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Abstract

The aim is to understand dilemmas to public deliberations by exploring three themes that are formulated as questions concerning the unknown, the unsensed and the unsayable. Further examination of these themes can help to improve our understanding of the relation between bodies, environments and invisible risk as well as the dilemmas to and the need for public deliberations over risk.

Its tentative argument is that the importance of certain knowledge for policy-making, the unsensed character of risk as well as problems of articulating certain experiences can be refuted on the basis of more extended views of science and policy, sensory experiences and the use of language. It argues that 1) certainty is not an unconditioned prerequisite for risk regulation. The boundaries between 'uncertain' and reliable knowledge are drawn in negotiations that take place in hybrid science-policy communities, 2) the senses do play part in judgements over 'unsensed' risk. There is however a need to reconsider sensory experiences in a way that fundamentally challenges the modern distinctions between sensations, emotions and cognitions, 3) the problem of articulation is only relevant within a particular understanding of language. Within a wider understanding of language the issues formulated as articulation problems rather says something about social problems and how kinds of social organisation make whole orderings of knowledge possible.

These three themes are discussed in relation to a case: how risk, knowledge and sensory experiences are debated in the case of 3G (third generation mobile phone system) transmitters. The material used are various actors' (authorities, researchers, local people, activist and interest groups) statements and reactions on the 3G development and radiation and electromagnetic fields generated by 3G transmitters. It examines how we can understand the known and the unknown, the sensed and the unsensed and the sayable and the unsayable in relation to the particular case.

Introduction

Today there are more far-reaching demands being placed on risk regulations in terms of stricter and standardised control systems, at the same time, as there is an increased awareness of its shortcomings. Partly because of this complexity, public deliberations within domains involving new technology, uncertain and diffuse outcomes and great social attention are seen as crucial by both researchers and policymakers.[1]

In a general sense 'public deliberation' demarcates increased communication between scientists, policymakers and a wider public. The term has connotations to reflection, consideration, and forethought but also to decisions and actions; careful considerations should be geared to practical decision-making. 'Deliberation' can be used rhetorically (sometimes with the aim to avoid the connotations that follows with 'participation', cf. Chess et al. 1998), with little impact on actual relations between policy, science and the public. Critique has also been directed to the elite character of deliberations because it associates with a certain style of communication, for which not all actors are equally equipped (Sanders 1997). Still, most would agree that deliberation in the sense mentioned above is an unproblematic standard for the accomplishment of legitimate decision-making. What seems to be needed then is a more bottom-up approach to deliberations, that does not assume that public deliberations only take place in top-down organised arrangements. We should rather begin with the questions of *where* public reflections and considerations start and *how* they can be geared to political decision-making.

This paper explores dilemmas concerning public deliberations over what is seemingly unknown (characterised by uncertainties, ambiguity and indeterminacy), unsensed (invisible and future risk beyond our senses) and even unsayable (characterised by vague feelings of unease or fears). With inspiration from pragmatist philosophy and science and technology studies it argues that in order to understand the dilemmas related to public deliberation we have to apply more extended views of science-policy relations, the relation between knowledge, emotions and sensory

[1] This report was earlier presented as a paper on the workshop *Sensing the unsensed: environment, technological risk and the limits of the senses*, 22-24 October, 2004, Lancaster. The workshop was arranged by SCORE, Man-Technology-Environment Research Centre, Örebro University and CSEC (Centre for the Study of Environmental Change), Lancaster University. It presents a preliminary theoretical analysis of an ongoing case study on public protest against 3G in Sweden. The analysis only concerns parts of the empirical material used in order to grasp what public protests are about and in order to understand dilemmas to public deliberation. The case study is part of a project funded by FORMAS (the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning).

experiences and the use of language. Given this approach this paper is evidently exploratory and its conclusions tentative.

As an illustrative example the paper uses public protests in Sweden against 3G (third-generation) mobile phone transmitters and risks associated with electromagnetic fields (EMFs). On the one hand we have a situation of massive local protests against planned 3G transmitters and worries about radiation. On the other hand, regulating authorities state that 3G transmitters pose no risk or harm to human health as long as established levels and guidelines are met. Further, there is disagreement among researchers concerning risk and EMFs.

Firstly, a background is given to the establishment of 3G in Sweden and current controversies. Secondly dilemmas are introduced as themes that are constituted by questions concerning the unknown, the unsensed and the unsayable. Each theme is treated separately and discussed first with reference to a theoretical understanding and thereafter with references to the empirical case. A third and concluding section discusses some of the issues raised in relation to ideas about deliberative democracy.

The 3G establishment, local protests and controversies: the Swedish case

The establishment of a 3G mobile phone system seems to take similar routes in several European countries (cf. Borraz 2004; Burgess 2004; Stilgoe 2004). There has been a quick process of establishing a new network (which implies the construction of a big amount of mobile phone transmitters that are put up on buildings or on already existing or new masts that are about 30-60 metres high). There have been multiple local protests against planned transmitters and masts as well as controversies over risk and long-term consequences of radiation.

First, a brief clarification of what the 3G (third-generation) mobile system is. The first generation of mobile phones was based on an analogue system and was developed with the aim of transferring speech. The second-generation mobile system is based on a digital system and mobile phones with the capacity to transfer not only speech, but text-messages, fax, and other types of information services. The third-generation mobile phone system, also based on a digital system, can transfer photos, speech, text etc. It has far more capacity in its transmission rate than its predecessor (a comparison is the 2G-system's capacity to transfer about 200 written words per second and the 3G-system's capacity to transfer about 11000 written words per second). The high capacity and the frequencies used by the 3G-transmitters, require a shorter distance between the base stations (i.e. senders and receivers). This means that the introduction of 3G will increase

the amount of transmitters and masts substantially. In Sweden masts are placed with a distance of 250 metres from each other in cities, and with a distance of about 10 000 metres in the countryside. This could mean anything from 6000 to 40 000 new masts in total, depending on how the operators co-operate by placing their transmitters on the same masts (SK 2002).

The forces behind the technological developments are the telecommunication industry (mobile phone industry and network operators) and standardising organisations. In 1998 the European Parliament decided to establish UMTS (Universal Mobile Telecommunications System) as the standard technology for a 3G net in its member states (EC 1999; se also Lembke 2002).

In Sweden, the National Government has announced an almost overly positive attitude towards this new technology and has ambitions to make Sweden a leading nation in terms of information and communication technology. The positive attitude can be illustrated by a quote from Ulrika Messing, when announcing the Swedish Government's perspective on the 3G establishment. As a Minister for Communications and Regional Policy, Messing has the responsibility for IT policy and telecommunications in Sweden:

> Finally, I want to emphasise the importance of public actors to embrace the opportunities that the new technology offers. 3G allow for a variety of new and highly useful functions and services. By opening our eyes to the possibilities of 3G technology the quality in the work of municipalities and county councils can be enhanced and the opportunities for co-operation with new partners and citizens are increasing.[2]

In the quote above, Messing refers for example to the 3G services that can be used for medical care. The function of sending pictures at a fast rate would allow for medical experts to follow filmed surgery operations at a distance at the same time as they are performed. This function could also be used to get quick overviews of scenes of accidents before sending out rescue vehicles.

The initial goal formulated by the Swedish Government and Parliament was to establish a 3G net that would cover 99,98% of the Swedish population by the end of 2003. This goal was formalised in the year of 2000, as an agreement between The National Post and Telecom Agency (PTS)[3] and mobile phone operators. In 2002 it was clear that the 3G

[2] *My translation* (Speech by Ulrika Messing. The Government's perspective on the 3G establishment. 2003-04-03, available at the Swedish Government's web page)

[3] PTS is the authority that monitors the electronic communications (including telecommunications) and post sectors in Sweden

establishment would be seriously delayed because of various reasons: the extensive process of handling building permits, insufficient applications from the operators as well as local protests against planned masts. The Swedish Association of Local Authorities states that the greatest obstacle and the primary explanation to the delays are public worries about potential health risk caused by radiation from the transmitters.

In Sweden it is the Swedish Radiation Protection Authority (SSI) that decides the national acceptable levels of radiation. They base their judgements on the recommendations by ICNIRP (International Commission on Non-Ionizing Radiation) and the EU (EC 1999b). The local administration in the municipalities, which are handling the permissions for building 3G masts, are not supposed to consider risks related to radiation but only the aesthetic effect that the planned masts will have on the landscape. Building permits for transmitters cannot be rejected by references to radiation and health risks if they meet the established levels. Despite this organisation, which places the responsibility for radiation concerns at the national level and the SSI, questions concerning radiation and risks to health are brought into the agenda by citizens at the local level.

Opposing citizens are mobilised in local networks that focus on planned masts near their own house, schools or childcare centres. Some of these networks also have a wider purpose to protest against the established levels of radiation and the 3G development in general. There are also national networks such as the Wave Breaker (Vågbrytaren), which is an independent association resisting all electro-magnetic radiation that can cause harm to health and the Swedish Association for the ElectroSensitive.

The conflict between opponents and proponents can be described as a science and technology based controversy in which all actors involved (scientists, decision-makers, journalists, industry, interest groups and citizens) mainly base their argumentation with reference to science.

The case study presented in the following sections is based on documents, interviews and taking part of activist meetings. Almost all of the interviewed activists, as well as the electrosensitives, are well-educated in technical or electro-technical subjects, and most of them also works with this either as engineers, as salesmen in the IT business or as consultants/mediators between technicians and clients. This is of course a biased selection of interviewees.[4] The focus has been on the local protests in two municipalities, which are situated in, or close to, the Stockholm archipelago. However the aim of this paper is not to say anything about

[4] Current plans are to extend the interview material with activists, researchers, regulators and local officials as well as to come in contact with electrosensitives with various situations and backgrounds.

these particular municipalities, local authorities or how activist networks are mobilised. The empirical material is in the context of this paper, only used as illustrations to the questions raised.

The following sections ask how we can understand 1) the known and unknown, i.e. how various actors talk about what is known concerning radiation and risk as well as what boundaries are made between certainties, uncertainties, ignorance and policy-making; 2) the sensed and the unsensed; i.e. how involved actors are entangled with invisible and future risk as well as bodily experiences of technologies and their environments; 3) the sayable and the unsayable, i.e. the relation between pre-reflexive motives for engagement and the explicit arguments or activities used by varying actors.

The known and the unknown

It is often maintained that the lack of reliable and consensual scientific knowledge poses a problem for policymaking and regulation (cf. Lidskog and Sundqvist 2002). It is assumed that certain scientific knowledge enhances co-operation between decision-makers and consensus over the appropriate policy response to a scientifically defined problem. Knowledge uncertainties and lack of scientific consensus could according to this perspective cause a problem for policymaking.

A distinction can be made between risk, uncertainty and ignorance (Resnik 2003; cf. Shackley and Wynne 1996:283). *Risk* refers to a situation when quantitative chances of something happening are known. *Uncertainty* refers to the situation when enough is known to make qualitative judgements. *Ignorance* is the situation when there is not enough knowledge to make even qualitative judgements.

The precautionary principle can have the function of guiding decision-making under uncertainty or ignorance. However, how a particular situation should be characterised on the scale from risk to ignorance is by no way clear-cut (Mattson 2004). It is rather the result of negotiations among the actors involved, and a result of policy-making itself. The construction of uncertainties can also have the function of shifting responsibilities from the political sphere to science.

Analyses of relations between science and policy can show how boundary objects are created in order to give force to the argumentation and validation of a certain policy. Boundary objects are relatively stable and reproducible things such as maps, quantitative measures or other relatively stable representations and ideas that help to co-ordinate actions and facilitate discussions between scientific actors, advisory scientists,

regulators or politicians (Jasanoff & Wynne 1998:22, cf. Rose 1999:197-198).

Consensus about certainty, uncertainty and ignorance has to be achieved in negotiations in science-policy hybrid organisations (Shackley and Wynne 1996). Through this boundary work regulatory authorities and policymakers do not only construct the object for regulations they also construct the public and public demands that they are suppose to meet (cf. Lidskog, Soneryd & Uggla 2004). Risk regulation, is not understood as measures to already existing risks or responses to public demands, but as the process in which all these entities ('risk', 'the public', and 'public demands') are constructed. When the public is added to the nexus of policy and science relations, this is not done in any direct way, but only through a particular model or understanding of the citizen or the public.

The following section presents how the regulatory authority the Swedish Radiation Protection Authority (SSI), relate to risk, uncertainties or ignorance in the case of 3G transmitters and electromagnetic fields and how citizens contest the current Swedish regulations of radiation. In the course of these events, not only boundaries between risk and uncertainties are created and contested, but also between science, policy and the public.

The boundaries of the regulatory entity

Whether the electromagnetic fields (EMFs), generated by 3G transmitters, pose a risk to human health or not is disputed. There are several distinguishable but related controversies about the health effects of EMFs that are linked to different technologies. Now EMFs generated by 3G transmitters as well as mobile phones are widely discussed. In the 1980s it was the hazard of living near powerlines that was in focus as well as EMFs generated by microwave ovens and computer monitors. Each of these EMF generating technologies carries its own controversy, but they share interest groups, styles of reasoning as well as the types of evidence that are seen as significant (Stilgoe 2004: 11)

The science and technology based controversy, over mobile phones and transmitters, is occupied with a dispute over thermal versus non-thermal effects of EMFs. The thermal effects are heating effects. The frequencies generated by mobile phones and their transmitters are similar to those of a micro oven. To be exposed by too high levels would literary make you cooked. However, since the levels from mobile phones are so low, and even lower from the transmitters, it is stated that heating effects do not pose a risk to health.

On the other side of the controversy are those who focus on the non-thermal effects. From this line of research it is stated that exposure to EMFs can cause other biological effects than heating. Neuronal damages have been found in the brains of rats exposed to weak pulsed microwaves, similar to the EMFs generated by mobile phone transmitters. These biological effects are explained as caused by the relation between exposure and an increased permeability of the blood-brain barrier, which causes a leakage of albumin into the brain (Persson et. al 2003). These effects are seen on much lower levels that those set in the recommendations by ICNIRP, the EU and SSI.

From the assumption that certainty and scientific consensus would facilitate co-operation and policy measures one would expect that recommendations concerning EMFs generated by mobile phone transmitters would be vague or that there are controversies within or between different regulatory institutions. Although there are differences between countries (many using lower acceptable levels than international and European recommendations) there seems to be a standard discourse, which is based on the idea of thermal effects. Regulating organisations such as WHO, ICNARP, EU as well as SSI base their recommendations on thermal effects. This means that risk calculations are made according to established scientific knowledge of heating effects and regulations are based on levels of exposure that are much lower than the levels that would cause hazardous heating effects on human beings. The idea of thermal effects can thus be seen as a boundary object that allow for some divergences but is stable enough to be adopted by many actors.

The recommendations on the acceptable levels of radiation that are given by the SSI (2003) are, as they state, "based on many years of research" which establish limits that will not cause disturbances in the neural system or give rise to damaging heating effects in human beings.[5]

To its assistance, SSI has an international research council with the mission to review current research on electromagnetic fields and human health. SSI bases their judgements on reports from its research council. A recent report (SSI 2003) state that there are no significant research results that give reason to change the current risk judgement or for SSI to change their recommendations. Among the studies reviewed are those mentioned above, about radiation and its effect on leakage in the blood-brain barrier as

[5] For the general public the recommended limit at a frequency of 2000 MHz (the frequency used for 3G) is set to 61 V/m (expressed in E-field strength) (SSI 2002). This can be compared with the UK recommendations 25 V/m and the Russian recommendations 15 V/m (WHO 2004, www.who.org, EMF World Wide Standards Database).

well as on stress proteins in the body and studies of increased risk to cancer from using mobile phones.

The report from the research council emphasises the importance of making repeated studies of the non-thermal effects before they can be accepted. The current scientific situation concerning non-thermal effects is by the SSI and its advisory committee framed as a situation of *ignorance,* rather than uncertainty. They do not judge the results to be reliable qualitative knowledge about the relation between exposure to radiation and biological effects or about what health effects the potential biological changes might have. SSI welcomed the report since it confirmed that there is no scientific evidence that EMF generated from mobile phones or base stations have any damaging health effects, as long as SSIs recommendations are followed (SSI 2003b).

There is some ambiguity however in the position presented by SSI and its research council. At the same time as the council emphasises that there is no need to take precaution they also pursues an urgent need for further research because of the unknown health effects of EMFs. That both SSI and its advisory researchers emphasise the need of further research can be seen as a delegation of the responsibility to science and a postponing of precautionary measures to the future. In protests against 3G and the current regulations of radiation, citizens demand stricter regulations and that the precautionary principle should be applied. Both the SSI judgements made on the basis of the present knowledge situation as well as boundaries between science and policy is thereby contested.

Contesting the boundaries

Citizens who protest against 3G and current regulations emphasise the unknown long-term effects of radiation and demand further precautionary measures. These protests are met by a standard answer from the SSI that there is 'no reason to worries'. Some of the opposing citizens base their argumentation on the scientific reports on non-thermal biological effects of radiation. They argue that their position is supported also by the fact that many of the reports that SSI base their judgements on are done by researchers financed by the mobile phone industry (Robert, interview July 2004).

Biased information from SSI is also taken as a base for not trusting the information from them. One woman who has been active in a local protest group, collected names on protest lists and arranged hearings with local politicians on the 3G issue, says "in all these reports that SSI refer to, there is nothing about non-thermal effects in them" (Anna, interview July 2004). She thinks that SSI dismisses the studies on non-thermal effects too easy

"there could be many studies that show that there is no harm, but only *one* that shows that something is bad, and that should be enough for taking precaution".

Some of the opponents to current regulation also, like the SSI, frame the situation as a situation of ignorance but emphasise the importance of taking precautionary measures in cases when there is lack of scientific knowledge. This can be seen when examples of other substances (chlorophenoxy herbicides) that was previously thought to be harmless and later proved to be extremely toxic are used in the argumentation. One of the opponents to 3G gave this example at a public meeting in January 2004 to which researchers, SSI and mobile phone operators were invited. This comparison is often and widely used by interest groups such as the national activist group the Wave Breakers and by various actors who contests the current regulation when debating in mass media.

Citizens' attitudes and their judgements of the trustworthiness of current regulation are also shaped by how local authorities deal with risk and radiation in an ambiguous way. A man with two small children who live close to a planned mast, has been active in engaging neighbours against the plans and has sent written statements to the local authorities as well as made appeals to the building permit that the operator now have received. He has also frequently been in contact with local officials because of the planned mast. He is upset by the ambiguous attitude by the local authority when they deal with building permissions. He says that local authorities continuously state that 3G radiation is harmless, still they considered that one of the planned masts would be controversial since it was close to a school. He says, "it is like they can sacrifice our children because we are so few, so we won't protest as laud as parents to children at an entire school" (Peter, interview August 2004).

The 'public' is by public authorities as well as the mobile phone industry seen as worried because of scaremongering in media. 'Public demands' for stricter regulations are therefore met by more information from the SSI who maintains that "there are no reasons to assume that mobile phone base stations can cause harm or inconveniences for human health" (SSI 2004). A similar perspective can be seen in the position of the mobile phone operators that state that public worries are caused by single and unreliable research publications that are given too much publicity in the media (The Swedish UMTS-net 2004).[6]

[6] The Swedish UMTS-net Company is a company shared by two of the Swedish telecommunication companies (Telia and Tele 2).

Authorities and industry thus assume that citizens shape their view on 3G and radiation on the basis of what they (wrongly) believe is scientifically known or unknown. This assumption relies on a traditional view of knowledge (that the natural world only can be grasped by science) and a split division between science and society. However citizens' perceptions of risk and uncertainties are rather the result of their various interactions with science, technologies and other people in their environments. Through these interactions different kinds of relations between various human bodies and technologies are shaped; bodies that can move in and out of EMFs of various strengths as well as 'impossible' bodies, such as the electrosensitives, which is the theme for the next section.

The sensed and the unsensed

The fact that modern risks are beyond the immediate experiences of our bodies and senses has been an important element for the construction of risk society in sociological thought (Beck 1992; Giddens 1994; cf. Faugére and Haynes 2003). Risk related to nuclear power, biotechnology or electro-magnetic fields cannot be seen, heard, smelled or touched. To get knowledge about unsensed risk, we are in need of instruments that can detect substances that are invisible for the eye, and of theories of general cause and effect relations. Critical accounts of these versions of risk sociology have criticised its overemphasis of the role of science (cf. Wynne 1996). From this latter perspective, the cultural character of both science and the lay and knowledge in general is emphasised.

Social sciences in general can be accused of not being able to describe how we as human beings are intertwined with the natural world; that we are engaged in embodied relations with one another as well as with the physical environment (Engdahl 2004; Milton 2002; Turner 1996). The understanding of knowledge as culture relies on an understanding of the human being as primarily a social and cultural creature and intertwined with other human beings. Another view present in social sciences is the idea of the human being as an individual, a self-contained entity, relatively autonomous from other individuals. Economic theory has during the late 20th century been relying on explanations that are based on individuals and rationality, while sociological theory has been based on the model of collectives and a shared social order or culture (cf. Brunsson 2005). Both these characterisations of the human being imply humanistic versions of knowledge. That is to say, they both place knowledge within the human world of individuals or collectives. They both assume that the human being

is separated from the outer nature but also from inner nature (emotions or instincts).

There are various efforts to remedy this deficit within the social sciences. One example can be seen in efforts to redefine the human being. Science and technology studies with an actor-network approach understand the human being as embroiled with natural and technological things. From this perspective there is no 'pure' human being, since human relations have always been intertwined with technologies, such as machines, computers, desks, chairs etc.; without the nonhuman (technologies and natural things), there would be no human. To be a human is thus to be a hybrid, that is, a mix of what we commonly understand and are trying to keep apart as human and nonhuman.

Another example of bringing in the body in social theorising can be seen in efforts to find concepts of 'knowing' or 'understanding' that is not equated with cognitive, intellectual activity, but are sensitive to interactions between bodies and environments. Mike Michael (2002:366-367) distinguishes three notions of understanding: comprehension, apprehension and prehension.

Comprehension associates to the assimilation of ideas and representations of the world that are seen as flowing from texts and practices into the mind of lay persons. It refers to the capacity of the mind to perceive and understand. It is the process of grasping with the intellect. This type of understanding is associated with traditional approaches to how the public understands and relates to science.

Apprehension, on the other hand, is linked to opinion, sentiment and emotion, particularly in the form of anticipation, feelings of distrust or fear. It is the type of understanding that associates with critical approaches to public understandings of science. Both science and lay publics are from this perspective seen as local. Apprehension occurs when there is a clash between these cultures and lay culture and identities are threatened. In contrast to the traditional approach it does not make a sharp distinction between cognitions and emotions. Similar to the traditional approach, however, it does not link public understandings to embodied interactions with an environment.

Prehension is a term that refers to an embodied account of both lay publics and 'understanding'. It refers to the "multitude of heterogeneous ways in which an entity (a category that includes humans) is attached to, and emerges out of, the external world" (Michael 2002:367). Instead of linking lay publics to local identity and culture, prehension understands the public as heterogeneous and made up with patterns of varying interactions

with the technical and natural world. What distinguishes prehension from apprehension is that it captures not only how we (through culture) constitute objects and things in the world, but also how we are constituted by them.

Prehension is understood at a pre-reflexive level, before comprehension and apprehension then there is prehension. The idea of prehension can be complemented with Emma Engdahl's (2004) theory of the emotional self. From a re-reading of the pragmatist thinker George Herbert Mead as well as with inspiration from Maurice Merleau-Ponty, Engdahl also grounds human reflection and thinking in the body at a pre-reflexive level. We have from the early child development acquired a 'style of the flesh' or 'corporeal attitude', which refers to a particular pattern of how our body move around in the world (Engdahl 2004:171). Our corporeal attitudes are shaped through interactions with the world as well as with other human beings.

From this perspective, cognitions, emotions and sensations are intertwined, since our reflection and judgements of things in the world are anticipated by corporeal attitudes. We can, at a pre-reflexive level have an open and embracing attitude towards some things in the world and a closed and rejecting attitude towards other things. Reflexive judgements then is not understood as a process that starts with the thinking about facts, values and the weighing of pros and cons. This comes after what we already have felt and acted out through our bodies. The corporeal attitude is a prerequisite for the mind and reflexive thinking to develop (Engdahl 2004:188). This happens when our corporal attitude is challenged and our acts are inhibited (by other corporeal attitudes or things in the world).

How then can we understand the hybrids that constitute EMFs and the prehending that takes place in shaping attitudes towards radiation and mobile phone transmitters? Through various patterns of human-technology interactions and prehensions, bodies and environments are constructed in multiple ways.

Constructed invisibilities and 'impossible bodies'

Citizens engaged against 3G and current regulations of radiation do not only respond to secondary information (mediated scientific knowledge) they are also mixed up in interactions with technologies, relations with other people and their immediate environments. Their understandings of 3G and EMFs can be explained as a combination of reading science reports which relate to understanding as *comprehension*, interaction with authorities and mistrust towards them, which links to *apprehension* as well

as interactions with technology, for example by measuring radiation in their homes, which links *prehension*.

They are heterogeneous since they all interact in various ways with science, technology and other people. Invisible hybrid phenomena such as EMFs (which belong both to the natural world and to the human world) can also be seen as constituted through the use of measurement techniques (cf. Mitchell and Cambrosio 1997). One of the interviewees shows me an instrument that can be used to measure the radio-frequency levels. While I am looking she measures the radio frequency levels close to my mobile phone, the microwave oven (turned off and on) and close to a wall which is next to her neighbours that probably have a stationary wireless phone that makes the meter go up high (Anna, interview July 2004). Another woman tells me about how she has changed her daily routines, after that she has become aware of EMFs by engaging in 3G masts. She uses her microwave oven less, talks less in her mobile phone and would now not even think of giving her children a mobile phone (Catherine, interview September 2004).

In the examples above the use of technology makes people not only aware of EMFs, it also can also change the ways in which they relate to other technologies. The measurement instrument allows people to walk in and out of EMFs with higher or lower levels of radiation. It can be used as a means to know where it is safe, but it can also enhance the feeling of constantly being surrounded by EMFs, generated by other technologies. However not all activists that protest against 3G masts relate this concern to other EMFs or technologies. Their various concerns can also be explained by a general attitude towards technology.

Some of the activists are technology freaks and welcome new functions of mobile phones, but still think that precaution should be taken concerning 3G-mast generated EMFs. This concern has been raised only when facing the plans of building a mast just outside their house. One man who defines himself as a 'technology freak' says that he is not against the 3G development in general. He says that people don't need mobile phones in their homes, to use them at the workplace is enough (Peter, interview August 2004).

This could of course be explained as an expression of a NIMBYist (Not-in-My-Back-Yard) position, since masts would be necessary by his workplace in the city and close to other people's homes. However, the concern about 3G close to his home and his children could also be conceived as a prehension, which could be the starting motive for reconsidering the use of mobile phones at all. Emotional responses and concerns about the ones who are close to us (including ourselves) could be understood as corporeal attitudes and could function as inhibitions that

make us reflect upon and reconsider our earlier positions. Since people's lives can be seen as caught up in a never-ending web of prehensions it is impossible to say what routes personal reflections will take. Without the prehending, however, there could be no reflections either.

Others can be described as having an explicit anti-technology and anti-capitalist position. One man, who is trained in electro-technology and has worked with similar issues all his life, now lives at the countryside, self-sustaining on sun energy and food supplies. He relates the 3G development to a 'Macdonald-isation' of society in general and feels that both humanistic and ecological values are threatened. This could be described as apprehension, that is, that citizens' judgements of technologies also link to moral judgements and that identities are threatened by what is perceived as abstract global processes.

This man, because he has worked with electro-magnetic measuring techniques, also relates to invisible EMFs in a concrete and routine way. He lives by the sea and when the ferries come, he always turns away his face, because he knows about the radar on the boat. It is the same thing with the masts "for me, because of my knowledge about radiation, the sight of the mast itself indicate risk" (Robert, interview 2004).

Comprehension (as grasping with the intellect), in the above case in terms of technical education, can thus change prehensions and corporeal attitudes as well. Rather than to say that one of them must come first, it is therefore more adequate to see them as part of a *rhizome*. A rhizome does not begin or end but is always in the middle, between things. The idea of the rhizome can be used in order to describe how the relation the scientific and the lay is not hierarchical but allows for a multiple entering points (Michael 2002:370).

The group of electrosensitives as stated in an earlier section, is one interest group, which has a stake in the debate over 3G. Their positions as well as their interactions with EMF generating technologies are very different from local protesters that raise issues of future risk and long-term effects. For the group of electrosensitives the expansion of radiating masts poses a direct threat to health and a diminishing of the space that may be relatively free from electromagnetic fields.

Like any other science and technology based controversy, the controversy over electrosensitivity was in the 1980's (and still is) played out between individuals, organisations, administrative rules and legislation, and institutions in a complex social network. In the process of the debate, two perspectives have been consolidated concerning the nature of the phenomenon. From the first perspective the symptoms of electrosensitives

are explained as exaggerated and expressions of hypochondria. From the other perspective societal (especially medical) institutions and doctors are described as negligent and dismissive to the people are suffering from this disease (Brante & Norman 1995:52).

The ongoing science and technology-based controversy can be understood as a scientific expropriation of the sensed experiences of these people. They become subject to discussions over cause and effect relations while they are concerned about their headaches, sticking sensations in the skin and loss of strength in their daily lives (which sometimes mean that have to leave their jobs and move out in caravans or cottages in the forest).

In the interview with two electrosensitive persons, we talked about how the invisibility of radiation and electromagnetic fields makes it more difficult for people to realise that it is there. In contrast, the electrosensitives feel the radiation. The man, who used to have a carrier in electro-technology and computer technology, tells me that he can actually hear when aeroplanes fly near (before they are close enough to hear the sound of them):

> I hear a swishing sound inside my head when an aeroplane comes. There could employ me as an agent looking for terrorists. I hear them before they come. The sound I hear is in correspondence with the movements on the instrument [instrument for measuring radio frequency waves]. Otherwise I would believe it was only imagination or tinnitus. It is like tinnitus but only in correspondence with the air traffic. (Carl, interview July 2004)

The sensory experiences of electrosensitive are, by most established societal authorities and science not accounted for as 'real', or in correspondence with things that happen in the 'outer world'. It is a group of people that constantly is met by mistrust from society. The woman, who also has worked in the electronic industry, and who has been ill since the end of the 1980's tells me about the mistrust that she met from her employer when she was ill. There are, however, a few people that take the problems of the group of electrosensitives seriously, the woman says " my doctor said that 'I don't know anything about this [electrosensitivity] but I believe what you tell me', and with that attitude you can go quite far" (Mona, interview July 2004).

The bodies of electrosensitives are made impossible in a society were EMFs are everywhere. The man and the woman, both in their 40's, and well educated used to have good jobs, families and houses in the Stockholm region. It was the expansion of the GSM mobile phone system during the end of the 1990's that made it impossible for them to stay in the

electro-sanitised house in Stockholm.[7] They were forced to live in a caravan the whole winter 1999. It was beastly cold and there was ice on the inside of the windows. They warmed themselves on candles. The woman had stopped working a few years ago before this, because of her illness. The man was still working at that time, in a barn close to the caravan, on a computer with a specially designed low-radiating screen.

They finally found a house in the countryside, far enough from power stations and mobile phones, in which they live today. They define themselves as 'mast refugees'. When the GSM system was expanded there was no place left to rest and gain strength in order to cope with the daily exposure to electricity. They are now facing the plans of having 3G masts put up close to their house.

Some of the activists concerned about 3G relate their engagement to a raised awareness of and sympathy with the group of electrosensitives (Catherine, interview September 2004). That engagement primarily comes from sympathy with others, is also witnessed by another woman who says that she is engaged not primarily for her own sake (she does not have planned masts close to her house). She is upset on behalf of the miserable people that she has met and who are worried about planned masts (Sara, interview September 2004).

Public concerns arise, because of a multiple web of prehensions that cannot be reduced to worries and fear for the unknown or the unsensed. They arise in relations between people, technologies and environments. They do not arise independently of scientific reports of risk in mass media, but they do not arise solely from these either. In protests against the 3G development and planned masts, people can be motivated by sympathy with others, concerns for themselves, or by anticipation towards the capital, the political system or public authorities. Some of these concerns have the character of private interest, for instance the concern of not wanting a mast outside you house, while others have more appeal to general interests, like long-term effects on human health or the idea that developments of new technologies should be discussed by all concerned. All of these concerns can however be linked to societal concerns, since social concerns always have to have their starting point in reflections over how we want to live and what kind of society we want.

The more important societal implications a debated issue has, the more likely it is that a controversy will arise between scientists and that other actors in the debate will use scientifically framed arguments (Brante &

[7] Stockholm City has, because of a few engaged local officials, a more generous attitude towards electrosensitives compared to other municipalities in Sweden. It is for instance possible to get financed support for electro-sanitising houses (Mona, interview July 2004).

Norman 1995:25). The question that arises then is – how can the pre-reflexive prehensions that make up peoples concerns be communicated to others?

The sayable and the unsayable

To grasp a third dilemma that might be present in deliberations over unsensed and technological risk I borrow the idea of the *unsayable* from Cornelius Castoriadis (1984).[8] What if some of the limits to deliberation are not only due to the fact that actors statements are given unequal status, and that some actors might have more cultural and material resources in struggles over definitions and argumentation. Perhaps some dimensions of risk cannot even *be* articulated. The unsayable is beyond perception, thinking and language. It seems to have some links to ideas of the 'sublime', the latter having connotations to the infinite, vague, emotional and a sense of vulnerability of the individual. It seems to be reasonable that perceptions of risk can entail feelings of being horrified or a sense of infinity that cannot be articulated adequately.

Emotions as described in earlier sections, can be understood at a pre-reflexive level, as the style of the flesh or as corporeal attitudes. It is the style of the flesh that gets reconstructed within culture. Such reconstruction only takes place when we become aware of our style of the flesh or corporeal attitudes towards the outer world. This happens when our style of the flesh is challenged and the act is inhibited (Engdahl 2004:153). The inhibited act functions as a trigger for reflection and forces us to rethink and adjust our own acts towards the other or the thing. From the 'something' that stops us and makes us reflect we can move on and articulate our reflections. This is nevertheless not the same thing as articulating the inhibition. We can never articulate the inhibition because it is a pure bodily and emotional reaction. It is pure in the sense that it is not *thought* but something that stops our thoughts. It is an instant. The articulation is a way to get through the obstacle, allowing us to continue. The inhibition stops us from moving, and the articulation (in thought, speech or gestures) makes us move again, but in another direction than before.

In order to understand the dynamic of articulation, according to Hans Joas (2003), we need to combine understandings of pre-reflexive experiences, individual articulations and the cultural repertoire of possible

[8] Castoriadis discusses the problem of the 'origins of meaning' in relation to the lingustic turn and the idea of a self-referential language. He concludes that 'the unsayable' is origin and by this he means that there are experiences of voids within language. We can experience things that cannot be articulated but which still have the function of a driving force for articulation (Castoriadis 1984:139).

interpretations. This ambition is important in order to understand both the possibilities to raise new ideas, ongoing processes of institutionalisation as well as interest conflicts.

However in order to do this it is important to understand articulation in a much wider sense than being about dressing thoughts or feelings in words.

Articulation is here understood as thought, speech, and gesture – anything that can be understood as meaningful and directed action. It is the opposite of being indifferent. In Bruno Latour's (2004:210) words: "Articulation thus does not mean ability to talk with authority […] but being affected by differences". An articulate subject is someone who is affected by others, someone who reacts in the same way as the other.

What cannot be said, then, can still be articulated. You can, for example, read an article about new restrictions in social services in the daily newspaper and say 'hmmpf' and the person at the other side of the breakfast table will know what you mean. Everyday talk contains a lot of 'hmmpf's. The important task for the study of public deliberations should then be, not to study what people actually say, but what they are articulating, what they are moved by, what concerns them.

Mead relates the ability to communicate our concerns to others to aesthetic functions. Whether or not communications will have an aesthetic function depends upon whether it "serves to interpret to the reader [or listener] his experience as a shared experience of the community of which he feels himself to be a part" (Mead 1926:390). Public responses can be understood as initially being inhibitions in encounters with technology and on a pre-reflexive level. Citizens' reflections and various forms of protest could according to a wider view of language be understood as articulations and efforts to communicate their aesthetic experiences in a wider forum.

Public protests as laud hawks

One woman tells me about the angst that she feel when she think about risks related to the radiation from masts (and other similar technologies):

> I don't want to have a mast. I don't want to live close to a mast. I am concerned for my children, my husband and myself. But most of all the children. But I don't want to have cancer from this either, within 30 years. Or that my children will get Alzheimer when they are 45 or 50 years old (Anna, interview July 2004)

Expression of angst, threatened dwellings, or the experience of the masts as something that intrudes, something "that you can see all the time, that worries, make ugly and damages" (Anna, interview July 2004) can be understood as the driving force for some of the activists. Others as described earlier, see 3G as an un-wished technology development that

only serves the interest of the capital. These driving forces are related to sensory experiences that are not distinguished as pure bodily sensations, distinguished from meaning, but as 'sensuous experiences' and related to aesthetics (cf. Mead1926:382).

Citizens try to communicate these aesthetic experiences through activities such as collecting thousands of names that are sent to the local authority or the government, by arranging activist meetings or by demanding public hearings and in demonstrations. Mailing lists, national networks and interest associations loosely connect local activist groups and other concerned citizens to each other.

Further, there are examples of civil disobedience, like tying yourself to the mast or cutting down already built masts. These activities are not formulated as arguments, but they can be back up with various kinds of rational arguments that concern the technological development and democratic concerns in general.

Public protests can thus be concerned as laud 'hmmpf's, that can be understood or not, ignored or met by some kind of response. Since they are the result of heterogeneous prehensions, apprehensions and comprehension they do not point at a single direction that can guide policymaking in any direct way, but they can raise questions that, from a standpoint of a deliberative democracy, ought to be discussed in various public forums.

If different positions over technology in general as well as in the 3G debate, are basically about different aesthetic attitudes, what then is needed for public deliberations to have aesthetic functions and eventually to be geared into political legitimate decisions? This is an extremely tricky question that this paper does not even come close to an answer to. In the final section, however, I still want to raise some points in relation to deliberative democracy that gives an argument for going back to 'the personal is political'.

Concluding discussion: the role of prehensions in a deliberative system

Public deliberations are often associated with organised interaction between scientists, decision-makers, industry and the general public. Deliberations can be put forward as a means to mitigate conflicts, to enhance democracy in the face of declining trust in societal institutions, to foster democratic citizenship and to build trust and new relationships. Critics have pursued that all the talk about public deliberations is only rhetoric and that it hides the power mechanisms behind deliberations.

From a critical perspective, deliberations over themes in expert dominated fields are perhaps especially troublesome. When there is a

science and technology based controversy, citizens cannot participate without being caught by the terminology used at one or the other side of the dispute. They would surely have lesser resources in such a debate than those who are experts or can afford to employ experts. I would like to address this problem as a need for a return to the 'personal is political', in a similar way as Jane Mansbridge (1999) does when she stresses the importance of everyday talk in a deliberative system.

A return to the 'personal is political' in the context of this paper is reformulated as a need to stress the importance of everyday prehensions. One important aspect for the study of public deliberations then is to give less focus to how issues are formulated (in a particular style or as rational arguments) and give more focus to how people's aesthetic attitudes are shaped in everyday life and their efforts to try to make these attitudes recognised by the societal institutions that make decisions that will affect their lives. In Jürgen Habermas (1996) idea of deliberative democracy, this problem is formulated as a problem of getting the political system to react on the social problems recognised by citizens as members of a lifeworld. He (1996:382) also mentions civil disobedience as a strategy to give public opinions more media attention and to provoke responses from the political system.

However, this is not to say that policy should be guided not by reductionist science but by the holistic judgements that are made by lay local publics. Science is often accused of being reductionist. But science does not, according to Latour (2004:219) reduce, it adds. The more science, artificial set-ups and interventions, the more differences will we be able to articulate. This means that the important distinction is not between science and politics but between inarticulation (which is redundant science or redundant politics) and well-articulated propositions.

Latour argues that good political articulations as well as good scientific articulations are those who make it possible to recognise more differences in the world, articulations that add something to the world, instead of just repeating what has already been said. This means that there is a danger if some issues are discussed from a narrow scientific perspective (meaning that alternative scientific explanations as well as other alternatives are excluded). "If science is left to its own devices to define by itself – without further scrutiny or court of appeal – what the body is made up of, as if it pertained to the realm of primary qualities, it will be impossible for other versions of what a body is to be sustained" (Latour 2004:224).

Well-articulated propositions can be said to be the corner stone in a deliberative democracy. One way to enhance deliberative democracy could be to recognise heterogeneous publics and thoroughly consider what

different consequences political decisions would have for various kinds of publics. These considerations and reflections could concern what different kinds of bodies are created through new technologies, if some bodies are made impossible and if we really want (and can justify the decision) to exclude these bodies.

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Interviews July-September 2004 and public meetings

Carl, 40 years, he was trained and had a carrier in electro-technology and computer-technology, suffering from electrosensitivity since 1989. He has two children and he lives at the countryside with his partner (Mona).

Robert, 63 years, trained in electro-technology and has worked with related topics for 30 years. He is now retired. He is engaged in environmental issues (has been active in Agenda 21) and he is now a self-sustaining farmer and lives at the countryside.

Sara, 55 years, higher education in humanities, meet many people in her work, she is married and has three children and lives together with her husband at the countryside.

Anna, 42 years, trained in media relations and has worked with similar issues. She is now unemployed. She is married and has two small children. They live in a densely populated area in the archipelago but are about to move, partly because of the planned 3G mast next to their house.

Catherine, 40 years, trained in media relations, in her work she is mediating between IT-technicians and customers. She has two children. She lives with her family in a densely populated area near the archipelago.

Peter, 33 years, has his own IT-company. He is at the moment on parents' leave but is about to start working soon. He lives with his family in a densely populated area near the archipelago.

Mona, 42 years, has worked in the electric industry. Is now on a sick pension and is suffering from electrosensitivity. She lives with her partner (Carl) at the countryside.

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