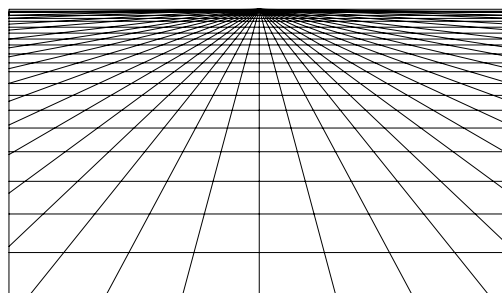# The Paradox of Technology and Time

- A Symmetrical Approach

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2 April 2002

Word count: 21 382

ESST
The European Inter-University
Association on Society, Science and
Technology

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SUMMARY

This thesis is about the relation of time and technology, how it is understood, and how it is analysed. My entry point is what I call the paradox of technology and time. This is the statement that the more time we save by using time-saving technologies, the less time we seem to have.

This statement presents the relationship between technology and time as a problematic one, and as a relationship where there is a breakdown-situation of some kind. This difficult relationship is the theme of this thesis. The paradox is followed through the thesis as a specific subject in the field of time and technology. My research questions about the relationship of technology and time are:

1. How is our understanding of time and technology since we have the feeling that we have less time even though we save time by using time-saving technologies?
2. Is an alternative understanding of time and technology possible, and if yes, can this be used to analyse situations where time saved by technology is lost?

The aim of the thesis is thus twofold: First to examine literature that analyses and discuss the relation between technology and time (with a focus on the paradox). Second, to use methodological principles from Science and Technology Studies (STS) to show how time and technology can be analysed in an alternative way.

The thesis investigates the time and the technology understanding that is included in analyses of time and technology. The paradox is used and presented as part of these analyses. This also includes a critical reading of social scientific studies about time. There are several challenges to both these types of analyses. There is large focus on economic time. Technology is often left out of the analyses, and in the cases where it is brought in, it is treated

instrumental. The various elements in the analyses (humans, time, technology) are also separated.

To give an alternative to this time and technology understanding, and to attempt to show how such an understanding can be used analytically, I apply three STS principles to time studies. The principle of symmetry gives the possibility to see the history of time, and to see how the decision that time works is a result of sociotechnical trials, rather than something pre-given. The term embodiment shows how there is other time included in artifacts than the purely technical. The complete time embedded (technical and social) in an artifact makes artifacts hindrances for our time use and understanding in the future.

I use the example of the microwave to see how it is possible to open the black box of technology *and* time for an artifact. This is done to show that time is embodied, and that a historically oriented analysis gives insights into why time is not a clear cut or simple issue, but highly complex.

The paradox of technology and time is based on the traditional understanding of time and technology. It is not possible to 'solve' or get an 'answer' to the paradox, but it must be taken serious for the persons or groups who lives with this feeling. However, since we accept the paradox as a 'valid' statement about our time and our technology it does also *hide* the complexity that is in everyday time and technology. As a statement it hides, because it accepts the time and technology understanding. This is a hindrance to actions that, for persons affected, could change the situation to one that the person is happier with. The paradox is thus good and intriguing as entry point, but not as answer or result of analyses.

Key words:
Time understanding, technology understanding, the paradox of technology and time, symmetry, embodiment, resistance, microwave.

ACKNOWLEDGEMENTS

This thesis would not have been possible without the help of many people. ESST students and staff in Oslo and Maastricht have given many comments and much advice. I am especially grateful for the help I received from Jessica Mesman and Terje Grønning for supervising various stages of the work. I would also like to thank Peter Peters for interesting conversations about time, and Leiv Bjelland for reading through and giving many good suggestions.

<div align="right">Oslo, April 2002</div>

1. INTRODUCTION

You have used them, and you have bought them: The time saving-technologies. The new computer that is faster than the old one, the microwave that makes cooking so much faster, and e-mail that makes communication over long distances almost instant. There are many technologies that are said to be time-saving, examples range from transportation technologies such as cars and airplanes, communication technologies like telephones and e-mail, to domestic technologies like dishwasher. Despite a large amount of time-saving technologies, the feeling and experience of less time is frequent. This is the paradox of technology and time: *The more time we save by using time saving technologies, the less time we seem to have.*

All the time saving technologies are built and presented with a promise: They will save us time. Airplanes will shorten the time we need to get on holiday or to a business meeting. E-mail makes it quicker to send a mail to your friends, or order a book you have been waiting for. With the microwave you will be able to watch your favourite TV show and eat dinner because the cooking was so fast. All of this happens every day. Each of these technologies does fulfil their promise of time-saving.

Despite this, many have the feeling that we have less time. The phenomenon is paradoxical because the result is exactly the opposite of what was anticipated, and intriguing because there is actual time-saving. The paradox is then a piece of 'evidence' that the relation between humans and technology is problematic. Humans and technology are separated, and what was thought to be a simple relation in a simple issue, is suddenly quite unclear and messy. Technology should simply help people save time, but this time suddenly disappears.

This difficult relationship is the theme of this thesis. The paradox is my entry point and will be followed through the thesis as a specific subject in the field of time and technology. The questions I will ask about the relationship of technology and time are:

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1. How is our understanding of time and technology since we have the feeling that we have less time even though we save time by using time-saving technologies?

2. Is an alternative understanding of time and technology possible, and if yes, can this be used to analyse situations where time saved by technology is lost?

By answering the first question I will uncover how time and technology is understood in relation to each other when they are analysed. The paradox is here often used as an entry point or as evidence that something is wrong between time and technology. I will also review academic studies of time. The second question follows from the exploration that is the answer to my first question. The answer to the second question is a theoretical presentation of an alternative time and technology understanding, with examples to show how this can be utilized for analytical purposes.

The aim of the thesis is thus twofold: First to examine literature that analyses and discuss the relation between technology and time (with a focus on the paradox). Second, to use methodological principles from Science and Technology Studies (STS) to show how time and technology can be analysed in an alternative way.

The thesis is theoretical, both in its approach and in its analysis. The alternative view on time that I present is based on developments within social research on time. STS will be used to present an alternative technology understanding, and as a tool to understand time and technology together.

I start by giving a short description of studies on time, and STS. This is to show the area that my questions are part of, and to give a background for why they are asked.

1.2 Time studies

Time studies is a field that in equal parts is fascinating and frustrating. Fascinating, because it touches one of our basic life categories and raises important questions. Frustrating, because time cannot be touched or counted, and every answer and experience can be meet by one that is equally true, valid or real, but completely different.

Work on time that is relevant for this thesis has focused around two areas. The first has been a quest for accuracy in measuring time, the second is about understanding of time.

1.2.1 Measuring time

The way technology and time has been studied has been with a focus on time telling technologies. Calendars and clocks have been studied extensively[1]. From simple sundials and water clocks, to the development of the clock through the middle ages.

This is a very interesting field of study, because it incorporates social development and technical development. The presumption that is most common in these studies is that there is some connection between how we measure time and the societies we live in. The direction of change has been described as both from the technology (calendars, clocks) to the social organisation, and from the social to the development of calendars and clocks[2].

The quest for accuracy through measuring technologies implicit assumes time as category in which social life happens. Coordination and control over this category became important because of increased complexity in societies. There was first a need to stabilise points in time in a more specific manner than the changing of seasons and moon phases could give. Placing of religious events, such as the Christian Easter, was an important driving force for production of various calendar types.

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[1] See Duncan (1999) for a history of the calendar, and Dohrn-van Rossum (1996) for a history of clocks.
[2] Eriksen, T.B., 1999: 224

The western calendar is the result of a several thousand year long development, and clocks are a further development within coordination. Time went from something closely connected to nature (morning, noon, night) to an abstract entity (hours, minutes, seconds).

The implications of this development of precise time measuring technologies for the way time is understood are described as drastic. Social scientist Helga Nowotny claims that 'If we alter the scales and dimensions with which we measure, we seem to alter the nature of that which is being measured, as well'[3], and this view is generally accepted. This is the thought that is essential for the connection time measuring/society. The implementation of the calendar and clocks is claimed to be one of the changes that helped a movement in western societies from task orientation to time orientation[4]. The measuring technologies are the net in which our lives are lived. Here we are paid by the hour, meetings are arranged to happen at a given minute, and so on. It is also here people experience the paradox of technology and time.

1.2.2 Time understanding

The other main area of research on time is about time understanding. The question 'what is time?' is the focus. This question seeks the *essence* in a non-tangible entity, and is therefore an extremely tough and metaphysical question. What is achieved by asking this question? Why do we have such a need to know this? It maybe very well be because it looks impossible. It would be a great accomplishment to give a final answer to this[5].

This is a question that is extremely relative to surroundings. For a long time it was related to religious questions, for example if the existence of time could be an evidence of the existence of God[6]. In modern science, the question has been 'solved', or given an answer through the general theory of relativity. This way of thinking about time is obviously

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[3] Bergmann, 1992: 99
[4] Korsnes et al, 1997: 326
[5] See Eriksen (1999) for a history of time.
[6] Held and Nutziger, 1998: 209

completely dependent on one set of thinking and reasoning: The rational-scientific thinking. For us this seems a right and sound way of thinking (and I will not argue against its correctness), but knowing the huge changes that time understanding has undergone, it does seem unlikely that this is the 'final' answer, or that there can be something like a 'final answer'.

Studies of time understanding, and then especially anthropological studies, do also show a multitude of different time experiences and categorisations. This means that every statement about time is context dependent, also our time[7]. I want to make the connection between time and its surroundings explicit. This has often been left unspoken of. With the paradox this reality of time is visualised. Technology is used to manipulate time, and we want it to save time. I will not try to answer the question 'what is time?', but rather ask what is time in the paradox? Which understanding is there, what is implicit, and finally; are there possibilities for an alternative understanding?

1.2.3 Time in social science

Time has also been dealt with explicitly in social sciences, and this is the academic area I will deal with. Studies that involve time in relation to societies are characterized by an extremely high diversity in analyses and terms used. However, time has most commonly been defined as a social construct, meaning that it is a social category that structures everyday life[8]. Social studies of time does also treat time as a resource in economic terms, for instance when productivity is studied. Also in these studies technology and other artifacts are often missing. There are however new developments within time studies in social science. They emphasise the need to investigate our own time more extensively, to transcend dualism and to include

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[7] Adam, 1995: 30-31
[8] Nowotny, 1992: 429

the physical world in analyses[9]. Part of the aim with this thesis is to use STS to gather some of these approaches, because STS can in my opinion be a good analytical entry to these areas. Chapter 3.6 is devoted to a wider description of time in social sciences.

1.3 Time-related technologies and time understanding in this thesis

Despite this huge interest in the technologies most closely related to time, there has been little interest in other technologies and their relation to time. This is technology that has an indirect relation to time, it is not used for measuring it. Many technologies are designed, marketed and bought because they can perform tasks in shorter time than what was previously possible, or because they make actions that previously was impossible, possible. The latter is often caused by creating a new time standard, for instance the shift from ships to planes in long distance transportation. Other examples range from information and communication technologies to domestic appliances. It is these technologies that are related to the paradox.

The questions asked here must be different, since the link to time is another than for the time measuring technologies. I am curious about these technologies that have an indirect connection to time. Will these also influence time? Why are some technologies thought to be time-saving? How come they do not fulfil their promise of time-saving?

Time understanding is not only something that exists in philosophical or scientific studies. The way ordinary people understand time gives results through different types of actions. The way we speak of time, write about it, complain about it, or act towards it, is both dependent on a time understanding and a manifestation of this understanding.

We do not need to have a well-articulated theory or given our time understanding much thought, our actions will consciously or unconsciously give evidence of our understanding.

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[9] See for instance Nowotny 1992 and 1994, Adam 1990 and 1995, Hörning et al 1999, and Glennie and Thrift 1998

The understanding can in other words be articulated or unspoken. It is a type of knowledge that in everyday use is tacit, but in some occasions becomes codified.

In this thesis the term 'time understanding' will refer to the way people treat time when they write about it. Sometimes they directly address the issue, other times analysis is needed to detect it clearly. The understanding found is then most common articulated or non-articulated version or theory about time. It is so to say the 'notion' of time, or the materialisation of time understanding in a society. The third chapter will present statements about time and technology. Thus the understanding will be shown, either directly or in the deconstruction of the statements.

1.4 Science and Technology Studies (STS)

In the field of science and technology studies, little is written about time. Time has been a subject in social sciences since the start, but it is rarely directly connected to technology. An STS understanding has not been used to investigate the paradox and its claims. In this thesis I will attempt this. I will use literature on time to understand and analyse time in the paradox, and STS for the technology and the whole paradox.

STS is a multidisciplinary field that researches science and technology with emphasis on the large number of non-technical elements involved in scientific development. This is done because power, social relations, politics and other human actions and influences are apparent in the making and use of both science and technology. This means that science and technology should be researched as social and cultural praxis[10]. Further on it has the consequence that it is our technological culture that should be the unit of analysis, rather than a technical artefact. This is because the culture, as Wiebe Bijker says, is '…the liquid in which politics, technology and social controversies dissolves with each other...'[11]. This

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[10] Asdal and Myklebust, 1999: 1; Asdal et al., 2001: 9-10
[11] Bijker, 1995a: 7. My translation.

technological culture is not static and not isolated. What is then needed is a debate that questions the nature of this culture[12].

The background for this understanding of science and technology is the discussion about science in itself, and science in relation to society, that came in the 1960s and 1970s. This was a reaction to the very strong faith that science was given as something 'pure' or 'true'[13]. This picture was challenged when some of the unintended consequences, like pollution, became visible. Science had also to a large extent been utilised to serve aims that many disagreed with. Examples are development of weapons, and specifically the atom bomb, but also nuclear power in general[14].

This development showed a need too include other kinds of knowledge about science and technology in studies. STS research is based on a large variety of disciplines. Sociology, anthropology, ethnography, history, philosophy, and economics are among the disciplines that are draw upon to conduct studies. STS does not in any way play down the role or importance of science and technology in society, it states that a focus different from a purely technical and instrumental is needed. Just as much as STS has been a critique of 'pure' science, it has been a critique of social studies for their lack of interest in non-human elements. Within STS there is a wish to fusion what as been seen as two separate universes, technology and culture. Bruno Latour states that machines are 'cultural objects' and that 'crowds of nonhumans' should be welcomed into social studies[15]. This is a challenge I will attempt to follow in this thesis.

Although STS is a wide field time is not a central element. In my opinion STS should include time as one of its subjects. This is because it is such a central cultural element, and many technologies are developed with an aim to save time. STS should also be well fitted

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[12] Swarz, 1993: 5
[13] Wouters et al., 1999: 7; Bijker, 1995: 4; Asdal et al., 2001: 13
[14] Escobar, 1994: 1
[15] Latour, 1996: 1-2

since it is multidisciplinary. Questions about technology and time also touches central STS debates, such as how cultural values are embedded in technology.

STS is also openly multidisciplinary. In this sense it converges with some of the main research done on time. There is an increasing agreement that time needs to be studied in a multi- and cross-disciplinary way[16]. The only journal that is devoted to time and the social, Time & Society, is multidisciplinary[17]. There is also an International Society for the Study of Time, which examines time from different disciplines[18]. STS should for this reason be well suited for studies of time.

In my opinion, the paradox of time and technology is a good entry point to a STS study because it makes it possible to describe our time understanding and our technology understanding. This understanding is mostly implicit in actions and statements, and is very much a taken for granted aspect of everyday life. For the paradox to exist it has to relate to this understanding. It also makes the technology/time relation visible. Many of the technological artifacts we use everyday, we do not think of as technology until there is a breakdown. This can be anything from a car that does not start to a computer that suddenly stops without you asking it to do so. Technologies with a time relation are also involved in this kind of situations. You do not think of your wrist watch as a piece of machinery, you now that it tells you the time and that you think it looks good, but that is only until it stops.

1.4.1 STS and this thesis

A review article on STS by R. Williams and D. Edge has comments about STS that are specifically interesting for my thesis. The first is the claim that technology is both material and symbolic objects[19]. The consequence of this is that studies look at technology both as

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[16] Nowotny, 1992: 441
[17] See http://www.sagepub.co.uk/frame.html
[18] See http://www.studyoftime.org/index.html
[19] Rammert, in Williams and Edge, 1996: 891

'socialised nature' and 'naturalised society'. This duality is important when it comes to time-saving technologies because they have clear technological features that deviate from parts of their social features. The second point is a modest critique of the STS field because it has not focused a lot on the role of ideology and culture in studies of how technology is shaped[20]. My study of time-saving technologies will focus on the role of culture for technologies. The question of why we need time-saving technologies is a question about our culture, and will be discussed in chapter 3. The third point addressed by Williams and Edge is that there is tension about the 'negotiability and fluidity of technology' within STS research[21]. The discussion is focused around how direct social relationships are embodied in technology, and how stable these are. This is in my opinion one of the most interesting and intriguing debates within STS, and my thesis will take part in this debate. The concept 'time-saving technologies' is one concept where the social embedding of values ('save time') is clear, and the paradox is also a case where there is a discrepancy between the assumed embedding and the result of use.

In the next chapter I will present the concepts symmetry, embodiment, and opening of the black box, which are the main STS theories I will use through the thesis.

1.5 Summary

With the presentation of time studies and STS I have tried to show how my research questions are entangled in both fields, and why I want to research them. In this introduction I have argued that:

- The paradox of technology and time presents a problematic relation between humans and technology, and is therefore worth studying.

- There are few studies that relate time and technology (except for studies on clocks and calendars), and no studies of the paradox.

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[20] Miles; Mackay and Gillespie; Cockburn; Cockburn and Fürst-Dilic, in Williams and Edge, 1996: 889
[21] Williams and Edge, 1996: 892

- STS has to my knowledge not studied time. I will use STS to understand both technology and time.

- I want to make the connection between time and its surroundings (technology) explicit: Which time understanding is contained in the paradox?

- I will use an alternative understanding of time when analysing the paradox.

- From STS I will focus on the principle of symmetry, opening the black box of technology, and the embodiment of the social in technology, when analysing time and technology.

- This thesis will take part in the debate about fluidity and negotiability of technology.

1.6 Outline of the thesis

The rest of the thesis follows the research questions. Before I go to the questions, I present the methodology and show how the analytical terms are part of STS theory in chapter 2. Chapter 3 is a presentation of technology and time understanding, and a presentation of academic research about time, and is thus the answer to the first question. The fourth chapter is a presentation of an alternative time and technology understanding, where I attempt to apply STS to time research. This is my analysis and the answer to the second research question. Chapter 5 incorporates the whole thesis and is my conclusion.

2. METHODOLOGY

2.1 Special problems because object of study is time

When time is the object of study some special problems occurs because time is such a special subject. Barbara Adam, who has written extensively about time, mentions three challenges[22]. The first is that the researcher is totally engulfed by the object that is to be studied. There is no way a researcher can get 'out of time' to see it from the outside, or be completely free from how he or she is thought to think about time. The second is that time usually is a taken for granted aspect of everyday life. Finally Adams states that problems with time studies often are that they are based on an unquestioned western time. Through the work on this thesis I have meet all these problems, and tried to take them seriously. In the thesis I try to make explicit the connection that is between our culture and our time understanding, to avoid taking one type of time understanding for granted.

Nowotny mentions another challenge that is important for studies of time[23]. Since time is a subject that is everywhere, both in experience and reflection, it is impossible to have a narrow approach on what type of sources to use, time as a subject is multidisciplinary. Comments or thoughts expressed by ordinary people are just as 'valid' as large theoretical works. It is thus hard to decide what should be kept in and what should be left out when time is studied. Because of this I have included a broad spectrum of sources, and let my research questions be my guide as to what is relevant literature and statements.

2.2 How to choose in a wide academic field?

During my work with this thesis, I have spoken to a lot of people about time. When I say that I am writing about the paradox of technology and time, I get two responses. Most people say

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[22] Adam, 1995: 30
[23] Nowotny, 1992: 441

that they think it is interesting, and tell about a situation, or a story that confirms the existence of the paradox. Then there are those who are extra interested in the subject of time, who comes with suggestions for reading. 'Since you're writing about time you must read X', 'you surely must be using Y then?', and 'hasn't Z written something about that?', are some examples of the input I get.

This is very stimulating, but also extremely frustrating. How can I choose which authors and approaches to include or exclude? The number of thinkers, researchers, philosophers and analysts that have touched upon the subject is enormous.

There is a long list of important writers from many categories, which have the status of 'must-be-included'. In social science Anthony Giddens has this position. Every social scientist that write about time, do sooner or later include him[24]. From the natural sciences Albert Einstein and Stephen Hawking are the two most cited and discussed persons. In philosophy there is not limit to the amount of philosophers that do discuss time.

My aim in this thesis is to have focus on the subject, which is the time and technology understanding necessary for the occurrence of the paradox. Because of this, and because of my own background in social science and STS, I have not included natural scientific analyses or philosophical analyses of time. The focus further on means that some authors that do write about time in social science, such as Giddens, are not discussed at any great length because they have no direct relevance to my research questions. As explained in the introduction I will use an STS understanding on my research questions and on time studies. In the chapter on time and social sciences I have tried to single out the areas that are most important to help me answer my research question. To limit the scope of the thesis I have also avoided the large debate about time and space, which is especially apparent in social geography.

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[24] See for instance Adam 1990.

2.3 What I have chosen

As I explained in the introduction, STS is not one type of analysis, or agreement about methods, but rather research joined by the common interest in science, technology and society. I have therefore had to choose within the STS field. Once again, the choices are made to fit the research questions best and as a result of my background. I have not chosen one specific 'school' (such as SCOT, ANT) within STS because I might loos valuable insight because I limit myself. The analyses and vocabulary within each 'school' is a result of the previous work, and since this does not deal with time, it is likely not completely suited for time studies.

My choice has been to have a sharp as possible focus on my research questions and see how a 'general' STS attitude could be used on time. This means picking different pieces, but it has also meant trying and failing with many attempts. The terms used for the analysis are not picked at random, but the result of various attempts at analyses. The huge advantage of this has been the possibility to investigate the things that usually are not investigated when time and technology is discussed. I have used the ideas, literature and concepts as 'tools for thought', and as a way to keep my focus on the paradox, and at the same time being able to investigate it as thoroughly and as exciting as possible. It is also an aim to see if ideas that have not been put together before, fit together, and if terms can be successfully moved or altered. In this way, the attempt to use STS on time is part of the aim of the thesis.

Like any academic area, there is plenty of disagreement and discussion within STS. This relates both to what should be studied and how it should be studied. Because of my social scientific background I will mostly use writings that relates to the sociology of scientific knowledge (SSK). This tradition was one of many starting points for STS and has dealt with the making and maintenance of knowledge in science, and later also discussed these issues related to technology.

Even though I have chosen not to pick one specific theory, the analysis in this thesis owes most to the so-called Actor-Network Theory (ANT). I have chosen not to write a pure ANT analysis for several reasons. The first is that ANT uses a quite specific language. This needs quite some explanation and is hard to use on already existing time studies. I have chosen not use this language. The second is that ANT is mainly used for empirical studies of specific cases. My work is theoretical and does match the ANT tradition that well.

2.4 The terms that are central to this thesis

I will now briefly introduce the three analytical concepts from STS that I later on will use for the analysis. The idea is to show why these terms are relevant for STS research. This is done here because they are also relevant for the next chapter, where I present analyses of time and technology. They will be discussed and used in full in chapter 4.

2.4.1 The embedding of sociality in technology

One starting point for STS is that Western culture is so filled with technology that it is hard to think of it without technology. Technology is not only artifacts we use for some parts of our lives; it is there all the time, everywhere. This knowledge about the importance of technology in our culture challenges the stand that technological development only is for scientists and engineers[25]. Because of this it is important not to study 'technology', but 'technology-as-culture', with an anthropological understanding of culture[26]. Michiel Schwarz defines this 'technological culture' in two ways:

> Firstly, technology is our 'milieu', and in this sense we live in a technological culture. And
> secondly, technological change has become the dominant force in shaping the values, norms and

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[25] www.esst.uio.no/spesialiseringene/Maastricht.html; Bijker, 1995a:1-8; www.fdcw.unimaas.nl/ esst/index.htm

[26] Schwarz, 1993: 1

expectations that together structure our thoughts and actions. In this sense Western culture is a technological culture.[27]

The technological culture is not only the artifacts or the results of science and engineering, but also the language we speak, the way we organise our society and in our expectations and values[28]. One of the most important elements in this culture is the interaction and interdependence of the technical elements and the human elements[29]. Arturo Escobar describes the core understanding of this relationship as '…the belief that any technology represents a cultural invention, in the sense that it brings forth a world; it emerges out of particular cultural conditions and in turn help to create new ones.'[30]

This view of technology and culture leads to a debate on how and to what degree values, norms, politics and ideas are part of technology. The idea that technology includes social elements has been described both as 'embedding', 'inscription', and 'embodiment'. I will use all of these terms when I later on discuss this issue with focus on time.

2.4.2 Opening the black box

There are different types of STS studies, but one of the most influential types has been the laboratory studies. These are studies carried out in an anthropological or ethnographical way in the laboratories. The purpose of these studies was to gather observations about the places where knowledge is created in modern societies, and to study the unfinished knowledge. Here the notion of constructivism in science was used. This states that knowledge in science rarely is more 'true' than other kinds of knowledge, and that it is often 'constructed' by the scientists in the laboratory. This is a highly controversial idea, both outside and within STS[31]. The aim of the laboratory studies was to open the so-called 'black box' of science. The notion of the

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[27] Schwarz, 1993: 3
[28] Bijker, 1995a: 1-8
[29] Aronowitz, 1994: 22
[30] Escobar, 1994: 211
[31] Knorr Cetina, 1995: 140-142; Asdal and Myklebust, 1999: 1; Asdal et al, 2001: 16

black box is linked to the idea of science and technology as something isolated from culture, economics and other factors[32]. When viewed this way, technology and science does not need any further explanation or analysis. One of the major results from the laboratory studies is the opposite: Science and technology are also social products. There is a need to open up their history and making to gain better understanding.

This view of science and the research within STS has lead to an understanding that studies must include social, political and economic factors. This is because technological and scientific development happens in a social context with strong social forces[33].

2.4.3 Symmetry

STS is a field that is open for the unexpected questions that cross boundaries, and it does even ask questions about the boundaries themselves. Is there, and should there be a boundary between human and nature, social and technical, when they are studied? It is also possible to ask fundamental questions about the categories. Is there one category that is technical and one that is social?

STS realise that there is a mutual dependence and shaping between what has been thought of as only technical or only social. New forms of technology creates potential for new cultural spaces where humans can act. On the other side culture, with norms, values, rules and ideas are shaping the technology. Wouters, Annerstedt, and Leydesdorff describe this mutual dependence when they write that 'Culture and technology shape one another in an intimate symbiotic dance'[34]. This is important because science and technology plays such and important role in peoples lives in Europe today. This society has advantages and disadvantages, Wouters et al states that: 'New inventions and insights seem to bombard the public on a daily basis, creating the feeling of countless opportunities on the one hand, and of

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[32] Latour, 1987: 2; Wouters et al., 1999: 3; Asdal and Myklebust, 1999: 1
[33] http://www.esst.uio.no/orginfo.html
[34] Wouters et al., 1999: 6

constant threat to present values on the other.'[35] This clash between possibilities and consequences is at the core of the paradox of technology and time.

When a statement like the paradox is presented, elements of what is assumed to be two separate sides meet. Time is part of the social world, and the time-saving technologies are technical. The parts included in the paradox are 'technology', 'time', and 'humans'. With an STS approach it becomes possible to rethink these parts and their relations. How to cross this divide is one major STS debate, and it has focused around the term 'symmetry'. This is a methodological term which says that what is thought separated should be analysed using the same methods and terms. The principle was first applied to studies of science, but later also to technology studies[36]. I will apply the symmetry principle in chapter 4.

2.5 The difference between process and presentation

My final methodological comment is about the difference between the process of writing a thesis and the final thesis. The process of figuring out the research questions, reading literature, trying out analyses and working on drafts is actually quite messy. It goes several rounds, and the focus and literature changes. The thesis is not a description or a picture of this process, but the result of it. The importance of this is that nothing in this thesis is given, either as questions, analyses or answers, but they are all results of my choices taken sometime during the work process. Hopefully this thesis presents the 'findings' in a good way, and I must specify that the questions also are part of the 'findings' since they are a result of early steps in the process.

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[35] Wouters et al., 1999: 2
[36] See Barnes and Bloor 1982, and Bijker 1995b

3 ANALYSES OF TECHNOLOGY AND TIME

This chapter presents literature about time and technology. First, I present statements of the paradox of technology and time, since this is my entry point. Second, various analyses connected to these statements is looked into. This is work that comes from a variety of writers. Third, purely academic work on time is reviewed. The chapter is thematically arranged, so that it covers the subjects that are discussed in relation to time and technology. The themes are inflation of speed, technology versus nature, speed in technology, speed in culture, time as a contrasting element between cultures and periods, time as social construct, and time as an economic entity.

This chapter moves from the example of the paradox, where the time and technology relation is visualised; to analyses and theoretical understanding of time. The chapter is the answer to my first research question: How is our understanding of time and technology since we have the feeling that we have less time even though we save time by using time-saving technologies?

I start of with a presentation of how the paradox is described. This is because the paradox often is an entry point to analyses, opinions, statements or complaints about the relationship of technology and time. Through a brief review of some statements and accounts of the relationship I will show *how* the parts (humans, technology, time) are described, how the relation between time, technology and societies is described, and also look at *why* they are analysed and discussed. The parts 3.1 to 3.6 are the presentation of the analyses, the points after that is my deconstruction and analysis.

3.1 Description of the paradox

When the paradox is presented, it is usually in one of two very similar statements. The moderate version states that we use more technologies that are said to be time-saving, but that we feel more pressure or lack of time. A few examples are:

> The paradox that many people experience is that the more time-saving items you use, the less time is left. Time is in an ever-higher degree mediated through technologies that speed up necessary processes. The new possibilities are sold as time saving, but together they do create new forms of time pressure.[37]

> The last decades has given us more time-saving technologies – from advanced time planners to e-mail, voicemail, mobile phones and word processing programs – and still most of us has probably never had as little time as just now.[38]

In these cases the paradox is an observation. We have artifacts that promised something important, time saving, but this has not occurred[39]. Most times the paradox is stated in a stronger version. We use the technologies that are said to be time-saving, and we do actually save time by using them. The PC does the job faster than the typewriter, the microwave cooks the food faster than the ordinary oven, aeroplanes bring you from one place to another quicker than a ship, and a fax is faster than a letter. Despite this saving of time, there is still a feeling of less time and more pressure. Statements of this kind is as follows:

> Do we not suffer from the paradox that although we constantly save time by using better and speedier technology, in the end we do not have more time than before, even less perhaps...?[40]

> The state of being connected makes them [people and businesses] more efficient - maybe even more nimble. Sadly, it also makes them feel busier - maybe even overloaded[41].

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[37] Eriksen, T.B., 1999: 259. My translation.
[38] Eriksen, T.H., 2001: 7. My translation.
[39] When technology and society is described and discussed, promises are frequent. A parallel type of promises has been given when ICTs and democracy are focused upon. ICTs are by many thought as a saver, re-newer or a radical improver for democracy (Winner, 1986: 105).
[40] Hörning et al, 1999: 295

The relentless introduction in the twentieth century of "time-saving" devices has encouraged us to think we would be liberated from toil, freed to pursue more creative work, peaceful reflection, more enjoyable sociability. These dreams have been inevitably frustrated. Our available time expands into a space of congestion – increasingly frenetic interactions encouraged by our machines. Although we "save time", we have not been clever enough to bank it.[42]

Technology has been a rapid heartbeat, compromising housework, travel, entertainment, squeezing more and more into the allotted span... Nobody expected that it would create the feeling that life moves to fast[43]

More and more 'time-saving devices' were and are bought by households … if this raised the hope of gaining time, it was to prove deceptive…In spite of all these time-saving devices, the middle classes in the successful industrial nations who had been able to acquire these devices very quickly felt more and more harassed.[44]

…we can safely say that in today's industrialized world - thanks to ready-made products and to household appliances such as the microwave oven - the time previously required for preparing food has been dramatically shortened…Unfortunately, this to is a Pyrrhic victory… For whilst one the one hand modern technology seems to save us time, on the other hand we seem doomed by the fact that practically all the time saved will now be spent on other aspects of food preparation and shopping![45]

Independently of whether the statements claim that we save time or not, the parts/elements included are the same. 'Humans' 'use' 'time-saving' 'technologies' but have 'less time', and the standard form is also the same: *The more time we save by using time-saving technologies, the less time we seem to have.* We see that the promise of time-saving has not been kept. There seems to be something wrong with the relation between time and technology. This broken promise is either related to aspects of the technology, or features of culture. The

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[41] Gleick, 1999: 84
[42] Winner, 1994: 194
[43] Social historian Theodore Zeldin, *An Intimate History of Humanity,* 1995 p 352, quoted in Gleick, 1999: 11.
[44] Held and Nutzinger, 1999: 217.
[45] Schneider, 1997: 90.

paradox is presented as part of analyses of time, technology and society. I will now look at how these problems the time-technology-society triangle is described

Different authors and commentators use the paradox of time and technology to make a statement about technology and time. The quotes above are picked from writers of different kinds to give a wide picture of time and technology understanding. They range from newspaper and magazine commentators to academics and intellectuals writing both specifically about time, and about more general subjects. Common for them is that have and opinion about technology and time use in our modern world, and that they often use this concern as a basis for wider statements about society and technology. I treat them approximately equally because it is impossible to draw a line that divides the ones dealing with time in a 'serious' way, from the ones dealing with it in an 'unserious' fashion. Statements about time can never be judged in advance, and I also want to see other sides of the time and technology understanding than the purely academic (See chapter 2 for a discussion about the use of a variety of sources). I will now turn to the areas discussed in the time/technology analyses.

3.2 Inflation of speed

One theme is the inflation that happens when we take new technologies into use. This could be the explanation of why we lose our gained time. The principle is easy to understand. A certain type of action happens at a certain speed. Then there is an improvement that makes it possible to accomplish the action in shorter time, something which then is done. There is then a time advantage compared to the others who still perform the action at the 'old' speed. Now two things happen. The first is that it is unthinkable for the persons doing the action at the 'new' speed to go back to the 'old' speed. The other thing is that the persons still locked in the 'old' time will try to, and eventually succeed at, accomplishing the 'new' speed. The

advantage is then lost for the ones that speed up in the start, and all the actions happen at a higher speed.

With a nice punch line this can be described as 'the more we drink the thirstier we get'[46]. One case is being on-line while at work. The Dutch professor Rein de Wilde tells the story of what happened when the possibility of being constantly on-line was introduced to his faculty:

> Smart products can make our life easier, but always up to a certain point, because they also offer new opportunities for raising our output… But, unfortunately, the cultural demands change accordingly: in my university, for instance, being on-line *all the time* (at home as well as in your office) basically became a requirement within a year after the introduction of the needed equipment.[47]

Another case is overnight mail. This is extra fast mail delivery and was first introduced as a service for the occasions when there was an absolute need for a speedy delivery. Since we know that speed is better than no speed, the overnight mail delivery soon became favoured by very many. The possibility of doing something in a fast way had actually disappeared because everybody is doing it at maximum speed all the time.[48] The consequences are clear: 'Where everyone goes fast, it becomes harder and harder to keep your own pace'[49].

This loss of saved time exists both on a personal level and in society as a whole. When writing about the completely wired professional, the newspaper columnist Brooks captures the personal attitude when he writes that 'He's bought the fastest machines, and now the idea of waiting for something to download is a personal insult'[50]. For our society it is claimed that 'One of the iron laws of capitalism is that profits tend to get beaten down to zero as more firms learn to implement new technology'[51]. Any advantage gained is quickly lost. In other

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[46] de Wilde, 2001: 8
[47] de Wilde, 2001: 8
[48] Gleick, 1999: 85
[49] Peters, 2000, on Sachs: 136; Lie in Morgenbladet 17.08.2001
[50] Brooks, Newsweek 30.4.2001
[51] Brynoffson in "we have computers. Why aren't we more productive?" in Salon
http://www.salon.com/tech/feature/1999/08/23/productivity/index.html

words, you both have to go faster to survive, but there is little use in it, because within a short time, everybody else is going at the same speed.

This goes for both physical artifacts and intangibles, for instance information, where the use of computers made information more accessible. The computers has made the access to information much more efficient, but the information has become less valuable[52].

3.3 Technology versus nature

Analyses of technology and time does also often speak about the quality and quantity of the time that is saved. The claim is that even though we now have faster and quantitatively better technologies, they have lower output quality. The slowness that was part of previous technologies actually made the end product better.

The first examples where the timesaving technologies supposedly have made an impact on the quality of a product or a service, is fast food. Fast food is the type of food that many feels is the type of food that is closest to our speed filled culture. The food should be quick to prepare and quick to eat. The success of fast food has been tremendous since the Second World War. McDonalds is today one of the worlds most known brand names, and the fast food industry is one of the worlds largest industries. It is not only dependent upon fast food but also fast infrastructure. The possibilities for transportation, storage and production must also be in a manner that is as cheap and fast as possible, and this means done in as short time as possible[53].

There are also other examples on how the urge to save time has influenced the qualitative content of non-technological things. In the USA there is a system called Soundscan, which is used to examine the sales of CDs in shops. Using this system makes it easy to see which albums that are selling and which are not. The consequence of this is that the record

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[52]Jeff Madrick in the magazine Salon, www.salon.com/21st/feature/1998/04/24feature.html
[53] Schneider, 1997: 87

companies quickly can decide where to cut promotion and instead put their effort into selling another album. This favours albums that sell a large amount from the day they are released, as oppose to albums that gradually pick up in sales. Some go so far as saying 'Soundscan has harmed the most creative side of rock n'roll'[54], because new music does not get the promotion it needs. A piece of time-saving technology has in other words influenced the quality of popular music.

In the case of food it is quite easy to understand the claim that quality disappears with speed up production. However, technology has also increased the speed in other areas, and also here are there claims of lost quality. An example comes from the world of information technologies. Typewriters, computers, faxes and data transmission via telephone lines have all changed the way letters are written and sent. They are easier and faster to write, and especially to send. Some feel that this change necessarily is not good:

> Who knew that the inconvenience of old-fashioned letter-writing provided a buffer? …the unavoidable delays in volleys of business communication before fax, before FedEx, and before E-mail, served as pauses for thought. A lawyer could reconsider a rash piece of mail while it was in the stenographer's out-box. Decisions could ferment during accidental slow periods.[55]

There is a physical resistance to speed in writing letters the traditional way that made these letters qualitatively better than modern faxes and e-mails. The time it took to write the letter meant that the phrases where better thought through, and the slow transportation meant that it was accepted to think matters through before a reply were sent. With e-mail, the reply must be instant[56].

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[54] Gleick, 1999: 141-2
[55] Glecik, 1999: 89
[56] Eriksen, 2001: 82-83

These examples and arguments are part of a modern cultural critique where a central cultural feature is seen as problematic. This is then used as a platform for presentation of cultural alternatives. There are several examples.

One example is an opponent to fast food, so called 'slow food'. This is a movement based in Italy that promotes food that is slow to eat and prepare. The reason for this movement is that the founders feel there is a lack of quality in fast food compared to slow food. From this starting point the movement has expanded and also has opinions about themes such as industrial production of food. This type of food production, they claim, has put quantity before quality, efficiency before taste, and standardisation before diversity, and does therefore make products that are of lower quality compared to traditional farming. Several traditional food products are used as examples as types of food that is not possible to make in a fast way, or which has a considerable loss of quality if so is done. Cheese, wine and beer are examples of such products[57].

The slow food movement is not alone on feeling that food is a part of life where time-saving does more harm than good. This is the issue for Schneider in the article 'Tempo Diet'. He is frustrated about the way food is produced and consumed today. There are no longer any seasonal or local foods, people are separated from the food that naturally belongs in their region. Anything can be purchased anytime, and worldwide transportation and corporations mean that food is the same everywhere. McDonalds is the ultimate example of this trend. Food is now often consumed alone, and what is eaten is ready-to-use products, that according to Schneider, has a lower quality that the original they imitate.

Schneider's alternative is to do something else than seek liberation from time and space through efficiency. He suggests that we should 're-cultivate our approach to space and

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[57] Morgenbladet 27.7.2001; Eriksen, 2001; www.slowfood.com; Newsweek, 2.07.2001; Gleick, 1999: 245-246; Schneider, 1997: 95

time'.[58] That means to appreciate constraints, accept variety, and take the attitude that food is a source of quality, rather than just an ordeal in a hurried life situation. Slowing down is not necessarily what is needed, but '…it is a matter of seeking *appropriate* tempi, that is, speeds relevant to the foods and processes involved.'[59] This will give a balanced 'tempo diet'. What an appropriate tempo is can be decided by such criteria as the flavour or ecological acceptability of the product. Finding the right pace means a rhythmic structuring of life, and this will have many advantages. Waiting time and a slower life will help us find ourselves, and having a better social life.

In the article 'Nonstop Acceleration' Held and Nutziger discusses how the separation of nature and technology is central to problems related to time. People are in trouble because time between activities is no longer seen as time for restitution and relaxation, but as un-economic time that should be used. In this available time we strive to fit inn everything we want to do, or think that we should do. Since we have plenty of time saving devices, we do not have to plan activities or chores in advance, and the paradox of technology and time is the assumed result of this. Held and Nutzinger address one central time problem: Consumption of nature (especially oil) is consumption of time, both the time of the past and the time of the future. This means that we are actually time thieves, and steal a too large part of the time that is available for humanity. Their answer to these time problems is sustainable development, where they say that '…the natural rhythms of reproduction – of our inner and outer nature – [is] taken into account again in the economic scheme of things.'[60] Modern humans should rediscover a life in harmony with our rhythms, rather than living a life filled only with efficiency.

In these examples, technology has in some way departed from what was natural, and people have to pay the price for this. More examples are available, and the type of technology

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[58] Schneider, 1997: 94
[59] Schneider, 1997: 87
[60] Held and Nutziger, 1998: 218

most frequently referred to is information and communication technologies. The starting point is what can be called "the technical aspect" of the technologies. Computers are today extremely much more powerful than the human brain on some areas. Every PC can perform complex calculations at a speed that is impossible for humans. The computers can also have control over a far larger amount of tasks, for instance controlling several machines at the same time, than any person can. The machines are so fast and 'intelligent' that people can be left to be second-class information analysts and maybe even citizens in their own society. This is not only a concern about the future, but also about the present, because we are out of touch with nature. Social critic Jeremy Rifkin writes:

> As the tempo of modern life has continued to accelerate, we have come to feel increasingly out of touch with the biological rhythms of the planet, unable to experience a close connection with the natural environment. The human time is no longer joined to the incoming and outgoing tides, the rising and setting sun, and the changing seasons. Instead, humanity has crated an artificial time environment punctuated by mechanical contrivances and electronic impulses: a time plane that is quantitative, fast-paced, efficient, and predictable.[61]

The above statements implies that there was a past with a natural time that we now have left. The machines we have built have passed the limits that biology has put on humans and animals. This separation means that natural fatigue and tiredness is no longer existent, such as it would for instance in horse travel. This makes humans stressed and uncomfortable, and there are calls for new limits[62]. Worse is the fear about how this division will develop. High profile physicist Stephen Hawking voices this concern when he states that: 'Computers double their performance every 18 months. So the danger's is real that they could develop intelligence and take over the world.'[63]

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[61] Rifkin, 1987: 12, in Adam, 1990: 104
[62] Peters (on Sachs), 2000: 133
[63] Newsweek, 17.09.2001

3.4 Speed in technology

> You can't stop or I might pass you,
> If you slow down I will outlast you…
> Can you make this thing go faster?[64]

Do problems in the relation between technology and society appear because things or technologies are going too fast? Among many there is a growing feeling that things in general happen too fast. There is a feeling that things happened at a slower pace before, and that the new speedy way is not a good way. All types of technologies, from transportation to domestic, do go faster than ever before. The development of transportation technologies can serve as one example.

Increase in speed seems to be the driving force in transportation development. The railway can be considered the major changing point of speed in modern transportation. With the building of tracks and development of steam engines, travel became possible at speeds previously impossible for humans. This development is even clearer with the car. Once there was developed a system with drivable roads, service stations and reliable cars, one of the aims of the car manufacturers and car users became faster transportation[65]. When more and better roads where constructed, larger engines utilised, and safer cars became available, travel times could be shortened and new distances could be covered by every car owner. When it comes to air travel the time saving advantages are clear. A good example is cross-Atlantic travel. Journeys that took weeks with boats, can be covered within hours by an aeroplane.

The entire system of machine-driven travel does have higher speed in its core. This does not only count for the machinery itself. A huge number of tunnels, bridges, channels and roads are build each year to save the time of travellers. The quest for gaining time lies in all

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[64] The Black Crowes, "Go Faster" from the CD "By Your Side" (1999)
[65] Peters, 2000: 143

turns that are straightened, each tunnel built through a mountain, and every expansion of railways from one to two tracks.

Transportation is a field where speed is an obvious part of the development and everyday use. But there is also other fields where speed has increased with the aid of technology. Within domestic technologies increased speed has been an important part of the development. Machines used for household chores are built to ease the workload, and time saved is an important part. The vacuum cleaner is faster than the broom, and the dishwasher does the dishes for you, so you can do something else instead.

This development can be found in almost every area where technology is involved. If it is possible to make something that saves time and speeds up a process, it is done. Two small, but famous examples are the door closing button in elevators and the traffic light button. The door-closing button closes the elevator door quicker than what it automatically would do. The gain can be measured in seconds, yet the paint on the button is often worn out because of heavy use. The button for pedestrians on traffic lights has the same function, and the amount of time saved is also here very small. Once again it is a frequently used button[66].

But the critics of the speed in machines do not only say that there is a need for limits but also points to a related paradox that allegedly comes from the increased speed: We have smarter technology than ever, but humans are becoming stupider than ever. This has by Langdon Winner been named the "paradox of intelligence" and is then seen as one of the large unwanted and unintended consequences of the information age. Even when the new ICT is used to learning, humans seem to be sliding downwards on the intelligence ladder. Much of the technology is made to facilitate stupider users; an example is cash registers with pictures of the goods instead of numbers. It is also likely that this development will continue, as Winner writes, because "...it's clear that as the Information Age matures, growing numbers in

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[66] Gleick, 1999: 23-30

our population will approach the world in a state of increasing incompetence and bewilderment."[67] The technology is exceeding the users and even the seemingly good consequences of the quick technology, easily changes into a negative turn for the users. The newspaper columnist Leonard writes:

> If it is true that hours spent on the net are often hours subtracted from watching television, one could argue that the digital era has raised the curtains on a new age of literacy – more people are writing more words than ever before! But what kind of words are we writing? Are we really more literate, or are we sliding ever faster into a quicksand of meaningless irrelevance, of pop-cultural triviality-expressed, usually, in lowercase letters, run amok? E-mail is actually too easy, too casual.[68]

The technology in itself is making us stupider. Once a technology with a more comfortable solution is available, we cannot resist it and we then loose some of our knowledge and competence. Because the technology helps us remember telephone numbers and other types of information, we do not exercise our brain with it anymore. We are no longer able to remember birthdays, spelling, appointments and phone numbers, and are in a general state of amnesia.[69, 70]

Because these technologies often are linked in networks, that are made possible by technological development, there is an additional effect. It is possible to transfer information much faster than anytime before, and the distance does not matter any more. E-mails and faxes are instantly received anywhere in the world. Combined with the huge distribution that information technologies have, the possibility of exchanging of information seems endless. The amount of e-mails and SMS messages has in very short time become enormous.

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[67] Winner, 1994: 192-193
[68] Leonard, 1999 *We've got mail – always* in Newsweek October 11, 1999.
[69] Gergen, quoted in *"mobiler og PC'er gjør oss dumme' (Mobile phones and PCs make us stupid),* VG 11.08. 2001.
[70] This complaint can also be found in literature. In 'Fury' (2001) by Salman Rushdie, the main character voices the feeling when he says: 'The speed of contemporary life, ...outstripped the heart's ability to respond.' (p. 228).

Here lies the core of the problem that technologies go to fast. The speed in the technologies has made it possible to do too much too fast. It is so much speedier to send e-mails than write letters that it is done extremely more often. This leads to information chaos. From having few and local sources of information and contact with the surrounding world, there is now no end to when or where the phone, fax, computer or pager rings, beeps or plays a merry little melody. The information flows everywhere and there seems to be no stopping it. The modern culture shows a darker side in this information chaos. In his book about speed in modern culture, the writer James Gleick writes: 'This is the Information Age, which does not always mean information in our brains. We sometimes feel that it means information whistling by our ears at light speed, too fast to be absorbed'.[71] The speed has made it impossible for humans to handle all the information[72]. These are examples of analyses where technological development disturbs human life and human time.

3.5 Speed in Culture

So far we have seen that technologies actually go faster, but that this has several unintended consequences. The speed and capacity of the machines, some claim, has made us stupider or drowned us in unwanted information. This takes away time that was saved. But the analyses of technology and time do not only focus on the technologies. There seems to be something in our culture that fosters and nourishes the speed that we put into our technologies. Many have called this a 'culture of speed'. As illustrated above, much development and use of technology is related to increased speed and time saving. As students of STS we know that a technology is far more than the technical[73]. What determines the goals and objectives humans have when they develop technology must surely be found in their culture. Technologies are made to go

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[71] Gleick, 1999: 87
[72] Barber, 2001: 42
[73] Asdal et al, 2001

faster because we want them to go faster. If we wanted slower technologies, technologies had been slower.

Is then the paradox of technology and time a consequence of a 'culture of speed'? Some think so, and say that we have a culture where there is 'time to do everything except think'[74]. Our culture may well be all speed: "Speed is not a product of our culture, our culture is a product of speed".[75] Others call the time we live in an era of instaneity[76]. There are several examples of a culture that nourishes speed and uses every potentially time saving technology a soon as possible.

This notion of a speed-up culture leads some writers to call for a change in time use and time in general. They make calls to 'take time back', or to have a technology-free day each week[77]. Books are written where an alternative time and technology use is proposed[78]. Conferences dealing with 'selective slowness' is held[79]. The Norwegian social anthropologist T.H. Eriksen promotes the concept 'slow time'. Slow time implies that public places should be free from mobile phones, city planning should focus on slow architecture (small streets and narrow roads), there should be e-mail-free months, and the press should write about serious issues in a slow and sober way[80]. This is his solution to what he sees as large time/technology problems in everyday life. Projects like these are popular, the book in which the idea of 'slow time' is presented has been a best seller, and the media attention has been large in Norway[81].

Others also pick up these very down to earth changes. A Danish advertising firm have a five-hour e-mail-free period during the day. The employees need to focus more on their tasks,

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[74] Brooks, Newsweek 30.4.2001
[75] Schwartz in Peters
[76] Baumann, 2000: 128
[77] Johansen in Morgenbladet 17.8.2001; VG 13.08.2001
[78] For instance: Bodil Jönsson: Ti tanker om tid – Til deg som har alt unntatt tid (Ten thoughts on time – For the one that has everything but time), and Anders Johansen: All verdens tid (All the time in the world)
[79] See for instance www.doorsofperception.com
[80] T. H. Eriksen, 2001: 198-210
[81] Herbjørnsrud in Aftenposten 29.12.2001

and they where stressed by the huge amount of e-mails arriving all the time[82]. Some projects of this kind are even quite large. Related to the slow food movement, there is also a project called 'slow cities'. So far 33 cities in Europe has agreed to build more pedestrian streets, put emphasis on local tradition, ban car alarms, lower the speed limits and in general act in a environmentally friendly and ecological way[83]. In Norway, a project named 07-06-05 involves academics, business and environmental organisations. Their aim is that Norway in 2005, hundred years after their liberation from Sweden, once again shall be liberated, this time from stress and pressure[84].

These analyses put emphasis on a culture where speed and timesaving is valued. The paradox is the major unintended consequence of this culture, and the alternatives presented are based on a hope that a better alternative, without negative side effects, is possible.

3.6 Time in social scientific research

In this part of the chapter I will present the main points in social scientific research and reflection on time. There are two reasons why I do this. The first is to give an overview over the academic area that deals with time. I will account for the main discussions and criticisms. The second is to see in what way technology is included in time analysis. Can social theory about time say something more, or analyse the problematic situations that involves technology and time in a better way? Is the time understanding that give us the feeling of less time despite the timesaving technologies, reflected in theory about time?

Before I go on with the description of time in social sciences, I will make some comments on the common claim that time is neglected in social sciences. Nowotnoy discusses this in her article 'Time and Social Theory'[85]. She writes that this claim is absolutely false. Once you

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[82] Dagbladet 17.5.2001
[83] Herbjørnsrud in Aftenposten 29.12.2001; Newsweek 2.07.2001
[84] www.070605.com; Dagbladet 7.6.2001
[85] Nowotny 1992: 423. She also comments briefly on it in Nowotny 1994: 7.

start looking around for the category 'time' in articles, books and papers, you will find that the available material is huge. Nowotny then proposes three explanations for the continued existence of the claim of neglect, despite the amount of work in the area. The first possibility is that authors make this statement so that they can avoid relating their research to the existing material[86]. The second possible reason is that there is such a high diversity in the field, that it is problematic, if not impossible, to know what is written. The third explanation is the tradition within social science to build own theoretical constructions. This tradition emphasises wide reaching analyses based on concepts made by the author, rather than cumulative theoretical development among authors.

The second point Nowotny makes, the high diversity, is where I will start. The task "write a brief article that summarises research on time in social science" should make any researcher flee for his or her life. It is practically impossible to give any full account of the area because of the diversity, both in approaches and analyses[87]. First there is a large amount of different terms used to explain time and its relation to the social. Is time a relation? Is time a resource? Is time a process? Is time an experience? [88] Or is time all of the above at the same time?

This diversity in terms can come from the fact that the question about the essence of time also is reflected upon directly or indirectly in social science. The varying understandings of time are again related to where in the analysis time is placed. Is it a basic term that has to be understood to understand all social life, or it is one of many aspects of the social? The aim of the analysis will also vary and thus different concepts of time will be used. Finally, the background of the author will influence the focus and time understanding used.

In the article 'The Problem of Time in Sociology', Bergman discusses the consequences of this lack of interconnectedness in time studies. He writes that there are few possibilities to make connections between the different studies, and thus few ways to criticise them. This is a

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[86] This point is also made by Bergman 1992: 82
[87] Adam 1990: 13-14
[88] Elias in Lash and Urry: 234; Silverstone, 1993: 289

hindrance for cumulative research, which is vital for any field to develop[89]. The lack of content is generally seen as one of the biggest problems for anyone studying time in relation to societies[90]. This causes quite some frustration and confusion: 'There is no warning for the unsuspecting researcher. There are no signposts for orientation in this maze of conceptual chaos'[91] is for instance what Adam writes about the impression one is left with after some reading about time and societies.

Some have however been brave and written review articles and books. Most important are Bergman (1992) 'The Problem of Time in Sociology', Nowotny (1992) ' Time and Social Theory', Adam (1990) 'Time & Social Theory', and Adam (1995) 'Timewatch'. Based mainly on reading of these I have found some converging points in the field. I will here describe how research on time has studied time as a contrasting element between cultures, and ages, time as a social construct, and time as an economic entity[92]. These are reoccurring themes that show how time is studied.

3.6.1 Time as contrasting element between cultures, and periods

One of the more common types of studies of time in societies has been the investigation and comparison of time in different types of societies and at different times[93]. These studies often describe the difference in time experience and time praxis[94]. One example is Bourdieu's study of the Kabyle in Algeria[95]. Here he presents how the peasants act and reflect on time. They seem to have no future perception, and live a rhythmical life based on their ritual calendar. The world consists of a set of opposing elements: Night and day, winter and summer, wet

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[89] Bergman, 1992: 82
[90] See for instance Lash and Urry, 1994: 223
[91] Adam 1990: 15
[92] There are many different ways of dividing time studies, Bergman (1992) identifies six themes, and Nowotny (1992) lists 13 themes, but I have found these points to be of central importance to the understanding of the paradox.
[93] Korsnes et al, 1997: 325
[94] Bergmann, 1992: 101, 118
[95] Bourdieu, 1963

season and dry season, and so on. Time is perceived in this manner, as reoccurring with the events, such as markets or the harvest. There is also a general indifference to time and punctuality, and there are no precise appointments. The Kabyle lives in a time culture completely different from ours. There are plenty of studies of this kind, but this one example is sufficient here[96].

These studies have focused on the organization and experience of time in different societies and cultures. Differences are often presented as dichotomies, where our time is compared to the time of those studied. Adam has collected the most used dichotomies of this kind[97]:

'Our' times	*'Other' times*
Linear	Cyclical
Irreversible	Reversible
Changing	Stable
Quantitative	Qualitative
Clock-based	Task/event based
Calendar-based	Nature-based
Abstract measure	Ecological measure

The most common and famous distinction is between linear and cyclical time. Cyclic time is the time of nature, a time that is lived and experienced with the rhythms in nature. The events that constitutes time is qualitatively different and do each have their own quite specific features. Linear time is our modern and abstract notion of time. Time comes from somewhere, and is going somewhere. Time is measurable and comparable; the focus is on the future, since

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[96] For reviews of this type of studies, see Adam, 1995: 32 and Bergman, 1992: 94
[97] Adam, 1990: 29-30

this is what happens next[98]. This separation is not only given for different cultures, but it is also used to compare our past time with our previous time. It is for instance claimed that the time orientation in the Middle Ages was cyclical, as opposed to linear today[99].

Based on the observation of different time in societies, there is an understanding of time as something basic for any societal form. Since there is such variation in time, it is often used as one of the elements that decides how or what a society is. Time is used as 'societal definition', where the existence of one type of time, or the change of main type of time, is the evidence that a society is 'modern', 'pre-modern', or 'post-modern', or any other label given to a specific society. This is often linked to changes in other parts of society, such as the family, production, science, and technology. However, the technology referred to is usually technology that has a direct link to time, such as clocks and calendars. Their development viewed both as an example of, and as artifacts that gave way to abstraction and measurability of time[100]. The time we have in our modern societies has developed from a rhythmical time to an abstract entity. 'Modern' societies is thus defined by having a time that is linear, measurable, economic and abstract, as opposed to 'traditional' societies where time is cyclic and rhythmical[101]. Two recent examples of research with this focus are the works of Castells and Bauman. Castells sees a movement away from time related to the rhythms and seasons to an abstract commodity as a major feature of what he calls the 'network society'. Especially important is the breaking down of rhytmicity[102]. Bauman defines our society by how we use our time, and calls it an 'age of instanity'[103].

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[98] Korsnes et al, 1997: 325-326
[99] Aubert, 1987: 243
[100] Held and Nutziger 1998: 211; Lash and Urry 1994: 227; Lee and Liebenau 2000: 45
[101] Korsnes et al, 1997: 326
[102] Castells 1996: 446
[103] Bauman 2000

3.6.2 Time as a social construct

The basic assumption that is included in almost all social research on time is that time is a social construct. This means that there is one time that is 'social' as opposed to time in biology, physics and other sciences[104]. Durkheim articulated the idea of time as something social. Based on observations, his claim was that it was social activities that make time. This time is a collective feature of the specific society, and not something personal. Sorokin and Merton, stating that social time is used for social coordination, and that it is heterogeneous, developed this analysis[105]. It is easy to understand and agree with this stand if we look at some most common and everyday parts of societies that relates to time. Weeks, hours and minutes are all social constructions[106]. Any distinction between something 'fast' and 'slow' is also decided socially.

This social time is a long-standing type of time, but most importantly is it our modern time. Gradually there was a change in time use, most clearly seen with the introduction and spreading of calendars and clocks. The main change was from an orientation towards time that was centred on tasks, to an orientation where time became abstract, theoretical and economic. This change was in no way purely technical; it was also driven by what Weber called the protestant ethic. The standardisation of international time zones is a good example on how time became constructed on a macro level, because of the abstraction in everyday situations[107].

This understanding of time is what we find if we look in social scientific dictionary for a definition of time: 'In sociology time is understood as *social* time, as a structuring category in

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[104] Nowotny 1992: 421; Lash and Urry 1994: 224; Lee and Liebenau 2000: 46
[105] Nowotny 1992: 422; Bergman 1992: 83
[106] Sorokin and Merton in Bergman 1992: 85
[107] Lash and Urry: 227; Adam 1990: 116; Lee and Liebenau 2000: 45

social life'[108]. Time as a social construct is frequently used as a starting point for analyses and is by many accepted as the right understanding of time in a social analysis[109].

The notion that time is a social construct is included in the long philosophy of time, taking the stand that time is not something given in advance. Kant has articulated the idea of time as an a priori category, and a social constructivist view on time rejects this[110]. This is important, because it establishes social time as something different from other types of time, and as something that changes[111].

3.6.3 Time as economic entity

Perhaps the most apparent and important issue related to time is its relation to economics and its comparison to money. Once again this is part of a long history. Time used to be understood as a gift from God, but has always been used in an economic way[112]. Calendars and clocks are examples of a rational and utilising way of treating time. In modern times this link became explicit. Time, like rest of nature was a resource that should be used in a rational and effective way. The famous quote 'time is money' was written by Benjamin Franklin when explained just this. A man that did not work was actually losing money, because the resource time was left unused. Unlike other resources time has to be used here and now, so there is no room for laziness[113]. Capitalism manifested the use of time as a resource, as the way to make a large profit was to produce more in shorter time, and preferably more than your competitors[114]. This time is seen as time in itself and is rarely questioned.

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[108] Korsnes et al 1997: 325, my translation
[109] Lee and Liebenau 2000: 44; Nowotny 1994: 7; Silverstone 1993: 288
[110] Lee & Liebenau 2000: 46
[111] Nowotny 1992: 422
[112] Held and Nutziger 1998: 211; Adam, 1995: 89
[113] Held and Nutziger 1998: 211
[114] Adam, 1995: 91, 100, 105; Adam, 1990: 113

Studies of work and production have because of this often been about time. The change in their aim and attitude is profound, from Taylor's work on 'scientific management', to contemporary studies of stress[115].

Economic time has become so important that it is the one dominant time, not only in production, but also in all other areas of life. The view of time as an economic commodity is the underlying logic when there is talk of profit. This is not only valid for production but also for consumption and household. We see this in the paradox, and this argument is shown in studies from many areas: The many time saving devices bought by households after WWII[116], observations that social life is 'timed social life'[117], and that leisure is planned, 'rational recreation'[118]. Adam pinpoints this when she writes that time without money value is seen as suspect time. It is unproductive, or even worse, wasted[119].

3.7 Analysing the descriptions

Through this chapter I have shown the time and technology understanding involved when the paradox is presented and analysed, and I have given a brief overview on important areas of research on time in social science. It is now time to look more into this information, and see what it tells us.

The descriptions of the paradox and the analyses surrounding them are all quite similar. They are based upon the same time and technology understanding. First, the elements that are discussed (humans, technology, time) are kept separated. One has an effect on the other, or there are errors within each element that lies behind the failure to save time. The technology is expected to work as intended, in an instrumental way where it does the time saving for the

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[115] Jary and Jary, 1999: 577; Adam, 1990: 113
[116] Held and Nutziger 1998: 217; Schneider 1997: 89
[117] Adam 1990: 104, 120
[118] Lash and Urry 1994: 226
[119] Adam, 1995: 99

humans. Time is a resource that can be used, and if we use less of it then there is more to spend.

There is not any discussion about the time understanding in theses analyses. Time is taken for granted as a pre-given entity. The language that is used to describe time is not discussed either. The language we use to describe, analyse and define an area is very important, because this to a large extent becomes the area itself. This is especially important for concepts with abstract features, such as time. To a large extent, language is what constitutes time[120].

The reason why this is important to remember is that it makes it clearer that the suggestions for a change in time and technology use are political statements. Here the paradox is used as a proof that something is wrong between technology and humans, and then to point at other features of society that is to blame (culture or technology). It is in other words presented as the explanans (it explains that something is wrong), rather than being looked at as the explanandum (the subject that needs to be explained)[121]. Because of this it is used politically. The political proposals are numerous. We should slow down, take time back, build slow cities, eat slow food, be reluctant to use e-mail, and have a balanced tempo diet.

I have now made the connection between time and its surroundings (technology) explicit. In the analyses it is the mismatch between the various elements and their promise that causes a situation like the paradox. In my opinion, the unquestioned language (where time is a resource in economic terms) is a necessary condition for the analysis. Combined with the instrumental expectations to technology, these are two features that need further explanation.

The time in the paradox is a conflict between the rational and measurable time, and the time in the situations. The abstract time is separable from the activities that take place[122].

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[120] Adam, 1990: 89
[121] Jary and Jary, 1999: 216; Bijker, W. 1995b: 13-14
[122] Giddens in Lash and Urry, 1994: 230

Since we believe the abstract time to be our time per se, there is a conflict when this time does not match the experienced time, the time in the situation.

Figure 3.1 The discrepancy between analytical time and experienced time

Time theory Time abstraction Time understanding	Economic, clocks, calendars
	↑ Conflict ↓
Time experience	Situations, relations, objects

The abstract time is 'empty'. It is blank like an unused calendar[123]. Time as we experience it is anything but empty. It is filled with other people and objects. This influences our time: How fast is the cashier? How many people are there in front of you in the queue? How long does the red light last? Will a bridge be built or do you still have to use the ferry? Technology does not only fill up our space, but also our time.

In the academic research, there has been much debate on the central features of time studies. Since time studies is such a wide theoretical and analytical field, it is hard to find 'schools' or 'approaches' that are opposites or follows in a direct development. However, all the previously mentioned analyses have met criticism.

The concept of socially constructed time is disputed. The most intriguing question towards time as a social construct is the simplest one: If it is that simple, why is time such a

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[123] Giddens in Lash and Urry, 1994: 233

challenge?[124] If time is a result of our intended and unintended actions, it should be quite easy to analyse, and act upon. As we know, time is not easy to analyse, and certainly not easy to do something about. Another point that is a challenge for the idea of time as social construct is that it rarely is constructed. Adam writes: 'It is quite apparent that very few identified sources of time are social constructions in the conventional social science sense. It is only their symbolic meaning which is always socially constructed.'[125] The way we measure and experience time is mostly natural. Years, months and days are all physical incidents. Hours, minutes and seconds are finer measurements of this. It is only weeks that are purely social[126].

Here we see the analytical problem that challenges socially constructed time. It maintains the separation between culture and nature, and is unable to grasp the time that is embedded in nature and the artifacts that surrounds us[127]. Social time has no room for time in nature. Time in nature and the physical environment is seen as unidirectional and as the flow in which our activities happen. This understanding and separation does not see the interdependency of humans and nature when time is involved[128].

Time studies of other cultures and other times are not free of criticism. The main challenge is that this research shows the time of 'others', but leaves 'our' time unquestioned. Adam writes that this is one of the largest problems with any time study. The base for our own time understanding is not discussed, but is used as background for comparison[129]. As Adam shows, the times of the others are described as what they are not, based on a contrast to our time. Bergmann also questions the use of dichotomies for creating stereotypical pictures of societies, and Adam writes that they maintain an unnecessary division[130]. She points out that

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[124] Adam, 1990: 42
[125] Adam, 1990: 44
[126] Lash and Urry, 1994: 234
[127] Nowotny, 1992: 422, 429
[128] Lash and Urry, 1994: 236-237; Adam, 1990: 126
[129] Adam, 1995: 30-33
[130] Bergmann, 1992: 94

most of our everyday experience is both cyclical and linear, working is for instance a linear development, but often happens at the same place, together with the same people.

The separation between cyclical and linear is based on the idea that time can be separated into past, present and future. Linear time happens in the present and is oriented towards the future. Cyclical time is not future oriented, there is a re-occurrence of the present. However, as Bergmann points out, in some cultures the past-present-future scheme does not exist, and it is therefore inappropriate to analyse or judge these time systems based on our scheme[131].

The focus on time as money is also criticised. Any study of time has its limits, and in some cases the scope should be economical. The problem that has arisen is that the economic time has become so dominant that there seems to be little room for other types of time. As researchers on time show, such as Glennie and Thrift, there is no one time[132]. Time is lived and experienced in a multitude of qualities and quantities, and economic time is therefore just one of many times. There is a discrepancy between one-dimensional time in studies and multidimensional time in social life[133].

3.8 Consequences of the analyses

In the first analyses the separation between 'humans', 'time' and 'technology' was complete. Especially technology is assumed to be context-free and instrumental. Time is given a history, for instance our 'culture of speed', but technology is not thought to interact with this time. Time is also analysed as a commodity that is to be used. The question is only how to adjust our use ('slow down', 'rhythmic') so the consequences are perceived are better.

In the analyses, the paradox is a situation that is highly dependent on some quite specific features that the elements it consists of (humans, time, technology) is believed to have, and how the relation between these features is thought to be:

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[131] Bergmann, 1992: 93
[132] Glennie and Thrift, 1998: 3
[133] Adam, 1990: 12; Adam, 1995: 21

1. One type of time (economic)

2. One relation to time (measurable, a resource to be used)

3. One relation to technology (instrumental, shall work as planned)

The result of 1, 2 and 3 is 'time-saving technologies' and later on 'the paradox', as a mismatch between 'time' and the 'time-saving technologies'. The analyses do therefore focus on how to do something about the social (our economic attitude towards time), or the technology (it goes to fast), but does not manage to incorporate both. The paradox as a statement is thus still unresolved. The reason for this is because the elements are not investigated further and are thought only to have one appearance or function.

The academic critique stated that it is not enough to analyse just one type of time. There are many other types of time than the economic, and these should be included in analyses of time. There is also a need to develop analyses of time and technology that takes our unquestioned understanding into the picture, since this is so important for both elements. The analyses so far are often asymmetrical: They do not question 'our' time, or our understanding. This is important because language and understanding is such a significant part of any study that involves time.

It is also important to remember that time is not only a social construct. Technology is part of time in a quite different way than as clear cut time saving artifacts created by humans. Technology is also in time studies 'the missing masses', as Latour has pointed out. A holistic approach is needed to deal with the challenges in time studies.

In chapter 4 I will try to bring technology into the time analyses by applying the principle of symmetry. This means accounting for the history of technology and time together. In this way the analysis can show the interdependence of all the elements. I will also show their close connection through the use of the term embodiment, and by showing this I also open the black box of the technologies involved.

3.9 Summary

- Analyses that relate to the paradox claim that technology goes too fast, that our culture is speed obsessed, that technologies make us stupid, and that there is a separation between technology and nature that is harmful.

- Time in these analyses is economic, abstract, blank, and not questioned.

- Technology is only discussed as something 'gone wrong', and is believed to be purely instrumental.

- The paradox is presented as a result of either technological failure or social failure.

- Social scientific studies of time are extremely diverse, both in approaches, analyses and terms.

- Time has traditionally been seen as a social construct.

- Studies have often focused on time as a contrasting element between cultures and periods.

- Economic time is dominant both in production and everyday life.

- Time is by many authors seen as a basic category of the social and is for that reason important for social theory.

- Criticism to these analyses are:

  - Separation is maintained through dualisms: Time is 'blank' a field/area not in contact with others

  - Time in artefacts is not grasped

  - Time of others is questioned, but our time is not discussed, language and metaphors are taken for granted

  - There is a one dimensional time in theory, but many times in social life

  - Technology is missing, or to say it with an STS language: It has been black boxed

4 ANALYSIS

In this chapter I will present three analytical points and tools from the STS field, that in my opinion can help untangle and open some of the problems related to the traditional time understanding. The three points are the principle of symmetry, inscription or embodiment, and the un-black boxing of technology. These points will be analysed and illustrated with examples throughout the chapter.

This presentation is the answer to my second research question: Is an alternative understanding of time and technology possible, and if yes, can this be used to analyse situations where time saved by technology is lost? The question arises because there are areas in the analyses that seem problematic. This is the one-sided, economic time, the instrumental view on technology, and the failure to see the interconnectedness between humans, time and technology. The link between the themes in the previous chapters and the proposals in this chapter is illustrated in table 4.1.

Figure 4.1: The connection between research question 1 and research question 2

Analyses and understanding of time and technology (research question 1)	Problematic area/ Questions not asked	The possibilities in an alternative analysis/STS (research question 2)
Time is economic and abstract	Many times exists	Symmetrical analyses
	Time is filled with objects	
Technology is instrumental		
	History and relation to other elements is not included	Embodiment
Humans, technology and time are separated		Open the black box of time and technology
	The base for our assumptions is not discussed	

This chapter is a proposal for, and an introduction, to important elements in an alternative way of analysing time and technology. Hopefully, this might fill some of the gaps in the analyses we have seen so far. I do not present a 'solution' to the paradox of technology and time, or a 'theory' about the issue, but try to see if STS insights might add something to time studies. This chapter will focus around an alternative time understanding and analyse. In the introduction and methodology I presented an STS view of technology, with a special emphasis on its interconnectedness to society. In the analyses we saw that this is a theme that is usually not very well covered. The STS understanding of technology is an alternative to this, and is incorporated in this chapter.

4.1. What is symmetry?

The principle of symmetry is a methodological principle introduced by Barry Barnes and David Bloor in the sociology of scientific knowledge. This is an academic field that studies how scientific knowledge comes into being and how it is validated and maintained by social relations[134]. They wanted to study scientific knowledge with the basic assumption that every statement should be treated as equally problematic, with regards to its origin and causes for credibility.

As the STS field developed, the symmetry principle became important also in technology studies. This is because it gives guidelines on how technology development could be studied. It has been developed and used by two approaches within STS, namely the Social Construction Of Technology (SCOT) and Actor Network Theory (ANT). There is some difference between the two camps, and there has been an angry debate over how the

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[134] Barnes and Bloor, 1982: 23

symmetry principle should be modified[135]. The SCOT approach defines symmetrical studies as:

1. Impartial to a machine being a success or failure.

2. Symmetrical with respect to explaining success and failure.

3. "Working" is the result, not the cause, of a machine becoming a successful artifact.

Within ANT, the principle is pushed further, because it also touches our basic assumptions about what is human and not, and defined as:

1. Impartial to an actor being human or non-human.

2. Symmetrical with respect to explaining the social world and the technical world.

3. The distinction between the technical and social is the result, not the cause, of the stabilisation of sociotechnical ensembles[136].

In my opinion, studies of time and technology will benefit hugely on applying a principle of symmetry in studies. This is because symmetrical analyses give new insights into what technology is and how it comes into being. In the book 'Of Bicycles, Bakelites, and Bulbs' Bijker (one of the SCOT creators) shows that what we think of as the best bicycle, was in fact viewed as anything but good when it was developed. To us, it seems natural that a bike with two equally sized wheels and chain drive is better than one with a huge wheel and one very small. When bikes first where used, they where used for showing off in parks by young men. This was best done high on a bike with a large wheel. The bicycle we see as ordinary today, was judged to be unpractical and stupid. The different types of cycles existed side by side, and Bijker shows how their development was influenced and shaped by the different groups who

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[135] The debate focused around epistemological issues, where one side claimed that the ANT influenced use was giving the experts on technology the final word (Collins and Yearly, 1992). The answer from Callon and Latour (1992) was to say Collins and Yearly reduced technology to social relations.
[136] Bijker, 1995b: 275

used them. Technology must therefore be seen as result of social and technical changes, not only of engineering and design[137].

In the following I will try to show how the two first ANT developed principles and the third SCOT principle can be used on time. The idea of symmetry has some support among researchers who work with time. Without using the term symmetry, Adam proposes the use of symmetrical studies when researching time. She writes that the background for our understanding should be given the same attention as what we are studying. For Adam this means to use our everyday knowledge about time, find the sources for the metaphors we use, and to study the technology and artefacts that influences our understanding of time[138]. This is because time is just as complex as technology. When researching technology and time, both should be approached with the same methods and terms.

4.2 Symmetry on time

4.2.1 Human/non-human

As pointed out earlier, the technology and time understanding that is necessary for the paradox implies a separation between the elements involved in a situation. In the paradox these elements are 'humans', 'technology', and 'time'.

Figure 4.2: The elements in the paradox

H = Human

NH = Non-human

      NH   H   NH   NH   H

The more time we save by using time saving technologies, the less time we seem to have.

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[137] Bijker, 1995b: 19-100

[138] Adam, 1995: 34, Adam, 1990: 46

The elements are here given specific features in advance. Time is treated instrumental and as a resource, humans want to save time, and technology is supposed to work within the time frame as an economic time saver. The situation in itself is actually not analysed in a good way because this separation is upheld. The elements are treated differently, because they are thought to be different. Further on, their separation is complete before they meet each other in a situation, for instance one that creates the paradox.

If we try to be impartial to an actor being human or non-human, new questions and analytical points surfaces. First of all it seems difficult to remove a boundary we are so accustomed to. If the boundary is removed - is then not causality also removed? Does not the paradox then become an invalid statement? My answer is that it is clearer to see that the paradox is a statement about time and technology that is based on quite specific assumptions about the parts included. This gives the possibility of asking questions without the taken for granted assumptions. Examples are:

- What is time in the paradox and why does it not work?

- If time is something else than the container that the situation happens within, how can it influence the situation?

- Where does time come from in this situation?

4.2.2 Symmetrical with respect to explaining the social world and the technical world

To answer the new questions the second ANT principle can be used. This is that studies should be symmetrical with respect to explaining the social world and the technical world. Since the time understanding in the paradox is based on a separation of the elements it does explain the elements in different ways. The best example of this is the analyses that either gives a social or a technical explanation for the paradox. These analyses are then used as

platforms for launching corrective political actions aimed either at the technology or the culture.

Because of this different treatment of the technical and social elements of the paradox, these analyses do not give any new insight. The paradox is used as the proof that something is wrong, rather than the situation that needs explaining. Further on there is some circularity in these analyses, because they do not move beyond the paradox. The paradox is the starting point, but also the end point, as it is given the role of evidence.

If we apply the same methods and terms to both time and technology, a better understanding of the situation is possible. This means investigating how we understand our time, why it is thought of in terms of an economic entity, how this influences technology development, and try to seek out why time is not working as planned, regardless of the type of involved parts, technical or social. The history of the technology involved must be traced to see the social processes involved, and the social definition of time related to this technology. These questions are frustrating and seem large, but a good way to move beyond the pre-given features attributed to the elements. An example of this will be given later. There I will investigate how time is inscribed into an artifact, and how this makes it difficult to get any answers if separate methods and terms are used for the social and the technical.

Figure 4.3: Ask the same questions for the social and the technical

Theme	Time	Technology
Ordinary situation	What are the historical reasons that make time 'work'?	What are the historical reasons that make technology 'work'?
Breakdown	Why does not time work?	Why does not technology work?
Actors	Who decides/has power to state what is an ordinary situation and what is a crisis?	

As show in table 4.3, questions can be asked both about different types of situations (ordinary, breakdown) and about who is involved (actors). Since technology studies has show the reason that a technology is perceived to not work, can be anything but technical (cf. the modern bike that did not work very well at first), it is possible to assume that the same can be for time. To figure this out, we must go back and ask how did technology become timesaving? We must also ask what makes the technology 'work' as timesaving.

4.2.3 Why does time work?

The third symmetrical principle of SCOT claims that: "Working" is the result, not the cause, of a machine becoming a successful artifact. This is because no machine is working independently of the social. It is through its social design and use that it does work, and is defined as a success or a failure. What we might think is a better solution *in itself* is previously or somewhere else viewed completely different. It is therefore possible to translate this postulate to specifically treat time:

> *That time is "working", is a result of relations and practices, not a cause.*

Time is not given to us as a resource that has to be divided up in the way we do, or to be saved for us to use it to something else. Time is what comes after countless negotiations among the actors defining our world. This is you and me, the designers of artifacts, and in this sense; also the artifacts themselves.

Previously I have written about the many different opinions about what time is and how time works. In the paradox statement this is reduced to one type of time, the economic time. If we turn this time understanding up side down, a different picture of time and technology appears. Up side down is here to look at time not as a given entity that works in one way.

Time is a fragile alliance carefully built up by varying pieces. This is everything from our scheduling of the day, our wish to save time on household tasks, technologies ability to work when we want them to, and - perhaps most frustrating - other persons use our their and our time. The time understanding necessary for the paradox assumes time and technology to fit like two pieces in a puzzle, but time and technology is more like a house of cards, where the smallest disturbance can cause a breakdown.

A key question is then: Why cannot technology save our time? The answer might lie in the close connection between time and technology. Since they are so close it can many time be impossible to use technology *on* time, because they can hardly be separated. This brings me on to the next point: The idea that time is embedded in technology.

4.3 Embodiment

In the introduction I mentioned that there is a debate within STS on whether social relationships are embodied in technology. Studies have given evidence on how social features of a technology development is crucial for the shape and the function that a technology ends up with[139]. This should also be analysed when it comes to time. The importance in this argument is the denial of the idea of technology as something neutral. The presumed neutrality of technology has given room for both social deterministic explanations and technological deterministic explanations. Social, in the way that technology is seen as something purely as a result of social relations, that it is only the social network in which the technology is used that is important. Technological, when technology development is thought to happen solely after an instrumental logic. This is the basis for studies of the impact of a technology on society[140]. None of these types of analyse are satisfying, but the idea that technology embody social values solves the problem of their one-sidedness.

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[139] See for instance Bijker, 1995b
[140] Winner, 2000: 151-152

Various authors present the argument, in a variety of terms and in different strength. There is a debate that focuses around how strong the non-technical features of a technology are. The most radical stand states that some technologies in themselves have features that brings forward specific social and political solutions. Examples used to support this argument are nuclear weapons (argued to imply a centralised political system), and the gun (argued to always raise the tension in a situation)[141].

There is also debate about the possibility of building in values into technical artifacts. Winner presents the most famous and controversial example here. The case is bridges built by Robert Moses in the New York Area. Winner claims that Moses with intent built railway passes and bridges low, to stop black people from travelling under them, and thus reaching beaches that where popular among white. He could do this because blacks could not afford private cars, and had to travel by busses that where to high for the bridges. In this way racism was built into the artifacts[142]. The example is disputed, but it serves too show how human ideas that are other than the functional ideas can be or are part of a technology[143].

The least radical argument is to say that technology embody human interest that are other than the purely technical. This can be either by intent or because some values are so generally accepted that they are thought to be 'normal, 'natural' or 'necessary'. The need for 'speed' and 'timesaving' are such values. The consequence of this embodiment is that the technology is different from its intentions. Expectations, use, consequences and the general role will vary. It is important to remember that this is a process that does not only happen when a technology is designed, it can be a continuous process, and changes can happen at several stages in the 'life' of a specific type of technology[144].

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[141] Winner, 2000; Tiles and Oberdieck, 1995.
[142] Winner, 2000
[143] Hörning et al (1999) claims that the bridges where built like any other bridges at that time, and that no racist motives can be given Moses.
[144] Bijker (1995b) uses the terms 'interpretive flexibility' and 'closure' about these processes.

My argument is that time also is part of artifacts in this way. This is not only the technical time, for instance how fast a car can go or how quick the dishwasher is, but our expectations, and our experience of the time related to the technology. Time does not come from the artifact, time is a result of the action that involves both humans and their environment. Time connected to an artifact is to a large extent directly linked to its physical time, but this is not alone the time in that specific machine. More important, it is not the technical time that is decisive for our experience of time as something that 'works'. The importance of the technical and social parts of a technology will vary, and it is in advance never possible to say what will be most important[145].

However, there are direct consequences of the technical and social time in an artifact. The most important is that this sociotechnical time serves as a hindrance to other sociotechnical times. The time that is the result of the embedding of values in to an artifact in one setting, has 'won' over other possible times. This means that our time is not totally free or changeable. Bergmann briefly makes this point. He argues that designing and planning the future is a way to 'de-futurize' it[146]. With this he means that planning makes the future less open and uncertain. This is obviously the goal of planning, but it has also got implications for time in the future. Bergmann briefly mentions that technology is part of planning. I will argue more strongly for the importance of technology when it comes to being a hindrance for completely open and non-existing time in the future. Time inscribed in technologies denies us a blank future, how our time use will be is to a certain extent given.

The two arguments, that technology contains values and prescriptions for actions, and that it thus serves as a hindrance, are not new, but have only scarcely been applied to technology and time before. Hörning, Ahrens and Gerhard addresses the issue in their article 'Do Technologies Have Time? (1999). This is a study of different people's use of modern

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[145] See for instance Zerubavel in Bergmann, 1992: 103
[146] Bergmann, 1992: 91

information and communication technologies. Their conclusion is that technology is not fixed, but open and changeable. When one person uses a technology in one way, it influences time one specific way, as opposed to other use. Even if a technology has a simple prescription for its time use, this will be altered when it is used. Time is not in the technologies, but is made in society, which technology is part of.

Tiles and Oberdieck (1995) also discusses how technologies embody values. They only briefly touch upon time, and their example is the microwave oven (an example I will use and expand later). They claim that the microwave is so loaded with values such as 'speed' and 'time-saving' that this applies to everyone that uses a microwave, no matter if they are in a rush or not. Because there exists a technology that is very fast, many come to the conclusion that they need to make fast dinners. They may have plenty of time, but can find no rest in doing things at the 'old' speed when there is 'new' speed available[147].

There are three reasons I have to include this argument. It is to show that:

(1) Time is not separated from the rest of the world, it is a part of the same network.

(2) The time that is experienced in the paradox is no coincidence; it is our time. It cannot easily be changed because the artifacts give a certain time. The result is resistance, and this is rarely illuminated.

(3) The time included in technology can have drastic consequences for people. Winner writes that '…people are often willing to make drastic changes in the way they live to accord with technological innovation at the same time they would resist similar kinds of changes justified on political grounds.'[148] Since the technological time is assumed to be neutral it is often followed.

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[147] Tiles and Oberdieck, 1995: 56
[148] Winner, 2000: 165

The point of embodiment has to my knowledge not been used together with symmetry and opening of the black box in time studies, which is what I will do in a later example.

4.4 Open the black box of 'time' and 'technology'

When technology studies have used symmetry and looked at the inscription of values, they have done this to open the black box of technology. That technology is black boxed is another way of describing the instrumental view on technology. It means that technology is assumed to work as planned and that the features are purely technical. This way technology is context free and neutral. The rationale behind the opening of this black box is to see how technology is the opposite; the result of the technical and social features that it incorporates.

In studies where technology is involved, this must also be done with time. The reason is threefold: First, to show that time has a history. Second, that time is what happens between persons and artifacts and this dynamic should be studied. Third, because 'our' time is not discussed when used as a background for comparison.

This means to go into the history of timesaving technology and the time it is assumed to save. By doing this we can understand how a technology works in relation to the other actors in a situation, including time. Because time is both in the technology and part of the world around the technology. Even if the time understanding in the paradox is focused around economic time, we have seen that there are other possibilities. Time must therefore be investigated. We must ask questions about the language and metaphors that shape our time understanding, and figure out what larger societal and technical connections time is part of. We must ask how time did come to be the time that is experienced in for example in the paradox?

4.5 An example: The microwave oven

How can these three methodological points be applied to the case of technology and time? My example is a simple time saving domestic device that is typical of the modern kitchen: The microwave oven. This situation 'cooking with a microwave' is chosen because it is an everyday situation, with a technical artifact that is supposed to save time in its middle.

The following analysis has in its various stages benefited from two different types of sources. There is not much literature about the microwave, but is the object in focus in the book 'Gender & Technology in the Making' (1993) by Cockburn and Ormrod. For the understanding of the social development of domestic technologies, Cowan's article 'The Industrial Revolution in the Home' (1976) has also been useful. Analytically, this part of the thesis owes a lot to writes associated with Actor Network Theory. I have not adopted their alternative language, but used the writings as tools for thought when considering an alternative time analyse. I have especially used the articles 'Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts' and 'Technology is Society Made Durable' by Latour (1992 and 1991), 'The De-Scription of Technical Objects' by Akrich (1992), and 'A Summary of a Convenient Vocabulary for the Semiotics of Human and Nonhuman Assemblies' by Akrich and Latour (1992).

The most important point for choosing the microwave is that the time involved seems to be very clear: The microwave cooks faster than an ordinary oven. This connection between speed and the microwave is so strong that it is claimed that the microwave imposes speedy action and eating even on people that have enough time[149]. The time understanding inscribed in the microwave is the economic time, with 'cook faster' as the dominant logic. The time that is defined to the microwave is 'cook food faster' by the human actors. The microwave has

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[149] Tiles and Oberdieck, 1995: 56-57

been designed and built with this in mind. It is an artifact that is better than ordinary cookers solely because it is speedier[150].

To accomplish time-saving, humans have purchased an artifact that they assume have their desired value, the microwave. Time is perceived to be a measurable unit that is a 'container' in which the activity takes place. This is physically apparent in the panel or switch on the microwave where the user enters the cooking time. The user chooses to make food in the microwave because she or he wants to consume less time. It is an easy choice because time use is easy to define (in minutes and seconds) and the microwave is the machine that has the most favourable result on this scale. Time is here something to be used[151].

What is anticipated looks simple and one-sided. The human user anticipates the microwave to cook within the expected time span. The microwave permits the user to follow the instruction, with the promise to deliver cooked food within limited time.

It is however more complicated than it looks at first sight. First I will point to the translation that has happened with the microwave[152]. A translation is the change that happens with the technology and the situation where the technology is used. It is the result of the process where humans and non-humans alter the use and meaning of an artifact. Technologies are developed and taken into use to displace 'work time' with 'non-work time' that is: 'saving time'. Instead of disciplining ourselves (make our kitchen lay-out more efficient, plan dinners ahead so we can use ingredients for several meals, etc) we delegate the task of saving time when it comes to cooking, to machines. The microwave is the result of such a translation attempt. This is a translation that is especially tempting to do, since the microwave has technical features that makes it well fit for the job. With the use of microwaves instead of gas or electrical heat, the microwave has the potential to cook faster. This is something that is hard, if not impossible, to achieve with the traditional cooking devices. If you want to cook

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[150] Adam, 1995: 100
[151] Cockburn and Ormrod, 1993
[152] Callon, 1991: 143

potatoes fast on an ordinary oven, you have to cut them into small pieces before you put them into the water. You can cook potatoes faster, but then they are potato pieces instead of whole potatoes. A small change, but important since the microwave can cook whole potatoes faster.

The translation of the 'cook fast' value does not always produce the same result with the microwave as without it. A good example is boiling eggs. If you want to boil eggs in a microwave, these have to be separated and placed in a bowl before they are put in the oven. If they are not they will explode. The task of cooking is in other words altered because of a feature in the microwave.

By taking a quick look at a few points in the history of the microwave, we can see that it is not only the cooking that has been translated. The microwave has not come into the setting as it was made, there has been a re-inscription of interests along the way. If we see the microwave as the physical manifestation of the value 'cook fast', we find some interesting contradicting interests that have influenced the way the microwave works. For the microwave to 'cook fast' it must convince as many as possible of the other actors that it can do the job. In this case this is the human user. They must be convinced that the microwave is the apparatus they should use to fulfil their wish of fast cooking.

Several values and interest are built into the microwave, and has changed it from its original design:

(1) The microwave was met by interests that were not anticipated. When microwaves were first produced they came in different colours. It was a product that tried to transcend the ordinary colour codes of home machinery: Artifacts that are used for cooking or cleaning (the female machines) are white, and artifacts used for entertainment (the male machines) are brown or black. At first the microwave came with an aura of being a technically interesting thing. This should get the men to buy it, and accordingly some microwave ovens where

brown. It quickly became apparent that the microwave was perceived as a piece of kitchen equipment, and white became the dominant colour.

(2) Change took place because users of the microwave wanted to have an oven that was as easy to use as possible. This led to alterations of the design.

(3) Then users wanted to make different kinds of food with the microwave. There are types of food that not are well suited to be made in a microwave. Food that needs a crust does not turn out good. Many people want to make this type of food, and they want to do it faster than with an ordinary oven. The producers of microwave ovens then began to develop ovens with additional functions to meet this need. This is to a certain degree conflicting with the wish to have as simple ovens as possible, and now two types of microwaves where on the market: One simple, and one with extra functions.

Figure 4.4: An advanced microwave

The Philips Whirlpool MD114, with 900 watts and 'pizza function'

(4) The users did not only want to save time when they where cooking, but also in the preparation of the food. To use the microwave to save time they wanted food that was also timesaving, pre-prepared food. This time the microwave did not have to change, but the 'accessories' where forced to change. Dishes where developed that could be taken out of the supermarket freezer, carried home, and put straight into the microwave.

This detour into the development of the microwave oven is not meant to be an accurate account of its development or use, but an example to show the many, contradicting interests that the microwave has had to face before it entered the everyday situation of being used to cook fast with. The time of the microwave is not only the technical time, but also the social time. The technical time is immensely important since this is the reason we use a microwave. It does actually cook faster, and this feature guides the time we will have when we use it.

The time in a situation where a microwave is used is thus the result of a socio-technical creation. I therefore agree with Latour when he states that: 'The passage of time becomes the consequence of alliances and no longer the fixed, regular framework within which the observer must tell a tale'[153]. Just as the actors create the relations inside the situation, time must be constructed in this setting[154]. The microwave is produced with a technical time; its cooking capacity, but it is also influenced by its users.

4.6 Resistance in technology

Through the case of the microwave I have show the social history of time related to the microwave. However, I do not want to say that this is the only time connected to the microwave, I want to see it symmetrically, and must explore the artifacts further. The microwave has a 'technical time'; that is the time it uses to perform a task. What makes this time 'fast' or 'slow' is dependent on the surroundings and what the microwave is compared with. It is thus part of the 'social time' that we give to it and experience it as part of. It must be noted that 'technical time' never can be observed objectively or without its surroundings.

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[153] Latour, 1991: 119
[154] Latour, 1991: 119-120

To understand this mutual shaping better, Akrich and Latour uses the terms 'prescription' and 'allowance'[155]. A technology will have both negative and positive consequences for its use. This is because it has limits, which both prescribes (negative) and allows (positive) actions. Latour's example is a hotel key[156]. This is a type of key that has a large piece of wood or metal attached to it. The reason for this is to make sure that people remember to deliver the key when they leave the hotel. Here a wish from the hotel manager has been manifested physically in the key. The physical resistance is so great that it is likely that you will deliver the key when you leave, because it otherwise will take up to much space in your pocket or purse.

The microwave cooks your food faster, and also makes your total cooking quicker. But this does not happen automatically. You have to follow the prescriptions and allowances the microwave gives. To be allowed fast cooking you must treat the food in the appropriate manner, place it on the right kind of plates and so on. In this way the development of microwave guides your use of it, but, as we saw above, the use of it also shapes the development.

The time in the microwave is thus a result of different times, and parts. Discussions around what is most important for the time related to a technology is complex and can often end up in reductionism. The important for this thesis is not to say that one part is more important than another, but show the combination and the interconnectedness of the various elements, human and non-human.

The problem with analyses that express the paradox is that they separated these elements. They expect well-defined elements with objective functions. These elements then meet out of nowhere, and the paradox happens. The aim of this thesis is to show that the elements (humans, time, technology) exist together, throughout the process. When somebody

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[155] Akrich and Latour, 1992: 261
[156] Latour, 1991

experiences the paradox, the mutual influence has existed for a long time. This is a new way of seeing the situation that requires different questions and analyses than the traditional.

The separation of time is one thing that leads to the statement of the paradox. There is an expectation of an objective time that applies to you, that is a container where you can save time because the microwave is fast. However, this is not the case. Your time in the situation is not just the technical time of the microwave; it is also the time that exists depending on how you subscribe to the prescriptions and how you handle the allowances. The paradox is based on a belief that the fast time of the microwave is the *total* time of the situation, which is it not. The embedding of values is very strong. The microwave, and other time-saving devices, is supposed to be fast. The expectation to this is so great that even the slightest disturbance gives you the feeling that this is not going as fast as it should. The case is probably that the technology saves you time, but that you expect it to perform its task in almost no time.

4.7 Conclusion: The paradox of microwave cooking

The prescription in the technology puts constrains on how we experience and use a technology. Isolated the microwave is fast, and this is the base for its prescriptions, and the reason why we experience it as fast. The same is the case for other technologies, such as the e-mail. However, the technology is never used isolated. The microwave is part of a network, where the features of the oven influence our actions, equally as much as our actions influence the oven. The human and non-human elements in the network shape each other continuously. The paradox is an expression of this network, the technical and human parts in influences one another, but the paradox as an expression is not willing to treat the actors symmetrically, it only lets humans *use* time-saving technologies.

The technology and humans only meet when the problem occurs, and then as complete strangers, because they are not treated symmetrically. With a symmetrical analysis it is

possible to see how they have been part of each other's lives through a long process. The paradox closes the relation between technology and time because it uses terms that make it impossible for the technology and time to meet and redefine each other. The conventional approach does for this reason not manage to move beyond the paradox, or gain any specific knowledge about its parts. Through the proposed STS approach it is in my opinion possible to treat time and technology in a different way.

5 CONCLUSION

In this thesis I have discussed how the time and the technology understanding that is included in analyses of time and technology. The paradox is used and presented as part of these analyses. I have also critically read social scientific studies about time. There are several challenges to both these types of analyses. There is large focus on economic time. Technology is often left out of the analyses, and in the cases where it is brought in, it is treated instrumental. The various elements in the analyses (humans, time, technology) are also separated.

   To give an alternative to this time and technology understanding, and to attempt to show how such an understanding can be used analytically, I applied three STS principles to time studies. The principle of symmetry gave the possibility to see the history of time, and to see how the decision that time works is a result of sociotechnical trials, rather than something pre-given. With the term embodiment, I showed how that there is other time included in artifacts than the purely technical. The complete time embedded (technical and social) in an artifact makes artifacts hindrances for our time use and understanding in the future.

   The example of the microwave was an attempt to show how it is possible to open the black box of technology *and* time for an artifact. This was done to show that time is embodied, and

that a historically oriented analysis gives insights into why time is not a clear cut or simple issue, but highly complex.

In the introduction, I quoted Wouters, Annerstedt, and Leydesdorff saying that culture and technology shape one another in an intimate symbiotic dance. With time and technology this is no traditional dance, a dance where one dancer is leading the dance. This is modern dance, it may include many dancers, active at various points, and with attachments to each other that are hard to see. I also quoted Williams and Edge on some STS issues that were relevant for the thesis. The first was the statement that technology is both symbolic and material objects. Throughout the thesis I have discussed how time is both technical and symbolic when related to a technology. Time and technology is created, maintained, and changed through its technical features, its use, and by the users. Further on, Williams and Edge asked about the role of culture in shaping technologies. The culture that shaped the microwave has embodied it with social time, and this together with its physical time makes it fast. Finally, negotiability and fluidity of technology has been discussed, and I will argue that a hindrance to complete negotiability is the physical appearance of the artifact.

What does then happen with feeling that even though we save time by using time saving technologies, we end up with less time? Through this thesis I have used the paradox of technology and time to illuminate analytical points. If you hoped that you would get an 'answer' or a 'solution', I must disappoint you. What is clear is that the paradox rests heavily on the normal, western and instrumental understanding of time. It is also dependent on the idea of technology as neutral. Through the alternative analysis, I have hopefully showed that there are possibilities for an alternative, although it is complex.

Does then the paradox still stand as a valid statement? In my opinion, it is not good as 'evidence' of a technology out of control, or a society completely engulfed by speed. But it is still important not to underestimate it as a serious problem for the persons that have this

feeling. However, that we accept the paradox as a 'valid' statement about our time and our technology does also *hide* the complexity that is in everyday time and technology. As a statement it hides, because it accepts the time and technology understanding. This is a hindrance to actions that, for persons affected, could change the situation to one that the person is happier with. The paradox is thus good and intriguing as entry point, but not as answer or result of analysis. The main problem with the paradox as a statement is that it reduces time and technology to simple things, and that this is taken for granted. Through the STS criticism is has been possible to open up for another understanding and thus other questions. To improve an analysis concerning the paradox, the terms used must be altered and critically discussed.

This is important because also analyses and statements that take something for granted are political. It may be intentional or unintentional, but as they accept the premises, it influences their analyses and proposals. Any political statement about time must be treated like any other political statement. Political statements and actions in any area, also time, have certain implicit or explicit sources and goals. These, and their consequences, must be brought into the open and critically analysed. 'Slow' is not necessarily better than 'fast'; What is possible and desirable for one person, group, business or academic area may be highly unfavourable to another. The unintended consequences must be sought after.

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