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Rethinking Cognitive Enhancement

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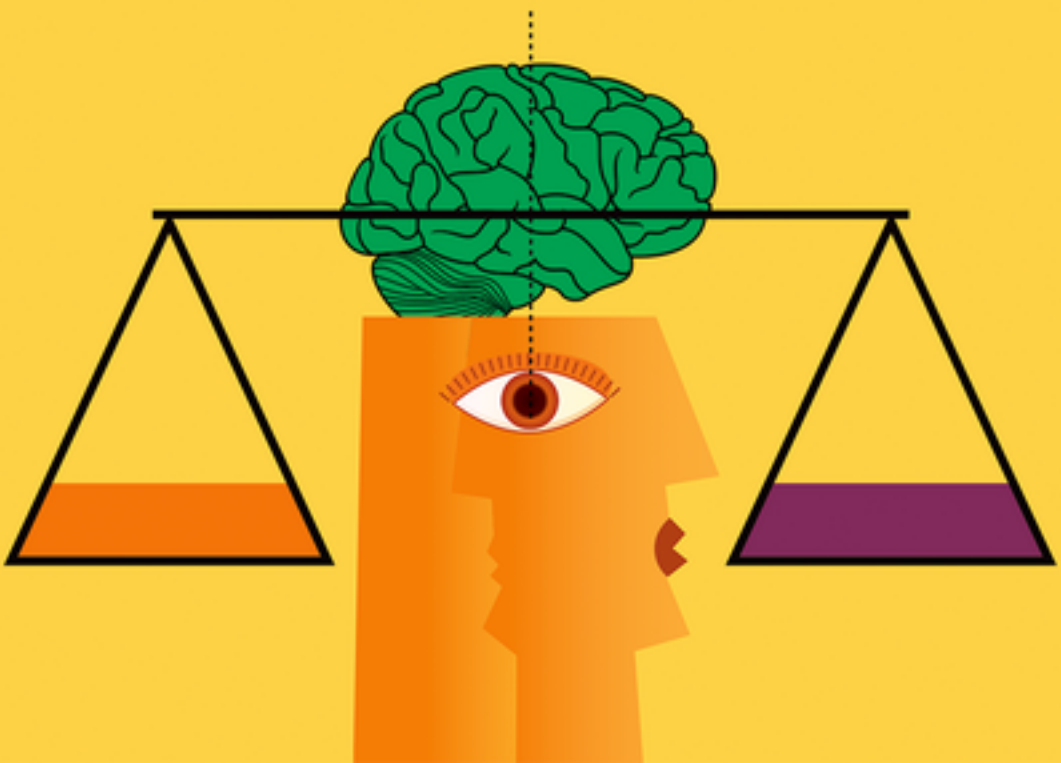

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Edited by

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OXFORD
UNIVERSITY PRESS

OXFORD
UNIVERSITY PRESS
Great Clarendon Street, Oxford, OX2 6DP,
United Kingdom

Impression: 1

Published in the United States of America by Oxford University Press
198 Madison Avenue, New York, NY 10016, United States of America

British Library Cataloguing in Publication Data

Data available

Library of Congress Control Number: 2016960549

ISBN 978–0–19–872739–2

Printed and bound by
CPI Group (UK) Ltd, Croydon, CR0 4YY

Preface

This multidisciplinary volume, including scientific, ethical, and legal perspectives, offers a much needed reality check to the debate on cognitive enhancement. While there may be potential benefits to human enhancement, and to cognitive enhancement in particular, there is a danger of slipping into a way of speaking about it that plays down potential downsides. It may be implied or even asserted that enhancement is inevitable or that it is by definition an improvement. Even if it *is* inevitable, however, that a person or persons will seek to find means of cognitive enhancement, and even succeed in doing so, that by no means settles the ethical, legal, and policy issues. Also, we should beware of making enhancement an improvement by definition. Whether any particular enhancement intervention is an improvement from an ethical point of view is an open question. For whom will it be an improvement and in what way? We have to have regard to the *respects in which* something is enhanced. As papers in this volume make clear, enhancement in one characteristic may result in worse performance in some other characteristic or characteristics: the associated risks need proper assessment and consideration of the extent to which the trade-off is worthwhile.

While these remarks are true of enhancement in general, where cognitive enhancement is concerned, there are specific issues to consider. On the plus side it might be thought that cognitive capacities are good for whatever life plan an individual might want to follow. Surely, it might be argued, greater cognitive capacities are associated with increased probability of a successful career and all the benefits that flow from that, although it is true that they do not guarantee happiness or well-being. Again, some people may argue that we cannot, and do not think we should, avoid affecting our cognitive capacities by education and other means such as meditation. Contemporary interest in practices such as mindfulness and their effects on neuroplasticity is increasing. On the other hand, there has been concern among paediatricians that some activities which people currently do without a thought may affect our brains in a deleterious way, such as too much passive consumption of screen time, especially in very young children. Given these facts, then why should there be anything wrong with choosing to enhance our cognitive capacities deliberately and in a targeted way, using pharmaceuticals and/or other technologies?

First, however, we need to have regard to what exactly is envisaged in cognitive enhancement, as this volume makes clear: how are we to understand the concept of cognitive enhancement, precisely which characteristics of the brain are to be enhanced and by what methods? Different technologies, including pharmaceutical products, brain stimulation, and genetic technologies, are all candidates, and each of these has associated safety, ethical, and regulatory issues. The fact that manipulation of the brain is involved gives rise

to multiple concerns discussed in this collection, including scientific evidence about the significance, in terms of effectiveness, of the baseline cognitive potential in an individual prior to an intervention; safety concerns about possible side effects such as addiction, especially but not exclusively in relation to drugs; philosophical questions about identity and disability; and ethical worries about the space for authentic autonomous choice. The inclusion of the legal dimension in this volume is particularly refreshing, as the potential implications of cognitive enhancement for professional responsibility and the laws of tort, and for other areas of law such as product liability, could be considerable.

So the issues about when, how, and where cognitive enhancement should be introduced require considered thought, and input from different disciplines, in order to address the pertinent questions. In particular what needs to be asked includes the following: What are the purposes of any given enhancement intervention? Is there a moral difference between introducing a cognitive change as a remedial measure as opposed to enhancing someone who already has high cognitive capacity, perhaps even beyond the current limits of human cognition? Among other dimensions to this issue which have been given perhaps less attention elsewhere, the question of potential biological constraints, relating to the way in which the human mind has evolved, is considered in this volume.

Given the importance of the human brain to human identity, the current stage of research into its complexity, and the uncertainty about consequences of some of the enhancement interventions envisaged, it is very timely to have a note of caution injected into the debate, in order to facilitate the introduction of any potential future programmes of intervention in accordance with scientific, ethical, and policy considerations which are in turn informed by rigorous academic debate. This is to be welcomed in this collection.

Ruth Chadwick
University of Manchester

Editorial

This book came about because of unease of the editors, and of many of their colleagues, with the current debate on the possibilities of human enhancement by the use of pharmacological drugs or other technologies impacting on the brain. They felt that the optimistic view of human cognitive enhancement as presented in the bioethics and transhumanist publications was not matched by evidence in the neurosciences about what these drugs could accomplish, and did not consider their harmful effects, including addiction and dangerous overconfidence. Moreover, they were not happy about the way critical views from the field of ethics, law, public health, and social science are ignored or pictured as conservative and Luddite responses that stand in the way of scientific and societal progress.

When the three editors met in Bristol a few years ago at a presentation by Wayne Hall on deep brain stimulation and addiction, they agreed to work together on this edited volume. The ground work was already prepared by Ahmed Dahir Mohamed, who had drafted an initial proposal to Oxford University Press. The editors are grateful to Oxford University Press for their willingness to publish the book and for their support during the process of collecting and editing the chapters. They feel particularly indebted to Martin Baum for believing in this project and for Charlotte Green for her invaluable help during the editing of the book.

The book *Rethinking Cognitive Enhancement* tries to present a critical reflection on the possible benefits and harms of the efforts to enhance the cognitive functioning of human individuals by the use of psychopharmacological drugs. This reflection is led by evidence from neurological and neuropsychological research, philosophical and ethical analysis, legal approaches, and perspectives from public health and drug policy. We hope that this multidisciplinary approach will help to "debunk" the high expectations of these drugs in academic circles but also the hype in the popular press about what these drugs could bring to people. What are needed are not exaggerated fantasies, but plain evidence and critical debate as the basis for sensible policy-making regarding the use of so-called cognitive-enhancing drugs.

The editors would like to acknowledge some people who have been important in the editing of this book. Ahmed Dahir Mohamed is indebted to Anthony Holland and Simon Baron Cohen, who respectively supervised and advised his doctorate in psychology at the University of Cambridge, Marilyn Williams his mentor and undergraduate supervisor, his friend Jenny Lewis, and finally Evianne Van Gijn and Anthony Edward Phillips, who were working alongside him when he was finishing his doctorate at Clare Hall, Cambridge. They have followed his progress with enthusiasm and curiosity and have been supportive all along the way.

Wayne Hall would like to thank his colleagues at the Centre for Youth Substance Abuse Research at the University of Queensland, particularly Stephanie Bell, Jayne Lucke, and Brad Partridge, for helping to refine his thinking about the topic of cognitive enhancement. He also thanks Sarah Yeates for her invaluable assistance in conducting literature reviews and preparing manuscripts for publication over many years.

Ruud ter Meulen would like to thank his colleagues and post-graduate students at the Centre for Ethics in Medicine for their discussions about human enhancement, particularly Sylvie Allouche, Alex McKeown, and Heather Bradshaw. He also thanks the many colleagues he worked with in European projects on human enhancement, like the ENHANCE project and the EPOCH project. Their contributions from the field of ethics, law, social science, and public policy-making have strengthened his belief in a multidisciplinary approach to the ethical issues of human enhancement as the basis for policy-making. Finally, he wants to thank Ruth Chadwick for writing the preface to this volume.

Bristol, Otago, Brisbane
January 2016

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Part I

Introduction

Chapter 1

Introduction

Ruud ter Meulen, Ahmed Dahir Mohamed, and Wayne Hall

There has been a recent excitement among some neuroscientists and bioethicists about the possibility of using drugs and other technologies to enhance cognition in healthy individuals (Buchanan 2011; Harris 2007; Naam 2005; Sandberg 2011; Schaeffer et al. 2014). This excitement arises from recent advances in neuroscientific technologies such as drugs that increase alertness and wakefulness in healthy individuals or technologies that can stimulate activity in different parts of the brain—either via the scalp or via electrodes in the brain, all of which raise the possibility of producing cognitive and affective improvements in otherwise healthy individuals. This development has been described using the term "cognitive enhancement," meaning an improvement of the cognitive and intellectual capacities of the brain. It is part of a wider drive to enhance human capacities by way of biotechnologies, including physical enhancement, mood enhancement, and extension of the life span (Savulescu et al. 2011).

This possibility raises important questions: What is meant by "improvement" or, more specifically, "improvement of the brain"? Does it mean merely improvements that result in better college grades or better work performance, or does it mean improvements that result in more well-being and happiness in individuals' personal lives? How can taking a drug improve these functions especially in healthy individuals free from clinical disorders?

While there is an increased interest in cognitive enhancement, and a strong ethical debate on the merits of cognitive enhancement (Bell et al. 2013; Bostrom and Roache 2009; Carter and Hall 2011; Mohamed 2014), there has been limited critical appraisal of (i) what we mean by cognitive enhancement and (ii) whether we can or should aim to achieve this in healthy individuals.[1]

On the basis of evidence from the neurosciences, the book aims to highlight the possibility that humans may face evolutionary, psychological, and social limitations in increasing their cognition function. For example, the idea that healthy individuals are cognitively enhanced in linear fashion has been challenged by evidence that appeals to the inverted U-shaped function relating arousal and performance. Arguments based on the evolutionary limitations of human cognitive function reinforce the implausibility of pharmaceuticals producing a linear increase in cognitive function in healthy individuals. There

may also be significant psychological trade-offs in increasing attention in healthy individuals that include impairments in creativity, flexibility of thought, and global thinking. Furthermore, it is not clear whether drugs that are claimed to enhance cognition in some healthy individuals have the capacity to meaningfully enhance cognition in the normal population. For example, there is as yet no evidence that these "cognitive-enhancing" drugs improve well-being, happiness, and real life achievements in healthy neurotypical individuals. There is in fact evidence that they do just the opposite where they induce depression in healthy individuals who take them (Teter et al. 2010).

The book has several objectives. Firstly, it reviews evidence of the neurosciences to critically evaluate and appraise the concept of cognitive enhancement. It challenges the assumption that healthy individuals will be unequivocally enhanced by the use of pharmacological drugs or other neuroscientific technologies. The key value of this book to the readers is that they will learn about the achievements and shortcomings of neuroscientific research on cognitive enhancement and appreciate that cognitive enhancement, as described by some researchers and indeed by the media, is an ambiguous concept. Do these drugs indeed improve wakefulness or memory in a meaningful way? What are the side effects of using these drugs? What is the impact on other cognitive functions when enhancing one particular function? Several contributions to this volume address these questions by reviewing evidence from laboratory studies and other empirical information.

Secondly, the book considers to what extent the ethics of cognitive enhancement might need to be reframed. Given that it is questionable that drugs like modafinil and methylphenidate meaningfully improve general cognitive function in healthy individuals, this work will consider whether some ethical questions, like cheating in the classroom, are even relevant. Instead of an uncritical praise of cognitive enhancement, the book examines possible trade-offs that may arise from the potential risks of the healthy using these drugs. For instance, if a drug is addictive but improves memory, should we allow its use among healthy individuals, particularly young ones whose brain are still in development? Since most healthy individuals do not always have access to balanced and unbiased evidence of the effects of these drugs on the brain and on the body, it might make their decision to take these drugs less informed and, in consequence, they might not be exercising their autonomy authentically. In the field of neuroethics these ethical issues are thus far widely ignored.

Thirdly, the book aims to contribute to discussions about cognitive enhancement and public health. For example, what are the risks posed by enhancement practices in relation to public health, particularly in respect of addiction? To answer such a question, the book includes a chapter by Heinz and Müller analyzing the risks of using stimulant drugs like modafinil and methylphenidate for enhancement purposes (see Chapter 5). Another chapter by Hall and Strang analyzes the question of whether cognitive drugs should be made widely available or whether policies should be restrictive toward their availability in view of the risks to public health (see Chapter 19).

The volume has two main sections: the first section reviews the (experimental and other empirical) evidence regarding the possible improvements of human cognition by the use

of neuropharmacological drugs as well as the limitations and possible side effects from using these drugs for enhancement purposes. The second section includes chapters about a range of ethical, philosophical, legal, and policy issues of the use of neuropharmaceutical drugs for cognitive enhancement.

The two sections are preceded by an overview of the debate on the ethical issues of human enhancement in general and cognitive enhancement in particular. This debate is characterized by strong oppositional views about the benefits and risks of the use of cognitive enhancement as well as other ethical perspectives like the respect for individual autonomy and the role of social justice. The chapter by Ruud ter Meulen (Chapter 2) distinguishes between a favorable view and a cautious position that supports more restrictive policies toward human enhancement. He highlights that on the favorable view, there are liberal and utilitarian authors who see nothing wrong in human enhancement which they argue has always been part of human history. An example is John Harris who argues that enhancement is not only an ethical pursuit but one that we have a moral obligation to pursue (Harris 2009). Cautious authors argue that the use of medical technologies for human enhancement will undermine important human values like dignity and solidarity with weaker groups in our society (President's Council on Bioethics 2003). Some critical authors are very skeptical about the possibility of cognitive enhancement and argue that the debate about the ethics of cognitive enhancement is a "phantom debate" (Quednow 2010). Ter Meulen's chapter deals with the concept and moral value of human enhancement as opposed to therapy; enhancement in relation to the goals of medicine; the benefits and risks of (cognitive) enhancement technologies; enhancement from the perspective of justice and access to enhancement technologies; and the relation of enhancement to fundamental values, like human nature, human dignity, human virtues, and authenticity. While many authors in the field of bioethics might be familiar with this debate, this overview might help readers outside the field of bioethics to better appreciate the various positions and empirical claims as well as the various ethical and legal questions that are raised in this volume. Moreover, the volume will help bioethicists to better appreciate the evidence regarding the use of cognitive-enhancing drugs and to balance the claims of their putative positive effects against the limitation and risks of using them.

1.1 Risk and benefits of the use of neuropharmacological drugs for cognitive enhancement

The first main section in this book reviews the evidence on the potential, the limitations, and the possible risks of cognition-enhancing drugs. This section starts with a chapter by de Jongh reviewing the experimental evidence about the possible enhancement of cognition, including functions such as memory, attention, language, perception, and executive functioning (Chapter 3). De Jongh limits his discussion to the study of cognition-enhancing drugs and uses the term "smart drugs." De Jongh argues that the use of drugs to enhance cognition is far from new. The stimulant caffeine, for example, has been used

for this purpose, among other motivations, for at least a thousand years. De Jongh evaluates the effects of these drugs on cognition and shows that although there may be some benefits in healthy people, the size of these benefits is small.

The chapter by Massie, Yamga, and Boot calls for better evidence on safety and efficacy on the neuroenhancement use of pharmaceutical drugs (Chapter 4). They define neuroenhancement as the use of medications by healthy people in order to boost cognitive and affective functions. They argue that the lack of evidence on safety and efficacy that motivates the proscription of neuroenhancement for children also applies to adults because, they assert, prescribing drugs for neuroenhancement requires that we re-evaluate the medication risk–benefit calculus. Massie, Yamga, and Boot reason that, in the case of neuroenhancement, because there is no disease to treat, and hence no disease-related harm to weigh against the risk of treatment, we should only accept the use of drugs for enhancement whose risks are well characterized as minor. They call for caution and for better evidence before physicians prescribe drugs to healthy individuals for the purpose of neuroenhancement.

Heinz and Müller argue that the debate about the ethics of cognitive enhancement has exaggerated the benefits and downplayed the risks (Chapter 5). Proponents of cognitive neuroenhancement usually assume either that stimulant drugs are effective neuroenhancers that can be used without serious risks and side effects or that such drugs will be discovered in the near future. Heinz and Müller argue that these assumptions underestimate the risk of addiction to cognitive enhancers, underestimate the medical risks of using cognitive enhancers, and finally overestimate the benefits of putative cognitive enhancers. They make the point that the neuronal mechanisms of learning and memory are fundamentally related to those underlying the development and maintenance of addictive behavior. Given this, it can be anticipated that drugs which modify the mechanisms of learning and memory will increase the risk of becoming addicted to these drugs. In addition to addiction, the authors note, there are significant psychiatric, cardiovascular, and other medical risks of using drugs like modafinil and methylphenidate for cognitive enhancement.

The chapter by Ahmed Dahir Mohamed reports the results from a randomized controlled trial on the effects of modafinil, a drug licenced for narcolepsy, on creativity (Chapter 6). These results are highly relevant to the debate about human enhancement because modafinil is reportedly one of the most popular pharmacological cognitive enhancers used by healthy individuals with no psychiatric disorders. The drug did not improve creative thinking in healthy individuals overall but its effects were (inversely) dependent on the individuals' level of creativity. Modafinil reduced the ability to creatively problem solve, as measured by the Remote Association Test, in participants who were highly creative but increased performance in participants who were low in creativity. Mohamed highlights the impact of modafinil on divergent thinking tasks (i.e., thinking outside of the box which is often seem as a hallmark of creativity). The experimental results by Mohamed's chapter indicates that modafinil reduces convergent thinking in

healthy individuals who are highly creative and uniformly reduces divergent thinking in most healthy individuals.

Mohamed's second chapter reviews neuropsychopharmacological evidence on the effects of modafinil on cognition in humans (Chapter 7). He concludes that, similar to his experimental findings, modafinil improves cognition in healthy individuals low in cognitive function, but it impairs cognition in healthy individuals who are high in cognitive function. His chapter shows that the cognitive and attention-enhancing effects of modafinil are mediated by effects on other forms of cognition such as motivational reinforcement and salience of pleasure. Modafinil is beneficial for narcolepsy but, as with amphetamines and psychostimulants, there is emerging evidence that modafinil has a potential for abuse. Because of these mixed effects, modafinil might have both positive and negative impacts on healthy individuals and on society. The cognitive-enhancing effects of modafinil are, however, small or at best moderate and there is a lack of ecological validity on its cognitive-enhancing effects in the real world. The chapter also summarizes evidence concerning modafinil's adverse effects and presents its safety information. Finally, the effects of modafinil on social cognition and ethical and moral reasoning are currently unknown and merit further rigorous research.

Shah-Basak and Hamilton provide an analysis of the opportunity, feasibility, and risks of pursuing cognitive enhancement using noninvasive brain stimulation (Chapter 8). They discuss two emerging questions. Firstly, they ask whether noninvasive brain stimulation can reliably enhance cognition in healthy individuals. Secondly, they explore the possible risks in using noninvasive brain stimulation. In addressing the first question, they review experimental data from cognitive neuroscience supporting the notion that noninvasive brain stimulation, and specifically transcranial direct current stimulation, can transiently enhance some aspects of cognition. In addressing the possible risks of the enhancement use of noninvasive brain stimulation, they consider the social environments in which the demand for optimal performance may prompt healthy individuals to use noninvasive brain stimulation. In regard to the future of noninvasive brain stimulation they argue that experts in neuroscience, public health, and public policy have an obligation to find an appropriate balance between ensuring public safety and respecting the autonomy of individuals who wish to use noninvasive brain stimulation.

In his chapter Attiah addresses the use of brain stimulation technology for cognitive enhancement and the potential for addiction (Chapter 9). Brain stimulation technologies are currently used for several therapeutic purposes, but they also have the potential for enhancing those without an illness. The phrase "brain stimulation" conjures a vast range of emotions from different segments of society, with fear or apprehension being a common and understandable reaction. The brain reigns as the control center for breathing, eating, and moving, to relating, feeling, and understanding. Changing these functions with electricity or magnetism can fundamentally change how we interact with our environment and one another. Even if this change is beneficial, there can still be a cause for concern. Enjoying the advantages that enhancement might bring could be intoxicating, as can be the case with having great wealth, prestige, beauty, or athletic ability. This chapter

explores the implications of such possible enhancement uses, as well as the notion that it could create a dependence on the stimulation akin to an addiction.

The first section ends with a critical review by Schleim and Quednow on the benefits and risks of cognitive-enhancing drugs (Chapter 10). Like other contributors in this volume, they point out that we are still uncertain about the safety of the long-term use of stimulant drugs by healthy individuals of the most commonly discussed cognitive enhancers such as methylphenidate, modafinil, and amphetamines. Schleim and Quednow argue that the vigilance-enhancing effects of these drugs are strongly baseline dependent; that is, they ameliorate impaired cognitive and affective functioning in people with low baseline levels of functioning while impairing cognitive and affective functioning in people with high baseline levels of functioning. They also point out that the use of these drugs entails trade-offs in which improvements in one cognitive domain often comes at a cost of impairments in other cognitive domains. It is possible that the same trade-offs occur in the enhancement of affective functions. Schleim and Quednow argue that the use of stimulant drugs as performance enhancers is neither new nor more common than decades ago. Their analysis of scientific sources in the 1960s–1980s shows that stimulant consumption for enhancement purposes was present and investigated before the "new" neuroenhancement debate. They conclude that the ethical significance of neuroenhancement has been exaggerated and that a more cautious stance would be more appropriate.

1.2 Ethical, philosophical, legal, and policy issues of cognitive enhancement

The second main section of this volume contains a number of chapters on conceptual and other theoretical issues. This section starts with a chapter by Hertwig and Hills on the evolutionary limits of neuroenhancement (Chapter 11). They argue that there are evolutionary limits to how much we can neuroenhance. Their chapter, which focuses on the pharmacological enhancement of cognitive traits, asks why traits such as focus and memory have not already been enhanced through evolution. They argue that the current understanding of human cognitive evolution is at odds with the assumption that more-is-better which underlies the claim that we need to use drugs to improve cognitive functioning in normal persons. Using examples from memory and attention, they demonstrate that evolution of the mind has produced a delicate balance between too much and too little of the cognitive trait in question (e.g., attention, memory, alertness). They highlight the evidence of trade-offs exemplified in the inverted U-shaped performance curves commonly associated with pharmacological interventions. This phenomenon, known as the Yerkes–Dodson law, describes an empirical relationship between arousal and performance in which performance increases with physiological or mental arousal up to a point at which further arousal produces a decline in performance. Enhancements—even routinely used ones, such as coffee—have side effects on other traits and their effects seem to follow the same inverted U-shaped curves. Hertwig and Hills present several examples of this trade-off in the context of memory and reasoning, highlighting the point that trying

to enhance healthy individuals with psychostimulants may achieve the opposite effects, that is, may impair rather than improve performance.

McKeown asks whether is it possible to draw a line between enhancement and therapy in using putative pharmaceutical methods for cognitive enhancement such as modafinil, Adderall, and Ritalin (Chapter 12). He also considers this question in relation to the potential for genetic cognitive enhancements, should they become available in future. McKeown makes three interconnected arguments. Firstly, he argues that the distinction between therapy and enhancement is ambiguous and logically unstable. Secondly, he asserts that despite this instability there is a relatively simple theoretical solution. This solution could if implemented, he asserts, negotiate the difficulties raised concerning the distinction between the two concepts and protect the just allocation of scarce medical resources according to need. Thirdly, he argues that contemporary medicine in the developed countries such as the UK is not institutionally ready to implement his proposed solution because of its use of "normality" to define the boundary of appropriate medical practice. McKeown concludes that we should limit our expectations about what can practically be achieved via the widespread use of cognitive enhancement drugs until the institutional assumptions of health care, and the training of medical professionals whose practice is informed by them, have undergone substantial reorientation.

In case enhancements are proven effective in improving cognitive functioning, a frequently used argument is that such a use is a form of cheating, particularly in the context of education and exams. The chapter by Schermer analyzes the enhancement-is-cheating argument by comparing sports and education, and by evaluating how the argument can be interpreted in both contexts (Chapter 13). If cheating is understood as breaking the rules in order to gain an unfair advantage over others, it can be argued that some enhancements are a form of cheating. A further analysis of the intuitions behind the enhancement-is-cheating argument, however, shows that if sports and education are understood as "practices," with their own internal goods and standards of excellence, some potential problems of enhancement can be articulated. These concern the internal goods and standards of excellence that are characteristic of specific practices (i.e., working hard, being honest, studying for the exams, and competing fairly). Seen from this perspective, the important question is how enhancement technologies might be embedded in specific practices—or how they might corrode them.

Although some drugs may improve a patient's functioning, including their cognition, it is unclear whether these drugs enhance cognition or ameliorate a debilitating clinical disorder. There are certain cases where therapy is required, as in the case of patients who are suffering from Parkinson's disease who require treatments rather than enhancement per se. Hence, for many clinicians psychiatric classification is the key in deciding whether to use cognitive enhancers. This is an issue that Stein addresses in his chapter on the relevance of psychiatric nosology to cognitive enhancement (Chapter 14). Stein considers to what extent psychiatric diagnostic manuals can assist clinicians when to decide about treatment in case of patients who are just under the threshold to be diagnosed with an illness and who might in fact ask for drugs to enhance their cognition or psychological

well-being. He argues that there has been renewed interest in psychiatric classification, with the recent development of the DSM-5, the ICD-11, and the RDoC framework. He argues that from a DSM-5 perspective, the clinical significance criterion delineates normality from disorder. This suggests that clinical judgment may be the key in making decisions about the diagnosis of mild symptoms. From an ICD-11 and global mental health perspective, Stein argues that the clinical significance criterion may be pseudo-precise. He suggests that instead the focus of clinical attention should be on evidence-based treatments for serious mental disorders. Finally, Stein thinks that the RDoC framework has emphasized that behaviors lie on dimensions, and that psychiatrists and physicians need to better account for the physiological mechanisms that underpin these dimensions of behavior. For the foreseeable future, an integrative approach to the assessment and treatment of patients with subthreshold symptoms will need to incorporate DSM, ICD, RDoC, and other constructs, and weigh up a broad range of relevant facts and values in deciding whether to use cognitive enhancers.

Bradshaw asks the questions of whether cognitive enhancement produces more well-being in the case of people with disabilities (Chapter 15). She argues that cognitive enhancements need to be assessed on a case-by-case basis using the morphological identity framework. After defining the terms relevant to morphological identity, she suggests that cognitive enhancement is one example of the wider class of morphological changes humans can undergo. As such, frameworks for assessing the impact on well-being of other morphological changes may also be relevant for cognitive enhancements. One such framework, she argues, arises from work with people with disabilities who have experienced multiple morphological changes. According to Bradshaw, the concept of morphological identity helps us better understand the moral value of cognitive enhancement technologies because it allows us to relate their use to the effects on the well-being of individual people, and to the operation of societies more widely, as we might do for other life choices. Bradshaw's chapter highlights the importance of paying attention to how cognitive enhancement technologies may affect identity in people with physical disabilities and mental disorders. She shows that using technologies to overcome disabilities can have a major impact on how people with disabilities relate to themselves, to others, and to the world.

The focus of the literature on enhancement has mainly been on ethical issues; there has been little discussion of the legal issues. The chapter by Goold examines a range of legal issues that may be raised by putative cognitive enhancement technologies (Chapter 16). She focuses on pharmaceuticals such as modafinil, which some studies have suggested can reduce the impacts of tiredness and fatigue, and improve attention and focus in those who are well rested. Similar issues may arise with new technologies that claim to improve other cognitive abilities, such as transcranial direct current stimulation devices, which are marketed as a means of improving a person's capacity to concentrate for long periods of time and to improve memory, learning, and facial recognition. Goold's chapter presents some of the essential legal principles that may be relevant to these putative cognitive enhancement technologies. Her chapter, for example, examines how product liability

rules might apply to the sale and supply of enhancement products, particularly the growing nonmedical use of devices. Related to this are questions about sale of goods and fitness for purpose, where drugs or devices are marketed with claims about what they may do for users. According to Goold, cognitive enhancement technologies also pose legal challenges for tort law, most particularly in negligence, where the availability of cognitive enhancement may affect the standard of care that is expected of persons in some professions. Goold argues that if enhancement enables us to improve our capacities, and if that enhancement becomes normalized or widespread (whether it is safe or not), this might influence how we define "reasonable care" and a "reasonable person." Goold asks the question: If drugs can improve our reaction times or our capacity to maintain our attention, should the law apply different standards to the enhanced and the unenhanced? She also suggests that questions may arise as to whether we should oblige some professionals to enhance themselves. This raises issues in the areas of negligence and employment law. Goold's chapter also touches briefly on the criminal law implications of enhancement. She focuses on the mental element of crimes and issues of consent and explores the relevance of enhancement to what it may mean to form an intention. Finally, Goold's chapter pays attention to the implication of enhancement for human rights law in a discussion that touches on privacy, particularly the emerging idea of mental or psychological privacy, and how we should protect it.

The chapter by Partridge critically analyzes the enthusiasm for cognitive enhancement shown by some bioethicists (Chapter 17). It challenges the evidence for claims commonly made in the bioethics literature on the cognitive enhancement use of stimulants, namely that it is common and increasing among college students, and that these drugs do in fact enhance cognitive function in normal persons. Partridge argues that the prevalence of enhancement use of stimulant drug use is much lower than some bioethicists claim and much of it is nonmedical use rather than use for cognitive enhancement; that controlled studies find it difficult to find evidence of the putatively cognitive-enhancing effects of stimulant drugs; and that bioethicists have underestimated the challenges in assessing the safety and efficacy of putatively cognitive-enhancing drugs. We should be aware of the potential risks to health from the nonmedical use of prescription drugs: uncritical appraisals about the prevalence and risk–benefit profile of cognitive-enhancing drugs could give rise to unwarranted policy decisions about the practice. For example, facilitating the practice by removing laws that prohibit the use of stimulants without a prescription assumes that cognitive enhancement is likely to be beneficial to the user and society. But this would appear to ignore the public health imperative that underpins regulation of these drugs in the first place. Conversely, calls for tighter regulations can also be unwarranted if not grounded in evidence. One speculated measure is for universities to drug test students prior to examinations, just as professional athletes are dope tested. However, such a policy would assume that currently available "cognitive enhancers" do in fact improve exam performance, giving users an unfair advantage over nonusers, and that there are a large number of users that can be "caught" this way. And yet there is little evidence that any of these things are true. In fact, in some situations, such a policy might only increase

the prevalence of cognitive enhancement by giving nonusers the impression that stimulants do improve performance and that many of their colleagues are using them.

In their chapter Bell, Lucke, and Hall argue that the creation of the term "cognitive enhancement" has obscured historical experiences with two medicinal drugs for which similar enhancement claims were made, namely, cocaine in the late nineteenth and early twentieth centuries, and amphetamines in the mid-twentieth century (Chapter 18). These drugs were initially introduced as medicinal agents in Europe and North America before becoming more widely used for a variety of nonmedical purposes, including what would nowadays be called cognitive enhancement. Their trajectory of use conformed to the typical use cycle of psychotropic drugs: an initial steep rise in prescribing for medical use, followed by nonmedical use fueled by enthusiastic descriptions of the drug's effects; increased societal concern as the number of regular users increased and problems related to use (such as addiction) became apparent; and the passage of laws banning nonmedical and, eventually, medical use. This historical experience shows that the adverse effects of enhancement use of pharmaceuticals only becomes apparent with regular, wide-scale use of a drug. Bell et al. highlight the similarities between the historical enthusiasms for cocaine and amphetamines and the contemporary enthusiasm for using prescription stimulants for cognitive enhancement. The authors argue bioethicists should not encourage the cognitive enhancement use of drugs such as methylphenidate in the absence of evidence on the efficacy and safety of their use for cognitive enhancement purposes.

Hall and Strang outline some of the challenges in regulating the enhancement use of stimulant drugs by normal individuals (Chapter 19). They focus on approaches to regulating the use of putatively cognitive-enhancing drugs such as dexamphetamine, methylphenidate, and modafinil because these are the drugs most often discussed in bioethics debates about the cognitive enhancement use of pharmaceuticals. Their key observation is that much of the discussion of possible regulatory regimes for cognitive enhancers in the neuroethics literature ignores a critical fact, namely, that the nonmedical use of stimulant drugs is prohibited in most developed countries under provisions of the 1971 international drug control treaty. This means that the most probable regulatory response to any new neuropharmaceuticals that are (supposed to be) cognitively enhancing will be much the same, especially if their use proves popular among young adults. In the absence of good evidence about their safety and efficacy when used for cognitive enhancement prohibition is the common precautionary response that is justified by the argument that it will minimize the risk of serious adverse health outcomes that may occur if these drugs are used recreationally. These international treaties are currently under challenge in the USA where four states have legalized the recreational use of cannabis, a drug whose nonmedical use is also prohibited under the same treaties. It remains to be seen whether any reconsideration of the way that the treaties regulate cannabis use in the USA will eventually be extended to the use of stimulant drugs for cognitive enhancement.

In view of the high expectations of cognitive enhancement and concerns about the potential risks of using cognitive technologies, this book critically engages with the scientific and ethical issues in cognitive enhancement. The book aims to inform critical readers and the public of the risks as well as the promises of cognitive enhancement. It examines the assumptions made about cognitive enhancement in healthy individuals in recent ethical discussions. A distinguishing feature about this book is that, for the first time, neuroscientists, neuropsychopharmacologists, ethicists, philosophers, public health professionals, and policy researchers work together to offer a multidisciplinary, critical consideration of the neuroethics of the use of psychopharmacological drugs for cognitive enhancement.

We hope that this book makes a valuable and positive contribution to the field of neuroethics and that, as the title suggests, by providing a critical analysis of the neuroscience, as well as the ethical, legal, and social aspects of the use of smart drugs, it provides the reader a chance to rethink about the relevant issues in cognitive enhancement.

Note

1. When we use the term "healthy individuals," we mean neurotypical people who have no psychiatric problems or clinical issues, i.e., neurotypically healthy individuals.

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Chapter 2

The ethical debate on human enhancement and cognitive enhancement by way of biotechnologies

Ruud ter Meulen

2.1 Introduction

In the past two decades there has been a lively ethical debate about the use of medical and biomedical technologies beyond traditional medical goals. While many of these technologies are developed to heal and restore health, they can also be used to improve or *enhance* human capacities beyond what is considered normal levels of human functioning (Savulescu et al. 2011). The ethical debate focuses on the question whether the use of medical technology for such enhancement can be justified from a moral point of view and whether doctors or other health care professionals should contribute to such a practice. In general one can distinguish two main positions in this debate (Schermer 2012). On one side, there are liberal and (partly) utilitarian authors who cannot see anything wrong in such efforts and even argue for a moral duty of individuals to enhance themselves (Harris 2007). On the other side, there are authors who take a more cautious and conservative position, arguing that the use of medical technologies for human enhancement may lead to a decline of important human values like dignity (Kass 2002) and solidarity with weaker groups in our society (Fukuyama 2003).

The purpose of this chapter is to provide the reader with a better understanding of the ethical implications of the empirical findings reported in this volume. At the same time we will wade into the ethical debate on cognitive enhancement by referring in various sections to the outcomes of empirical studies about the risks and benefits of cognitive drugs (and other neurotechnologies).

The chapter will start with a discussion about how to understand human enhancement, including its moral value. The chapter will continue with a discussion of enhancement in relation with the goals of medicine. This section will be followed by a discussion of the benefits and risks and, after that, a discussion of justice and access to enhancement technologies. We will then move to a discussion of more fundamental topics in relation to human enhancement, like human nature and human dignity. We will finish with a discussion about enhancement and the importance of authenticity.

2.2 The moral value of human enhancement

Before discussing the moral value of human enhancement, including cognitive enhancement, it will be important to understand what human enhancement actually means. According to Buchanan (2011) an enhancement is an "intervention … that improves some capacity (or characteristic) that normal beings ordinarily have or, more radically, that produces a new one" (Buchanan 2011, 5). Cognitive enhancement is the improvement of cognitive capacities, including various kinds of memory, attention, reasoning, and executive function (the ability to monitor direct and coordinate various mental operations (ibid.).

According to Harris (2007), enhancement has been part of human history. From "our first beginnings" (Harris 2007, 16) there has been a continuous effort to improve our functioning by education, health care, housing, language, cultivation, cooking, farming, etc. These are all ways to improve human life and can all be considered human enhancements. Harris mentions this as an argument in favor of the moral value of human enhancement by technological means:

> If the goal of enhanced intelligence, increased powers and capacities, and better health is something that we might strive to produce through education, including of course the more general health education of the community, why should we not produce these goals, if we can do so safely through enhancement technologies or procedures? (Harris 2007, 2)

As mankind has always tried to improve its capacities, what is wrong when we do this by technological means? Actually, improving by way of technology is morally superior as it is more efficient and leads to quicker results than waiting for evolutionary or cultural processes to reach a better level of functioning.

However, one can argue that there is a difference between enhancement by way of cultural and evolutionary processes and enhancement by the use of technology (Schermer 2012, 8). The direct changes in bodily and psychological functioning by means of technological interventions are different, because this process represents a new and different methodology (ibid.). Perhaps helpful is the definition by the Science and Technology Office of the European Parliament (STOA): "an enhancement is a modification aimed at improving individual human performance and brought about by science-based or technology-based interventions in the human body" (STOA 2009, 13). We shall use this definition of human enhancement and use the term *biomedical* enhancement (Buchanan 2011; Schermer 2012) to distinguish these interventions from the cultural, social, and evolutionary processes mentioned by Harris in the previous paragraph.

As mentioned in the introduction, there are different views on the moral value of enhancement. Harris, for example, argues that enhancements are unequivocally good; otherwise, we would not call them enhancements:

> Enhancements of course are good if and only of those things we call enhancements do good, and make us better, not perhaps by curing or ameliorating our ills, but because they make us better people. (Harris 2007, 2)

Harris continues that, apart from the added value of better memories, better experiences, and better processing and assimilating our experiences, we will be less slave to illness, pain, disability, and premature death. We will have less pain and we will be less dependent on doctors and medical science.

This positive view on human enhancement technologies reflects the ideals of the Enlightenment and its utopian perspective of improving the world and ameliorating human suffering through the use of science and technology (Jotterand 2010a). The utopian and rationalist perspective of the Enlightenment has been criticized by the critical theory of the Frankfurt School (Jay 1973), which has emphasized that instrumental reason has resulted in domination of our lives by technology and in an impoverishment of human relationships.

As opposed to the optimistic view of Harris, conservative authors argue that the use of biotechnologies should be limited to the goals of therapy. The use of biotechnologies for human enhancement will have fundamental consequences for human nature and will limit human freedom. Fukuyama, for example, argues that biotechnology "and a greater scientific understanding of the human brain" will have significant political ramifications. The knowledge of pathways in the brain and the workings of certain psychopharmacological drugs will open possibilities for social engineering and control: "Neuropharmacology has already produced not just Prozac for depression but Ritalin to control the unruly behaviour of young children" (Fukuyama 2003, 16). As we discover the molecular pathways between genes and traits like intelligence, aggression, and alcoholism, "it will inevitably occur to people that they can make use of this knowledge for particular social ends" (ibid.).

The US President's Council on Bioethics was particularly concerned about this possible development, which it saw as more morally problematic than medical therapy. While therapy was considered natural in trying to assist the natural healing process, enhancement was regarded by the council as adding something—possibly detrimental—to the human being that was considered unnatural:

> When a physician intervenes therapeutically to correct some deficiency or deviation from a patient's natural wholeness, he acts a servant to the goal of health and as an assistant to the nature's won powers of self-healing, themselves wondrous products of evolutionary selection. But when a bioengineer intervenes for non-therapeutic ends, he stands not as nature's servant but as her aspiring master, guided by nothing but his own will and serving ends of his own devising. (President's Council 2003, 285–6)

Critics of human enhancement technologies point out the possible eugenic tendencies that may be reinforced by these technologies (Sandel 2007). They fear that people with physical and learning disabilities might be subjected to (further) discrimination by the application of enhancement technologies, much like they were during the Nazi regime and, before that, in sterilization programs in Europe and the United States. However, the proponents of human enhancement technologies argue that there is a big difference from the "old" eugenics because the "new" eugenics emphasizes free choice and autonomy (Agar 2004). Nonetheless, according to the critics, the basic idea is the same, namely, the weeding out of undesirable physical and psychological traits.

A possible way to understand the moral significance of human enhancement is to compare its goals to those of "normal" medical therapy. Yet it is not easy to establish robust distinctions between therapy and enhancement. According to Juengst, "enhancement interventions are any interventions designed to produce improvements in human form or function that do not respond to legitimate medical needs" (Juengst 1998, 31). However, Juengst argues that the distinction between therapy and enhancement is rather complex. There is no consensus about what should be seen as legitimate medical needs or a normal application of medical technology. Normal means a treatment that falls within the goals of medicine, like the treatment of disease and the alleviation of suffering (see section 2.3). Therapy and enhancement are to a certain extent overlapping; all successful therapies are a kind of enhancement of impaired function, even if not all enhancements can be called therapeutic. For example, the improving and regenerating of organs and tissues in the elderly may be seen as enhancement, but it can be considered to be a therapy as well.

According to Harris, the distinction between therapy and enhancement "cannot be coherently or consistently maintained" (Harris 2007, 57). Therapy and enhancement are not mutually exclusive categories: they have the moral imperative both to prevent harm and to confer benefit. In that moral light, Harris argues, it is unimportant whether the protection (for example, by vaccination) or benefit conferred is classified enhancement or improvement, protection or therapy. As there are no differences between the two, it makes no sense to argue for permissibility or impermissibility of one or the other based on such a distinction (ibid., 58). Instead, Harris argues, we should look at the benefits or harms that both therapy and enhancement confer and look at the right balance between these when making decisions about their permissibility.

However, though a certain therapy can be an enhancement, not every enhancement is a kind of therapy. When modafinil is used for the treatment of narcolepsy, it is clearly used for a therapeutic purpose. However, when pilots or surgeons take modafinil to stay awake for a longer period (to cope with a long flight or when performing a long surgical procedure) we cannot speak of a therapy but of enhancement. The benefits and harms have a different and noncomparable meaning in both cases: when using modafinil to treat narcolepsy we will accept a different balance of benefits and harms than when it is used as an enhancement. The benefits and harms in the case of therapy are entirely defined by the interests of the affected individual. In the case of enhancement we look not just at the benefits and harms of the pilot or surgeon, but also at the risks of the patient when undergoing surgery or the risks of the passengers on the long haul flight. For example, there is some evidence that modafinil could increase overconfidence which can put the patient at risk (Baranski and Pigeau 1997; Baranski et al. 2004; Repantis et al. 2010).

2.3 Enhancement and the goals of medicine

An important ethical question is whether doctors and health care professionals should be involved in human enhancement. In other words, does enhancement belong to what

is called the *goals of medicine*, meaning which activities should be part of medical practice and what are the professional duties of doctors in relation with these activities? In a special supplement to the Hastings Center Report on the goals of medicine, a group of experts from fourteen countries identified four core values which would help maintain medicine "to maintain its integrity in the face of political or social pressures to serve anachronistic or alien purposes" (Hastings Center Report 1996):

1) The prevention of disease and injury and the promotion and maintenance of health;
2) The relief of pain and suffering caused by maladies;
3) The care and cure of those with a malady and the care of those who cannot be cured; and
4) The avoidance of premature death and the pursuit of a peaceful death.

The discussion about what constitutes the goals of medicine has for an important part to do with the boundaries of medical practice and of the health care system: when we have a shared understanding of what doctors (and other health care professionals) should consider as their core values, we have a better idea of which activities should be reckoned to be part of our health care system and, in accordance with this, which activities should be funded by the public health care system.

A definition of the goals of medicine might help to limit the tendency of medicine to stretch the limits of the medical domain and engage in activities that cannot be considered appropriate in relation to its core values and goals. The discussion about the goals of medicine is particularly meant to put a halt to the *medicalization* of society, a concept used to describe the increasing influence of medicine in various areas of our society. The concept of medicalization was launched in the early 1970s by Zola to describe the process in which modern medicine has become one of the most important mechanisms of social control, taking the place of religion and law (Zola 1972). By defining certain phenomena like alcoholism, aggression, ageing, or reproduction from a medical perspective, society is becoming more able to control such phenomena. Illich further developed the thesis of Zola in his book *Medical Nemesis* (1975) in which he argued that medicine and health care do not improve health but in many cases are responsible for a worsening of people's health, a process which he called *iatrogenesis*. According to Illich, medicalization means increased power of doctors and an increasing dependency of individuals on the medical system.

An example, which might be relevant for this volume, is the rapidly increasing use of Ritalin to treat attentional problems in young people who are diagnosed as having attention deficit hyperactivity disorder (ADHD). In a growing number of cases, the diagnosis of ADHD and the use of Ritalin to remedy this disorder can be regarded as medicalization of children's behavior in order to better control it. It includes a definition of what is called appropriate behavior and also an explanation of this behavior as caused by biological processes in the children's brain. Critics of the increased use of Ritalin refer to the social and psychological origins of so-called problematic behavior of young people, which in their view are snowed under the biomedical explanations. Moreover, according to the critics, the indications for ADHD are not clear and there is a tendency to apply the diagnosis to an increasingly wider range of behaviors (Coppock 2002).

Does enhancement fall under the goals of medicine, or is it another manifestation of medicalization, meaning the use of medical technology in areas like education which would normally depend on social and individual factors? It is difficult to answer this question: on the one hand, enhancement cannot be seen as healing a disease, but on the other hand it may promote health and help to avoid premature death. An important problem is that there is no consensus on how to define health and disease. An example is the question whether we should treat children with low height with growth hormone. In some cases there is no biological cause of the low height. According to Daniels (1992, 2000) one can ask whether one can make a clear-cut distinction between treatment of a child with growth hormone deficiency that is the result of a brain tumor and enhancement of one's child's height because of a normal hereditary shortness (Daniels 1992, 2000). Both children have the same height, but it is a height that is seen as inferior according to our cultural standards. However, in the first case, the problem has a medical cause, namely the tumor. In the second case, the child's (future) shortness is part of a normal variation in human height. The big question is, do the two cases fall within the area of medical necessity, and if yes, do they qualify for medical treatment? Or are we on the path of unacceptable medicalization when we think that both cases qualify for medical treatment and reimbursement?

According to Kass, medicine should limit itself to restoring normal functioning and should only treat physical and biological needs (Kass 1985). This biological view on health (and restoring health) can also be found in the works of Christopher Boorse (1977). According to Boorse (1977), health can be described in terms of functions which are typical for a certain species to which an organism belongs. A function is something that contributes to the goals of a certain organism including its natural design. Such a design is different for every species. However, we can determine empirically what this design is and which goals an organism is striving for. To do so, we should research a large number of exemplars of a species to find its "species design," differentiated to age and gender. The result of this biological-statistical analysis is that biological functions are in the end focused on survival and reproduction of the species. On the basis of this analysis, Boorse argues that health equals "normal functional ability." To assess the health of an individual, a doctor should focus whether the body of that individual still works according to the species design.

Boorse's biological-statistical concept of health has been much criticized as being reductionist and failing to account for conditions that, according to his theory, can be considered healthy, but which are treated by the health care system (like caries, prostate enlargement, and arterial problems; Ten Have et al. 2013). Moreover, many mental conditions and physical handicaps are excluded from medical treatment as they have nothing to do with normal species functioning. An important problem with Boorse's (and Kass') approach is that it does not take into account the social and cultural context of specific conditions. A condition like color blindness, for example, is in itself a neutral condition. To call it a disease is dependent on the context in which people with this condition live (ibid.). According to some authors, the distinction between disease or disability and

health or normality is, in fact, culturally defined. Engelhardt, for example, argues that concepts of health and disease are guided by value judgments and prejudices that may change over time (Engelhardt 1996). Examples are masturbation, which was for a long time considered a disease (Engelhardt 1974), and homosexuality, which was removed from the *Manual of Psychiatric Disorders* (DSM) in 1974.

One can argue that the distinction between normal and enhanced is basically normative rather than objective or universally valid, as Boorse seems to assume. One can also argue that the distinction between treatment and enhancement is based on a cultural definition of what counts as a disease and what does not. If one follows that argument, the distinction between therapy and enhancement will become highly questionable and nothing will stand in the way of the application of biotechnologies outside the medical domain.

However, it seems that doctors do not feel much interested in going beyond the traditional goals of their clinical practice. This could be concluded from McKeown's interview study reported in his chapter in this volume among renal doctors regarding the use of erythropoietin for physical enhancement (see Chapter 12). The doctors involved did not object to enhancement as such, but thought that the provision of enhancement drugs was far away from their day-to-day clinical work, which was primarily helping sick patients and caring for their immediate needs. They did not regard enhancement as a goal of medicine, but would reconsider their position if enhancement would become a more legitimate goal of medical practice. Nonetheless, in daily clinical practice there are signs that doctors do go beyond the goals of medicine, for example by supplying Propranolol, a beta-blocker used for the treatment of high blood pressure, to professional musicians in order to reduce performance anxiety. Similarly, doctors prescribe psychopharmacological drugs like Prozac for people who feel depressed but do not meet the criteria for clinical depression. With reference to the title of a book by Carl Elliott (2003), one can say, that these people want to feel "better than well."

Though it is difficult to draw the boundaries between normal functioning and what goes beyond it, it is important to continue the discussion on what counts as legitimate goal of medicine and whether so-called enhancement technologies fall within this scope. As Juengst argues, the distinction about enhancement, as distinguished from therapy, is helpful in defining the boundaries of medical practice. Concepts of health and disease, sociological perspectives on medical practice, or a theory about what is the human norm can be considered tools to help define those boundaries. This is important because, as Juengst argues, the line that the treatment versus enhancement distinction draws is the boundary of medical obligation, not the boundary of medical tolerance (Juengst 1998, 44). Doctors should be able to deny prescribing enhancements if they go against their professional judgment, but such enhancements should still be permissible. This distinction is relevant for policy-making regarding access to care and public funding of what from a medical point of view is necessary and what should be left for private arrangements and funding in respect with self-improvement. This does not mean that in private arrangements for self-improvement doctors do not have professional obligations: as, for example, in cosmetic surgery, doctors still need