que la documentation*. p.7.(Paris: EDIT), quote from Buckland, M. (1998) "What is a digital document?" in *Journal of the Document Numérique (Paris)* vol.2, no.2, p.222.

equipment and documents. An extraordinary feature at the National Library is the mountain storage vault that is planned to preserve all kinds of documents including paper and digital, for at least 5000 years. Because of the Legal Deposit Act, every document produced in Norway has to be deposited at the National Library and is stored at this vault. There is *NO selection* of the documents. All documents are stored. When asked why there is no selection, there appears to be a consensus among staff that all the documents are part of the Norwegian heritage and therefore should be kept for future generations. It is up to them to make the selection, not us. Our duty is to preserve everything so that they know how things are at this moment in history. This line of reasoning reflects a belief in documents as evidence of the cultural heritage and as proofs to our existence. But these documents are fundamentally *constructions*.

It will be interesting to see how an account on digitalization at the national library will appear when compared to Latour's account on the laboratory. What kind of *story* will that be?

Story, storytelling and translation

This idea of story and storytelling seems to be central among STS researchers.⁴⁸ Latour and Woolgar admit they are writing a story about how scientists construct facts. Likewise, John Law argues that to talk about a theory is to make representations about it – it may be better to tell stories about it rather than summarising it.⁴⁹

The interesting thing about storytelling is you do not tell the same story twice. Based on the research by Perry and Lord, Ong described storytelling by the illiterate narrative poets in Yugoslavia who told stories from an oral tradition.⁵⁰ Even though the stories were metrically regular, there were never told exactly the same. When these narrators were being accused that they were not telling the same story, they became angry and claimed that they were. To them, stories are built into units, patterns and formulae and need to be stitched together in different manners depending

⁴⁸ Latour, B. & Woolgar, S. 1979/86; Haraway, D. 1991; Verran, H. 1998,1999; Law, J. 1999.

⁴⁹ Law, John (1999) "Traduction/Trahison: Notes on ANT" (On-line Papers, Centre for Science Studies Lancaster University), previously published at <http://comp.lancs.ac.uk/sociology/stslaw2.html>.

⁵⁰ Ong, Walter J. 2002 *Orality and Literacy: The Technologizing of the Word* pp.57-60. (Routledge).

on the context such as the occasion and the audience. In short, telling the same stories does not mean repeating the stories in the exact words and the exact manner.

If we think about translation, it also implies the same and not the same. When translating a text from a language to another, one tries to find words that may stand in for another. However, often not only the words are concerned but also the concepts, the customs, the habits behind the words. In order to translate a story from one language to another, most of the time, it cannot be done by means of word-to-word translation. Because even though each word may be accurately translated, the combination of these words does not necessarily form the story. A word-to-word translated story may become a story beyond comprehension or a completely different story.

To use the dragon as an example, the Chinese often call themselves descendants of the dragon. The dragon in the Chinese culture is a sacred imaginary animal, which can fly, swim, and walk occasionally on earth. It has a soul which is materialized in the form of a pearl. When the dragon throws up its pearl, it implies spiritual death. But the Western dragon is a completely different matter. It is the embodiment of evil – a terrible creature that kidnaps princesses and steals gold and jewels. To tell a story about a Western dragon being slain by a prince can be a shock to Chinese children who have never been exposed to Western culture. Some of them may even cry for the dragon and regard the prince as the evil one. Likewise, telling a story about a Chinese dragon to western children may also be a strange experience.

Helen Verran’s stories about Mr. Ojo and the land titles illustrate some of these complexities. To her, it is not enough to acknowledge that there are different versions of quantification or land titles because of cultural differences. In order to live together in this world and make it a better place, one needs to make linkages. I have great respect to this position but my question is again a pragmatic one – how?

My question is: Is it really possible to mix concepts or knowledge claims of different cultures together to form something else? Let me use the dining table, a material non-human actor, as an example to illustrate my query. Unlike the Western rectangular dining table, the Chinese dining table is round and the dishes are usually placed in the

middle of the table. A round table is a symbol of equity firstly because no matter where you sit, the distance between you and the food is almost the same. This is important because it is not the Chinese custom to pass the food from one person to the next. Everybody has to get their own food that are stationed in the middle of the table. Also, there is no Head position at the round table. Each position is as important as the other. This implies that the guests are as important as the hosts. If the Western rectangular dining table is to blend with the Chinese dining table, what will it become? So when it is dinner time, how are we going to settle down for dinner? If it is not good enough just to acknowledge and respect our cultural differences, and a blending is necessary, so how will these mixtures look like?

I agree with John Law's sayings that,

there is no such thing as technology transfer. That technologies don't originate at a point and spread out. But instead that they are passed. Passed from hand to hand. And that as they pass they are changed. Become less and less recognisable.⁵¹

Not only technology but almost all knowledge and concepts are as such. It is not a simple transfer and it will not work out in exactly the same way. But how can we describe the product after the transfer to make people aware of the transfer and the change that has happened in an 'accurate' manner?

Some concluding remarks.

In this essay, I attempt to introduce briefly the project I am working on; to outline some central arguments in STS; and to suggest how STS may be related to my project. Prior to the course, my knowledge of STS is almost non-existent. Even up to now, my knowledge and understanding of STS is still very limited.

We have only 'situated knowledge' and our personal experiences as well as cultural baggage often restrict our 'vision' of seeing ourselves and the world. And it is not possible to throw away our beliefs and worldview overnight. In my case, I have problems placing non-human actors on the same plane as humans. I have also questions about the essentially political feminist material semiotics – the 'call-for-arms' attitude. And I am not convinced that postcolonial STS is a step forward in

⁵¹ Law, John (1999) "Traduction/Trahison: Notes on ANT" (On-line Papers, Centre for Science Studies Lancaster University), previously published at <http://comp.lancs.ac.uk/sociology/stslaw2.html>, p.2.

approaching cross-cultural studies. The Nigerian classroom story reminds me of the Scallops and the Fishermen of Saint Briec Bay. The privileged white female lecturer becomes the spokesperson for Mr Ojo, the other Nigerian teachers, the Nigerian children and the Nigerian classroom. May be she also has to rely on 'translations' to understand what is happening in the Nigerian classroom? If Mr. Ojo has made a 'revelation', I would much prefer to hear his explanations and reflections on the issue rather than a western white female spokesperson. Thus, to use STS or not to the research project I am working on is still an open question. (Total: 5822 words)

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