

**RECERCA**  
**REVISTA DE PENSAMENT I ANÀLISI**

núm. 13

**RETOS ACTUALES**  
**DE LA NEUROÉTICA**

**CURRENT CHALLENGES**  
**FOR NEUROETHICS**



**UNIVERSITAT**  
**JAUME·I**

**Departament de Filosofia i Sociologia**  
Any 2013

RECERCA. Revista de Pensament i Anàlisi es una publicació anual, realitzada desde el Departament de Filosofia y Sociología de la Universitat Jaume I de Castellón, que aborda desde una perspectiva filosófica y sociológica crítica las principales temáticas que actualmente se están abordando en la comunidad académica. Cada número de RECERCA aborda una temática concreta con la colaboración de destacados investigadores del panorama nacional e internacional. La revista presenta: ensayos de pensamiento y análisis, traducciones críticas y reseñas sobre los libros más actuales en torno a la temática de cada número, siempre desde una perspectiva multidisciplinar. Los trabajos son sometidos a una revisión ciega por pares y pueden estar redactados tanto en español como en catalán o inglés. La nueva época de RECERCA comenzó en el año 2001 con un nuevo impulso que busca la calidad y generar un espacio de difusión y diálogo. RECERCA está indexada en Humanities Source Publications (EBSCO), DOAJ, Philosopher's Index, CINDOC y Latindex.

- Direcció:** Dra. Elsa González Esteban Universitat Jaume I  
Dr. Ramón Andrés Feenstra Universitat Jaume I
- Secretaria tècnica:** Dra. Martha Rodríguez Coronel Universitat Jaume I
- Edició a càrrec de:** Jesús Conill Sancho  
Pedro Jesús Pérez Zafrilla
- Consell redacció:** Antonio Ariño Villaroya, Universitat de València  
Mercedes Alcañiz Moscardó, Universitat Jaume I  
Domingo García Marzá, Universitat Jaume I  
Alfredo Alfageme Chao, Universitat Jaume I  
Salvador Cabedo Manuel, Universitat Jaume I  
José Félix Lozano Aguilar, Universitat Politècnica de València
- Consell assessor:** Sonia Alonso, Social Science Research Center Berlin -wzb-, Alemania  
Fermín Bouza Álvarez, Universidad Complutense de Madrid  
Victoria Camps Cervera, Universitat Autònoma de Barcelona  
Mauricio Correa Casanova, Pontificia Universidad Católica de Chile  
Adela Cortina Orts, Universitat de València  
Paul Dekker, Universiteit van Tilburg, Holanda  
María Das Dores Guerreiro, Instituto Universitário de Lisboa (ISCTE-IUL), Portugal  
Félix Duque Pajuelo, Universidad Autónoma de Madrid  
Joám Evans Pim, Center for Global Nonkilling, Estados Unidos  
José María García Gómez-Heras, Universidad de Salamanca  
Jerry Hoeg, The Pennsylvania State University, Estados Unidos  
John Keane, The University of Sydney, Australia  
Alain Montclair, IUFM Besançon, Université de France  
Eulalia Pérez Sedeño, Universidad del País Vasco  
Juana Sánchez Gey, Universidad Autónoma de Madrid  
Vicente Sanfélix Vidarte, Universitat de València  
José María Tortosa Blasco, Universitat d'Alacant  
Ciprian Valcan, Tibiscus University Timisoara, Rumanía  
Sonia Reverter Bañón, Universitat Jaume I  
Delamar José Volpato Dutra, Universidade Federal de Santa Catarina, Brasil

Aquest monogràfic ha rebut el suport del Pla Estratègic 2013 del Departament de Filosofia i Sociologia.

© Del text: els autors i les autores, 2013

© De la present edició: Publicacions de la Universitat Jaume I, 2013

Edita: Publicacions de la Universitat Jaume I. Servei de Comunicació i Publicacions.

Campus del Riu Sec. Edifici Rectorat i Serveis Centrals. 12071 Castelló de la Plana

Fax 964 72 88 32 <http://www.tenda.uji.es> - e-mail: [publicacions@uji.es](mailto:publicacions@uji.es)

ISSN: 1130-6149 - Dipòsit Legal: CS-301-1992

DOI Número Revista: <http://dx.doi.org/10.6035/Recerca.2013.13>

DOI Revista: <http://dx.doi.org/10.6035/Recerca>

<http://www.e-revistetes.uji.es/index.php/recerca>



Cap part d'aquesta publicació, incloent-hi el disseny de la coberta, no pot ser reproduïda, emmagatzemada, ni transmesa de cap manera, ni per cap mitjà (elèctric, químic, mecànic, òptic, de gravació o bé fotocòpia) sense autorització prèvia de la marca editorial.

# ÍNDIX

## Introducció

<b>RETOS ACTUALES DE LA NEUROÉTICA</b> <i>DESDE LA FILOSOFÍA PARA LA PAZ</i> .....	5
JESÚS CONILL SANCHO Y PEDRO JESÚS PÉREZ ZAFRILLA	

## Articles

<b>SPECULATION AND JUSTIFICATION IN POLICY-MAKING ON NEUROENHANCEMENT</b> <i>ESPECULACIÓN Y JUSTIFICACIÓN EN LA ELABORACIÓN DE POLÍTICAS SOBRE NEUROENHANCEMENT</i> .....	11
STEFAN SCHLAG	

<b>ON THE NORMATIVE IMPLICATIONS OF SOCIAL NEUROSCIENCE</b> <i>SOBRE LAS IMPLICACIONES NORMATIVAS DE LA NEUROCIENCIA SOCIAL</i> .....	29
ARLEEN SALLES	

<b>LECTURA DE LA MENTE. UNA PERSPECTIVA NEUROFILOSÓFICA</b> <i>MIND READING: A NEUROPHILOSOPHICAL PERSPECTIVE</i> .....	43
KATHINKA EVERS Y MARIANO SIGMAN	

<b>EPISTEMOLOGICAL AND ANTHROPOLOGICAL THOUGHTS ON NEUROPHILOSOPHY: AN INITIAL FRAMEWORK</b> <i>REFLEXIONES EPISTEMOLÓGICAS Y ANTROPOLÓGICAS SOBRE NEUROFILOSOFÍA: UN MARCO INICIAL</i> .....	63
SONIA PARÍS ALBERT E IRENE COMINS MINGOL	

<b>CRÍTICAS Y ORIENTACIONES PARA EL ESTUDIO EN NEUROÉTICA</b> <i>REVIEWS AND GUIDANCES FOR STUDY IN NEUROETHICS</i> .....	85
DANIEL VICENTE PALLARÉS DOMÍNGUEZ	

<b>EN BUSCA DE UN FUNDAMENTO CRÍTICO Y SOCIAL DE LA MORAL DESDE UNA PERSPECTIVA NEUROCIENTÍFICA</b> <i>IN SEARCH OF A CRITICAL AND SOCIAL FOUNDATION OF MORAL FROM A NEUROSCIENTIFIC APPROACH</i> .....	103
EDGAR STRAEHLE PORRAS	

<b>TRANSHUMANISTAS Y BIOCONSERVADORES EN TORNO AL DOPAJE GENÉTICO</b> <i>TRANSHUMANISTS AND BIOCONSERVATIVES ON GENE DOPING</i> .....	121
RAÚL FRANCISCO SEBASTIÁN Y VÍCTOR PÁRAMO VALERO	

<b>LA REPUGNANCIA: DE REACCIÓN FISIOLÓGICA A EMOCIÓN POLÍTICA</b> <i>DISGUST: FROM PHYSIOLOGICAL REACTION TO POLITICAL EMOTION</i> .....	137
MARTA GIL BLASCO	

<b>NEUROETHICS AND SPANISH LITERARY RESPONSES TO LA CRISIS</b> <i>LA NEUROÉTICA Y LA RESPUESTA LITERARIA ESPAÑOLA A LA CRISIS</i> .....	153
JERRY HOEG	

<b>RETHINKING DEMOCRACY, RETHINKING STATE: A CONSERVATION WITH ZYGMUNT BAUMAN</b> <i>REPENSANDO LA DEMOCRACIA, REPENSANDO EL ESTADO: UNA CONVERSACIÓN CON ZYGMUNT BAUMAN</i> .....	171
VICENTE ORDÓÑEZ Y VICENTE SANZ	

### **Ressenyes de llibres**

Adela Cortina, <i>Neuroética y Neuropolítica. Sugerencias para la educación moral</i> (Daniel Vicente Pallarés Domínguez).....	183
Kathinka Evers, <i>Neuroética. Cuando la materia se despierta</i> (Martha M. Rodríguez Coronel).....	188
Vicent A. Querol Vicente, <i>Las generaciones que llegaron tarde. Análisis de las prácticas sociales de los mayores en el ciberespacio</i> (David Muñoz Rodríguez y Emma Gómez Nicolau).....	191

<b>Breus currícula dels autors i les autores</b> .....	195
--	-----

# Speculation and Justification in Policy-Making on Neuroenhancement

*Especulación y justificación en la elaboración de políticas sobre neuroenhancement*

STEFAN SCHLAG

JOHANNES GUTENBERG - UNIVERSIDAD DE MAINZ

---

## Resumen

Los descubrimientos de las neurociencias permiten intervenir en el cerebro humano para mejorar su estado o sus capacidades sin indicación médica. Este fenómeno es conocido como “Neuroenhancement” y está sujeto a un amplio debate ético. Como “Neuroenhancement” es un fenómeno evolutivo, el debate de aspectos éticos está necesariamente orientado al futuro y depende de la información sobre el posible desarrollo de la tecnología y sus consecuencias para la sociedad. Sin embargo, hay que establecer límites para la formulación de previsiones especulativas en argumentos éticos y justificaciones políticas. Propongo distinguir argumentos con tres propósitos distintos: la formación de intuiciones éticas, el reflejo sobre el futuro de la sociedad y justificación de normativas y políticas. Para cada uno de ellos necesitamos estándares adecuados. Es tarea de la filosofía política desarrollar un estándar para los argumentos justificadores.

**Palabras clave:** ética anticipatoria, ética especulativa, formación de políticas, justificación, mejora de capacidades.

## Abstract

Neuroscientific findings allow interventions in the human brain to improve its function or modify mental states even without medical indication. This procedure, termed as neuroenhancement, is subject to a broad ethical debate. As neuroenhancement is an evolving phenomenon, the debate is necessarily future-oriented and highly dependent on information about future developments. It remains an open question to what degree uncertain forecasting or even speculation should be considered in the ethical debate and policy-making. I propose to distinguish between arguments with three different purposes: intuition-forming, self-reflecting and justifying arguments. Adequate standards are required for all kinds of future-oriented arguments. The development of these standards for justifying arguments is a task for political philosophy.

**Keywords:** anticipatory ethics, justification, neuroenhancement, policy-making, speculative ethics.

## Introduction

Many technological developments are of great benefit for humanity. At the same time, they eventually pose serious threats. This ambivalence became apparent in the beginning of the atomic age. Could we have known what terrible effects nuclear fission brought about? Looking backwards, it seems to be an essential challenge for humanity to avoid catastrophes caused by technological developments. However, what the future will bring is a matter of speculation.

Neurosciences are said to be one of the most important technologies at the beginning of the 21<sup>st</sup> century. Equally important is the discipline of neuroethics which reflects on ethical, legal and social issues of neurosciences. Not surprisingly, neuroethics is highly dependent on speculation and a debate about the acceptability of speculation in ethical arguments developed. In this papers I would like to propose a different view on speculation that recognizes the various purposes of arguments in ethical debates.

In a first section, I will give a brief introduction to neuroenhancement, probably the most speculative application of the neurosciences. The second section provides a short overview on the ethical debate concerning neuroenhancement. As a crucial problem for the further development of the debate, the problem of uncertainty is identified. The third section, the discussion of three approaches to this problem will show that they fail to fully consider the specific purposes of speculative arguments. As a remedy, I will propose a distinction of three types of arguments that allow for different degrees of speculation. Concentrating on justifying arguments, I will conclude with some examples to illustrate the relation between speculation and justification, which is essential for policy-making.

## Neuroenhancement<sup>1</sup> on the Way Neurosciences: Therapy and Enhancement

The human brain is in the focus of current research in many different scientific disciplines. They use a variety of approaches to gain a better understanding of the brain. Without doubt, Neuroscientists made ground-breaking discoveries.<sup>2</sup> The exploration of the anatomical structure of the nervous system by Camillo Golgi and Santiago Ramón y Cajal in the 19<sup>th</sup> century was a first important step. They provided the basis of our contemporary understanding of the brain, namely that it is made up of a network of information-processing cells: the neuron theory. In the

---

<sup>1</sup> The concept is used here only for illustrating purposes. I associate no evaluative relevance (cp. Bostrom and Savulescu, 2009: 3). For the general problems of the concept «Enhancement», see Savulescu et al., 2011.

<sup>2</sup> For a brief overview, see Chudler's website <http://faculty.washington.edu/chudler/hist.html#source>.

1960s, Eric Kandel conducted experiments with the sea slug *Aplysia* to explore the mechanisms at work on a cellular level. In the 1970s, imaging techniques as MRT, PET or CT were developed. They allow to examine the structure of the working brain and to identify the areas involved in processing sensory input, motor control and cognitive functions.

The progress of the complementary research on neuronal mechanisms and on the structure of the whole brain encourages some researchers to expect solutions for big mysteries of humanity, for instance the question of free will (Libet et al., 1983) or the problem of consciousness (Crick and Koch, 2003). In contrast, others doubt that neuroscientific methods are appropriate to answer such philosophical questions. Nevertheless, the great potential of the neurosciences beyond these questions fundamental for human existence is undisputed. Insight into the central human organ and connected mental phenomena promises great benefit. Applications of neuroscientific knowledge have been successful, above all in medicine. The understanding of the brain as a whole including its anatomical structure, its cellular mechanisms and mental functions allows the diagnosis of diseases and is also the basis for attempts to actively intervene in the brain to influence its function. The aim is, if diseases cannot be cured, at least to alleviate symptoms. For example, antipsychotic drugs are used to treat depression, and deep brain stimulation reduces symptoms of Parkinson's disease.

Beyond that, insight into functions of our brain and related mental phenomena attracts interest also in non-medical areas. A couple of scientific disciplines try to figure out how neuroscientific findings are connected to their fundamentals and what implications these findings could have for their own work (e.g. neuroeconomics, neurolaw). The findings are also used to make processes in everyday-life more successful. The setting of situations can be modified to make them more brain-friendly what facilitates or directs acting in these situations (e.g. neurodidactics, neuromarketing).

The systematic design of the environment of the brain is an interesting possibility, but attempts to intervene in the brain in order to improve mental states or processes in healthy individuals go much further. This non-medical use of neuroscientific findings is known as neuroenhancement and has brought about a distinct field of research.<sup>3</sup> To clarify, neuroenhancement is not about the use of some external devices to improve performance (as e.g. magnifying glasses improve vision), but about direct interventions in physiological functions. Neuroenhancement is neither about interventions for medical purposes (as e.g. visual prosthesis restore vision), but about interventions to improve states or functions above the «normal» level of

---

<sup>3</sup> In the field of neuroenhancement, the neurosciences are only one branch of the converging technologies nanotechnology, biotechnology, information technology and cognitive sciences, which all contribute to possibilities of human enhancement (Roco and Bainbridge, 2002).

healthy individuals. The idea of enhancement is known, for instance, from doping in sports to increase physical performance or from cosmetic surgery to change physical appearance with regards to aesthetics. The neurosciences allow for similar interventions in the nervous system, particularly in the human brain. This is not due to research specifically aiming at enhancement. Findings of basic research in neurosciences and their medical applications have given rise to general neuro-techniques not limited to medical use but applicable for neuroenhancement as well.

### Areas of Application and Methods

Possible areas of application of neuro-techniques for enhancement are four different kinds of mental states or capacities: emotional states, motivational states, moral capacities and cognitive capacities. Enhancing emotional states, the attempt to improve mental well-being, is adequately described by the idiomatic title of Elliott's *Better Than Well: American Medicine Meets the American Dream*. Motivational states determine our capacity of goal-directed behaviour. Moral capacities are such as moral judgement or social awareness. Among the cognitive capacities are alertness, attention, reaction time, memory, concentration or executive functions like planning, decision-making and behaviour control.<sup>4</sup>

The currently discussed methods of enhancement are equally diverse: prenatal or postnatal genetic modifications, various technical implants (e.g. deep brain stimulation, brain-computer-interfaces) and psychotropic drugs are all said to possibly have enhancement effects. Most prominent are stimulants such as amphetamine (known as Adderall<sup>®</sup>, Dexedrine<sup>®</sup>, and as the recreational drug Speed), methylphenidate (known as ADHD-medication Ritalin<sup>®</sup> or Concerta<sup>®</sup>), modafinil (known as narcolepsy-treatment Vigil<sup>®</sup>) and caffeine; the antidepressant fluoxetine (known as Prozac<sup>®</sup>) and the antedementia agents donepezil or memantine.

### Current Prevalence

The methods differ in the extent to which they are currently used for enhancement, respectively in the likelihood of their use in the future. In this regard, the psychotropic drugs mentioned above have a special status. Firstly, they are based on well-known technologies with a long history of application.<sup>5</sup> Secondly,

<sup>4</sup> The boundaries between these four areas are blurred. For instance, moral capacities require cognitive capacities like judgement and include moral sentiments like shame (Metzinger and Hildt, 2011: 257).

<sup>5</sup> Examples for early psychopharmacological enhancement are the distribution of methamphetamine (Pervitin<sup>®</sup>) during the Second World War or the use of Fenethylamine (Captagon<sup>®</sup>) by students in the 1970s.



these drugs have been approved for the treatment of diseases in many countries and are thus in principle available on the market. Thirdly, they are relatively cheap and easily applicable without the need for any technical devices, laboratories or surgery. As a consequence, pharmacological neuroenhancement is the only type of neuroenhancement pursued to a small but still observable degree. Newer studies with pupils and students in Germany report prevalence rates for the enhancement-use of psychotropic drugs between 1.5% and 5% (Franke et al., 2011: 62; Middendorff et al., 2012: 13). However, the number of potential users is much higher. Studies report that between 30% and 80% of the interviewed persons consider psychopharmacological enhancement as an option (Middendorff et al., 2012: 12; Franke et al., 2012: 51).<sup>6</sup> The other methods mentioned above are used in medical contexts but are not yet ready for enhancement-use (e.g. deep brain stimulation). Still, other methods could prove their potential only in animal experiments or are mere theoretical considerations (e.g. radical genetic modifications of the human brain or the creation of completely new capacities).

To conclude with the merely technical background for the further discussion, I want to point out that the many forms of neuroenhancement are situated between societal reality and science fiction. As an evolving phenomenon, neuroenhancement is worth further analysis.

## **The Ethical Debate about Neuroenhancement**

### **The State of the Debate in Neuroethics**

Ethical, legal and social issues related to neuroenhancement together with ethical questions concerning other medical and non-medical applications of the neurosciences are discussed under the label of neuroethics.<sup>7</sup> The initial phase of the debate about neuroenhancement was concerned with identifying general ethical problems and outlining possible arguments for and against neuroenhancement (Chatterjee, 2004; Farah et al., 2004; PCBE, 2003). Now, in a second phase, these arguments are subject to more in-depth analysis, criticism and completion with empirical data (Schöne-Seiffert, 2009: 349). Biedermann (2010) maps the argumentative landscape as follows:

A first kind of arguments deals with the ethical evaluation of enhancement as such. Some of them relate enhancement to God's work or, in the secular version of the argument, to the natural. They either refuse enhancement as an illegitimate intervention into God's work or into the natural respectively. Or they

---

<sup>6</sup> However, these studies should be interpreted with care. The results depend on study methods including speculative assumptions as will be criticised later.

<sup>7</sup> A second branch of neuroethics deals with the neuroscience of ethics (Cortina, 2011: 39-47).

endorse enhancement because they consider it as human vocation to continue God's creation or as part of human nature to enhance oneself respectively. Other arguments about enhancement as such refer to social conventions and object that enhancement is cheating or contradicts the purpose of medicine.

A second kind of arguments refers to the consequences of neuroenhancement, either for the individual or for the society. Arguments on the individual level cite medical knowledge about possible side-effects, obvious and subtle. Additionally, they consider the philosophical question of what is a good and authentic life. On the societal level, the main issues are freedom (from direct or indirect coercion to use enhancement and freedom to use enhancement autonomously), aspects of justice, equality and fairness in competitive settings (enhancement as a threat to justice and enhancement as a remedy for injustices) (Biedermann, 2010, cp. e.g. Greely 2008; Bostrom and Sandberg, 2009; Metzinger and Hildt, 2011).

The discussion of these numerous and diverse arguments has by no means reached a consensus. The problems require much more ethical discussion and empirical work. Nevertheless, a third phase of the debate is emerging. Recent contributions critically reflect on the debate and suggest future directions of the debate. In the two following sections, I describe two kinds of critique to sketch a problem for the debate about the evolving phenomenon of neuroenhancement.

### *The Next Step: From Ethics to Policies*

The first critique of the enhancementdebate objects generalisations and calls for a careful differentiation and more detailed arguments aiming at specific policies.<sup>8</sup> In their review of the debate, Bostrom and Savulescu (2009) recommend avoiding generalisations in judgements about enhancement. Instead, they suggest the individual and context-sensitive evaluation of different methods and areas of application. This has to include more precise questions about specific policyoptions (Bostrom and Savulescu, 2009: 19). Buchanan (2011) explains convincingly why this is necessary. He asserts that the debate has stalled because of the predominance of arguments aiming at general statements about enhancement. But «being for enhancement or against enhancement makes as little sense as being pro-globalization or anti-globalization» (Buchanan, 2011: 11). The more relevant task is identifying specific problems associated with the complex and unstoppable phenomenon of enhancement and finding practical responses to them (Buchanan, 2011: 11-12).<sup>9</sup> Even if it was possible to morally evaluate enhancement in general, it would remain unclear what the necessary reactions on the societal level are. Enhancement is not only a problem of individual ethics but also of policy-making and institutional

<sup>8</sup> With «policy», I refer to public and private policies on a local, national and global level.

<sup>9</sup> Buchanan himself suggests a new institution as a practical response to the problem of international distributive justice in the field of innovation (Buchanan, 2011: chapter 8).

design. Therefore, enhancement is a task for consumer protection policy, research policy, education policy, health policy and many more.

The second critique objects the empirical backing of many arguments for and against enhancement. Outram (2010) as well as Lucke et al. (2011) argues that prevalence rates and possible effects of current enhancement-methods are being overestimated. Concerning prevalence rates, although studies about non-therapeutic use of pharmaceuticals exist, they do not investigate enhancement-use separately and are sometimes misinterpreted (Lucke et al., 2011: 39). With regard to effectiveness, results of the limited number of laboratory studies do not allow to draw reasonable conclusions for everyday situations (Outram, 2010: 199; Lucke et al., 2011: 40). Based on theoretical considerations about mechanisms responsible for addiction, Heinz et al. (2012) conclude that negative consequences of enhancement are being underestimated in the ethical debate. Without in-depth empirical research, the assumption of safe enhancement-methods remains rather speculative (Heinz et al., 2012: 374). In the light of the limited empirical evidence, Heinz et al. oppose arguments with an «if-then structure» which draw ethical conclusions on the basis of speculative assumptions about safe and effective enhancement-methods (Heinz et al., 2010: 372). That is exactly the argumentative pattern Nordmann (2007) identified in the enhancement-debate concerning possible future technologies. In this case, possible future developments are used to derive calls for attention, ethical conclusions and policy-recommendations. Although these scenarios are not results of scientific forecasting but improbable guesses about future developments, they are treated as if they were real. Nordmann criticises such arguments as «speculative ethics» (Nordmann, 2007: 31). Buchanan (2011) identifies a third kind of speculative assumptions. According to him, assumptions about user's motives and social effects of enhancement are in many cases not supported by empirical evidence but generalising claims (Buchanan, 2011: 9). To sum up, this sort of critique identifies speculative assumptions about current technologies, future developments and their consequences in the enhancement debate. In contrast, the authors call for assumptions that are not merely speculative but supported by empirical evidence. Unfortunately, this empirical evidence is lacking.

### *The Problem of Limited Empirical Evidence in Policy-Making*

Taken together, the two kinds of critique confront the debate about enhancement with a serious problem: How is policy-making based on limited empirical evidence possible?

As a preliminary, one might ask if this is really a problem. In the light of the mentioned arguments about empirical evidence, the need for policy-making may appear questionable. If enhancement is not a mass phenomenon and safe but effective means for enhancement do not exist, calls for action might be dispensable.

However, this consideration fails to fully acknowledge the complexity of the current development. Even though effects of enhancement methods are limited and their use is not widespread, there is a considerably amount of research and development. Depending on the expected consequences of future developments, regulation of research and development needs to be addressed at an early stage. At the same time, a complete ban of specific research on enhancement is very difficult. Firstly, a ban to effectively stop enhancement research requires measures on a global level and is, therefore, highly unlikely (Bostrom, 2007: 139). Secondly, as mentioned earlier, the development of enhancement methods is a by-product of useful basic and medical research (Schermer et al, 2009: 78). Therefore, enhancement, in whatever form, is very likely to progress. That requires societies to think about possible problems and appropriate practical responses in order to make the right decisions (Bostrom, 2007: 131). This central aspect of the enhancement debate is reflected in the reasonable demand for anticipatory ethics and correspondent policies.

Obviously, anticipatory ethics is a complex and demanding enterprise. There are several reasons why it is hard to know what is the right thing to do. But how to proceed? Farah et al. (2004) pointed out early in the debate that sound conclusions require «disentangling moral principle and empirical fact» (Farah et al., 2004: 424). Accordingly, the problem of policy-making on uncertain grounds is twofold. On the one hand, the short introduction to the ethical debate above shows that intuitions about enhancement vary. The ethical problem is to reach a consensus about normative principles. On the other hand, concerning the empirical facts, we are faced with the epistemological «problem of uncertainty» (Brey, 2012: 2). That is, we do not know in advance what technological developments the future will bring and what consequences this will have. Anticipatory ethics, including policy-making, depends heavily on information about future developments and ethical judgements formed on the basis of this information. Several solutions for the problem of uncertainty have been proposed. Three of them, paradigmatic for three basic approaches, will be discussed in the next section.

## **Uncertainty in Anticipatory Ethics**

### **Three Approaches to Uncertainty**

A first approach to deal with uncertainty is accurate forecasting, represented here by Brey's *Anticipatory Technology Ethics* (2012). Brey argues that the problem of uncertainty «can only be overcome through methodologically sound forecasting and future studies» (Brey, 2012: 1). Based on a critical analysis of three contemporary forecasting approaches, Brey establishes his own integrative approach. It is characterised by a distinction of three levels of analysis. The technology as such, artefacts as physical configurations of the technology and applications as particular

uses of artefacts are treated separately. For the technology and the artefact level, Brey suggests an ethical analysis of the inherent character and of possible consequences of the technology, the artefact respectively. In addition, the risk has to be evaluated that a technology results in morally problematic artefacts and that artefacts lead to morally problematic applications. On the application level, the analysis focuses on the morality of possible purposes of the artefact and on side effects of the use of the artefact (Brey, 2012: 8-9). So far, the approach provides a useful heuristic for the analysis and thus meets the requirement mentioned in the first kind of critique above: differentiation and contextualizing. Nevertheless, this is not yet a solution for the problem of uncertainty. To overcome the problem of uncertainty, Brey recommends a mixture of forecasting methods. Depending on the level of analysis, he suggests consultation of engineers, utilization of existing forecasting studies, initiation of expert surveys and roundtable discussion, consideration of policy documents, company studies, academic texts and even science fiction stories (Brey, 2012: 9-10). Brey demands scrutiny regarding feasibility and plausibility of future projections. Nevertheless, he concedes that forecasting is imaginative and speculative and, therefore, will never be exhaustive and sometimes may be wrong (Brey, 2012: 10). Due to this problem, the task of the ethical analysis is not only to identify possible negative impacts of future technologies but also to evaluate the likelihood that these impacts become important for society (Brey, 2012: 11). As a final step, Brey suggests three optional uses for the results of the analysis. Firstly, they can help to guide the development process of future technologies. Secondly, they can be used to assign responsibilities for possible negative impacts to actors in the development process. And thirdly, results of the ethical analysis can be used for policy-recommendations (Brey, 2012: 12). Again, Brey's approach offers a useful overview on forecasting methods and possible uses of their results. Nevertheless, the author offers no solution to the problem of uncertainty. It remains an open question what «methodologically sound forecasting» (Brey, 2012: 1) really is and how exactly future projections can be evaluated. As a consequence, some writers are sceptical about the power of forecasting approaches (e.g. Bostrom, 2007: 150; Hanson, 2011: 138-139).

The two following approaches represent more general options. In his critique of speculative ethics, Nordmann (2007) opposes ethical engagement with human enhancement on uncertain grounds. Imagined possible technological developments and possible harmful consequences do not demand immediate attention (Nordmann, 2007: 32). Instead, Nordmann maintains that scarce ethical resources should be allocated for examining on-going developments (Nordmann, 2007: 34). Refraining from speculation, Nordmann tries to avoid that present ethical issues become «displaced by a perceived need to proactively engage emerging issues» (Nordmann, 2007: 34). His approach can be interpreted as being sceptical about the possibilities

of forecasting and the need for speculation concerning technological developments in human enhancement. Supporting Nordmann's view, Schermer et al. (2009) identify ethical issues concerning psychopharmacological enhancement which are relevant today and require attention. One question is about off-label prescriptions for enhancement purposes by medical doctors (Schermer et al, 2009: 83). Another question concerns regulations of non-prescription use of enhancers (Schermer et al, 2009: 84). Without doubt, this contribution satisfies the demands of the first critique of the debate perfectly. Nevertheless, some of the ethical questions reveal a serious limitation of the approach. In addressing the issue of publically promoting enhancement research, the authors need to refer to possible future developments (Schermer et al., 2009: 80). Policy-making is not possible without considerations of future scenarios. To refrain from any forecast not only contradicts the intention of anticipatory ethics but is impossible.

In opposition to Nordmann's approach, Roache (2008) argues for an unrestricted debate about enhancement, open for speculation beyond current or emerging technologies. She recognises that «any decision about which course of action to take will involve attending to possible scenarios» (Roache 2008: 319). For several reasons, some of these scenarios have to be speculative. Firstly, the ethical evaluation of speculative scenarios is necessary to avoid the waste of scarce scientific resources. Roache gives the example of the development of morally problematic technologies. They can only be stopped by ethically motivated speculation and evaluation before the full emergence of their negative consequences (Roache, 2008: 323). Secondly, Roache points out that the evaluation of possible futures should not be limited to the probability of the scenario. An equally important aspect of the analysis is the possible harm that could be caused. If certain consequences of a technology are unlikely but extremely harmful, it is reasonable to avoid them (Roache, 2008: 323). In addition, speculative future scenarios can motivate technological developments to move in a desirable direction, for example the development of a cure for cancer (Roache, 2008: 323). In the enhancement context, one could argue that moral enhancement, though speculative today, is an equally desirable goal (Persson and Savulescu, 2012). However, should we really prepare for the imaginable worst case and, at the same time, invest in improbable but desirable projects? Roache admits that there are limits to speculation (Roache, 2008: 325). Her point is that being unlikely is not a sufficient reason to ignore possible future scenarios.

The discussion of the three approaches shows that anticipatory ethics bound strictly to scepticism about speculation is not satisfying. On the other hand, unlimited speculation in ethical analysis has its weaknesses. And even integrative

forecasting approaches do not solve the problem.<sup>10</sup> The question remains to which extend speculation is acceptable in anticipatory ethics. I would like to propose a differentiated view on speculation. In my opinion, the general approaches of Nordmann and Roache fail to take into account the different uses of speculation in the neuroenhancement debate. Therefore, I will outline three types of arguments. Although they all have to make assumptions based on imagination, they serve different purposes. As a consequence, they require particular standards of knowledge and therefore speculation is acceptable to different degrees.

### **The Purpose of Speculative Arguments**

The first type of arguments is mentioned by both, Nordmann and Roache. Such arguments «help us to examine our intuitions» (Roache, 2008: 318) or to «discover values that might guide decisions» (Nordmann, 2007: 43). Methodologically motivated, they use «improbable scenarios» (Nordmann, 2007: 42) not «ever likely to happen» (Roache, 2008: 318). This is what is known as thought experiments in philosophy.<sup>11</sup> Nordmann and Roache point out that the question about these hypothetical scenarios is not how likely they are (Nordmann, 2007: 43; Roache, 2008: 318). To be clear, according with Roache, I will call these scenarios hypothetical. They are theoretical assumptions often contradicting current technological possibilities. Disregarding empirical facts, hypothetical scenarios help to clarify normative principles. For the purpose of intuition-forming, there is no need to limit these thoughts.<sup>12</sup> In the enhancement context, some surveys ask for the opinion about enhancers under the condition that they were safe and effective. A proper intention of such surveys is exploring people's intuitions about enhancement. Theoretically excluding limited effects and unavoidable side-effects allows asking for the values people hold beyond realistic cost-benefit-analysis. Surveys of this type should not be used for extrapolations of future prevalence rates. Interpreted correctly, they should not be accused of making false assumptions.

The second type of arguments helps the society to reflect on technological developments and on itself. These arguments are about visions, positive and negative, how society might look like in the future. Imaginative but not predictive, they move on from current technologies to possible developments of technology and possible consequences of current and future technologies. Inevitably, they are

---

<sup>10</sup> Other approaches dealing with uncertainty are less prominent and less elaborated. For instance, Bostrom mentions the possibility to «resort to courses of action that will do reasonably well independently of the details of how things turn out» (Bostrom 2007: 36). Unfortunately, he gives no examples.

<sup>11</sup> Nagel's brain in a vat (Nordmann, 2007: 42) and Parfit's divided mind (Roache, 2008: 317) are examples.

<sup>12</sup> Intuition-forming should not rely exclusively on thought experiments because they can serve as misleading intuition pumps (cp. Dennett, 1995).

speculative in the sense that, however improbable the scenarios are, there is a chance that they become true. However, no claims about the likelihood of the scenarios are needed. Arguments of this type can have the positive effects mentioned by Roache. Being future-oriented, imaginative and speculative, they widen the horizon to either identify possibly harmful developments or motivate ethical projects. In this sense, even Nordmann seems to accept such arguments as long as they provide «a backdrop for society to reflect upon itself» (Nordmann, 2007: 43). In the enhancement debate, most arguments about new enhancement methods and possible consequences for society are of this type. It is important to note that they are not identical with the first kind of arguments. While the hypothetical scenarios are abstract theoretical constructs used to form intuitions or identify values, speculative scenarios are empirical claims about possible futures which need to be evaluated.

The third kind of arguments is not adequately considered in the approaches of Nordmann and Roache. The purpose of these arguments is the justification of policies. They possess two basic characteristics. First, policies discussed in an enhancement context are aimed at solving problems somehow related to the development and use of enhancement methods. To be effective and enforceable, they have to address the problems implementing specific measures. Relevant arguments, as the first critique mentioned earlier demands, need to be equally specific. Second, policies concerning enhancement will to some extent restrict individual freedom (e.g. of users, physicians, manufacturers, distributors, researchers, tax-payers). Therefore, arguments need to give sufficiently compelling reasons to justify the restrictions of freedom. The justifying power of arguments depends on the strength of normative assumptions and on the quality of empirical assumptions.<sup>13</sup> The last point renders the status of speculative arguments for justification highly problematic. In the enhancement debate, arguments ending with policy recommendations are possibly of this type and have to be subjected to scrutiny. However, not all closing statements of general character should be misinterpreted as serious specific conclusions. Ironically, one of the major problems of the debate is the lack of these specific, problem-solving policy recommendations.

By distinguishing purposes of arguments, I have to admit, the problem of uncertainty is not solved. However, the distinction clarifies the need for different kinds of epistemological standards in the enhancement debate. The development of these standards for arguments of justification and the evaluation of arguments in the light of these standards is a challenge for political philosophy. Even though the acceptability of knowledge for justifications is ultimately a political decision, political philosophy can guide necessary deliberations. The debate about enhancement is not only a topic for ethics and technology assessment, political philosophy can contribute substantially.

---

<sup>13</sup> This point has not been elaborated in the enhancement debate. Nevertheless, some authors allude to this basic requirement (e.g. Greely et al., 2008: 704; Metzinger and Hildt, 2011: 259).



## Speculation and Justification

To conclude, I would like to propose a couple of examples which might serve as a starting point for the development of a more comprehensive framework for the justification of policies concerning neuroenhancement. They are based on a speculative scenario: *A society conducts neuroscientific research that might lead to the development of a powerful and acceptably safe enhancing drug. One day, the drug might be widely used in the society. That possibly leads to several consequences for the society, which might be evaluated positively or negatively. For instance, only to allude to the most common arguments in the debate, non-users might feel pressured to use the drug against their will; the eventually high price of the drug might lead to an undesired stratification of the society; in contrast, a low price and specific patterns of action might help levelling the playing field in competitive situations.*<sup>14</sup> Of course, in the extensive literature about enhancement no similarly simplified scenario can be found. The abstraction is exaggerated for illustrating purposes only. While such scenarios are perfectly possible and might serve to motivate further thinking, it is questionable to what extent they can justify policies. Every single sentence includes speculation about future developments.

If the possible consequences are evaluated extremely negative, can this justify a ban of the research on the technology? Apart from the arguments against the feasibility of such a ban, a general research-banning policy does not directly aim to solve a problem caused by the consequences of possible technologies. Not being specific enough, the policy rules out all possible outcomes of the research in question, negative and positive. As long as the likelihood of positive and negative consequences cannot be compared on scientific grounds, mere speculation should not be decisive. On the other hand, a ban of research is an extensive restriction of freedom applying to all researches for sure. It has to be weighed against the many «mights» in the scenario. In contrast, a ban of an application of the technology (in Brey's terminology) can be more specific. Suitable problem-oriented policies are limited to specific contexts. They limit freedom not in general but only in these contexts. Therefore, they seem to be easier to justify even if they are equally speculative.

What can be done if speculation does not allow for a justification of strict policies? One example among the unlimited policy-options is monitoring. Whereas speculations about positive or negative consequences cannot be compared scientifically, it can be monitored whether they arise. Do people increasingly feel pressured to use enhancement drugs? Do usage patterns indicate significant differences between the rich and the poor? These questions can be examined with resources increasing as results confirm speculation. Monitoring, even if it

---

<sup>14</sup> Compare e.g. Greely et al., 2008.

is mandatory for drug manufacturers, schools or other organisations, is far not as restrictive as a ban. It is supposedly easier to justify although it is based on a highly speculative scenario. Thereby, monitoring fulfils exactly one of the functions Roache ascribes to speculative ethics: the motivation of ethical projects. It cannot be settled here whether monitoring is a squandering of scarce resources in the sense of Nordmann.

An option aiming at positive consequences of enhancement is research funding. Can speculative benefits from future enhancement technologies justify the allocation of scarce research resources especially to enhancement projects? In the light of possible adverse effects of the very same enhancement methods to be developed, the problem is that funding supports all possible outcomes of the research, negative and positive. Again, speculative assumptions should not be decisive. Basic medical research is an alternative where expected benefits, however improbable they may seem, outweigh possible harmful consequences.

## Conclusion

Basic neuroscientific research and medical applications are the source of general neuro-techniques. These are applicable for enhancement purposes as well. Neuro-ethicists discuss a variety of ethical legal and social issues. Recent criticism of the debate shows the need for more concrete, policy-oriented discussion. At the same time, much information needed for policy-making is lacking. Policy-making on uncertain grounds is a serious problem. This article reviewed three approaches trying to solve the problem of uncertainty: forecasting, abstinence and speculation. The discussion showed that none of the three general approaches satisfies the needs of anticipatory ethics concerning neuroenhancement. We need to know how neurosciences and their applications for enhancement could change our society and how we want to react. Nevertheless, the central question remains unanswered: to what extend is speculation in anticipatory ethics and policy-making acceptable? As a first step to a solution, I proposed a differentiated view on speculation. Central for this perspective is a distinction between three different purposes of arguments in the enhancement debate: intuition-forming, self-reflection and justification. Speculative scenarios are used differently in these arguments. It becomes clear, that it is not necessary to rule out speculative scenarios completely. Neither is it necessary to endorse all speculative scenarios. It is important to draw the right conclusions depending on the purpose of the argument.

With respect to the normative dimension, we need to form our moral intuitions. Unrestricted hypothetical scenarios in the sense of thought-experiments can help. In addition, we need to know about and prepare for possible harmful or benefiting

technologies and their consequences. Imaginative speculative scenarios help the society to reflect on possible developments in the future. Finally, we need to take specific measures to manage the development. But the argumentative justification of these freedom-restricting policies is demanding. That requires moral consensus and empirical information about the future. Consequently, a major challenge for the debate about neuroenhancement is the question how policies can be justified on the basis of speculative information about the future. Apparently, we need both, sound justification and speculation. It is a task for political philosophy in the debate about problems of enhancement to develop standards for the acceptability of speculative scenarios in justifying arguments. A comprehensive framework has to distinguish and to describe policy-options in order to explain what degree of speculation is acceptable for the justification of these options.

## Literature

- BIEDERMANN, F. (2010): «Argumente für und wider das Cognitive Enhancement», *Ethik in der Medizin*, 22 (4), pp. 317-329. [DOI: <http://dx.doi.org/10.1007/s00481-010-0070-3>].
- BOSTROM, N. (2007): «Technological Revolutions: Ethics and Policy in the Dark» in MITCHELL, M.E. and CAMERON, N. (ed.) *Nanoscale. Issues and Perspectives for the Nano Century*. Hoboken, N.J. John Wiley, pp. 129-152.
- BOSTROM, N. and SANDBERG, A. (2009): «Cognitive Enhancement: Methods, Ethics, Regulatory Challenges», *Science and Engineering Ethics*, 15 (3), pp. 311-341. [DOI: <http://dx.doi.org/10.1007/s11948-009-9142-5>].
- BOSTROM, N. and SAVULESCU, J. (2010): «Human Enhancement Ethics: The State of the Debate» in SAVULESCU, J. (ed.): *Human Enhancement*. Oxford, Oxford University Press, pp. 1-22.
- BREY, P.A. E. (2012): «Anticipatory Ethics for Emerging Technologies», *Nanoethics*, 6 (1), pp. 1-13. [DOI: <http://dx.doi.org/10.1007/s11569-012-0141-7>].
- BUCHANAN, A.E. (2011): *Beyond Humanity? The Ethics of Biomedical Enhancement*. Oxford, Oxford University Press.
- CHATTERJEE, A (2004): «Cosmetic Neurology. The controversy over enhancing movement, mentation, and mood», *Neurology*, 63 (6), pp. 968-974. [DOI: <http://dx.doi.org/10.1212/01.WNL.0000138438.88589.7>].
- CORTINA, A. (2011): *Neuroética y Neuropolítica. Sugerencias para la Educación Moral*. Madrid, Tecnos.
- CRICK, F. and KOCH, C. (2003): «A Framework for Consciousness», *Nature neuroscience*, 6 (2), pp. 119-126.

- DENNETT, D. (1995): «Intuition Pumps» in BROCKMANN, J. (ed.): *The Third Culture*. New York, Simon & Schuster, pp. 181-197.
- FARAH, M.J. et al. (2004): «Neurocognitive enhancement: what can we do and what should we do?», *Nature Reviews Neuroscience*, 5 (5), pp. 421-425. [DOI: <http://dx.doi.org/10.1038/nrn1390>].
- FRANKE, A.G. et al. (2012): «Attitudes Toward Cognitive Enhancement in Users and Nonusers of Stimulants for Cognitive Enhancement: A Pilot Study», *AJOB Primary Research*, 3 (1), pp. 48-57. [DOI: <http://dx.doi.org/10.1080/21507716.2011.608411>].
- FRANKE, A.G. et al. (2011): «Non-Medical Use of Prescription Stimulants and Illicit Use of Stimulants for Cognitive Enhancement in Pupils and Students in Germany», *Pharmacopsychiatry*, 44 (2), pp. 60-66. [DOI: <http://dx.doi.org/10.1055/s-0030-1268417>].
- GREELY, H. et al. (2008): «Towards responsible use of cognitive-enhancing drugs by the healthy», *Nature*, 456 (7223), pp. 702-705. [DOI: <http://dx.doi.org/10.1038/456702a>].
- HANSSON, S.O. (2011): «Coping with the Unpredictable Effects of Future Technologies», *Philosophy & Technology*, 24 (2), pp. 137-149. [DOI: <http://dx.doi.org/10.1007/s13347-011-0014-y>].
- HEINZ, A. et al. (2012): «Cognitive neuroenhancement: false assumptions in the ethical debate», *Journal of Medical Ethics*, 38 (6), pp. 372-375.
- LIBET, B. et al. (1983): «Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential). The unconscious initiation of a freely voluntary act», *Brain*, 106 (3), pp. 623-642.
- LUCKE, J. et al. (2011): «Deflating the Neuroenhancement Bubble», *AJOB Neuroscience*, 2 (4), pp. 38-43. [DOI: <http://dx.doi.org/10.1080/21507740.2011.611122>].
- METZINGER, T. and HILDT, E. (2011): «Cognitive Enhancement» in ILLES, J. and SAHAKIAN, B. (ed.): *Oxford Handbook of Neuroethics*, Oxford, Oxford University Press, pp. 245-264.
- MIDDENDORFF, E. et al. (2012): *Formen der Stresskompensation und Leistungssteigerung bei Studierenden. HISBUS-Befragung zur Verbreitung und zu Mustern von Hirndoping und Medikamentenmissbrauch*. HIS: Forum Hochschule, 01/2012.
- NORDMANN, A. (2007): «If and Then: A Critique of Speculative NanoEthics», *Nanoethics*, 1 (1), pp. 31-46. [DOI: <http://dx.doi.org/10.1007/s11569-007-0007-6>].
- OUTRAM, S. (2010): «The use of methylphenidate among students: the future of enhancement?», *Journal of Medical Ethics*, 36 (4), pp. 198-202. [DOI: <http://dx.doi.org/10.1136/jme.2009.034421>].
- PERSSON, I. and SAVULESCU, J. (2012): *Unfit for the future. The Need for Moral Enhancement*. Oxford, Oxford University Press.

- PRESIDENT'S COUNCIL ON BIOETHICS (2003): *Beyond Therapy. Biotechnology and the Pursuit of Happiness*. Washington, D.C.
- ROACHE, R. (2008): «Ethics, Speculation, and Values», *Nanoethics*, 2, pp. 317-327. [DOI: <http://dx.doi.org/10.1007/s11569-008-0050-y>].
- ROCO, M.C. and BAINBRIDGE, W. S. (2002): *Converging Technologies for Improving Human Performance*. Arlington, Virginia.
- SAVULESCU, J. et al (2011): «Well-Being and Enhancement» in SAVULESCU, J. et al. (ed.): *Enhancing Human Capacities*. Chichester, Wiley-Blackwell.
- SCHERMER, M. et al. (2009): «The Future of Psychopharmacological Enhancements: Expectations and Policies», *Neuroethics*, 2, pp. 75-87. [DOI: <http://dx.doi.org/10.1007/s12152-009-9032-1>].
- SCHÖNE-SEIFERT, B. (2009): «Neuro-Enhancement: Zündstoff für tiefgehende Kontroversen» in SCHÖNE-SEIFERT, B. (ed.): *Neuro-Enhancement. Ethik vor neuen Herausforderungen*. Paderborn, mentis-Verlag, pp. 347-363.

*Artículo recibido: 25/10/2012*

*Solicitud de revisión: 07/12/2012*

*Artículo aceptado: 09/04/2013*