DESIGN FOR A COMMON WORLD

On ethical agency and cognitive justice

Abstract: The paper discusses two answers to the question, How to address the harmful effects of technology? The first response proposes a complete separation of science from culture, religion, and ethics. The second response finds harm in the logic and method of science itself. The paper deploys a feminist technoscience approach to overcome these accounts of neutral or deterministic technological agency. In this technoscience perspective, agency is not an attribute of autonomous human users alone but enacted and performed in socio-material configurations of people and technology and their 'intra-actions'. This understanding of agency is proposed as an alternative that opens up for the reconfiguration of design and use for more ethical effects, such as the cultivation of cognitive justice, the equal treatment and representation of different ways of knowing the world. The implication of this approach is that design becomes an adaptive and ongoing intra-active process in which more desirable configurations of people and technology become possible.

Keywords: cognitive justice; design; diversity of knowledge; ethical agency; feminist technoscience; intra-action; neutral technology; web directories.

Introduction

The increasing spread of information and communication technologies poses a direct challenge to the prevailing assumptions about the ethical neutrality of tools. The view that information and communication technology is ethically neutral assumes that the ethical implications of new technologies are not in any way intrinsic but result from the way in which they are used. The advancement of human rights, for example, does not benefit directly from technologies themselves, but rather from their use by ethical, autonomous human agents (UNDP, 2001, Rundle and Conley, 2007). This perspective locates ethical agency solely in the hands of the user. Indeed, as long as the technology is not used, there seemingly are no ethical implications.

My research into the implementation of new information and communication technologies in developing countries suggests that this prevailing ethical paradigm – in which ethical agency is located with the user alone - is not adequate to navigate what is happening to the diversity of human knowledge. In this essay I will discuss some results from the introduction of information and communication technologies through international development assistance, which indicate that it is difficult to locate agency solely in the users of the technology. I will then position the discussion of ethical agency in two perspectives on how to address the abuses of science and technology. The first, by Meera Nanda, proposes the purification of science because only science and its method can get rid of the abuses of science. The second perspective is represented by Shiv Visvanathan, who argues for cognitive justice, in a democratisation of science, as a way to deal with the harm of science and technology.

In this paper I explore ethical agency and technology design from a technoscience perspective, which assumes that science and technology cannot be separated from each other or from the society in which they are produced (Haraway, 1997, p. 50-51, p. 279n1). Feminist technoscience is the application of feminist theory to technoscience. This approach enables reconfigurations of binaries such as male-female, subject-object, human-machine; etc., opening up a space in which particular sociomaterial configurations become visible and possible. In taking this approach, based on the work of Karen Barad (2003, 2007), Donna Haraway (1997, 2003), and Lucy Suchman (2007), I am concerned to develop an ethics that focuses on agency and accountability. In this essay I will argue that ethical agency resides in the "intra-actions" (Barad, 1999) between people and technologies. This understanding of agency locates ethical agency not solely in the hands in the user but in particular sociomaterial configurations of designers, technology, and users. This perspective proposes an understanding of agency as produced in the co-constitutive relations between people and artefacts, while at the same time acknowledging the particular accountability of people for the things they create and for how they use them.

Neutral technology

The idea that information and communication technology is neutral is well established in the international development sector. For example, in *Making New technologies Work for Human Development* (UNDP, 2001), we can read: "Technology is not inherently good or bad – the outcome depends on how it is used" (p.27). In *Ethical Implications of Emerging Technologies*, a report published by UNESCO, Mary Rundle and Chris Conley (2007) survey the possible ethical challenges of new technologies such as the 'Semantic Web' and 'digital identity management' to human rights. 'Possible' challenges, they argue, because "technologies have multiple possible

applications" and "technology in itself is neutral; it does not directly contribute to the advancement of human rights" (ibid, p. 11). The thesis of the neutrality of technology is based on an instrumental theory of technology (Feenberg, 2002, p. 5 - 6). In this view, moral and political judgements apply to ends, not means, and a technology is only evaluated on the basis of its efficiency (Barney, 2004). If a technology has unintended and unforeseen consequences, the instrumental understanding of technology responds by insisting that we need to "improve our science, and to be more careful in our calculations" (ibid, p. 37). Thus an instrumentalist understanding of technology results in the conceptualisation of technology as a *black box* (Winner, 1993); a thing with input and output, while ignoring its origins. Such thinking pays no attention to the social, political, environmental, economical, and technical decisions made in the design and production of the technology.

A similar closure is found in the social constructivist understanding of technology. Even though social constructivists do acknowledge the values and worldviews of all the social actors involved in the design and production of technology, once the black box is closed, the social origins of the technology are quickly forgotten (Feenberg, 1999, 11). Social constructivism does focus on the "interpretative flexibility" of technology (Pinch and Bijker, 1987), on how people interpret a technology and understand the output of a black box. Technology is thus not determining, they argue; people do have a choice.

The notion that 'technology is not inherently good or bad, it depends on how it is used' can be understood as a convergence of these perspectives. For example, the instrumentalist understanding of technology both underlies and is an effect of the liberal faith in progress and development (Feenberg, 2002, Barney, 2004). On the level of implementation, in ICT for development projects, the social constructivist perspective that people are free to interpret, adapt, and use a technology is widely held. Should we conclude on the basis of the notion of the interpretative flexibility of technology that technology is ethically neutral?

Bernd Carsten Stahl argues that in a humanist perspective computers cannot be considered moral subjects because they are lacking free will and are dependent on users (2002). Stahl argues that the absence of free will does not mean that technology is ethically neutral (2003). The scientists and engineers who design technology are moral subjects. Their technological choices affect the physical design and as a direct bearing on how people can use a technology or on how people can be affected by a technology.

In my research I have explored the notion of cognitive justice in global, interactive information and communication technology (ICT). Cognitive justice is expressed in ICT through open and flexible designs that do justice to the different ways of knowing and being in the world (van der Velden, 2005, 2007). Ethical agency is the capability to act responsibly towards the

'other' (van der Velden, 2008), in particular to do no harm. From this perspective it becomes clear that ICT itself plays a role in furthering or hindering our capability to act responsibly. Donna Haraway argues that by restricting our analysis to the *use* of technology, we exclude understandings of how technology design interacts with our use and excluding the impact of design will limit our understanding of the ethical implications of a technology. Haraway argues that such a perspective results in 'strong stories' in which exclusion has become invisible (1997).

Haraway's critique is relevant for two examples from my research in the conceptualisations of knowledge in the design of information and communication technologies. In order to make exclusions visible I propose to expand the network in which I analyse use in order to include both design and non-users.

Classification

My first example is based on my research into the categories used by web resources that organise information on issues pertaining to development and social justice[1]. These web resources can be described as web directories or web portals. A web directory contains web pages with hyperlinks to different kinds of digital resources, such as documents, images, sounds and movie files, web pages, databases, other directories, etc. It specialises in categorising those links in a kind of classification system that facilitates information retrieval and makes the information more accessible. Unlike in a library, where a book is categorised in one spot on one bookshelf, a web directory can categorise the same resource, i.e. the hyperlink to the resource, in many different ways. Even the category in the web directory, under which the link is organised, can be a hyperlink and be found under more than one higher-level category.

In *Sorting Things Out: Classification and its Consequences,* Bowker and Star describe the 'ideal' classification as a system that is consistent, complete, and with mutually exclusive categories (1999). In reality, they argue, no working classification system meets these three requirements. This is also true for the web resources under investigation. Even though they cover similar information interests, they use different sets of categories. What they have in common, however, is a similar way of organising the hypertext links in their collection. Furthermore, even though hyperlinks allow the free organisation of information on the web, all web resources use a hierarchical, tree-like classification scheme to organise information (Kwasnik, 1999).

Technology design is often based on the designer's way of knowing and being in the world (Heeks, 2002, Oudshoorn, Rommes et al., 2004) and on the designer's anticipations of how the technology will be used. The design of the web directory is based on a particular

[1] I analysed seven web resources that organised links to development and social justice information and three general web resources that also include links to development and social justice information (see van der Velden, 2008)

conceptualisation of relationships between the different levels of categories, which are often expressed in terms of family relationships, such as 'parent', 'child', 'grandchild' and 'sibling'. Research has shown the cultural specificity of such logical structures and that classification schemes of web directories are often built around the interests of 'Western' users (Walton and Vukovic, 2003). It has been convincingly argued that other ways of knowing and being in the world, which may result in other ways of organising and categorising knowledge, remain invisible in such classification schemes (Olson, 2001, Pannekoek, 2001).

The design of the web directory seems to function as a frame that enables the organisation of information in one particular way. Andrew Feenberg (1999) describes such a frame as *technical code*: "Technical codes define the object in strictly technical terms in accordance with the social meaning it has acquired. […] Each new instance [of a standard technology] must confirm to its defining code to be recognizable and acceptable" (p.88). The technical code of the web directory thus functions as a "hegemonic global structure" (Wilk, 1995, 2004) and explains the hegemony of the web directory as one of *form*, not of content. The web directory promotes a particular way of organising and representing knowledge. This limitation does not promote homogeneity but it enables "particular kinds of diversity while submerging, deflating, or suppressing others" (Wilk, 1995, p.118). Understanding a web directory as an hegemonic technical code helps us to see what is assumed to be an universal design more accurately as an exclusive frame that may limit the diversity of its content.

Local knowledge sharing in a global network

My second example comes from research into the conceptualisation and organisation of knowledge in a global network for local knowledge sharing (van der Velden, 2006). This network is based on specially designed software supporting the knowledge sharing of communities and community-based organisations in several countries around the world. Local knowledge[2], for example an herbal cure, can be shared through the global network, from a fishing community in India to a pastoralist community in Kenya. The software facilitates knowledge sharing in a diversity of languages not found in any other network[3].

I visited two villages in India that were connected to the global network through a local ICT project that supports rural internet centres. These centres were initially used to bring new information into the communities but soon became the basis for participation in other types of initiatives, such as the global network. The global network encouraged people to share their local

[2] The project defined local knowledge as "locally owned and adapted knowledge of a community – where the community is defined by its location, culture, language, or area of interest" (Ballantyne, 2002, p. 2)

[3] Information exchange takes place in such languages as English, French, Hindi, Luganda, Ndebele, Nepali, Portuguese, Shona, Sinhala, Spanish, Swahili, Tamil, and Wolof.

knowledge with people in other communities. I met some of the local volunteers, women from the community, who collected local knowledge about 'native treatments' for both people and livestock. This local knowledge, such as herbal treatments for snakebites or parasites, was generations old. Normally, younger people learned the work of healing from older relatives in a kind of apprenticeship. There were two important aspects to this particular kind of knowledge: it existed in the form of memory and practice as there were no written texts to consult and, secondly, the treatments did not have a monetary value[4]. As part of the participation in the global network, volunteers collected these treatments in a notebook and the information was later entered into a computer at the rural internet centre and sent to the national organisation where they were edited and archived[5].

In my interviews with women healers it became clear that the ability to know, use or benefit from this local knowledge was understood both in terms of community service and common good. With the wider availability of 'English' medicine and treatments, however, younger generations seemed less interested in learning local treatments. The local volunteers and project workers told the local healers that if no one was interested in learning their knowledge, their knowledge would die with them. The volunteers, project workers, and healers thought of the technology offered by the rural internet centre as a solution to provide local medical knowledge 'immortality'. The technology would keep their knowledge 'alive' even after their deaths. The healers told me that they consented to sharing their knowledge with the volunteer because they didn't want their knowledge "to die" with them. There was no form of compensation for the local healers who shared their knowledge other than the promise of the 'immortality' of their knowledge through digitalisation[6]. More to the point, the values of community service and common good, in which this knowledge was embedded, became invisible once the local knowledge was codified, digitalised and made available via the global network. Once the knowledge left the community, in a digital format, it became a commodity subjected to national and international laws, treaties, and markets.

The focus on the digitalisation of local knowledge influenced the whole project. There was no reflection on what the commodification of local knowledge through digitalisation meant for the community. For example, the project did not seem to consider the differences between learning local treatments in an apprenticeship and reading about a treatment in a database. The result was that the proper Latin name (Linnaeus nomenclature) for the local name of a plant, berry,

[4] Sometimes gratitude for a successful treatment was expressed by a gift in the form of food or a piece of clothing.
[5] Some of the treatments were also published in a local community newsletter. The treatments were also collected in three paper-based collections, but these were only available at the project's regional centre.
[6] One healer mentioned that she would be compensated for sharing her knowledge in the form of 'blessings'.

seed, etc. was identified and added, but there was no precise information on, for example, where to find a particular plant in the village or at what time of the season or day to pick the leaves. Such information is crucial to the effectiveness of some cures and simply common sense for apprentice healers working in and for the community, but it became invisible in the technological frame provided by the internet centre and the global network.[7]

Do we all know the world in the same way?

Above I presented the web resources I looked at as hierarchical classification schemes built on the ontological assumption that the body of knowledge they organise can be captured in a pre-set selection of categories organised in an hierarchical tree structure. Each new knowledge item has to fit in at least one top-level category and one sub-level category. The designers of such classification systems often treat the world as a knowable world, which can be captured in a number of categories. In the case of the Development Gateway[8], one of the web directories I analysed, the content manager defended the Gateway's set of categories by arguing that "development is a mature subject, I think we do know the classifications" (quoted in Wilks, 2002). Shirky paraphrases the ontologist of Yahoo!, another web resource I looked at, as saying; "We are Yahoo. We do not have biases. This is just how the world is. The world is organized into a dozen categories" (Shirky, 2006).

I decided to look at the design of classification systems for people who have a different way of knowing the world (van der Velden, 2007). For example, the *Indigenous Knowledge and Resource Management in Northern Australia (IKRMNA)* programme developed TAMI[9], a database designed to be useful for the Yolŋu Aboriginal Australians. Unlike 'Western' cultures, the Yolŋu do not make a priori split between nature and culture. In order to accommodate their way of knowing, the database was developed with a minimum of ontological presumptions built into it, allowing the users to design the classification system that organises their knowledge while they are using it (Christie, 2004, Verran, 2005, Verran, Christie et al., 2007). The users design the classification and organisation of knowledge by creating their own metadata as they tag each item they enter in the database. Another example is the work of Kahnawake librarian Brian Deer, who designed library classification schemes for several First Nations community libraries in Canada. Deer designed a new classification system for each of the communities he worked with,

[7] Knut Rolland studied knowledge sharing in an international corporation and argues for the preservation of heterogeneity in knowledge representations in knowledge intensive firms and settings in order to provide "a rich context in which meaning can be generated and negotiated" (2006, p.152). Without this heterogeneity, knowledge repositories become "scarcely used digital junkyards".

[8] See http://www.developmentgateway.org

[9] TAMI, URL http://www.cdu.edu.au/centres/ik/db_TAMI.html#, last accessed 23 April 2007.

using categories that reflected the lives, needs, and practices of the particular users (MacDonell, Tagami et al., 2003).

Comparing these examples of indigenous classification work and the classifications enabled by the web resources shows that it is not only about different designs for different ways of knowing the world, but also about designing classification systems based on the principle that there are different ways of knowing the world. The issue can thus be framed as a question of cognitive justice: Can a classification system treat different ways of knowing the world equally? The web resources are based on a design that is centralising and hierarchical, based on the view that the 'knowable' world can be captured in a specific set of categories. The indigenous designs are non-hierarchical and participatory. These designs are based on the view that there are different ways of knowing the world, resulting in a variety of classification systems and design approaches that try to capture this diversity. In particular the TAMI example shows how users design their classification system by adding their own tags to the items they put in the database (van der Velden, 2007)

The second example of the rural internet centres and local healers in India shows how the framing of information technology as a better way of preserving local knowledge excludes other ways of sharing knowledge and keeping knowledge 'alive'. For example, the project could have included non-digital means of sharing and preserving local knowledge by facilitating knowledge sharing among local healers or actively seeking people in the community who are interested in becoming healers. Instead, the choice to focus on the digitalisation of local knowledge may in the end not result in 'immortality' but in a sudden death by 'museumisation'. This risk was exemplified when the global network 'progressed' to a new version of the software. One organisation participating in the global network had been using an earlier version of this software. Since the two software packages were not fully compatible, the users were unable to restore the files they had stored in the old version. The result was that the digitalised henna designs, based on traditional designs that women apply on their bodies during wedding festivities, which were stored on the hard disk, could not be located with the new software. This is not uncommon. Anyone who has upgraded their software might have experienced similar risks. Ultimately, digitalisation also resulted in the transformation of local knowledge into a commodity. One of the volunteers from the community involved in collecting local treatments voiced her new understanding of local knowledge as a commodity by expressing the wish to become a healer herself. With a notebook full with treatments and local names of plants, herbs, and seeds, she felt she could become a traditional healer too. But unlike the local healers, who had shared with her their treatments without direct compensation, she was going to ask a fee for her treatments.

Locating agency

The examples of the web resources and the global network for local knowledge sharing suggest that the introduction and use of information and communication technologies (ICTs) have set a chain of events in motion that may have effects well beyond the aims and goals of the organisations that initiated them. In particular, they make clear that the design of their technologies play a role in how knowledge becomes visible or invisible. The ethical agency to represent one's knowledge, or someone else's knowledge, with and through ICT was hampered by technological designs that did not treat different ways of knowing equally. This suggests that people's agency to act ethically is not only based on the use of technology, but also the uses enabled by the technology. The technological design enables some uses more than others, while other uses are clearly disabled in the design. It is the sociomaterial configuration of users and technology design, which influences the agency of both: agency is produced in subject-object *intra-action* (Barad, 2003, Suchman, 2007). As Suchman explains: "Whereas the construct of interaction suggests two entities, given in advance, that come together and engage in some kind of exchange, *intra-action* underscores the sense in which subjects and objects emerge through their encounters with each other (Suchman, 2007, 267). Intra-action stresses the notion that technology and user are not distinct phenomena but emerge in these intra-actions; they are mutually constituted. In that sense agency cannot be reduced to pre-existing attributes of users; it is located in our intra-actions (ibid, p.285). Suchman stresses that this doesn't mean people and artefacts are similar in the way they constitute each other and asks: "How might we reconceptualize the granting of agency in a way that at once locates the particular accountabilities of human actors, while recognizing their inseparability from the sociomaterial networks through which they are constituted?" (ibid, p. 270).

The two examples I discussed above make clear the particular accountability of people for the way in which they translate their values and ways of knowing the world into technology designs. For example, the content manager who believed that the world could be organised in an hierarchical set of categories, designed a web-based classification that made other ways of organising and knowing the world invisible. In the case of the global network, the local organisation decided that technology, not people, was a better way to preserve local knowledge. The examples contest the idea of neutral technology and autonomous agency of users and at the same time show that people design or apply technology that affect the agency of users.

These examples help explain that ethical agency is not an attribute of human beings, in this case technology designers and technology users, but enacted in and through the sociomaterial configuration of people and technology. Thus, if we only focus on the use of web resources, will we never fully understand the role of the technological design in making ways of

knowing visible or invisible. Similarly, if we focus on the use of ICTs in the two villages in India, will we never fully understand how the introduction of ICTs in these villages affected the women healers who themselves did not use the global knowledge-sharing network. Nor will we understand how the introduction of ICTs created the possibility that a new generation of local healers will operate on the bases of a market economy.

In the Enlightenment perspective of the world, people have agency, while nature and things are neutral until acted upon. In this view, ethical agency remains located in the autonomous user (Adam, 2003). The above suggest however that ethical responses to possible harmful effects of the introduction and use of ICT will have to move beyond prevailing assumptions about the neutrality of technology and an ethical agency located solely in the hands of humans. Technology is never neutral; neither in use, as the example of the web resources shows, nor in non-use, as the case of the village healers shows. The understanding of agency as relational and enacted, as part of a particular configuration of people and artefacts, not only emphasises that our ability to act ethically is co-constituted by technology, it also opens up ways of thinking about the relations between designers, users, and ICTs and how they may be reconfigured for more ethical effects.

Ethical science

When technology causes harm, it is the responsibility of people to improve the science that informs the technology design. The understanding of technology as non-neutral, and agency as located in the intra-actions between humans and artefacts, does not in any way diminish the accountability of designers for their designs or users for their use of ICTs.

In this section I will situate the discussion of agency and harmful technology in debates on the abuses of science and technology. An outspoken participant in these debates is Meera Nanda. A microbiologist and philosopher of science, Nanda reads Immanuel Kant's motto "Sapere aude! Have courage to use your own reason!" as "a rallying cry for freedom" (Nanda, 2006, 493): freedom of the method of the philosophers and scientists and their knowing based on Enlightenment rationality. Nanda's discontentment is with the neo-Hindu appropriation of reason: "[W]hile neo-Hindu philosophers accepted the Kantian emphasis on using 'one's own reason' and not the authority of priests and holy books, they rejected the limit the empiricists had put on the power of reason" (p.494). Neo-Hindu philosophers insist that mystical experience, through, for example, yoga or meditation, constitutes a valid empirical experience. This is an important problem for Nanda because these neo-Hindu philosophers also provide the inspiration for fascist Hindu nationalism.

"Modern science", argues Nanda (2003), "combines in it the power of disenchantment and universalism. It is time it was recognized, once again, as an ally of social justice, peace, and advancement all around the world" (p.267). Nanda sees Kant's critical reason as the only way forward for India's "incomplete and schizophrenic modernity" (2006, 496). In *Prophets Facing Backward: Postmodern Critiques of Science and Hindu Nationalism in India* (Nanda, 2003), she takes a strong stance against the 'prophets' and 'clerks' who, intentionally or not, support the Hindu fundamentalists (p.1). The prophets are the Hindu nationalists, who "even as they march forward, keep their faces turned backwards toward an imagined past of Hindu glory" (ibid.). But Nanda's main issue is with the "betrayal" of the 'clerks', "men and women of secular learning, intellectuals who uphold left-wing political ideals, but who have lost confidence in the classic left-wing cultural ideals of scientific reason, modernity, and Enlightenment" (ibid.). In Nanda's (2003) argument, the list of ´clerks´ includes the "strong sociologists of knowledge", e.g. Barnes and Bloor (p.128-136); "feminist epistemologists" such as Anderson, Code, Harding, and Longino (p. 145-150); "postmodernists" such as Chatterjee, Nandy, Said, Spivak, Shiva, Visvanathan, Verran and Turnbull (p.151-158), and others "who took the culturalist turn in science", e.g. Haraway, Hess, Latour, and Rouse (p. 136-145). All of these come in for particular criticism from Nanda for their critique of the method and logic of science, its universalism and objectivity – a critique that, in Nanda's view, opens the doors to the abuse of science.

Nanda argues that the 'clerks', with their pluralist conception of science, attempt to develop an epistemological egalitarianism that results in a relativist position: "[T]hat what constitutes relevant evidence for a community of scientists will vary with their material/social and professional interests, their social values including gender ideologies, religious faith, and with their culturally grounded standards of rationality and success" (Nanda, 2003a). It is relativism, argues Nanda, which delivers the poor "non-Western masses" into the hands of the fascists and fanatics. For Nanda, critical inquiry is part of an act of purification: Science has to be cleansed of the philosophers and scientists who provide the Hindu nationalists with theoretical foundations that can be used to discredit modern science and validates superstition. The only way forward, Nanda argues, is a solution based on the complete separation of science from religion, culture, and ethics.

Some of those whom Nanda refers to as 'clerks' refuse to accept the dichotomy between (objectivist) science and (relativist) social constructivism. They prefer instead to seek a different formulation of Nanda's problem. For example, anthropologist and human rights activist Shiv Visvanathan and feminist technoscientist Donna Haraway argue for an approach which takes differences in knowing and being seriously. They ask: How we can do justice to our different knowledge practices and at the same time share a common world? This perspective

acknowledges the role of science and technology in the production of knowledge and conceptualises knowledge as embedded and situated (Haraway, 1988). Contrary to Nanda, they see the democratisation of science and technology as a requirement for the answer to their question.

Cognitive justice

Shiv Visvanathan's call for the democratisation of science and technology is motivated by what he describes as the history of the violence of science and development in India[10]. Visvanathan (1988) describes the abuses of science and development as the "triage ethics of modern science". The idea of triage combines the concepts of controlled experiment, obsolescence, and vivisection - whereby a society, a subculture or a species is labelled as obsolete and condemned to death because scientifically reasoned judgment has deemed it incurable or beyond help, given available knowledge, time, and resources. Visvanathan argues that science has failed to understand and guarantee life. It has become a "major cognitive gatekeeper", resulting into 'monocultures of the mind' (Shiva, 1993, Code, 2006). Monocultures "generate models of production which destroy diversity and legitimise that destruction as progress, growth, and improvement" (Visvanathan, 1988, p.7).

In a presentation on "*Western Science, Power, and the Marginalisation of Indigenous Modes of Knowledge Production*", Visvanathan argues that the impact of post-Second World War science on third world countries should be characterised as the museumisation of indigenous knowledge and scientific endeavour:

> "It entails the relegation of indigenous knowledge forms as obsolete artefact, useful only for historical display. It comprises the imposition of controlled laboratory conditions, rationalist thinking and other western knowledge rules and prescriptions which have broken the connection between third world communities and their own cosmologies" (Visvanathan quoted in Kraak, 1999, p.1).

Almost all post-colonial nationalist movements embraced the "modernisation premises of western science", but western science has not been able to provide these societies the promised prosperity, quite the opposite: "poverty, ecological destruction and the displacement and museumization of traditional technologies" have been the result instead" (Visvanathan quoted in Kraak, 1999, 2).

Visvanathan argues that romantic or revivalist ideas of a return to indigenous and traditional knowledge and solutions are unrealistic in the "political and economic onslaught of

[10] Visvanathan's studies include shifting cultivation, Bhopal, and hydroelectric dams in India (1988, 2000, 2003). See also Rajagopal (2001) and World Commission on Dams (Dams, 2000) on the violence related to the construction of dams in developing countries.

globalisation" (ibid). His approach focuses on bringing democracy and diversity into science (Visvanathan, 2002, 2006, 2007) and is based on a political economy and cosmology that are founded on the notion of cognitive justice. Visvanathan recognises the risk of such a project, for example in terms of its appeal to fundamentalisms, but argues that science contains its own grammar of violence that needs to be addressed. Visvanathan stresses that cognitive justice is not simply about participation but cognitive representation: "The idea of participation fundamentally accepts the experts' definition of knowledge. […] experts' knowledge is presented as high theory and the layperson's ideas as a pot-porri of practices, local ideas and raw material. There is no principle of equivalence" (Visvanathan, 2007, 92).[11] Secondly, premised on the situatedness and embodiedness of knowledge, the idea of cognitive justice suggests a link between survival and the diversity of human knowledge (ibid, p.93). Thus the democratisation of science, argues Visvanathan, should be extended to include alternative sciences. We cannot close the discussion on "democracy within knowledge" by pointing to the abuses of science by, for example, the Nazis in Germany or, in Nanda's case, fascist Hindu nationalism in India.

Visvanathan's approach is a call for a new relationship between science and democracy, opening up science to include the knowledge of the people "triaged out of citizenship", because their knowledge and ways of life or livelihood are from the past, or their knowledge and skills have become valueless because of, for example, their displacement by the science of agriculture and forestry. In this new relationship, framed by the notion of cognitive justice, it becomes possible to validate other forms of knowledge and to validate laypersons as experts. This validation is not an automatic justification for local practices but a "positive heuristic for dialogue" (Visvanathan quoted in Kraak, 1999, p. 3). Nanda strongly objects to such a position because it refuses to acknowledge that science has developed distinctive methods and social practices that "promote a higher level of self-correction of evidence, and ensure that methodological assumptions that scientists make themselves have independent scientific support" (2003a).

Do no harm

In *Prophets facing backwards,* Meera Nanda asserts a particular ethical responsibility for scientists. She reminds the science and technology studies scholars, the 'clerks' and all of "us" of what she calls a "simple truth":

[11] Mark Elam and Margareta Bertilsson (2003) agree. In their analysis of the engagement between science and civil society they describe the democratic spaces, which promote the ideal of the democratic discussion and the equality of inquirers. But, similar to Visvanathan, Elam and Bertilsson argue that this ideal can't be reached as the deliberative democratic discussion "*provides a model of democracy where scientists have good chances of appearing before others as already model scientific citizens. By valuing rationality, reserve, selflessness and powers of argumentation, deliberative democracy is a democratic politics played out on scientists' home turf*" (p.242).

> "[I]deas have consequences. Those of us who trade in ideas have a responsibility to ensure that our ideas do no harm. In the face of the rising threat of reactionary populism in India and many other parts of the developing world, it is high time critics of reason and Enlightenment asked themselves if they are fulfilling their responsibility" (2003, p. 159).

Nanda presents her 'do no harm' principle as the ethical responsibility of every scientist. But Nanda fails to describe the content of this responsibility. Nanda argues that the ethical responsibility and intellectual responsibility of the scientist are the same: pure science will ensure that others will not be harmed as long as scientists follow the logic and method of science.

Enlightenment's separation of man from nature, the foundation of Nanda's conception of science, produces among other things the invisibility of other ways of knowing in which no such separation exists (e.g. the example of the Yolŋu above). Code (2006) argues that such separation of man from nature "tacitly promoted a picture of a world, both physical and human, that privileged and was subservient to a small class and race of people whose sex required no mention because it was presumptively male and in any case irrelevant and who were uniformly capable of achieving a narrowly conceived standard of rationality, citizenship, and morality" (ibid, p.3). In *Ecological Thinking: The politics of Epistemic Location,* Code argues that "specifically located, multifaceted analyses of knowledge production and circulation in diverse biographical, historical, demographical, and geographical locations generate more responsible knowings" (ibid, p.9).

Visvanathan and Code propose that 'responsible knowledge' is the result of democratic processes that take cognitive agency and cognitive representation seriously. Nanda is determined, however, to understand the pluralists' willingness to take stock of the different ways of knowing, the 'is', as an ethical norm of uncritical tolerance to these different ways of knowing, the 'ought'. But such tolerance, is not a logical consequence of the fact that there are diverse ways of knowing (Renteln, 1988). In fact, Visvanathan does not claim that because there 'are' different ways of knowing, we 'ought' to be uncritically tolerant to these different ways of knowing. Visvanathan argues that people's actual behaviour is an expression of their way of knowing and being in the world, not as a tradition from the past, a superstition that can be "museumised" and excluded from the debates on their futures.[12] Donna Haraway insists, however, that it is not tolerance but respect that is needed. Tolerance *can* result in a relativist position, which is equally from 'nowhere' as that of Nanda's scientism. Respect, Haraway argues, is acknowledging that we

[12] Both Bruno Latour (2004, p. 245) and Donna Haraway (2003, p. 6) quote Alfred North Whitehead who described the concrete as a "concrescence of prehensions", and "actual occasion". I understand Visvanathan's call for cognitive justice as an attempt to bring all peoples into the "concrete", to make them matter.

are *all* from somewhere in this world, no one has a view from nowhere or outside this world (1988). Only through respect, by taking difference seriously, can we begin to find ways to live together in a common world (Haraway, 2003).

Design for a common world

Respect for the different ways of knowing the world underlies Visvanathan's notion of cognitive justice. Cognitive justice is first of all a call for making other ways of knowing matter, in particular the knowledge of the defeated and marginalised. The different ways of knowing the world should be treated equally in terms of cognitive representation in the dialogues of knowledges. Contrary to Nanda's critique, such a project does not deny epistemic responsibility or relegate science to an uncritical domain of equally valid knowledges. Instead it calls for a confrontation of science by other ways of knowing the world, towards more responsible dialogues on what knowledge forms the basis for just, sustainable and peaceful development.

Our common world emerges from the dialogues of diverse ways of knowing and being in the world. How then to design for a good common world? How to make the global common frame more inclusive? What design principles encourage cognitive justice?[13] One suggestion is the socio-ecological concept of adaptability. An adaptive technology design would be able to change according to the diverse or changing needs of the users. An adaptive design based on open source software, open standards, and open hardware designs, encourages the flexibility, equity of use, sustainability, and transparency of the technology. An adaptive design also allows the adaptation of some components or 'layers', while others stay the same[14]. This design principle changes the conception of the design process, from a process that ends when the 'product' is finished, to an ongoing intra-active process, a design process as an ongoing dialogue between design, designers and users as designers. A focus on adaptability also changes the perception of the lifetime of design. Current designed obsolescence results in the continuous deleting of software and unsustainable dumping of hardware and, in its wake, the loss of knowledge and expertise and the erasure of the digital knowledges and memories stored on our hard-drives or organised by our softwares[15]. Designed longevity will facilitate sustainable designs and sustainable knowledge.

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[13] In other work I suggest four general principles that can inform designing for cognitive justice (see van der Velden, 2005).

[14] Stewart Brand's adaptive architecture shows what we can learn from the architecture of buildings and the six 'layers of change': stuff, space plan, services, skin, structure, and site. Some layers are more adaptable than others (1994)

[15] Natalie Ceeney of the British National Archives mentions the possibility of "losing years of critical knowledge" because modern computers cannot always open old file formats (BBC, 2007).

Margunn Aanestad (2003) describes such an ongoing design process as “design-in-use” and design as the “design of configurations” of human and non-human actors. Design for a common world is based on the recognition that ethical agency resides in the particular configurations of people and technology. This perspective on agency denies the neutrality of technology and confirms the particular accountability of users and designers:

> “Particular possibilities for acting exist at every moment, and these changing possibilities entail a responsibility to intervene in the world’s becoming, to contest and rework what matters and what is excluded from mattering” (Barad, 2003, p.827).

Conclusion

The analyses of web resources and of a global knowledge-sharing network suggest that agency is located in the particular configurations of design and use. In the example of the online classifications of development information we saw how the configuration of web directory design results in a culturally specific classification system, producing the invisibility of other ways of knowing the world. The example of the global knowledge-sharing network shows how local knowers, who do not use the global network, are directly affected by its configuration of design and use. In both cases we can discern limitations in the cognitive representation of other ways of knowing the world.

We are poorly equipped to deal with the ethical challenges this poses. Science and technology create frames that “narrow our gaze to *particular kinds* of difference” (Wilk, 1995, p.130). We have to widen the gaze. But how? Meera Nanda’s conception of science, built on a particular Enlightenment perspective, results in a science of limited ethical significance. In this perspective, ethical agency remains solely in the hands of the autonomous scientist, who is called upon to improve science when science results in harm. Visvanathan’s call for bringing democracy and diversity into science and technology, based on cognitive justice and cognitive representation, opens up the way for reconfigurations of design and use in which more responsible intra-actions become possible.

Yet, contrary to the critique, the principle of cognitive justice does not lead inexorably to the acceptance of a plurality of worlds, but stops short of what Nanda calls an anything goes kind of relativism. Rather, our lived experience of difference, or our encounter with otherness, is in reality an experience of coexistence and dialogue within a common world. The barriers to dialogues of knowledge are our own constructions of imagined incommensurable worlds (Haraway, 2003). Hence, the ethical obligation for scientists and technology designers to keep the

gaze on what is excluded from mattering. The ethical responsibility of doing no harm is in this sense a responsibility to ensure that people and their different ways of knowing are included in the dialogues on a good life. My analysis reinforces the argument that dropping our assumptions about the division of the world between humans and non-humans can help us understand ethical agency as emerging from particular sociomaterial configurations of people and artefacts. Ultimately, the point is not, as Suchman (2007) argues, to locate agency in people or technology, but to understand how our capacities to act are realised through them both.

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References

Margunn Aanestad. The camera as an Actor: Design-in Use of Telemedicine Infrastructure in Surgery. *Computer Supported Cooperative Work* **12**(1): 1-20, 2003.

Alison Adam. Feminist Ethics for Computer Ethics. In Christina Mörtberg, Pirjo Elovaara and Agneta Lundgren, editors, *How Do We Make A Difference: Information Technology, Transnational Democracy, and Gender*, pages 137-149; Luleå University of Technology, Luleå, 2003.

Karen Barad. Agential Realism: Feminist Interventions in Understanding Scientific Practices. In M. Baglioli (Ed.), *The Science Studies Reader* (pp. 1-11). New York, Routledge, 1999.

Karen Barad. Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter. *Signs* 28(3): 801-831, 2003.

Karen Barad. Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning. Durham, Duke University Press, 2007.

Darin Barney. *The Network Society*. Cambridge, Polity, 2004

BBC. Warning of data ticking timebomb, 3 July 2007. Available at http://news.bbc.co.uk/2/hi/technology/6265976.stm (Last accessed on 3 July 2007).

Geoffrey C. Bowker & Susan Leigh Star. *Sorting Things Out: Classification and its Consequences*. Cambridge, The MIT Press, 1999.

Stewart Brand. *How Buildings Learn*. New York, Penguin Books, 1994.

Michael Christie. Words, Ontologies and Aboriginal Databases, 2004. Available at http://www.cdu.edu.au/centres/ik/pdf/WordsOntologiesAbDB.pdf (Last accessed 23 April 2007).

Lorraine Code. *Ecological Thinking*. Oxford, Oxford University Press, 2006.

Dams, World Commission on. *Dams and Development: A New Framework for Decision-Making*. London, Earthscan Publishers, 2000.

Mark Elam and Margaretha Bertilsson. Consuming, Engaging and Confronting Science: The Emerging Dimensions of Scientific Citizenship. *European Journal of Social Theory* **6**(2): 233-251, 2003.

Andrew Feenberg. *Questioning Technology*. New York, Routledge, 1999.

Andrew Feenberg. Transforming Technology: A Critical Theory Revisited. Oxford: Oxford University Press, 2000.

Donna Haraway. Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies* **14**(3): 575-599, 1988.

Donna Haraway. *Modest_Witness@Second_Millenium.FemaleMan©_Meets_Oncomouse™*. New York, Routledge, 1997.

Donna Haraway. *The Companion Species Manifesto: Dogs, People, and Significant Otherness.* Chicago, Prickly Paradigm Press, 2003.

Richard Heeks. Failure, Success and Improvisation of Information Systems Projects in Developing Countries. Manchester, Institute for Development Policy and Management, University of Manchester, 2002.

Andre Kraak. Western science, power and the marginalization of indigenous modes of knowledge production [Interpretative minutes of the discussion held on 'Debates about Knowledge: Developing Countries Perspectives' co-hosted by CHET and CSD], 1999. Available at http://www.chet.org.za/publications/Debates%20about%20Knowledge%20-%20Report.doc (Last accessed 23 April 2007).

Barbara H. Kwasnik. The role of classification in knowledge representation and discovery. *Library Trends, 48*(1), 22-48, 1999.

Bruno Latour. Why has critique run out of steam? From matters of fact to matters of concern. *Critical Inquiry* 30(Winter 2004): 225-248, 2004.

Paul MacDonell and Reiko Tagami, et al. Brian Deer Classification System, 2003. Available at http://www.slais.ubc.ca/courses/libr517/02-03-wt2/projects/deer/index.htm (Last accessed 23 April 2007)

Meera Nanda. *Prophets Facing Backwards: Postmodern Critiques of Science and Hindu Nationalism in India*. Rutgers, Rutgers University Press, 2003.

Meera Nanda. Postmodernism, Science and Religious Fundamentalism. 2003a. Available at http://www.butterfliesandwheels.com/articleprint.php?num=40 (Last accessed 23 April 2007).

Meera Nanda. How Modern Are We? Cultural Contradictions of India's Modernity. *Economic and Political Weekly*: 491-496, 2006.

Hope A. Olson. The Power to Name: Representation in Library Catalogs. *Signs* **26**(3): 639-668, 2001.

Nelly Oudshoorn, Els Rommes, et al. Configuring the User as Everybody: Gender and Design Cultures in Information and Communication Technologies. *Science, Technology & Human Values* 29(1): 30-63, 2004.

Frits Pannekoek. Cyber Imperialism and the Marginalization of Canada's Indigenous Peoples. In Jean-Paul Baillargeon, editor, *The Handing Down of Culture, Smaller Societies and Globalization*. Toronto, Grubstreet Books, 2001.

Trevor Pinch and Wiebe Bijker. The Social Construction of Facts and Artifacts. In W. Bijker, T. Hughes and T. Pinch, editors, *The Social Construction of Technological Systems*. Cambridge, MIT Press, 1987.

Balakrishnan Rajagopal. The Violence of Development. The Washington Post. Washington, 8 August 2001. Available online at http://mit.edu/phrj/publications/010808_washington_post.html (Last accessed on 23 April 2007)

Alison Dundes Renteln. Relativism and the Search for Human Rights. *American Anthropologist*, New Series, 90(1), pp.56-72, 1988.

Knut H. Rolland. Achieving knowledge across borders: Facilitating practices of triangulation, obliterating "digital Junkyards". *Ethics and Information Technology*, 8:143-154, 2006

Marie Rundle and Chris Conley. *Ethical Implications of Emerging Technologies: A Survey*. Paris, UNESCO, 2007.

Clay Shirky. Ontology is Overrated: Categories, Links, and Tags, 2006. http://www.shirky.com/writings/ontology_overrated.html (Last accessed 23 April 2007)

Vandana Shiva. *Monocultures of the Mind: Perspectives on Biodiversity and Biotechnology*. Dehra Dun, Natraj Publishers, 1993.

Bernd Carsten Stahl. The Moral and Business Value of Information Technology: What to do in Case of a Conflict? In Namchul Shun, editor, *Creating Business Value with Information Technology: Challenges and Solutions*, pages 187-202. Hershey PA, Idea-Group Publishing, 2003.

Bernd Carsten Stahl. Can a Computer Adhere to the Categorical Imperative? A Contemplation of the Limits of Transcendental Ethics in IT. In Iva Smit and George E. Lasker (editors), *Cognitive, Emotive and Ethical Aspects of Decision Making and Human Action*, pages 13-18. Baden-Baden, 2002.

Lucy Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions* (2nd edition). Cambridge, Cambridge University Press, 2007.

UNDP. *Human Development Report 2001: Making New Technologies Work for Human Development*. New York, UNDP, 2001.

Maja van der Velden. Programming for cognitive justice: Towards an ethical framework for democratic code. Interacting with Computers **17**: 105-120, 2005.

Maja van der Velden. A license to know: Regulatory tactics of a global network. In Fay Sudweeks, Herbert Hrachovec, et al. *Cultural Attitudes Towards Communication and Technology 2006*, pages, 555-563; Murdoch, Murdoch University, 2006.

Maja van der Velden. Invisibility and the Ethics of Digitalization: Designing so as not to Hurt Others. In Soraj Hongladarom and Charless Ess, *Information Technology Ethics: Cultural Perspectives*, pages 81-93; London, Idea Group Reference, 2007.

Maja van der Velden. Situated Classification Work on the Web, 2008. Retrieved 20 June 2008, from http://www.globalagenda.org/file/10.

Helen Verran (2005). Personal communication per email, 21 November 2005.

Helen Verran, Michael Christie, et al. Designing digital tools with Aboriginal Australians. *Digital Creativity* **18**(3): 129-142, 2007.

Shiv Visvanathan. On the Annals of the Laboratory State. In Ashis Nandi, editor, *Science, Hegemony, and Violence: A Requiem for Modernity*. Tokio, United Nations University, 1988

Shiv Visvanathan. Environmental Values, Policy, and Conflict in India, 2000 (Carnegie Council on Ethics and International Affairs). Retrieved 20 June 2008, from http://www.cceia.org/resources/articles_papers_reports/709.html/_res/id=sa_File1/709_visvanathan.pdf.

Shiv Visvanathan. The future of science studies. *Futures* (34): 91-101, 2002.

Shiv Visvanathan. Progress and Violence. In A. Lightman, D. Sarewitz & C. Desser (Eds.), *Living with the genie: Essays on technology and the quest for human mastery* (pp. 157-180). Washington, Island Press, 2003.

Shiv Visvanathan. Alternative Science. *Theory, Culture & Society* 23(2-3): 164-169, 2006.

Shiv Visvanathan. Knowledge, Justice and Democracy. In Melissa Leach, Ian Scoones and Brian Wynne, editors, *Science and Citizens*, pages 83-94. London, Zed Books, 2007.

Marion Walton and Vera Vukovic. Cultures, Literacy, and the Web: Dimensions of Information "Scent". *Interactions* (Special Issue: HCI in the Developing World) 10(2): 64-71, 2003.

Richard Wilk. Learning to be local in Belize: Global systems of common difference. In Daniel Miller, editor, *Worlds Apart: Modernity Through the Prism of the Local*, pages 110-135. Routledge, 1995

Richard Wilk. Miss Universe, the Olmec and the Valley of Oaxaca. *Journal of Social Archaeology* 4(1): 81-98, 2004.

Alex Wilks. Development through the Looking Glass: the Knowledge Bank in cyberspace. *Information Development, 18*(1), 41-46, 2002.

Langdon Winner. Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology. *Science, Technology, & Human Values* 18(3): 362-378, 1983.