

Visions and Ethics in Current Discourse on Human Enhancement

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Abstract Since it is now broadly acknowledged that ethics should receive early consideration in discourse on emerging technologies, ethical debates tend to flourish even while new fields of technology are still in their infancy. Such debates often liberally mix existing applications with technologies in the pipeline and far-reaching visions. This paper analyses the problems associated with this use of ethics as “preparatory” research, taking discourse on human enhancement in general and on pharmaceutical cognitive enhancement in particular as an example. The paper will outline and discuss the gap between the scientific and technological state of the art and the ethical debates, pointing out epistemic problems in this context. Furthermore, it will discuss the future role of genuine ethical reflection in discourse on human enhancement, arguing also that such discourse needs to include a technology assessment—in the broad sense of the term—which encompasses, inter alia, anthropological perspectives and aspects of social theory.

Keywords Visions · Human enhancement · Ethics · Speculative ethics · Pharmaceutical cognitive enhancement

Introduction

Research into the ethical, social, legal and political aspects of emerging technologies, commonly known as ELSA, which began with the launch of the Human Genome Project in 1990,¹ has nowadays acquired a fundamental role as preparatory research for the governance of these technologies. ELSA reflection in Europe has been framed by ideas about the co-evolution of science and society and about the need for reflexive science. In its 2009 report entitled “Challenging futures of science in society—emerging trends and cutting-edge issues”, the EU MASIS Expert Group stresses the growing role played by applied ethics—alongside science and technology studies (STS), technology assessment (TA) and other fields—in what it calls “*reflexive science*”: the idea is that science should reflect on its role and its impacts on society, not only as a purely philosophical exercise. The group gives two examples of this reflexive science, the

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¹ http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml

first being the debate on human enhancement (HE):²

“In the ongoing debate on human enhancement many new questions arise, ranging from ethical ones of how to deal with the increased use of pharmaceuticals for enhancement purposes in daily life and in sports to far-ranging philosophical questions about human nature, and future relations between human kind and the environment. (...) Beyond ethical considerations at the individual level, there are also questions about how society will evolve—into an ‘enhancement society’? Science-in-society activities such as public engagement will be needed to mediate between public attitudes, stakeholder positions and scientific interests. This is one sort of ‘reflexive science’ at work.” (p. 14)

A special degree of reflexivity appears to be needed in the ethical debate on HE, due to the unpredictability and uncertainty of technological future(s)—typical of emerging technologies—and the fact that HE indicates a goal rather than a particular set of technologies. However, the major part of the ethical debate on HE remains at an abstract and very general level, not differentiating between technologies already in use (such as cosmetic surgery and doping in sport), emerging technologies and merely possible or conceivable technologies (far-reaching visions). The generality and repetitiveness of the debate can lead to an impasse [4, 57].

In this paper we argue for enhanced reflexivity in academic ethical discourse on HE by means of an analytical focus on technoscientific visions. For many decades, historians of ideas about science, technology and the future have emphasised the importance of future visions and imagined scenarios for the social shaping of science and technology and have analysed how values and interests shape such imaginings. Likewise, STS and TA have increasingly dealt with these topics since the 1990s. Discussing the ethical debate on pharmacological cognitive enhancement (PCE), we will show how in this case the scarcity of empirical evidence relating to both the safety and the social relevance of the field in question necessitates a discussion of the values and motives underpinning discourse on PCE. In our view, academic ethical debate on HE needs to be reframed by fully

acknowledging the “visionary” nature of the discussed technoscientific developments, i.e. their role as future visions and imagined scenarios which, at the same time, act in the present, influencing research agendas, the allocation of resources and even regulatory frameworks.

Ethical Reflection on New and Emerging Technologies

Applied ethics such as bioethics has been developed as an ethical future-oriented mode of reflection, since it analyses the implications of and conflicts in the perception of technological visions in different contexts. One of the reasons why ethical reflection has progressively gained importance is precisely that we do not wish to start discussing future problems or the unintended consequences of technology development at too late a stage. Preparatory ethical reflection on technologies which are in their infancy and designed to be used for the purposes of human enhancement has to deal with specific challenges. However, scholars from the social sciences or other humanities (notably STS and TA) have often accused the bioethical discourse of taking specific technological developments for granted and thus remaining largely untouched by the idea of a co-evolution of science and society (cf. [16, 21]). Grunwald [29] observed that assumptions about the future of NBIC convergence and related HE issues were often formulated in terms of a ‘constative future’, frequently stating simply that certain developments will be part of reality at some point in the future—and completely ignoring the open-ended nature of ‘the future’ and the possibility of alternative developments. Although the role of future imaginations has been broadly analysed in STS literature (for example by Jasanoff and Kim [34] using the concept of socio-technical imaginaries³ or by Rip and Kemp [65] using

² The second example regards the increasingly important role played by scientific expertise in decision making, possibly under conditions of extremely high uncertainty.

³ Jasanoff defines sociotechnical imaginaries as “collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects” (Jasanoff & Kim, p. 120). In her analysis, Jasanoff refers to sociotechnical imaginaries as attainable and prescribed futures in policy-making, i.e. in publicly supported science and technology research, which then differ depending on the countries. In this article, by contrast, we are discussing the ethical dimensions of technological visions in academic literature, which develops general patterns of argumentation independently of the concrete cultural national context.

the concept of emerging irreversibilities⁴), academic discourse on new and emerging technologies often fails to explicitly acknowledge the normative role of technoscientific visions, particularly those related to genomics and nanotechnologies (cf. [80]). These debates often use a repertoire of limited narrative structures, populated by certain groups of actors, their problems and their solutions to present the future as if it were here today. This leads to a “compression” of foresight and of critical anticipation [80]. One main challenge facing discourse on the ethics of new and emerging technologies is therefore to find a way to appropriately engage with the normativity of technological and scientific visions without promoting techno-determinism yet fully acknowledging the open and political nature of our discussion about the future.

Scholars working in the fields of TA, STS and philosophy of technology have developed different methods of incorporating lessons learnt about the contingency, complexity and unpredictability of (socio-) technological developments into the ethical reflection process. These methods include but are not limited to Constructive Technology Assessment (CTA) and Socio-Technical Scenarios [66], ‘ethical technology assessment’ [56], the ‘techno-ethical scenarios’ approach [5, 44], the ETICA approach [77], and ‘anticipatory technology ethics’ (ATE) [9]. Despite their differences, these approaches share the belief that, if we are assessing technological visions, we should explicitly acknowledge this fact. They tend to focus on future science and technology scenarios and possible changes in moral attitudes and moral conflicts

⁴ The concept of emerging irreversibilities was developed by Rip and Kemp [65] to indicate the fluidity and open-endedness of sociotechnical developments and was integrated into the Constructive Technology Assessment (CTA) approach. Irreversibility—the idea that developments cannot be undone once they have occurred—was analysed in connection with new and emerging technologies as a phenomenon which reduces complexities: as a matter of fact, if promising results in a technological field are obtained they shape expectations, research agendas and demand. These decisions, for their part, reduce progressively the available choices and render technology part of the accepted landscape [65]. In their paper, Rip and Kemp [65] argue that measures sometimes need to be taken, due to the evolutionary character of sociotechnical change, to counter emerging irreversibilities and focus their discussion on the role of governments in research policy and on possible ways of shifting sociotechnical regimes. As already noted with respect to Jasanoff’s analysis, our paper focuses on the academic ethical debate on new and emerging technologies and on the need to disentangle the normative force of technological visions.

arising from the contingent nature of technological developments.

In our paper, we focus instead on the role of technoscientific visions in the present context and on their actual ‘real life’ impacts, analysing these visions as imaginations of the future which exert a normative force in the present.

The Debate on Speculative Ethics

In the current debate on new and emerging technologies a discussion is underway about how to appropriately address the normative nature of technological visions, a problem which is discussed in the debate on “speculative ethics”: Nordmann [51] and Nordmann and Rip [52] showed how something that was originally a conditional if-then chain can in many cases evolve gradually and imperceptibly to become an expectation or even certainty:

“As the hypothetical gets displaced by a supposed actual, the imagined future overwhelms the present” ([52], p. 273).

According to Nordmann, speculative ethics suffers from

“a radical foreshortening of the conditional, that is, ... what one might call the ‘if and then’ syndrome. An if-and-then statement opens by suggesting a possible technological development and continues with a consequence that demands immediate attention. What looks like an improbable, merely possible future in the first half of the sentence, appears in the second half as something inevitable. And, as the hypothetical gets displaced by a supposed actual, an imagined future overwhelms the present” ([51], p. 32).

The central problem concerns the relationship between visions of future technoscientific development and ethical reflection, something which has also been discussed in relation to the so-called Collingridge dilemma: although in principle it is easier in the early phases of scientific and technological development to influence the course of events, it is precisely in this early stage that the required knowledge that would enable one to intervene in a constructive manner is absent [15, 20]. Furthermore, Nordmann and Rip believe that such speculative ethics has deleterious effects on reflection on new and emerging

technologies by distracting attention away from major and more urgent problems [52].

One defence of speculative ethics has been developed by Roache [67], a scholar at the Future of Humanity Institute in Oxford which is led by transhumanist thinkers. Roache gives four reasons for defending speculation in ethics: first, speculation is a means of making it more difficult for unethical projects to gain acceptance; second, speculative scenarios are sometimes instrumental in motivating important ethical projects; third, to claim that it is always inappropriate to take action to prepare for such highly speculative scenarios is an exaggeration and contradicts some important ethical intuitions; fourth, the emphasis on currently pressing issues may distract us from what is important. The examples discussed by Roache are interesting, especially those related to the first reason:

“For example, carbon capture and storage technology is a response to ethical concerns about global warming, and preimplantation genetic diagnosis technology is a response to ethical concerns about creating children with inherited diseases. Identifying an ethical issue, judging it sufficiently serious to warrant a technological response, and deciding what form that technological response should take is a process that requires both ethical and scientific input. Further, the ethical input is required from the very beginning. [...] For example, if ethical concern about global warming is the chief motivation for creating carbon capture and storage technology, and if it turns out that such ethical concern is misconceived, then there remains little motivation for developing and using such technology.” ([67], p. 322–323)

Framing technological development in this way is overly simplistic, however, and in some cases also misplaced, since it ignores the role of history and culture in framing technological development and the contingencies and conflicts which characterise the development of many technologies from the outset. Furthermore, it relies on the assumption that the technological path can provide the right solution to problems which in many cases are determined by a multiplicity of factors. There is, however, a more

profound tension underpinning Roache’s defence of speculative ethics: the fact that Roache [67] believes it is important to prepare for future scenarios because they show genuine ethical conflicts, such as the disagreement between Nordmann and de Grey as regards the value of anti-ageing research—the former being a critic and the latter a supporter. Given that there is such a conflict in society, this example illustrates that ethical problems are genuinely at stake in the case of human enhancement technologies, despite or maybe because of the need for a certain degree of speculation.

It would be inappropriate to believe that ethics should concern itself only with developments that are certain to materialise, because that would mean missing out on opportunities to influence developments (cf. [28]) and may result in important ‘weak signals’ being overlooked. The latter risk appears to be lower in the case of rather well-established nutritional, surgical, pharmaceutical and other traditional medical enhancements and higher in the case of enhancements that are based on or may emerge from advances in brain research, new neuro- and biotechnologies, nanoscience and artificial intelligence research. Such “second-stage enhancements” [39] would have the potential to radically change the human condition. According to Khushf [39], these tendencies in human enhancement are conceptualised as (a) “self-aware evolution” (direct engineering of the next stages of the processes guiding the development of life through the genetic alteration of existing living systems or the direct creation of artificial life), (b) “human–machine hybrids” or “Humanity 2.0” (in line with the trend towards developing technologies that make humans stronger, faster and more agile, using increasingly seamless human–machine interfaces and directly incorporating ever smarter technologies in the form of implanted chips, neural interfaces or simply remote sensing capacities), and (c) “medical enhancements” (refining medical tools, enabling and enhancing normal human function and making radically new functions possible, introducing capacities that humans have never had before). To this list could be added drugs which, though still largely visionary, are designed to alter basic human traits (such as empathy or aggressiveness) or fundamental features of an individual’s psychological identity (such as drugs for memory erasure).

On the other hand, speculation is also a problem for a variety of reasons: first, from a theoretical point of view, the simple possibility of imagining a certain

scenario cannot be utilised as an argument or as part of a chain of arguments, as this leads only to aporias. As Jonas [36] pointed out, if the future conditions upon which ethics reflects were purely speculative in any radical sense, the ethical advice that might follow from such reflection could not lead to anything of consequence. Hansson [32] arrived at the same result by analysing ‘mere possibility arguments’. Second, the object of ethics would become lost in the speculative consideration of the consequences, making ethics obsolete: ethics would not set limits on technology, yet technology—as a result of its uncertain future—would set limits on ethics [3]. Third, speculation drives the debate in directions which distract from other more urgent questions or which prevent any discussion of specific conflicts of interests, such as the criteria for the allocation of resources (cf. [52]).

Elsewhere it has been argued [28] that the Collingridge dilemma is exaggerated. The question of whether ethics should start at an early or late stage and whether it should be prospective or should not begin until reliable statements about the consequences are available presents a false alternative. The issue here is not about choosing one or the other, but about a nuanced ethical reflection in line with the problem in question and with the validity of the knowledge of the consequences that is available. Ethical reflection differs in terms of conception and methodology according to whether it is concerned with the measureable consequences of technology or simply with imagined or even merely speculative ones. Above all, it also serves *different purposes*. The question, for example, of whether it is responsible to permit nanoparticles to be included in food is a concrete issue that needs to be considered in the context of regulation, labelling requirements, corporate commitments or individual responsibility. In contrast, early thoughts about synthetic biology or human enhancement served rather to promote conceptual understanding and clarification of the issues from a normative perspective or to facilitate the development of clear terminology and ethical alternatives, without anything immediately requiring regulation.

Vision assessment could be an appropriate means of evaluating the benefits promised by the technology (cf. [28]). This is based on the *feasibility* of a technology and its (social) *desirability* (analysis of discourses). Assessing feasibility requires sufficient technical data about present prototypes and an

exploration of possible breakthroughs. Assessing social desirability involves analysing discourse relating to the technologies and, in particular, their content and strategic role within the debate, evaluating the normative implications involved and scrutinising the practical impact the transported visions will have on present society. Any epistemology of futures involves a kind of ‘deconstruction’ of the elements which comprise such futures—such as knowledge, uncertainties, ad hoc assumptions, values etc.—and their ‘construction’ to create one picture of the future, followed by an assessment of the validity or plausibility of these elements and of the overall ‘rationality’ of this future scenario as compared to the rationality of other alternative scenarios (cf. [30] with focus on energy futures).

Karafyllis [38] suggests that vision assessment should be combined with media ethics, science ethics and business ethics, thereby giving rise to other relevant questions such as who is funding the agenda-setting for what purpose and who is setting the agenda. Nordmann [53] argues that the dilemmatic nature of the Collingridge dilemma reflects the spirit of technoscience and that the main criterion for TA would be to not let this dilemma emerge, that is to maintain controllability (cf. [42]). In Nordmann’s view, believing in the possibility of shaping the world through science and technology and viewing the future as an object of design is an assimilation of the technoscientific hubris. Furthermore, since technoscience tends not to be interested in the limits of technical control or disciplinary divisions and, on the contrary, is enthusiastic about transdisciplinarity and “enhancement of material nature”, tending to avoid any clear distinction between technical feasibility and mere theoretical possibility, it is a difficult research subject for TA [53]. As an alternative path for TA he proposes a *forensic of wishing*:

“Put briefly, the sciences in the age of science had a future in a historical sense of the term, but technology does not—and when the technosciences speak of shaping the future, they are not referring to the future of humanity and society, but rather to the realisation of a potential or the fulfilment of a wish, that is, they are talking about a future that is fully contained in the present. And if to posit a potential or to formulate a wish is the same as shaping the future, TA needs to be a forensics of wishing and can thus

engage the future without going beyond the present [...] This analysis is oriented to the cultural imaginaries and stereotypes that defines research agendas and shapes ideas of technical solutions to societal problems [...] In this way we will avoid to consider the Collingridge dilemma as a dilemma waiting for a solution. It is a kind of vision assessment, but it focuses not only on roadmaps that lead from wish to its fulfilment, but at least as much on the idea of fulfilment that is contained in the wish. This vision assessment can be limited to something that is amenable to assessment now without estimates of probability and credibility (included the evaluation of technological alternatives) ([53], p. 12–13).

When it comes to an ethical reflection on human enhancement, one challenge is posed by the conflict between the perspective of ‘multiple futures’, characteristic of most current academic and policy discourse on science and technology, and the determinism displayed by many participants in discourse on human enhancement (cf. [74]). In the view of Nordmann, however, it remains difficult to speak of the future in these terms, since the future should rather be conceived of not as something we can shape, but as something epistemologically inaccessible and as something we are always changing, taking action in the present.⁵

The debate on speculative ethics is ongoing and plays an important role in the self-reflection of scholars engaged at the interface between ethics and politics of new and emerging technologies. On the one hand it seems to be unavoidable and important that a normative reflection is directed towards technological visions, since they are fundamental motors of technological development by influencing science’s agenda, public perception and research funding. We do not suggest that the implications and consequences of technologies need to be evaluated now, but rather that we need to *reflect on the motives and goals which shape these visions and thus which drive technological development in one direction rather than another*. On the other hand, many scholars emphasise that it is crucial to find an appropriate way to engage with these visions

in order to meet the challenges and avoid the shortcomings mentioned above [74, 79].

In order to demonstrate the importance of discussing the normative force of technoscientific visions in the present, an analysis of the debate on pharmacological cognitive enhancement (PCE) is presented below.

Current Ethical Discourse on Pharmaceutical Cognitive Enhancement (PCE)

If we take a closer look at ethical debates on particular HE technologies, we notice how strongly our perception of what is really at stake is influenced by visions, as they construct a debate even in cases where empirical evidence of concrete goals is lacking [12]. This work of “colonisation of the future” (cf. [73]) is clearly visible in the debate on pharmaceutical cognitive enhancement.

Interestingly, the term ‘cognitive enhancement’ was originally used to describe the treatment of disease-associated cognitive impairment, such as in dementia and schizophrenia, and involved using various strategies to boost cognitive functions. The meaning of the term was subsequently broadened to encompass the use of interventions for mild cognitive impairment (MCI), currently defined as cognitive deficits that do not overtly impair function [37]. Nowadays ‘cognitive enhancement’ is often applied exclusively to interventions in normal ageing processes and in ‘healthy’ people for non-medical purposes.

In recent years there have been interdisciplinary attempts to put cognitive enhancement on the governance agenda, presenting it as an urgent issue to be discussed and regulated, for example in the following quote:

“When not to decide is to decide. Neurocognitive enhancement is already a fact of life for many people. Market demand, as measured by sales of nutritional supplements that promise cognitive enhancement, and ongoing progress in psychopharmacology portend a growing number of people practising neurocognitive enhancement in the coming years. In terms of policy, we will soon reach the point where not to decide is to decide. Continuing our current laissez-faire approach, with individuals relying on their physicians or illegal suppliers for neurocognitive

⁵ Paper presented at the S.Net conference 2011 in Tempe, Arizona and personal communication.

enhancement, risks running afoul of public opinion, drug laws and physicians' codes of ethics. The question is therefore not whether we need policies to govern neurocognitive enhancement, but rather what kind of policies we need" ([18], p. 424)

In 2007 the British Medical Association (BMA) published a report on ethical aspects of cognitive enhancement with a view to facilitating informed debate among various specialists about the future development and use of cognitive enhancers. Providing an overview of the ethical and social implications of cognitive enhancements, the authors stressed the need for a rational debate in society. In 2008 Greely and colleagues published a commentary in *Nature* in which they argued for an appropriate regulatory framework capable of recognising the possibility of responsible use by healthy individuals of cognitive enhancing drugs.⁶ A German interdisciplinary research team proposed much the same thing in a memorandum published in an important popular journal on brain science; they concluded that there are no convincing intrinsic objections to the pharmaceutical enhancement of the brain and that appropriate regulation should allow individuals to make autonomous and informed choices, minimising undesirable social consequences [25].

The cognitive enhancement debate has been largely based on three important assumptions. First, that cognitive enhancement is a relevant phenomenon in society: it has entered daily life, especially in highly competitive contexts like academia (it is very widespread among students and professors). Second, that there is scientific evidence that certain pharmacological substances have cognitive enhancement effects and that cognitive enhancement will work much better in the near future than it does today. This assumption

⁶ Greely and his colleagues called for a presumption that mentally competent adults should be able to engage in CE using drugs; for an evidence-based approach to the evaluation of the risks and benefits of CE; for enforceable policies in the use of CE drugs to support fairness, protect individuals from coercion and minimise enhancement-related socioeconomic disparities; for a programme of research into the use and impacts of CE drugs by healthy individuals; for physicians, educators, regulators and others to collaborate in developing policies that address the use of CE drugs by healthy individuals; for information about the risks, benefits and alternatives to pharmaceutical CE to be broadly disseminated; for careful and limited legislative action to channel CE technologies into useful paths [27].

would require us to initiate a debate—involving public engagement and regulation—in society right now. Third, that we need prospective ethics in order to avoid a gap occurring between ethical reflection—which ought not to start too late—and the state of the art in research and development (cf. [7, 18, 25 27]).

Recently, many scholars have begun to challenge these assumptions, underlining the importance of an appropriate and more realistic assessment of empirical data on pharmacological cognitive enhancement [54, 58, 60, 72]. In fact, a closer look at the current empirical research challenges the first two assumptions, since neither the social relevance of pharmaceutical cognitive enhancement nor the biological efficacy and safety of the pharmaceutical substances indicated as pharmacological cognitive enhancement are really based on convincing evidence. If the empirical evidence concerning these two major issues is proven to be scarce, then the necessity of an ethical debate on this phenomenon also has to be challenged (cf. [70]).

How Socially Relevant is PCE?

The studies present very different conclusions as regards the social relevance of using illicit prescription drugs for the purpose of cognitive enhancement. The first empirical data testifying to the illicit use of prescription drugs for cognitive enhancement date back to the beginning of this century, and the practice continues among college students in the USA today. The majority of studies concentrate on methylphenidate formulations, of which Ritalin has received the most attention: from 2003 on, for example, Teter and his group conducted different surveys of students and illicit use of Methylphenidate. In general, doubts have been expressed concerning the extent to which these studies are representative of the entire population, since the students surveyed are not representative of the entire student body (other age groups⁷), and self-reported prevalence rates are not provided (cf. [78]). Furthermore, no other relevant data are considered in an attempt to investigate the reasons behind the

⁷ For example, a 2004 study reported the following past-year prevalence rates of illicit amphetamine use among high school seniors: 2.3 % Ritalin, 1.9 % methamphetamine, 0.7 % Dexedrine, 0.2 % Benzedrine, 0.2 % Methedrine, 0.1 % Preludin, and 0.1 % Dexamyl [35].

consumption: interaction with other addictive habits or the availability of a particular drug on a particular campus are, for example, often ignored. The tendency towards using illicit stimulating drugs for PCE appears to be greater among those who are best informed about the possibilities and risks, namely social groups for whom cognitive capacities are very important in their work: academics and students [22]. This use is significantly higher among US students involved in fraternities or sororities and among those generally more likely to use illegal substances for recreational or other reasons. The latter suggests that the phenomenon can be seen as a minority development within drugs-affine groups rather than a broad societal development [6]. Furthermore, the methodologically more precise study conducted by Lieb and his colleagues shows that there are major differences in prevalence rates and motivation between different countries, such as for example between US and German students ([22]; cf. [23]).⁸

The bias in the statistical acquisition of data also concerns the general question of the degree to which the academic population is representative of the population as a whole. Highly contested, for example, was the informal survey initiated by Sahakian and Morein-Zamir in *Nature*, which aimed to ascertain whether subscribers to one of the most respected academic journals illegally use cognitive enhancing drugs ([68]; cf. [46]). They polled 1,400 subscribers from 60 countries and reported that 20 % used prescription drugs for non-medical reasons to stimulate focus,

⁸ Franke and his group investigated a sample of pupils (1035) in small and big cities and university students from three departments (medicine, pharmacy, economics) (512) and found that the prevalence of the illegal use of prescription drugs was not as high as was previously discussed at the national level, especially in the media [23]. In Germany, the use of illicit drugs (amphetamines, cocaine, ecstasy) for cognition enhancement is higher than the nonmedical use of prescription stimulants: 2.42 % of pupils and 2.93 % of students in the former versus 1.55 % of pupils and 0.78 % of students in the latter case, where a lifetime illicit use of stimulants for cognitive enhancement with lower last-year and last-month rates was reported. Prevalence was higher among male pupils, pupils from vocational schools and pupils with bad marks. In a follow-up paper which looks more closely at the content of interviews with students, it has emerged that information about neuroenhancement is disseminated in a somewhat selective and underhand manner among students, who tend to avoid critical discussions [24]. For these reasons, the authors involved in the investigation point out that the potential risks associated with stimulant use require early awareness and intervention strategies.

concentration or memory. The biggest problem here was the lack of clarity about how the respondents were recruited, whether in fact they were only *Nature* readers or whether other people also took part (through word-of-mouth advertising) (cf. [41]). One of the conclusions drawn by a German survey initiated by an insurance company (DAK—Deutsche Angestellten Krankenkasse) was also highly contested: having surveyed 20,000 workers about the use of illicit substances at the workplace, the report concluded that 1–2 % of the workers (of all ages) use “doping” drugs.⁹ The problems with this study included the fact that no data were available about the different work groups, and that the data were not distinguished according to specific drugs and included, for example, antidepressants.

A recent extensive review of studies of prevalence in the US and Canada, conducted by Smith and Farah [76], points out that the study results vary dramatically depending on whether lifetime-prevalence (people who have used prescription substances at least once in their lifetime for non-medical reasons) or last-year-prevalence is investigated. Studies of smaller, more specific groups of people often show a much higher prevalence than broader, nationwide studies. This again supports the argument that PCE is a group-specific phenomenon. To sum up, the social relevance of the motives for cognitive enhancement, of the prevalence rate and of people’s readiness to use these drugs is far from statistically robust. Many aspects still need to be investigated, such as the development of individual stimulant use by students who graduate and enter job life [76] and epidemiological aspects.

How Empirically Robust are Safety and Efficacy Claims Concerning the Illicit Prescription of Drugs for PCE?

A close look at the current state of scientific literature on pharmaceutical substances for cognitive enhancement reveals that the empirical evidence for enhancing effects appears to be even scarce and not at all similar to the picture often presented in the debate. First, it should be pointed out that it is no easy task to assess the state-of-the-art of the major substances discussed in the debate on PCE due to the lack of precise

⁹ In the media it was sometimes reported that between 800,000 and two million people in Germany use these substances, based on a superficial extrapolation of this percentage to the entire workers’ population in Germany.

information about the effects of these substances on healthy people. There is a general absence of data on healthy subjects and of statistically relevant data. Since drugs and substances were originally designed for sick people, it is often not possible to draw conclusions about healthy individuals on their basis (cf., among others, [8, 41, 63, 64]). Often there is no use of standardised tests for specific cognitive abilities, with the result that conclusions remain very general (cf. [45]). Furthermore, only small-scale clinical trials are available in many cases, meaning that there is no standardised method in the majority of the cases of assessing adverse reactions and reporting drop-outs due to adverse effects (cf. [8, 43]). There is also frequently no clear relationship between the studies' outcomes and the variability in cognitive performances of healthy individuals: the outcomes depend to a very great extent on the initial state of test subjects (whether for example they are fully engaged in a task or are sleep-deprived) (cf. [45]). There is a general lack of appropriate studies of the long-term effects of substances and of their addictive potential (cf. [8, 63, 64]).

Second, it is interesting to note that evidence of the safety and efficacy of PCE substances is very scarce. In the following we will mainly discuss data taken from recent review studies. Methylphenidate, for example, which is broadly discussed and often quoted as being capable of enhancing memory, has only in some cases moderate positive effects on spatial working memory in a single dose, while no general conclusions can be drawn for repetitive drug administration (cf. [1, 45, 63]). Furthermore, it improves vigilance yet impairs attentional control, and exhibits highly individual effects on cognition which depend on genetic predispositions and individual current states (cf. [11]). Amphetamines have a positive effect on memory under certain conditions, but they are controversial on account of their long-term detrimental effects and addictive potential (cf. [41, 59, 75]).

Despite the fact that a number of individual studies—most of them published between 2003 and 2004—revealed that modafinil brought about some improvement in memory function, current literature indicates that it does not lead to any improvement in memory in the majority of the studies (cf. [1, 45, 63]). Modafinil works in augmenting cognitive deficits in sleep-deprived subjects and improves performance in

fairly simple, fatigue-sensitive tasks (such as sustained attention and reaction time) (cf. [61]). There is still a lack of more accurate studies which distinguish single dose from repetitive drug administration, and of any appropriate understanding of the cellular effects of its consumption (cf. [59]). Baranski et al. [2] showed that modafinil leads people to overestimate their own cognitive performance. Last but not least, the effects of a 200 mg or 400 mg dose of modafinil are comparable to 600 mg of caffeine [40, 41].

Currently it is not possible to draw any sound general conclusions concerning the major substances discussed in discourse on pharmacological cognitive enhancement. There is no evidence whatsoever in the empirical literature that any substance can lead to a person developing extraordinary (superhuman) capabilities. It is not even clear whether certain substances can help an individual to increase their particular cognitive ability beyond the optimal level (i.e. when she/he is not suffering from stress, sleep deprivation or similar conditions). Comparative studies of different substances have pointed out that the advantages (if any) produced by each substance may differ according to the cognitive demands of the task. There is also growing evidence that it is not scientifically sound to speak of “cognitive enhancers” for healthy individuals: if a substance can be proved to have an enhancing effect, this is always on a particular property of cognition; such an effect is often differently interrelated with changes to other properties (which may also be detrimental) (cf. [45]). Last but not least, stimulants seem to have a placebo effect, since the mere expectation of receiving a stimulant can raise subjective arousal [43].

A Questionable Ethical Debate on PCE

If the social relevance and efficacy of currently available substances for cognitive enhancement is found to be problematic and anything but evident, we believe we are justified in questioning whether an ethical debate of these particular visions as something which would materialise soon is needed at all. To answer this general question we need to carefully reconstruct how the debate started (who were the first to test certain drugs on healthy subjects and for which purposes?) and identify the actors who drove the debate forward. If the answer to the above question is yes (purely for

pragmatic reasons, for example, given that it would be difficult to stop it now), we need to reflect on what we *can* really discuss at the moment without engaging in superficial and biased speculation [49]. Most of the current ethical literature on pharmaceutical cognitive enhancement takes the existence of these drugs for granted (or at least its possibility in the near future) and concentrates on the question of whether there are sound ethical arguments for or against these technologies (cf. [20, 54]). If we wish to take the problems raised in the empirical literature seriously, however, we believe we should proceed in a different direction: first, we argue that the scholars engaged in ethical discourse on pharmaceutical cognitive enhancement have a responsibility to initiate a debate and to contribute to it; they should make proper reference to the results of scientific research and avoid implicit technodeterminism (cf. [55, 60]). Second, ignorance of the empirical literature creates a bias effect when it comes to formulating relevant ethical questions. An improper account of empirical data obtained in both experimental pharmacological research and the social sciences restricts the narrative framework within which the visions of pharmacological cognitive enhancement are conceptualised, because it reifies it as an entity despite the lack of evidence (cf. [54]).

Last but not least, it is important to note that we also know very little about how likely it is that the use of the drugs in question for cognitive enhancement purposes will achieve broad public acceptance. There is some evidence that a large majority of people in the German-speaking part of Switzerland object to such use by healthy people and to the legalisation of such use [50]. While one of the most interesting findings of the above-mentioned German DAK study is that a large percentage of the working population is ready to accept PCE, the “lack of data to inform discussion on cognitive enhancement” (cf. [48]) is still also a problem with regard to the views of the public. Overhasty assumptions concerning public acceptance of HET should be avoided. In fact, we still do not know whether new HET are likely to be broadly accepted or rejected. The scant evidence that we do have (e.g. [33, 48]) suggests that application contexts (health, military and so on) play a central if not decisive role—on the basis of this evidence, however, it is not even clear whether issues of equity and equal access or worries that scientists may ‘play God’ with HET rank higher among the concerns of the public. The studies also

reveal the relevance of national factors (in this case the US) and corroborate a very common finding of surveys and similar research on the public perception of new and emerging technologies, namely that the views of the public are highly influenced by the general level of trust that citizens have in various players in the science and innovation system (scientists, governments, business enterprises and so on). Thus the ‘discourse of inevitability’ often pursued by proponents of CE is premature and can be dangerous since it undermines the serious discussion of all possible options (cf. [47]).

The Challenges of Visions for Human Enhancement Ethics

The lack of empirically sound results relating to cognitive enhancers should motivate scholars engaged in the ethical debate to pose different questions to those concerning the legitimacy of taking these drugs in the name of free and informed individual choice. If no substances are proven to be efficacious and safe cognitive enhancers, then there is no decision to be taken at the individual consumer level (cf. [19]). Since PCE is genuinely a vision rather than an existing technology, we should move from questions about the implications of the substances to (a) questions about the political and economic decisions needed to turn these visions into reality, if these visions are welcome, and (b) questions about the motives and diagnoses which today are fuelling the ongoing and lively debate on HE.

Human enhancement provides both a goal for research and a vision of the future [14]. Properly speaking, there are no specific HE technologies, since potentially any technology which can be useful for this goal and this vision is automatically a HE technology. This makes ethical discourse in this field very complicated, since the use of pharmaceutical substances for cognitive enhancement can raise very different questions than, for example, those concerning cosmetic surgery or brain-computer interfaces. This difficulty, which is visible in almost every single publication on this topic, is connected with the debate on the definition of enhancement: the volatility of the idea of enhancement and of the conception of a technological complex—defined around a goal rather than a proper set of technologies—is a challenge for the ethical

debate. Since ethical discourse on HE takes the form of discourse on *technological visions*, it is constitutively characterised by its relation to a distant future.

Questions of acceptability thus acquire a predominant role in current ethical discourse on emerging technologies. This framework contains a reference to positive potentiality (a technology has the potential to be accepted because it is good for people and because it offers a positive balance of risks and benefits) and to reasonability (a technological product can provide a reasonable solution to certain problems in anticipated yet reasonably possible situations) (cf. [62])

In the current debate, some authors have proposed moving away from the framework of acceptability to one of *desirability*. This implies distancing oneself from the actual existence of certain desires in society and asking which desires are based on good motives (cf. [26]) and how they are attached to particular technological visions [28]. Any genuine ethical reflection on HE technologies should explicitly acknowledge that it constitutes discourse on visions of technological development, rather than concentrating on the novelty of ethical conflicts raised by these visions (cf. [81]). What is at stake in this discussion are the *values which drive forward the technological development* or, more precisely, the *desirability of these values*, regardless of whether these values already exist or indeed even constitute the *status quo*: this is, in a sense, a banal truth, precisely because of the way technological development is embedded in society. A genuine ethical reflection should not refrain from asking fundamental questions about the normative framework in which visions grow and develop, as it would otherwise be destined always to come too late, i.e. only once technologies have been already developed.

Returning to our particular case of pharmacological cognitive enhancement, it is precisely the question of social desirability that should be framed differently to the way it has been up until now. Rather than merely engaging in often very general and abstract discussions about whether pharmacological cognitive enhancement will cause social injustice and whether it will be detrimental to human nature and devalue our appreciation of efforts (cf., among others, [10, 17, 69, 71]), we need to reflect deeply on not only the different ethical methods of engaging with foresight studies (cf. [9]) but also on the question of what these *future visions* mean for our *present*. Visions do not exist per

se, they are not discovered and they do not arise of their own accord; they are “made”. Stories of the future such as HE visions are construed, modified, developed and communicated by particular persons and groups (see [30] for examples of energy futures). Visions are deeply related to the attitudes, knowledge, perceptions, values, world views and interests of their authors and disseminators. The authors are part of a specific culture and a specific society at a concrete point of time in history. They also cannot break out of the present, always shaping the futures they tell us about on the basis of *present* knowledge, *present* estimates of relevance, *present* values and *present* worldviews. Visions are thus always contemporary and change with the changes in each present.

Assuming one wishes to take this—somewhat banal but often ignored—diagnosis seriously, one really interesting point would be to ask about the motives, worldviews and values behind the current wave of HE visions and to confront them with the actual state of empirical knowledge available (“[The Debate on Speculative Ethics](#)”). Given for example that the empirical evidence of pharmaceutical cognitive enhancement is scarce, any ethical analysis should focus on the social, economic and political imaginaries which accompany the evaluation of drugs and the criteria for the allocation of resources in medical research *nowadays*. This includes (1) focusing on the current criteria for research funding in this field, (2) looking at the current regulatory system with a view to possibly integrating HE technologies, and (3) asking about possible deeper-lying societal attitudes and perceptions behind the debate on cognitive enhancement.

- (1) We believe it is important to reflect on current criteria used to justify the investment of social and financial resources in particular kinds of research on enhancement. In order to answer this question, we need not only to explore the motives behind the willingness to increase cognitive properties in particular contexts, but also to link these motives with the specificity of the possible effects obtainable from pharmaceutical substances. This is very important to acknowledge, since pharmaceutical substances which produce effects will always show side-effects in complex systems like the brain, which are still far from fully understood. There is a conflict between the calls of

several groups of researchers for us to proceed along the path towards cognitive enhancement (“Ethical Reflection on New and Emerging Technologies”) and our present body of knowledge concerning cognitive enhancers (“The Debate on Speculative Ethics”). This conflict should either give rise to calls for extensive research funding on cognitive enhancers or should question the intensity of the debate.

- (2) It also seems important to raise the question of whether we wish to change our current regulatory system in clinical research. As recent analysis has shown [70], current regulatory systems are not compatible with the intentional integration of cognitive enhancement. The debate on pharmacological cognitive enhancement could, for example, gain much from the discussion of policies for regulating (illegal) drugs: it could prove fruitful to compare not only the motives and values behind the individual use of illicit substances and possible cognitive enhancers but also the social motives which justify prohibitionist or non-prohibitionist drug policies. These questions could even be helpful when it comes to shedding new light on current regulatory frameworks and policies for existing technologies or substances. Sport could be an interesting model, as much has been learnt in this field about the distinction between permitted forms of enhancement—such as training and the use of technical support—and illegal enhancers such as drugs (doping) [70].
- (3) A third issue concerns possibly underlying aspects of the debate which are more difficult to uncover. Protagonists of HE regularly argue according to a libertarian perspective: “A more mundane vision in a similar vein, presents us with a society in which “morphological freedom” and “cognitive liberty” are core values (...). “In such a society, every individual would have the right to treat his or her own body as fully malleable object” ([13], p. 44). While this position is, in a sense, ‘politically correct’ and consistent with the principle of informed consent in medical ethics, it seems to be biased by restricting the argument to the individual level and refraining from taking the surrounding societal dimension into account. The libertarian argument regards individual persons as monads who are free to make decisions on their own. It is not

only the authors of visions and other types of futures who are bound to a specific point of time and development in history and to the particular values and worldviews of that time, however—this situation is common to all of us, and indeed to individuals who have to decide whether to take cognitive enhancers or not. Thus we could ask what can be learned from the fact that the emergence of an attractive world market for enhancement technologies and procedures has already been predicted. What do the (admittedly preliminary) results of social science research concerning the public acceptance of cognitive enhancers tell us about today’s society and perceptions and about the concerns of people living today? The question of social diagnosis is whether we find ourselves at the point of transition from a performance-oriented capitalist achievement society to a performance-enhancing one. In such an ‘enhancement society’ [13], one of the most pressing tasks for individuals will be the competitive improvement of bodily preconditions and requirements for successful performance.

The changes in the world of employment and the increasing competition at the global level have presumably increased the pressure on individuals. It often no longer appears to be sufficient for an individual to produce the expected performance in a context defined by salaried employment. More and more people feel compelled always to improve their performance in an increasingly flexible labour market. Technical and particularly cognitive enhancements could help individuals to prepare themselves for even tougher global competition. For many people, strengthening their own abilities is the overriding priority [81]. Individual actors are part of a society in which competition is the prime driver of development. We live in a world of rankings and ratings and constant evaluations, in which we need to present ourselves and beat our competitors, whether at work, in our love lives or during an evening TV game show. Whether we want to become the next top model or use some crazy idea to get onto the news or into the Guinness Book of Records, competition is ubiquitous, and competitiveness is measured by such abilities. Competition and abilities are inextricably linked and thus, in the dynamics of development, so too is the *improvement*

of abilities, because any success in any competition last only for a finite period of time and is constantly threatened by the possibility that others might catch up or pull ahead. Thus the notions of competition and human technical enhancement are likewise inextricably linked [31]. If this link could be confirmed—and there are some arguments to support it—this would say something about the location and direction of the social debate that would have to be conducted concerning this situation and about the corresponding social sciences research required. It would then not simply be about ethical issues at the individual level, which could be answered in one direction or another, but also about the form of society in which we live and about its implications. Taking this turn seriously, the radical libertarian focus on individual freedom of choice might be proven ideology.

Conclusions

Ethical reflection on technological visions could therefore be useful in re-framing certain issues: those who argue in favour of liberalising pharmaceutical cognitive enhancers, for example, would do better to ask whether we as a society are ready to accept the consumption of pharmaceutical substances whose effects have not been fully tested (and, if so, why we are prepared to accept lower safety standards for enhancers in healthy subjects than in established standards for therapeutic uses on patients), rather than whether banning these enhancers is compatible with our respect for autonomy (cf. [19]). In the debate on cognitive enhancement, the motives behind the wish to improve specific cognitive abilities and the reasons which make this wish desirable in which type of society need to be analysed. In a society dominated by competitiveness, for example, it is clear that improved cognition will be perceived and evaluated differently than in a society where greater value is attached to solidarity.

An analysis of normative issues connected to technological visions in the field of cognitive enhancement and HE in general therefore needs not only to inquire about the scientific plausibility of technology assessment, but also to embed the question of desirability and acceptability of HE technologies into a broader perspective on social development. In other words, an ethical analysis of visions should not function as an ethical assessment of the general conditions for and

against a particular technology: precisely because many visions of human enhancement are technological visions, their normative assessment lies at the interface between individual responses to good life and societal needs and shared values. Technological visions concerning human enhancement are not merely discoveries, but are human projections of desires and aspirations at a particular time in history. In this sense, an STS perspective which sheds light on the social contexts of technological visions can be particularly fruitful in the area of philosophical ethics, since it allows us to fully acknowledge cultural contingency and the social construction of technological visions. In ethical analysis, reasons for desirability need to be contextualised in a particular socio-political context rather than investigated solely with regard to their intrinsic value. In addition to ethical reflection, a normative analysis of technological visions therefore needs a vision assessment which reveals more about the authors of HE visions, their motives and worldviews but also about our current societal situation and self-perception. In this way, vision assessment would be an element of enlightenment in the rather traditional sense of making the implicit explicit.

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