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The Newness of Nanoethics and the Consequentialist Bias

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ABSTRACT
While many authors agree that a necessary condition for considering nanoethics as a new distinct field of inquiry is that some ethical problem arising in nanotechnology be new, I argue that we have good reasons to consider nanoethics as a new distinct field of applied ethics, although we have *no good reason* to think that any new ethical problem shows up in it. In fact, I claim that nanoethics will ask us to re-shape our ways of conceiving reality, the relationship between ourselves and the external world, and the whole ethical dimension of such relationship – and this is enough for considering it as a new distinct field of inquiry. Then I offer a view of what is part of nanoethics and what is not, and in particular I argue that – under an account of 'ethics' and 'nanoethics' as battlefields for arguments supporting rival ethical conclusions – even a description of what people ethically think about nanotechnology, or a description of nanoethics itself, are not part of nanoethics. Finally I consider the possibility of a consequentialist bias affecting nanoethics: I admit that risks have inappropriately monopolised the debate and that some interesting nanoethical issues may have nothing to do with risks, but I also stress that it is particularly difficult to adopt a non-consequentialist view in nanoethics, because non-consequentialism presupposes that consequences are going to fall within a known range of possibilities, and this presupposition is not attainable in nanotechnology.

KEYWORDS
Nanoethics, nanotechnology, uncertainty, prescriptive, descriptive, consequentialist bias, consequences, risks

1. *An argument in favour of nanoethics*

Researchers do not agree about whether *nanoethics* exists. It seems paradoxical, although philosophically admirable, that even a scientific journal titled *NanoEthics* publishes many papers dealing with the question whether there is such a thing as nanoethics (see, e.g., Allhoff 2007; Grunwald 2005; McGinn 2010; Swierstra & Rip 2007). But how should we interpret this question? Of course, it cannot be interpreted as the question "Do ethical issues arise in nanotechnology?". The reason is that nobody doubts that this is the case. There are a lot of important ethical issues arising in nanotechnology. Kermisch (2012) has recently showed that fundamental ethical issues arise not only in second-generation nanotechnologies (active nanostructures, which change their behaviour according to their environment), third-

generation nanotechnologies (integrated nanosystems), fourth-generation nanotechnologies ("heterogeneous molecular nanosystems where each molecule has a specific structure and plays a different role"[1]) and converging technologies (technologies resulting from the convergence of nanotechnologies, biotechnologies, information technologies and cognitive science), but also in first-generation nanotechnologies (passive nanostructures). If important ethical issues are already at stake when we are dealing with the simplest kind of nanoproducts, there is no way of doubting that an ethical dimension of nanotechnology exists.

What scholars have in mind when they wonder whether nanoethics exists is the question whether we are entitled to talk about nanoethics as a new specific field of inquiry. This is a harder question, since there is no agreement about the kind of evidence that it is necessary to produce in order to show that the answer be 'yes' or 'no'. Is it sufficient, in order to claim that the answer be 'yes', to show that some researchers start referring to their own scientific community as the 'nanoethics community'? Or, that new journals devoted to nanoethics appear? Or, that a considerable amount of money is invested in a field labelled as 'nanoethics'? Indeed Allhoff & Lin (2006, p. 183) have sustained that the latest is a good argument in favour of the claim that nanoethics is a distinct field: "It would certainly be strange that there would be so much invested by various government agencies, universities, publishers and other organizations globally, if nanoethics were not a distinct or intelligible field". However, it seems to me that McGinn (2010) is right in replying that the argument is not relevant. Being a distinct field "depends on properties of the field itself and the kinds of issues it raises compared with those of other fields of applied ethics, not on how much various organizations invest in it"[2]. The same point holds against the relevance of there being a nanoethics community, or some journals devoted to nanoethics. The fact that some researchers start calling themselves 'nanoethicists' can at best reveal that they believe that nanoethics is a distinct field, not that it really is a distinct field. But what does 'being a distinct field' amount to after all?

A possible answer is that nanoethics is a new distinct field if and only if it can be shown that some *new* ethical problems arise in nanotechnology that cannot be found elsewhere. This idea has attracted many people, and a large number of papers have focused on the question whether there are new ethical issues in nanotechnology (see, e.g., Allhoff 2007; Allhoff & Lin 2006; Grunwald 2005; Holm 2005; MacDonald 2004; McGinn 2010; Swierstra & Rip 2007; van de Poel 2008). However, since it has not been clarified what counts for being a *new* ethical issue, as opposed to being a well-known one,

[1] Kermisch (2012: 30).

[2] McGinn (2010: 121).

this move has not contributed to make the original question more objective. While many have established that no ethical issue arising in nanotechnology is actually new (e.g., McGinn 2010), others have tried strenuously to detect some trace of ethical newness in nanotechnology in order to conclude that nanoethics is a distinctive subfield of applied ethics (e.g., Allhoff & Lin 2006).

I think that the 'new ethical problems issue' is not so important. Firstly, as I have said, it would be necessary to furnish a perspicuous criterion for objectively distinguishing a new ethical problem from an old one. Doing so may be neither simpler nor less arbitrary than directly providing a criterion for objectively distinguishing a new distinct field of applied ethics from an old one. Therefore, getting from the 'new distinct field issue' to the 'new ethical problems issue' may be not a real gain. Secondly, nanoethics can be a new distinct field of inquiry also in case there are no new ethical problems arising in it. We do not need to detect authentically new ethical issues in some new area to be entitled to start considering that area as a distinct area. It may be sufficient to show that so many new (non-ethical) things are going to happen in that area, that they will make us reframe our conception of the (old) ethical issues arising together with them. In other words, nanoethics may be innovative for applied ethics also if it is not going to engender any new ethical issues. In my opinion, this is exactly the case. If we think that nanotechnology is going to be cognitively revolutionary for applied ethics, we can consider it as a new distinct field of applied ethics also if no new ethical problem shows up in it.

After all, although we agree with McGinn that being a distinct field "depends on properties of the field itself and the kinds of issues it raises compared with those of other fields of applied ethics", we should not believe that 'being a distinct field' is an objective property of the world. We do not *discover* that a given field is a new distinct field. We *decide* that it is, on the base of both empirical evidence (included some expected empirical evidence) and our goals and preferences. I think there is room for such decisions to be rational and relevantly dependent on reality. I also think it to be rational to decide that nanoethics be a distinct new field, although we have good reasons to claim that no ethical problem arising in it will ever be authentically new (McGinn 2010). This does not amount to say that we "need a new nanoethics" (Holm 2005). We do not necessarily need a new toolbox, and "the toolbox developed in applied ethics during the last 35 years probably already contains the necessary tools for the analysis of nanotechnology" (*Ivi*, p. 3). Nonetheless, it is not difficult to argue that nanotechnology can help us look at old ethical problems in new different ways, and because of this change we will need a new toolbox for the whole applied ethics. This is a sufficient reason, I claim, to think that nanoethics *is* a distinct sub-field of applied ethics.

2. *Why nanotechnology is likely to change our minds*

Why do I maintain that nanotechnology will invite us to reframe our well-known ethical problems arising in technological domains? In a word, because many new amazing things will happen in nanotechnology in the next years. We will therefore see well-known ethical problems in brand new clothes, so that our overall perception of those ethical problems will not be the same as before.

Nano-objects notoriously possess unexpected new properties in virtue of their small size. Their qualities can be radically, and surprisingly, different from larger particles of the same substance. This scale effect is due to several factors: the surface to volume ratio increases, as well as the proportion of atoms that come in contact with surrounding objects; gravitational forces become unimportant; electromagnetic forces prevail; quantum mechanics laws become relevant; the strong Brownian motion of nanoparticles has significant effects. As a result, the nano-world behaves differently and unpredictably from whatever we may know. Our knowledge of the macro-word is not useful to anticipate the interactions at the nano-scale. In fact, we have to deal with a new kind of uncertainty. As in quantum mechanics, uncertainty and unpredictability are not a result of insufficient knowledge, but are constitutive attributes of the situation. They are intrinsic and ontological features – not just epistemic ones. We must remember that some interesting nanoparticles do not actually exist in the world – or, at least, we cannot know whether they exist or not – before they are artificially created. Such new nanoparticles often are precursors of systems, structures and devices with novel functions. But we cannot know how they will behave before characterization. We just can have *a posteriori* nano-knowledge. This fact produces a radical kind of uncertainty that we are not familiar with. Although this is not ethical novelty, it is an important psychological, social and political novelty, that is likely to cast new light over old ethical problems raised by uncertainty and unpredictability. Of course we have experienced some structural uncertainty in the past, for instance with regard to environmental pollution, toxicity, ecosystems change, OGM, and human genetic manipulation. But now we are dealing with the kind of intrinsic uncertainty of quantum mechanics, not just with the one related to complexity and complex systems. Moreover, we are challenging it by *creating new objects* rather than by just altering natural processes, which is something we are

more accustomed to, and is conceptually included in the stronger and more specific action of irremediably introducing novel entities in the world. It may be objected that *creating new risky objects* yields a new ethical problem after all. I reply that we would need a clear definition of 'being a new ethical problem' in order to have a sensical possibility of agreeing with this claim. By the way, I prefer saying that this is not a new ethical problem with respect to altering natural processes, although it *is* a new psychologically relevant way of altering natural processes that is likely to make us start reasoning differently about the whole ethical problem of altering natural processes.

Another aspect characterizing nanotechnology that has the power to reshape our ways of conceiving reality, as well as the relationship between ourselves and the external world and, accordingly, the ethical dimension of this relationship, is the new epistemological profile of a nano-object. A traditional macro-object is defined by the properties that it has. The nature of its interactions with other objects is determined by the properties it possesses independently from such interactions. Properties are prior to relations. Nano-objects require a Copernican change: a nano-object seems to have no relation-independent property, and is defined by what it actually does when interacting with its environment. Relations are prior to properties, and nano-objects are a new kind of relational entity (Bensaude-Vincent 2013). They also can auto-assemble and auto-organise, eclipsing our traditional distinctions between natural and artificial, on the one hand, and living/non-living, on the other hand. Once again, although these features do not constitute any new ethical issue *per se*, they can change our way of conceiving old problems, in particular old ethical problems.

Nano-objects represent the most advanced human attempt to realise the ideal of perfect engineering control over matter and natural processes. It seems we can modify the macro-world directly intervening on the nano-world it supervenes upon. It is like if, for the first time in our history, we could affect directly the bottom level of reality and its casual processes. Of course we have no good reason to think that the nano-level is the fundamental irreducible level of matter, and on the contrary we have good reasons to think that it is not. But indeed we get a more accurate control over matter by applying our power of designing new functional objects and provoking new desired effects onto a lower level of reality. The conquest of a greater power also has its dark side. For instance, it is now possible to modify the macro-world in new invisible ways. Think of the new possibilities of using nanotechnology to affect biological processes in the human body. This is not absolute novelty, of course. But our chances to perceive that someone is crucially affecting the natural functioning of our body dramatically decrease if nanotechnology is used for accomplishing the purpose. This simple fact is likely to change our relation to science and medicine, but also to food, deter-

gents, goods, the law, the State, and our trust in them. We can no more conclude that everything is fine just because we cannot perceive that something wrong is happening. The level of reality at which some important human causal interactions take place is simply out-of-reach if nanotechnology is involved.

3. *What is part of nanoethics and what is not*

According to Allhoff (2007), ethical issues arising in nanotechnology can be grouped into a few categories: legal and regulatory issues; research funding and priorities; equity; environment, safety, health issues; privacy; medicine. Kermisch (2012) sustains that the main ethical issues posed by first-generation nanotechnologies are the question of their social desirability, the ethical issues associated with the difficulties to define nanotechnologies properly, the ones linked to uncertainties surrounding nanotechnologies, the threat of 'nano-divide', and the ethical issues linked to nanotechnology as 'dual-use technology'. On the other side, she reconstructs that the main ethical issues raised by second-, third-, and fourth-generations nanotechnologies will concern nanomedicine in the first place: access to treatment, equity and distributive justice (rich/poor patients; developed/developing countries); autonomy and informed consent; privacy and data protection (e.g., risk of medical surveillance by insurance companies); safety and responsibility. The issue of privacy and data protection will also rise independently from the problem of medical data security. The possibility to implant nanochips in the human body without the person knowing anything about it raises concerns about "invisible surveillance" by the State, and about manipulation of desires, beliefs and the will. Obviously the human enhancement prospect involves ethical discussion concerning human dignity, physical change, cognitive change, will alteration and manipulation, and the change of our self-representation as humans. The conceptual hybridation imposed by future nanotechnological developments – human/non-human, natural/artificial, living/non-living – will require ethically debating about the novel, unclear moral status of many of our actions, as well as about patentability of nano-products. Finally, the question of desirability of nanotechnological progress will also be at stake, and Kermisch interestingly introduces the specific ethical issues regarding the manipulation of the social demand and the instrumentalization of the social debate.

I think it is important to remark that we do not need to be realist about any specific mapping of the ethical issues raised by nanotechnology. Ethical issues taxonomy and classification, as well as decisions about whether one issue is ethical or not, are partly determined by the concepts themselves, but

partly dependent on our goals and preferences. Just like 'being a new distinct field of inquiry' and 'being a new distinct ethical issue', also 'being a distinct ethical issue arising in nanotechnology' (as opposed to 'being just part of a distinct ethical issue arising in nanotechnology', and to 'being just a heterogeneous constellation of separate ethical questions pertaining to separate distinct ethical issues arising in nanotechnology') should not be thought as an objective, intrinsic property of the world – not even of Popper's world 3[3]. Therefore we should not discuss about either Allhoff's or Kermisch's account is more correct. However, we can discuss about either Allhoff's or Kermisch's account is more useful *and* correct, or, most usefully correct – as well as about whether one particular ethical issue included in one mapping, but not in the other one, actually should be considered as an ethical issue arising in nanotechnology or not.

But what is not part of nanoethics? There seem to be three cases in which any issue should not be counted as an ethical issue arising in nanotechnology: first, it is an ethical issue but does not arise in nanotechnology; second, it is an issue arising in nanotechnology but is not an ethical issue; third, it is neither an issue arising in nanotechnology nor an ethical issue. I think that, while it is infrequent that in the literature some issue is claimed to arise in nanotechnology when it actually does not, it is easier that some issue arising in nanotechnology is supposed to be an ethical issue when it is not.

An ethical issue is an issue that can be debated only by developing, or rejecting, arguments in favour or against some ethical position about it. Under an ontological point of view, an ethical issue is therefore reducible to some arguments supporting ethical conclusions (a negation of an ethical position being an ethical position itself). An argument supporting an ethical conclusion can rely on some factual premises (and typically does), but must rest as well on at least one ethical premise, as a consequence of Hume's thesis that an *ought* cannot be derived from an *is*[4]. As a consequence, an ethical issue is reducible to an indefinite number of arguments going from some presumably shared ethical premises to some disputed ethical conclusion about the issue itself. What is not so reducible – or, what is not debatable by such arguments – is not an ethical issue at all, and for this reason cannot be part of nanoethics.

Many things that are not part of nanoethics actually are, or may be, useful to nanoethics. In same cases they are, or may be, exceptionally useful to it. But the fact does not change that they are not part of it. Describing what people think about nanotechnology is not part of nanoethics. Even describ-

[3] Karl R. Popper (1978).

[4] David Hume (1739-1740: book III, part I, section I).

ing what people *ethically* think about nanotechnology is not part of nanoethics. In fact, when we veridically describe what people ethically think about nanotechnology, we are neither proposing nor rejecting any argument in favour or against some ethical position about it. This is history of nanoethics, or, psychology of nanoethics; still this is not nanoethics. In the same line of reasoning, sociology of nanotechnology is not part of nanoethics, just as sociology of ethics is not part of ethics. Ethical issues are constituted by arguments supporting *prescriptive* propositions, while sociology is a descriptive enterprise, like psychology and history. I therefore assume that, for example, the issue whether people ethically approve nanotechnology is not part of nanoethics. Of course this descriptive issue may become crucial to ascertain the strength of a descriptive premise of a prescriptive argument supporting some position about some ethical issue that is part of nanoethics. But the same can obviously happen relatively to any other factual, non-prescriptive issue that evidently is not part of nanoethics, such as – say – the non-ethical issue: 'How many people bought the first beauty product containing nanoparticles?'. Answering this question, in principle, has nothing to do with ethics, and *a fortiori* with nanoethics; it has to do with *facts* pertaining with marketing and statistics. No doubts that any non-ethical issue can be recruited into some argument supporting one ethical position about some aspect of nanotechnology. But this is not surprise. Many issues that are not part of nanoethics – in particular, many issues that are not part of nanoethics because they are not *ethical* issues – can become the focus of some argument taking a stand about some ethical issue that *is* part of nanoethics. In this sense, almost every issue can become relevant to nanoethics also without being part of it. Argumentative relevance can be contingent, occasional, ephemeral and evanescent; 'being part of' is stable, permanent, long-term and structural.

The study of nanoethics is not part of nanoethics either. We are accustomed to considering that a researcher who reconstructs the ethical arguments used in one particular field of applied ethics actually is a researcher in that field of applied ethics. After all, what else could she be? But in order to do nanoethics we need to be (1) appropriately prescriptive, that is, prescriptive in the specific ethical modality (being *ethically* prescriptive is not the only way we can be prescriptive, since we also can be aesthetically prescriptive, for example); and (2) focused on nanotechnology. Reconstructing the ethical arguments used in nanoethics is neither (1) nor (2), since it seems to be a descriptive enterprise whose target is nanoethics itself rather than nanotechnology. Some disciplinary regard upon nanoethics can be constitutively prescriptive: it is the case of logical or argumentative evaluation of comparative strength and weakness of the arguments supporting some ethical position about some ethical issue being part of nanoethics. It is also pos-

sible to have a meta-look upon nanoethics that actually is *ethically* prescriptive – as if, for instance, we try to ethically evaluate the behaviour consisting in proposing the different opinions composing the nanoethical debate. But the fact remains that all these metalinguistic viewpoints about nanoethics are not part of nanoethics, although of course they could reveal to be – and often clearly are – very useful to nanoethics. A fundamental distinction must be drawn between (descriptively or prescriptively) analysing a pattern of moral positions about one action or practise, and ethically analysing that action or practise. Applying this distinction, it is possible to separate nanoethics from many kinds (historical, psychological, sociological, logical, argumentative, ethical, etc.) of analysis of nanoethics.

4. *A consequentialist bias in nanoethics?*

Some researchers have complained about there being a dominance of the consequentialist perspective in nanoethics. For example, Swierstra & Rip (2007: 17) have denounced a "consequentialist-ethics bias" in nanotechnology regulation; and Ferrari (2010: 31) has remarked that there is "a clear dominance of the consequentialist position. […] Even if talking about consequences is not the same as being consequentialist […], the dominance of consequentialist framework is particularly evident if we consider the centrality of issue linked to the risks of nanodevices in the debate. […] there is a strong tendency to see risks as the sole issue emerging from nanotechnological applications".

I think that these worries are justified, and that it would be a theoretical limitation as well as a pragmatic mistake to attribute excessive weight to consequentialist considerations in the nanoethical debate. In a different vocabulary, I would say that not every ethical issue that is part of nanoethics can be formulated in consequentialist terms. The discussion about risks, danger, regulation and its forms, and precaution, has been sometimes thought as possibly representing the whole discussion in nanoethics: but it is evident that this is not the case.

For example, an ethical issue that is part of nanoethics and that has nothing to do with consequentialism, consequences or risks, is the issue whether people have the right to live without nanotechnology also in the case nanoproducts were not more risky than natural products. Another one is the issue whether people have the right to be informed that artificial nanoparticles are specially involved in some process or present in some good, also in the case such nanoparticles were not more risky than any other particle or thing.

The right to be informed could be seen, of course, as a instrumental right protecting a more fundamental right, the right to free and autonomous choice. If I do not want to use any beauty product containing artificial nanoparticles, for example (whatever the origin of my preference: religion, ideology, extravagancy), I need beauty products to be opportunely labelled in order for my desire to be protected as a right.

On the one hand, we can register that it has been far more common in the literature to talk about an alleged right not to run augmented risks coming from nanotechnology, than considering any right concerning nanotechnology independently from risks, such as the right not to make use of any nanotechnologically equipped product at all. Such a right seems a very interesting one, as it has to do with lifestyles, personal choices, autonomy and the relationship between individual and society, and it calls for respecting some other right, as the right to be correctly informed about market and scientific and technological progress – since it is evident that it is not psychologically possible to start desiring not to make use of any nanotechnologically equipped product unless one knows that nanotechnology exists, that some goods sold in the market are nanotechnologically equipped, what is nanotechnology, and so on.

On the other hand, the idea of protecting such a right as the right not to make use of any nanotechnologically equipped product may seem exaggerated under some respects. In fact, if we suppose that the problem is not represented by risks, acknowledging this specific right would open the door to acknowledging similar rights as, for example, the right not to make use of goods manufactured by any racist person. The problem is: to what extent do I have a right to be informed about goods and, generally, about the things I make a use of, relatively to any feature of them that may be relevant for me, but not for anyone else, or in any case not for the majority of other people? Again, we could compare the right not to make use of any nanotechnologically equipped product with the right not to make use of the internet. Could the latter right be acknowledged? Defending the individual right to cultivate one's own lifestyle must be balanced against the societal need to take some sharp-cut directions, such as that of deciding that public information and institutional communication are to take place through the internet rather than by either word of mouth or printed material. As we can see, the issue whether there can be such a right as the right not to make use of any nanotechnologically equipped product also in case there is no augmented risk is an ethical issue that is part of nanoethics, of course, and it has *prima facie* nothing to do with consequences and risks.

But what Swierstra & Rip, Ferrari and others have in mind when they complain about the "consequentialist-ethics bias" and the "dominance of the consequentialist position" is a bit different from what I am suggesting. What

they are really saying is that the risk issue has been overrated, and has been addressed mainly under a consequentialist frame. As a result, deontological ethics and virtue ethics, for example, are not adequately represented in the nanoethical debate.

I agree that risks have inappropriately monopolised the debate. But I also consider it important to remark that 'risks' and 'consequences' are two very different notions. Actually risks are just a subset of the possible consequences of a nanoproduct – more or less, possible harmful consequences on human health and the environment. But the notion of 'consequences' is much broader, as it includes both negative and positive political, economical, social, cultural, psychological and other kind of consequences. My claim is that it is not at all easy to be non-consequentialist with respect to nanotechnology, because it is impossible to do what non-consequentialist usually do: taking for granted what the consequences are going to be, roughly. You can say that, ethically, consequences are not what really count, just in case you can presuppose that consequences are going to fall within a known range of possibilities. But if you are dealing with a 'relational entity' whose behaviour is impossible to predict, the resulting structural uncertainty eclipses any idea of a limited range for its consequences to fall inside. A new nanoparticle might turn out to be extremely beneficial, extremely harmful, or non-influential. It might contribute reducing the gap between the developing and the developed world, but it might contribute increasing it either (notice that this kind of negative consequence is not traditionally thought to be 'a risk'). Both the extension and the magnitude of its possible consequences are indeterminate. In such situation, being non-consequentialist is particularly hard. I therefore maintain that, although we may complain that too much space in the debate has been dedicated to a (most-important) subset of possible consequences constituted by risks, we should understand why it is so difficult to develop non-consequentialist arguments in nanoethics[5]. In short, we cannot *afford* non-consequentialism, which seems to presuppose some kind of background supervisory control of consequences that, in the case of nanotechnology, simply seems unattainable.

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[5] See Bacchini 2012.

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