Public involvement and narrative fallacies of nanotechnologies

Abstract

This paper analyzes a European research project called 'Deepening Ethical Engagement and Participation in Emerging Nanotechnologies' with the abbreviation DEEPEN. The DEEPEN's findings and conclusions on the narratives, public understandings and the lay ethics of nanotechnologies are examined in a critical manner. Through a criticism of the theoretical framings of what constitutes a narrative and the application of a different theoretical framing of narratives, the paper argues that the findings and conclusion of the DEEPEN should be approached with caution as there are several unjustified claims concerning the contextualization of the findings. Such claims pertain to the theoretical framing of narratives, virtue ethics, modernity, lay attitudes, and earlier research.

Key words: Ethics, nanotechnology, narratives, cultural theory, laypeople, deficit model

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In the beginning of the 2000s all of Europe witnessed an increase in public involvements in decision-making around GMO and biotechnology. At the same time another technology came to the fore as the technology of the future, nanotechnology. Combined with the relative failures of the public involvement in biotechnology appraisals mainly due to unclear mandates and/or inclusion of the public at very late stages of technology development (Hansen 2010 116–117), this timing of the new introduction of nanotechnology as a research priority both in the USA and in the EU created a demand for earlier involvement or inclusion of public perspectives and values. Already in 2005 Phil Macnaghten et al. wrote:

> It has been striking to see the rapid official uptake in UK and EU science policy communities of the idea of upstream public engagement

with science; an idea that emanated from an extensive academic

scholarship in science and technology studies (Macnaghten et al.

2005, 277)

Macnaghten et al. point here to the fact that the earlier oppositional position of including

the public – or non-experts – into decisions concerning the interfaces between science

and society became mainstream policy in the 2000s (Nydal & Strand 2008). Mario Kai-

ser (2010) sees this change as the rise of the assessment regime where ethics and social

sciences address alternative futures to in order to determine the acceptability of an

emerging technology.

The case presented in this paper is one such upstream involvement, financed under the

'Science and society' in the EU's Sixth Framework Programme, called 'Deepening Ethical

Engagement and Participation in Emerging Nanotechnologies' with the abbreviation

DEEPEN. Based on a different theoretical framing than the DEEPEN authors, this paper

points to several weaknesses in one of the aspects in the project, namely the attempt to

discover specific lay ethics that is based on 'narratives underpinning responses to the

issues posed by nanotechnology' (Davies and Macnaghten 2010, 145). The further in-

terpretational use by Jean-Pierre Dupuy (2010), another DEEPEN associate, can be said

to constitute a philosophical version of the 'deficit model' of public understanding of

science and rests upon several unqualified ontological claims. The paper will first pre-

sent the conclusions from the DEEPEN project before moving on to argue that there are

weaknesses in the narrative theory being used by the DEEPEN and in the method used

to elicit public perceptions. Towards the end, the DEEPEN's avoidance of earlier re-

search on public perceptions of novel technologies also adds to the reservations on the

status of their conclusions. The DEEPEN approach postulates the existence of narratives

as independent of a narrator. This position where narratives are presented as empirical

facts rather than co-constructed theory-based entities runs counter to an approach

where the meaning of and political reality of a specific technology is seen as socially constructed.

The DEEPEN project

The DEEPEN project was formed as a consortium by sociologists and philosophers in 2006 to address the EU call for proposal with the following stated objective:

> **4.3.2.3 Deepening the understanding of ethical issues**
>
> Comparative research, foresight and impact studies on ethical issues in relation to science and technological developments and their applications. The emphasis is on ethical, legal, cultural and societal issues related to research topics that cannot be addressed within the integrated projects of the relevant thematic priorities. The aim is to improve understanding of the issues, and to develop recommendations, either for research practices, or for approaches that could be followed by public authorities to address the issues concerned. (European Commission 2006, 12)

What Gernot Rieder (2013, 61) calls a '"Dream Team" of European upstream engagement' joined forces to apply on the specific technological areas that were further specified in the 'Call for proposals':

> The main topics are: emerging questions in nanotechnology; converging technologies (nano-bio-info-cogno); research to enhance human mental and physical capacities, including new developments in neurosciences; cloning; privacy and data protection in relation to genetic data and bio-banking; pharmacogentics; questions related to the question of dual-use and bioterrorism ; the fusion of human and non-

human material, including artificial material. (European Commission

2006, 12–13)

Alfred Nordmann and Phil Macnaghten (2010) describe the DEEPEN motivations, but without accounting for why the DEEPEN project chose to work with ethical issues relating to nanotechnologies instead of the other technologies listed in the EU 'Call for proposals'. Following Nordmann and Macnaghten, the DEEPEN members shared the conviction that public engagement should be more than an instrumental activity to create trust and acceptance of new technologies. According to Davies et al. (2009, 3) the starting points of the DEEPEN were

- To examine how ethics and responsibility are understood within
  the nanoscience community and to explore ways of enhancing
  ethical reflexivity;
- To understand how lay publics view the ethical import of emerg-
  ing nanotechnologies and to develop methodologies aimed at bet-
  ter characterisation of public views;
- To organise deliberative fora aimed at bringing together stake-
  holders and publics in the discussion of emerging nanotechnolo-
  gies and their ethical and governance implications;
- To deepen understanding of ethical issues associated with nano-
  technologies;
- To develop recommendations for ethical deliberation in nanosci-
  ence and governance communities.

And their one conclusion from Davies, Macnaghten and Kearnes was:

In sum, the DEEPEN project has found that current efforts in "respon-

sible development" – whether in ethical analysis, public engagement,

or new forms of governance – while impressive, are still dominated by

limited and limiting modes of thought. They will require reconfigura-

tion in order to fulfil the promise of socially responsible nanotechnol-

ogy. (Davies et al. 2009, 3)

This article will limit itself to the part of the DEEPEN work that consisted of examining

laypeople's understandings of nanotechnologies, and especially the lay ethics of nano-

technologies. When explaining these issues, Davies et al. found that public understand-

ing of nanotechnology can be understood as being formed by what they refer to as 'ar-

chetypal stories' that are deeply embedded in European culture. They find five such ar-

chetypal stories. These stories emphasize the risks and dangers of technologies and re-

ject a vision as technology as beneficial. According to Davies et al. these findings suggest

that the public's understanding is more complex than just as being pro- or anti-, and that

further research into methods for understanding public attitudes is called for. The five

suggested narratives are called:

- 'the rich get richer and the poor get poorer'

- kept in the dark'

- 'opening Pandora's box'

- 'messing with nature'; and

- 'be careful what you wish for'.

These conclusions pertain to a programme for the governance of technologies and is as

such a reply to the EU Call for proposals which purpose was 'to develop recommenda-

tions, either for research practices, or for approaches that could be followed by public

authorities'. The responses by the DEEPEN team as presented in papers and research

reports propose 'more integrative forms of innovation governance' (Davies et al. 2009,

27), and aim at, as is the title of their project report, reconfiguring responsibility (Rieder 2013, 48).

The DEEPEN theoretical approach: 'Archetypal stories'

It is a central finding in the DEEPEN project that there are five archetypal narratives structuring laypersons views on nanotechnologies. Both in the DEEPEN writings and in the reception of the DEEPEN research, the relation between these narratives and nano-technology is unclear, and this point will be further elaborated later in this paper. For the time being it suffices to say that there is inconsistencies on the central point if these suggested lay narratives are related specific to nanotechnologies, to the governance of nanotechnologies, to technologies in general or to the governance of technologies in general. This paper will investigate Nordmann and Macnaghten's (2010, 138) interpre-tation that the proposed narratives are not 'original or specific' to nanotechnology – while documenting lack of clarity on this point – and provide several instances where the DEEPEN has been understood as presenting narratives about nanotechnologies.

It follows from the theoretical approach chosen in this paper that if the stories are gen-eral stories, then the division of them into five narratives is contingent upon the DEEP-EN project members' co-creation. Where the DEEPEN approach suggests that nanotech-nology creates or evokes these stories, this theoretical approach stresses the part played by the social scientists. These so-called narratives have been used in public perception studies earlier, but then as interpretive tools rather than 'archetypal narratives'. The lacking connection between the DEEPEN narratives and these earlier studies is a hin-drance to theoretical and empirical comparisons.

Sarah Davies and Phil Macnaghten (2010) present the research leading up to the five narratives. They use one single source for their understandings of 'archetypal stories': A nine pages long chapter by Agnes Heller (2006) in a reader. The inclusion of Agnes Hel-ler and the short article 'European master narratives about freedom' by Davies and

Macnaghten and others connected to the DEEPEN project (Dupuy 2010) demands further justification from the researchers since Heller's essay is very brief and contains only very general references. She 'employ[s] the concept of master narrative in the spirit of the History and Memory school initiated by Pierre Nora' (Heller 2006, 257). Heller's understanding of the concept of a master narrative is:

> A master narrative can be termed an 'arche' of a culture in both interpretations of the Greek word. The 'arche' stories are stories to which we always return, they are the final, or ultimate foundations of a type of imagination. Yet as the guides of imagination they also rule, control, and are vested with power. (Heller 2006, 257).

The narratives are then beginnings and ends of a culture. A culture is defined by and delimited by its 'master narrative'. And, according to Heller

> The European master narratives are the Bible on the one hand, and the Greek/Roman philosophy and historiography on the other hand. They are texts. We have no access to happenings or acts or to the spoken words but through texts. (Heller 2006, 258).

Heller's notion of a narrative is very different from other approaches that stress the meaning as being actualized in a given cultural-political setting, as we know from Michel Foucault amongst others. In *Madness and Civilization*, Foucault writes about changing conceptions and understandings of madness. In all the different understandings of madness, there are references to Christ, God, the Bible etc., but it is the meaning attributed to the biblical stories through the understanding of, in this case, madness that give meaning to the phenomena (Foucault 2001). The view that narratives themselves exist is named *the ontological fallacy* in studies on narrative. Brockmeier and Harré (2001, 48) explain this fallacy consists in postulating that 'there is really a story "out there" waiting to be uncovered, prior to the narrative process and absent from its analytical re-

construction, we shall call the ontological fallacy'. The theoretical position that there is no narrative without a narrator is foundational to the discipline of cultural studies of narratives in both structuralist and post-structuralist versions as laid out by Tzvetan Todorov : 'L'histoire est une abstraction car elle est toujours perçue et racontée par quelqu'un, elle n'existe pas "en soi"' (Todorov 1966, 127). ['Story is an abstraction because it is always perceived and told by someone, it does not exist "in itself"'].

It is further the question of the taxonomy of the five narratives. It would seem that the point made by Brockmeier and Harré that the piecing together of elements and Todorov's call for a narrator, create uncertainties regarding the status of these narratives. Are they necessary, sufficient – or both or neither – in explaining to us how the public understands nanotechnologies? I will follow the status of these narratives through the article.

The theory for the DEEPEN's framing of narratives is not robust, and this finding indicate that the results of the DEEPEN project should be approached with caution.

The DEEPEN method: syntax

The methods used in the DEEPEN project need to be presented in depth because they are influential in determining the outcome of the research project. It is important to show how the DEEPEN's methodological choices might affect the findings and conclusions: the proposed five narratives.

It is uncontroversial to infer that the DEEPEN conviction arose from experiences with European public engagement in relation to GMOs and biotechnological innovations based on the Macnaghten et al. (2005) demand for another mode of public engagement to take place more 'upstream'. Furthermore, they were opposed to the notion that public interest should be reduced to risks and benefits, and that public engagements should be understood only as a complex opinion poll. Such a position is similar to what Sheila Jas-

anoff (2003) has described as the movement from a technology of hubris to a technology of humility. The technologies of hubris are predictive socio-technical sciences that aim at removing uncertainty and fear while the technologies of humility focus on how cultural-technical artefacts alter society. One of the central issues is a shared DEEPEN conviction on what constitutes ethics:

> However, the DEEPEN collaborators were also not satisfied with the idea that, for the understanding of ethical issues, no process of discovery is required at all and that rote issues of surveillance and privacy, bodily harm, equality of access, rights to know or not to know simply reappear in nanotechnological guise. We distrusted, in other words, the notion that there is a given and a priori set of recognizable ethical issues and that one should simply look out for those nanotechnological developments that trigger such ethical sensibilities. (Nordmann & Macnaghten 2010, 134)

It is important to recognize that the quote refers to a state before the research in the DEEPEN started up. My reading of the quote above is that central to the DEEPEN project is a conviction that ethics and ethical issues are field or issue dependent; the DEEPEN has as a research aim to document both methods and contents of a possible specific nanotechnological ethics. This conviction is challenged through the empirical work, but Nordmann and Macnaghten attempt to keep it alive through a semantic work that oscillates between an intellectual Herculean labour and a Procrustean bed. They describe the outcomes from the public involvement in Portugal and the UK as not exactly confirming or falsifying their convictions:

> the emergent issues raised in lay discussion would prove their relevance in two ways. First, to the extent that they arose directly in response to presentations about nanotechnologies in pertinent real-

world contexts, they are certifiably germane without needing to be

specific (in the sense of applying only to nanotechnologies and noth-

ing else). (Nordmann & Macnaghten 2010, 135)

The central notions here are 'certifiably', 'germane', 'specific' and 'pertinent'. It falls outside the scope of this paper to give a full account of the DEEPEN project, but both Stephens (2005) documents changes in presentations of nanotechnology according to the different media, and Kjølberg & Wickson (2007) document that the ELSA (Ethical, Social, and Legal Aspects [of new technologies]) literature has mainly addressed governance and perceptions of nanotechnologies. It seems that the use of 'pertinent' indicates that the DEEEPEN team had pre-understandings of nanotechnologies and their place in the world. To be explicit about the original working hypothesis or research questions is in itself a laudable position. Outside of Nordmann & Macnaghten (2010), the phrase 'certifiably germane' only occurs in one internet page that seems to be a Chomskyan sentence generator (jaeashzotm 2011). By introducing vague and unclear terminology, Nordmann and Macnaghten do not install confidence in the readers. In order to find a way of analyzing the public reactions or concerns, Nordmann and Macnaghten propose to understand the public deliberation as taking place in another mode than a conflictual, dilemma-oriented 'conversational mode' that they claim is characteristic for ethical discussions in 'responsible development of nanotechnology'. Such a view on the process and the content

... helped articulate the shared and culturally-specific narratives that

shape and structure latent public concern, and thus the reasons why

particular concerns cannot be reduced simply to a list (Nordmann &

Macnaghten 2010, 136)

Through active engagement with the public the DEEPEN researchers are able to uncover the public concerns with nanotechnologies. It is not rendered explicit by Nordmann and

Macnaghten why they emphasize that these concerns cannot be reduced to a list. This 'antireductionist' disclaimer can be read as addressing colleagues involved in researching public attitudes, and as pertaining to the introduction of the paper where they oppose the view that public concerns can 'be reduced to questions of risks and benefits' (Nordmann & Macnaghten 2010, 134) in line with the difference between technologies of hubris and humility. The position that public concerns move beyond risks and benefits is well established and well documented in studies of public perceptions, but the structuration around the five narratives is not.

As for the public engagement, there is the analysis by Sarah Davies and Phil Macnaghten (2010), their methods and the conclusions are presented as:

> The authors uncover a set of five narratives which, they argue, inform the attitudes of lay publics to nanotechnology. There is no claim that these five stories of technological development are original or specific to nanotechnology. Instead, nanotechnology appears in these stories as an intensification of familiar trends, bringing to a head the latent conflict between the Enlightenment claim for mastery and control and historical experience of contingency and tragedy. (Nordmann & Macnaghten 2010, 138)

In this positioning, there is an explicit denial by Nordmann and Macnaghten that the narratives – or stories – are original or even specific to nanotechnology. On the other hand, there is the claim that we can uncover (a list of) five narratives. Since the DEEPEN provides a list of narratives, there needs to be something in the nature of narratives that transcends the format of a list. A list is first and foremost without any temporal dimension while narratives have a development and unfolding in time. In a list, there is no direct trace or reference to the narrator while narratives or stories depend on someone enouncing and tying together the different instantiations. The following point needs to

be stated: Who is the narrator of the DEEPEN stories? Linked to this point is the issue of the oppositional pairs as they are produced in the DEEPEN project since it seems unlikely that European laypeople can have a general understanding of technology as tragedy given that 250.934.000 Europeans used Facebook in 2012 (Miniwatts Marketing Group 2012). This consideration relates to a general methodological point concerning the adequacy to only use peoples' stories instead of their actions as a basis for generating lay ethics; a theme that will not be pursued in this paper.[1]

What Nordmann and Macnaghten propose seems to be a grammar of technological development where nanotechnology appears as a catalyst in a story where on the one side 'mastery' is opposed to 'contingency' and 'control' opposed to 'tragedy', and on the other side there is 'story' versus 'experience'. Simultaneously, nanotechnology is said to be contingent and not necessary for this syntax since 'nanotechnology appears in these stories as an intensification of familiar trends'. The two available stories presented by the DEEPEN should then look as follows:

- Experience: Nanotechnology affects humans' strivings in a contingent way and leads to tragedy.
- Story: Nanotechnology affects humans' strivings in a controlled way and leads to mastery.

The DEEPEN method: theatre

The syntax of technology development suggested by Nordmann and Macnaghten as opposed to a list of concerns is then generated from the work published by Davies and Macnaghten (2010). The research behind this article is presented as being based on six

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[1] It is customary to refer to 'morals' as individual behaviours, while 'ethics' refers to the justicifation, but I have not found that the DEEPEN project related to the practical lived lives of the participants and their everyday technology. On the other hand, the UK workshops employed traffic metaphors to explore the control of innovations: 'We cannot stop innovation, but we do need to control it. They explored this using an extended metaphor of roads and driving' (Durham University 2009, 5). Driving is here not explored as a technology, but as a part of everyday life.

groups, each with six to eight individuals. Each group met twice: once for an evening focus group and once for a Saturday workshop. The main content of the findings listed in Davies and Macnaghten (2010) are:

- discussions about what it mean to be human, and if nanotechnology can cause a loss of individuality
- dangers of 'messing' with the natural order
- consumer choice
- money or finance as technological driving force, or other forces as military and security

From these points of discussion, Davies and Macnaghten suggest that the talk 'can be understood as structured by a number of archetypal and deep-rooted cultural narratives' (2010, 145). For the workshops, the DEEPEN project members had produced posters presenting nanotechnological applications and policy issues (Rieder 2013, 102). The stories told by the lay people in the DEEPEN project were generated by a novel method described by Davies and Macnaghten (2010, 144) as:

> we drew upon group performance and theatrical techniques based on
> the work of the Brazilian dramatist Augusto Boal on the 'Theatre of
> the Oppressed'. Theatrical techniques are able to harness unex-
> amined, affective and intuitive ethical responses, and thus provide in-
> sight into the social dynamics and the perceived moral orders driving
> those responses. Through them it is possible to examine the shaping
> of ethical narratives and the resources that people bring to bear on
> this process.

There is no further justification of this method. The uses of methods developed to pro-test and rally to protest against Brazil's military government in the 1960s might be

questioned as suitable methodology for eliciting focus group responses on current democratic challenges in technology development. L. M. Bogad formulates the scope of such workshops as activist:

> Theatre of the Oppressed workshops can play a vital role during cycles of contention in helping members of a burgeoning movement define their issues and explore possible solutions. Whether participants are seasoned activists or people who have never engaged in overt political action, Image Theatre can help bring people together, in a common space, to creatively, nonverbally, and dialogically express and develop their perceptions of their world, power structures, and oppressions. Forum Theatre provides a relatively safe space, protected from the actual ramifications of reactive state repression, to experiment with possible contentious methods. (Bogad 2006, 49)

According to Bogad, this approach creates a safe atmosphere for protest against the current state of affairs. Davies and Macnaghten reflect on the compilation method they apply with a reference to John Law's concept of messiness:

> This 'messiness' points to the fact that we have, in our description and analysis of focus group data, ordered and smoothed out complex and frequently chaotic talk. Our analysis, as with any, has been performative, working to create what it purports to describe (Davies & Macnaghten 2010, 148).

This self-critical reflection in the DEEPEN work concerns general aspects of social scientific research and does not address the specific situation that arises through the application of these methods and the striking opposition mentioned between actual technology use and the DEEPEN conclusions. This conflict will also become apparent between the

so-called five lay narratives and what the DEEPEN calls the European technoscientific master-narrative.

With reference to Ulrike Felt and Brian Wynne (2007), Davies and Macnaghten have established that there exists a master narrative in modern technoscientific society 'that blame ignorance and privilege scientific knowledge' (Davies & Macnaghten 2010, 142). The lay narratives identified should be understood in opposition to this master narrative. It is surprising that none of the participants in the DEEPEN-project shared this master narrative, but rather than reflect on the methods for generating public views on nanotechnologies, Davies and Macnaghten use the lack of adherence to the technoscientific master narrative as an indication of a specific 'lay ethics'. The absence of support for or references to the 'technoscientific master narrative' can be approached by two diametrically opposed explanatory strategies. 1) The European elites are so out of touch with the general population and Europe is marred by a large democratic deficit in the democratic governance of science. 2) The DEEPEN narratives tell the story of the interaction between researchers and lay people and are a result of the reminiscences of the DEEPEN project's past as understood by the participants and interpreted and retold by the DEEPEN in papers and reports. The DEEPEN project seem to go for strategy 1) while this paper opts for 2), but there is a hermeneutic space between these strategies that can also be explored.

Regarding the question of what the lay stories are about, Davies and Macnaghten state:

> Lay narratives of nanotechnology cannot, however, be considered in isolation: they are produced in response to contact with the ways in which nanotechnology is currently being envisaged by different actors and in different domains. These in turn are connected to larger social imaginaries of science and technology in contemporary society (Davies & Macnaghten 2010, 141).

Here it seems clear that the object of the narratives is nanotechnology, but with all the verbs in the passive mode in the quote, any reader will be confused. Further into the paper, the object becomes technological society in general:

> Concerns about nanotechnology, in other words, form part of a larger context of concerns about technological society in general, and general cultural storylines can be applied to them. (Davies & Macnaghten 2010, 141).

The narratives structuring and underpinning concerns about nanotechnologies are general stories relating either to our culture, to technology, or to nanotechnology.

The reception of the DEEPEN narratives

It is possible to find all forms of interpretations in the DEEPEN project's publications and in the literature quoting the DEEPEN project. In an article discussing geoengineering, it is stated: 'For example, the DEEPEN project identified five cultural narratives that characterised participants' responses to nanotechnology' (Corner et al 2013, 3). Here it looks as if there is a direct relation between the technology and the narratives. Similarly, a recent PhD thesis also connects the DEEPEN findings to nanotechnology:

> Cheap energy is cast as the object of our desire, but the uneasy, almost resigned tone of the exchange suggests that we should "be careful what we wish for". This notion was identified as a narrative publics used to articulate concern about emerging nanotechnologies expressing a sense "that getting exactly what you want may not ultimately be good for you" (Williams 2014, 61)

This impression is also present in an article on the need to go beyond risk assessment when addressing new technologies:

The stories that lay people tell about nanotechnology clearly express perceptions about nanotechnology that go beyond conventional physical risks and focus on uncertainly of benefits associated with technoscience and a profound perception that nanotechnology has the potential to *"re-shape our entire experience of living in the world"* (Senjen & Hansen 2011, 643)

Here the connection to the 'arche' stories is understood as a 'profound perception' of nanotechnology. This uniqueness of nanotechnologies to specific responses is further possible to find in another article co-authored by Phil Macnaghten:

all our UK group discussions ended in tragedy, offering the opinion that under real-world circumstances nanotechnology would generate profound and complex dilemmas that were predicted to exceed our ability for collective control and negotiation. (Macnaghten & Guivant 2010, 215)

While the article does not address responses to other technologies, it can be argued that the quote frames the UK perceptions as specific to nanotechnologies. Another understanding of the DEEPEN findings can be found in an article on science education the authors write: 'The DEEPEN programme identifies five "narratives" that influence responses about nanotechnologies' (Panissal & Brossais 2012, 107). In this case, it can be other sources of influence on public responses to nanotechnologies in addition to the five narratives since it is a question of influence. A more generalist interpretation of the DEEPEN findings can be found in other articles and books:

This result shows that public perception of new and emerging technology not only depends on the specific parameters and impacts of that technology but also on underlying cultural attitudes and traditions. It also makes clear that the public debate on nanotechnology is

> not an isolated one but is rather part of an ongoing societal debate on
>
> new science and technology (Grunwald 2012, 47)

> As Davies and Macnaghten (2010) note in a seemingly paradoxical
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> finding in their study of lay perceptions of technology, "getting exactly
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> what you want may not ultimately be good for you." (Grinbaum &
>
> Groves 2013, 135)

> Several studies emphasise the importance of stories for understand-
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> ing public perceptions of new technologies, such as for instance re-
>
> garding nanotechnologies (Meyer, Cserer & Schmidt 2013, 10)

Such confusion in the reception of the research, and the ambivalence in the DEPPEN texts themselves, is alarming. Here we have a case where some authors claim that the narratives are specifically addressing nanotechnologies while others claim that this is not the case, but that the narratives are general responses to technology.

From metaphors to metaphysics

Nanotechnology is introduced into the story of uncovering the narratives in a highly interesting manner. Davies and Macnaghten suggest that the master narratives presented by Felt and Wynne are apparent in discourses about nanotechnology. Then they write

> Bensaude-Vincent suggests that the metaphysical backdrop to nano-
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> technological research programmes contains an all-pervasive meta-
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> phor of both nature and technology as machine-like (Davies & Mac-
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> naghten 2010, 142).

To build an argument on a 'suggestion', as is done in the quote above, creates difficulties for a reader since it is unclear whether the claim is truthful and whether or not the authors agree with the claim. It is further problematic to deduce from the uses of meta-

phors to a metaphysical programme. It is questionable if one can validly deduce from talk about something by someone to a general metaphysics. It is also a question of who can have metaphysics. If Davies and Macnaghten are correct in believing that is possible to deduce from metaphors to metaphysics, then a reply could be that their suggestion that nanotechnological research programmes in some sense are in possession of metaphysics is a revealing metaphor of a specific metaphysics, namely that something as abstract as a research programme in itself is the creator of a world. But such interferences are not easy to prove valid. The argument concerning nanotechnologies continues with reference to Matthew Kearnes who has found a multitude of 'power to' formulations in nanotechnological research programmes. From the presence of technoscientific master narratives about nanotechnology, Davies and Macnaghten then state:

> Nanotechnology, then, is a technoscience par excellence, a true inheritor of the rhetoric of modernity. It combines narratives of the inevitability and unambiguous goodness of progress with tropes of a control that is absolute and which operates in multiple ways. (Davies & Macnaghten 2010, 143).

The important verb is in this context 'is'. This conclusion moves from the cultural framing of a technology, the master narratives, to a statement about what nanotechnology really is. This interference from a discourse about something to the truth or falsity of the discursive object is what Brockmeier and Harré (2001, 48–49) call the representational fallacy.

The methods applied by the DEEPEN public engagement team carry with them the researchers' convictions. The starting point of finding some specific form of ethics – beyond risk and benefits – for nanotechnologies, could be one factor in explaining why it is so unclear what the relations are between the so-called narratives and nanotechnology.

The choice of Boal's theatre of the oppressed might be a factor in helping us to understand why the groups' responses are so radical.

The five postulated narratives

There are also other issues with the claims by Davies and Macnaghten. First there is the taxonomic issue of the five different narratives, and then there is the claim that these narratives concern nanotechnology. These two issues are related. Davies and Macnaghten (2010, 141) state that their work consists in 'presenting an analysis of lay ethics of nanotechnology'. And this ethics is represented by an opposition that takes the shape of the five narratives, according to the authors. Here, this paper will argue 1) that the five-fold division is so closely connected to earlier research on the field of public perception and media presentation 2) that the findings are not particular to nanotechnology, but rather are some kind of expression of future expectations.

In studies of public reactions to nuclear power and biotechnology, researchers (Durant, Baur & Gaskell 1998; Gamson & Modigliani 1989; Nisbet & Lewenstein 2002) have used what they refer to as a framing typology that uses the concept of Media packages:

> A package has an internal structure. At its core is a central organizing idea, or frame, for making sense of relevant events, suggesting what is at issue. […] This frame typically implies a range of positions, rather than any single one, allowing for a degree of controversy among those who share a common frame. Finally, a package offers a number of different condensing symbols that suggest the core frame and positions in shorthand, making it possible to display the package as a whole with a deft metaphor, catch- phrase, or other symbolic device. (Gamson & Modigliani 1989, 3)

In total Gamson and Modigliani use six different such packages that are in use in different media, but they see the changes in the occurrences in such packages as event-driven, that is that certain central events like Chernobyl influence the public perception and the media presentation. Such media packages are compared to the archivists' tools as 'interpretive *packages*' and not as some inherent quality in the material (Gamson & Modigliani 1989, 2).

Nisbet and Lewenstein (2002) analyse biotechnology and use the following packages:

- 'Progress': celebration of new development, breakthrough; direction of history; conflict between progressive/conservative-reactionary.

- 'Economic prospect': economic potential; prospects for investment and profits; RandD arguments.

- 'Ethical': call for ethical principles; thresholds; boundaries; distinctions between acceptable/unacceptable risks in discussions on known risks; dilemmas. Professional ethics.

- 'Pandora's Box': call for restraint in the face of the unknown risk; the opening of flood gates warning; unknown risks as anticipated threats; catastrophe warning.

- 'Runaway': fatalism after the innovation; having adopted the new technology/products a price may well have to be paid in the future; no control any more after the event.

- 'Nature/Nurture': environmental vs. genetic determination; inheritance issues.

- 'Public accountability': call for public control, participation, public involvement; regulatory mechanisms; private versus public interests.

- 'Globalization': call for global perspective; national competitiveness within a global economy; opposite: splendid isolation.

Lewenstein et al. (2005) use the method from Nisbet and Lewenstein (2002) in investigating changes in nanotechnology coverage in the US press. In their findings, the inter-

pretative package 'Pandora's box' did not enter into the coverage until after the publication of Michael Crichton's *Prey* (2002) and the ETC report on nanotechnology (2003). These examples serve to illustrate that the DEEPEN project taxonomy of narratives is one taxonomy amongst many possible ones. Similarly, these frames are not unique to nanotechnology, but should rather be understood as – at least – intrinsic in the expectations to new technologies, and perhaps as indicative for general future expectations. As Sarah Davies (2011) has argued, these expectations serve as forming opinions on nano-technologies, but not necessarily the content of the opinions.

There is a significant theoretical difference between the media analysis use of 'packages' and the DEEPEN's use of 'narratives. This difference does not affect the present criticism of the DEEPEN project, as I will explain – and this difference can be explained through their notions of 'framing'. For media analysis, 'framing' is a choice of context for a material that the narrator uses to obtain certain effects. Here, there exists a truth independent of the frames and the frames directs or 'nudges' the receiver (Tversky & Kahneman 1981; Thaler & Sunstein 2008). While in the constructivist understanding in the DEEPEN project, these frames constitute the meaning of the content (Schön & Rein 1994). The current paper shares the constructivist understanding with the DEEPEN and therefore highlights the frames used by the DEEPEN as co-creating the suggested narratives.

A more theoretically informed criticism of the structuration of the taxonomies of narratives could be taken from the work of Jacques Derrida (1967). In an elaboration on Claude Lévi-Strauss' work on and understanding of myth and history. Derrida shows how the imposition of a structure from without in order to explain – or make sense of – human phenomenon cannot be viewed as an impartial instrument for truth. The taxonomic structuring of lay people's talk in the DEEPEN report is then the source of the shocking results. Even if the DEEPEN team are sporadically cautious as to the rigor of

the ontology of the suggested narratives, the proposed framing through narratives provides readers with heuristics as to how the public really thinks.

The lay ethics versus the Enlightenment

From the outset of the DEEPEN project, a central hypothesis was whether specific nano-ethical concerns could be found. In the empirical work with laypeople, the DEEPEN project documented general concerns regarding technology development. The term 'lay ethics' connotes a stance where 'both researchers' and lay participants' discourses of ethics fall under the category of lay "ethical" knowledge' (Strassnig 2008, 93), but at the same time is opposed to expertise in ethics as found in ethics committees (Strassnig 2008, 190) . The literature referred to by Davies and Macnaghten when introducing the term 'lay ethics' all use scenario methods to investigate normative stances towards biotechnological issues (Banks, Scully & Shakespeare 2006; Scully, Banks & Shakespeare 2006; Scully, Shakespeare & Banks 2006; Strassnig 2008). Scenarios are narratives that elicit narrative replies. Davies and Macnaghten (2010, 141) conclude that their empirical work documents ethical concerns 'can be understood as being structured by five archetypal narratives which underpin talk'. With reference to the philosopher Michael Sandel, Davies and Macnaghten suggest that these narratives are related to 'the giftedness of life'. Sandel is a value-oriented philosopher close to the thinking of Alasdair MacIntyre. In *After Virtue,* MacIntyre explains the rationale for studying ethics as narratives:

> The hypothesis which I wish to advance is that in the actual world
> which we inhabit the language of morality is in the same state of grave
> disorder as the language of natural science in the imaginary world
> which I described. What we possess, if this view is true, are the frag-
> ments of a conceptual scheme, parts which now lack those contexts
> from which their significance derived. We possess indeed simulacra of
> morality, we continue to use many of the key expressions. But we

have-very largely, if not entirely-lost our comprehension, both theo-

retical and practical, or morality. (MacIntyre 2007, 2)

The stories people tell each other are, according to MacIntyre (2007, 84–85), the reminiscences of an earlier ethics uncontaminated by the mechanistic sciences. Davis et al. suggest that 'nanotechnology make salient a range of very old concerns' (2009, 39). Jean-Pierre Dupuy (2010) elaborates on this point and suggests that the only form of ethical theory providing such narrative form is virtue ethics.

As with the affirmation of nanotechnology as a 'technoscience par excellance', there is also an interesting *drift* from the findings in the lay groups to the inclusion of Michael Sandel's ethical theories. We can read in Davies and Macnaghten:

They [the public] share a disconnect to the visions of the Enlighten-

ment, and instead can be seen as pre- or a-modern in the values they

convey. It is this that binds them together, and which makes them so

peculiarly relevant in responding to a technology that can, as we de-

scribed above, be understood as a pinnacle of the trend towards ideal-

ised and total control.

This contrast can be explored in more detail using the writing of Mi-

chael Sandel. (Davies & Macnaghten 2010, 149)

Since Sandel is critical about what he views as a modern tendency to control all sides of the human condition, and especially in reproductive health, Davies and Macnaghten connect to his criticism because they claim that their lay groups are 'pre- or a-modern' and disconnected to the visions of the Enlightenment. And the understanding of the Enlightenment is

a number of authors have argued that nanotechnology can be under-

stood as driven by visions of mastery and control over matter—

visions which have their root in the Enlightenment, have marked the

scientific project throughout history, and which reach their epitome in

the promises surrounding nanotechnology. (Davies & Macnaghten

2010, 142)

It is notoriously difficult to understand what Davies and Macnaghten exactly mean by

"Enlightenment" – and especially formulated in a figurative language where 'visions'

have 'roots'. It might be the view of modernity as exposed by Bruno Latour (1993) with

the modern as a 'break', or a 'combat' with mixtures versus purifications, or Sheila Jasa-

noff's (2002, 259-260) *'inequality, hyperrationality and unintended consequences'*. In

such a perspective, one legacy from the Enlightenment is mastery over nature. However,

understood from the perceptive of historical sociology, Davies and Macnaghten's

presentation of the Enlightenment is similar to Horkheimer and Adorno's presentation

of it in *Dialectic of Enlightenment*:

Enlightenment, understood in the widest sense as the advance of

thought, has always aimed at liberating human beings from fear and

installing them as masters. Yet me wholly enlightened earth is radiant

with triumphant calamity. Enlightenment's program was the disen-

chantment of the world. It wanted to dispel myths, to overthrow fan-

tasy with knowledge. (Horkheimer & Adorno 2009, 1)

Central to the view expressed by Horkheimer and Adorno is an understanding of reason

as violent as becomes clear through the uses of 'liberating', 'installing', 'triumphant ca-

lamity', 'dispel', 'overthrow' – a point elaborated by Peter Hohendahl (1985) in his anal-

ysis of Habermas's criticism of Horkheimer and Adorno's dystopic view on reason. Since

Davies and Macnaghten do not cite any references for their understanding of Enlight-

enment or what it means to be modern, it is up to the reader to speculate on this point,

but the similarity to Horkheimer and Adorno is striking. Regardless of the theoretical

pedigree of the notion of the Enlightenment, the proposed reduction to 'mastery and control over matter' constitutes a narrow understanding. Davies and Macnaghten could equally have chosen to quote the first paragraph of the *Declaration of the Rights of Man and of the Citizen*: 'Men are born and remain free and equal in rights. Social distinctions can be founded only on the common good' (The Avalon Project 2008). According to Charles Taylor (2007, 244) the hallmark of the Enlightenment was that

> this modern humanism is different from most ancient ethics of human nature, in that it is exclusive, that is, its notion of human flourishing makes no reference to something higher which humans should reverence or love or acknowledge

In this understanding there is nothing pre- or a-modern about an attitude towards the human existence that places humanity and human life above all other concerns. On a meta-ethical level, the finding that lay people express their personal morality instead of the moral codes as set out by some authority, in itself points towards a modern or Enlightenment view of the moral subject as expressed by Immanuel Kant (1867, 161) in his *Beantwortung der Frage: Was ist Aufklärung?*: 'Sapere aude! Habe Muth, dich deines eigenen Verstandes zu bedienen! ist also der Wahlspruch der Aufklärung'. The lay participants are expressing their own moral views, and in doing this acting as modern moral subjects. The claimed contrast between the participants' morals and the Enlightenment morals fits a narrow and controversial view of both Enlightenment as violent and a weak understanding of human-centered ethics as pre-modern.

A philosophical deficit model of the public understanding of science

Jean-Pierre Dupuy (2010) criticises the lay people in the DEEPEN focus groups for being committed to the narratives in the sense these are laid out by the DEEPEN group and interpreted by Dupuy. Dupuy criticises the DEEPEN focus group participants for not rendering explicit their cultural contexts:

When laypeople show their awareness that the seductive promises of boundlessly enabling technologies may backfire, it is unclear where they situate themselves. Does their "be careful what you wish for" refer to a pre-Christian world in which words may have the magical power to fulfill a wish? Or are they referring to a Judeo-Christian world in which the pursuit of the good may become one of the major sources of evil, without magic having anything to do with it? (Dupuy 2010, 157)

The situatedness of the laypeople is interpreted by Dupuy into larger constructs of religio-ideological thinking as the 'Judeo-Christian world' and the 'pre-Christian world'. Both these terms so abstract that they are difficult to fill with meaning since they rely either on a theological meaning or an anthropological meaning. A theological interpretation of these words would mean that the reader of Dupuy would need to commit to the eventual truthfulness of the theological claims. An anthropological interpretation of the terms would presuppose that the apophatic notion of "pre-Christian" has a commonly agreed upon meaning. I would think that the category "pre-Christian" is both too broad and impossible to delimit since it is just phrased in the negative and referring to everything before Christianity. Dupuy does not explain what he believes these terms refer to nor does he provide any argument for interpreting the Davies and Macnaghten findings within a framework of Christianities. Dupuy illustrates the 'ancient' with references to a tale by the brothers Grimm, a movie by Lars von Trier, and a Greek myth. Dupuy never approaches the five narratives as intellectual research heuristics, but as self-existing entities. This misinterpretation of the epistemic foundation of both the narratives and the normative position of the researcher (Dupuy) is a salient feature also in the discussion about 'Messing with nature':

However, with regard to "Messing with Nature" laypeople are in my opinion the most out of touch with our situation in the current technological age. This narrative revolves "around the disruption of nature, the natural, and the human. It implies that orders and boundaries which should – generally – remain left alone are being dangerously messed with, blurred and transformed"

The narrative works with what appears to be a traditional conception of nature that is inherited from the Ancients. According to this conception, the order of things, the Cosmos, is stable and exterior to the human world, with its desires, its conflicts, its various depravities. As such, it sets boundaries that human beings should not transgress. Again, this is a Greek story, linked to the Greeks' conception of the sacred: the Gods, jealous of men that are guilty of *hubris* send after them the goddess of vengeance, *Nemesis*. But this conception was completely shattered into pieces by the joint evolution of Judeo-Christian religion and science. This evolution, in which philosophy itself played an important part, goes by the name of disenchantment (*Entzauberung*) or secularization of the world. I prefer to call it *desacralization*. Our problems today have nothing to do with the transgression of sacred limits. (Dupuy, 2010, 159)

One possible interpretation of Dupuy is to classify him as belonging to a philosophy version of the deficit model of the public understanding of science that is outlined by Brian Wynne (1991) to consist of two features: the naturalness of scientific understanding of the world and the view that the lack of such understanding indicates a deficit of democratic capabilities. Dupuy states that the laypeople are 'out of touch' with the technologi-

cal contemporary, and thus fulfils Wynne first feature. The line of reasoning behind Dupuy's conclusion of the lay peoples' distance from the real problems is interesting:

> As a philosopher, I am more troubled by the false humility, for in truth it is this, and not the vainglory, that constitutes the height of pride. I am less disturbed by a science that claims to compete with God than by a science that drains all meaning from one of the most essential distinctions known to humanity: the distinction between that which lives and that which does not; or, to speak more bluntly, between life and death. (Dupuy, 2010, 160)

One reading of Dupuy's argument here could be that he believes that the lay people's understanding of the issue is wrong since they are concerned with other issues than his professional interest as a philosopher. Here, it is possible to infer that the laypeople's faulty understanding places them outside of what Dupuy views as 'the most essential distinction' and thereby disqualifies them from having an opinion. Such a disqualification is close to Wynne's second feature.

Dupuy's explanation as to how different groups of people in the early 21st century can have inherited a cosmology from 'the Ancients' draws upon René Girard's theological anthropology where people in vain 'want to conquer and surpass infinity' (Dupuy 2010, 168) instead of submitting to the demands of the sacred proper that consists in a cleansing catastrophe. Dupuy uses this extracted and abstract world view from Girard to explain social phenomenon as though they have explanatory values independently of the context where (elements or parts of the values contributing to) these actions were carried out or took place.

Let us make small thought experiment: Let us think that the five descriptions done by Davies and Macnaghten are about the personal stories that people tell in the construction of their worlds. What will it mean when Dupuy states that such stories are 'out of

touch' or that the people should clarify their situatedness outside of such stories? In my understanding of the position implied by Dupuy's criticism, is that there exist a reality (and an understanding of this reality) which is cut off from or independent of the stories about this reality. Such an understanding of narratives will run counter to central methodological presumptions in the psychological model of the self as generated through narration because it is through the dialogical positions on different issues and in different settings that a self comes into being. Parallel to the psychological field, we also have the cultural field where the myths or the stories told influence (or are) the phenomena in the world.

Conclusions

Upstream public engagement for science policies presents challenges to social scientists. It is praiseworthy to test out new methods for public inclusion, and the internal discussions of the significance of the DEEPEN findings by DEEPEN researchers are highly commendable. To present an upstream technology involves a certain transfer of values, but also the whole recruitment process of participants must be seen as value-loaded and thus as relevant for the interpretations of the findings. Evolution is characterised by both success and failure. What remain troubling are the missing connections to earlier research and the lack of trials for falsification. Further, the theoretical grounding of the DEEPEN approach in Agnes Heller (2006) is not adequate since that text is just an essay without scientific arguments, but just claims. The lack of references to and distinctions from earlier research on Nano perceptions is also a central issue in this criticism. From my point of view, the DEEPEN team is making very strong claims about the true nature of nanotechnologies, public perceptions, the Enlightenment, moral subjects, and the relations between these elements. The DEEPEN project's conclusions regarding lay ethics and its opposition to technoscientific master narratives should be thus approached with caution. In practical terms, this means that future research projects drawing upon

the DEEPEN findings should critically assess the methods and the theories underlying the specific research questions that the project sets out to investigate.

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