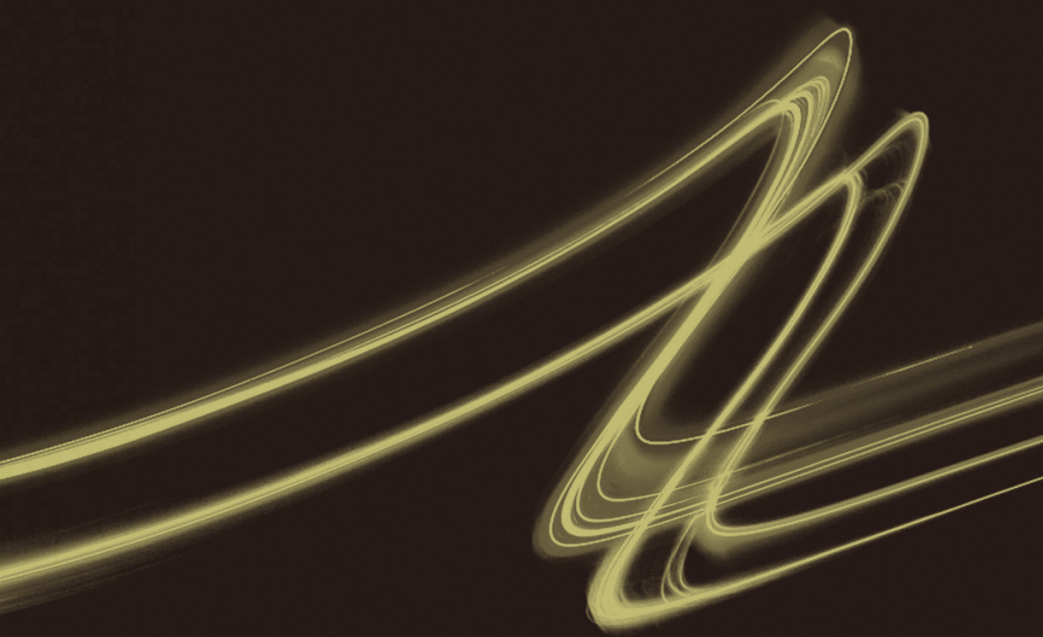


# INQUIRING INTO HUMAN ENHANCEMENT

INTERDISCIPLINARY AND INTERNATIONAL PERSPECTIVES

Edited by  
SIMONE BATEMAN, JEAN GAYON, SYLVIE ALLOUCHE,  
JÉRÔME GOFFETTE and MICHELA MARZANO



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# Inquiring into Human Enhancement

## Interdisciplinary and International Perspectives

Edited by

**Simone Bateman**

*Centre National de la Recherche Scientifique, France*

**Jean Gayon**

*Université Paris 1 Panthéon-Sorbonne, France*

**Sylvie Allouche**

*Université Catholique de Lyon, France*

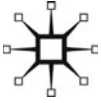
**Jérôme Goffette**

*Université Claude Bernard Lyon 1, France*

**Michela Marzano**

*Université Paris Descartes, France*

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# Series Editors' Preface

Medicine, health care and the wider social meaning and management of health are undergoing major changes. In part this reflects developments in science and technology, which enable new forms of diagnosis, treatment and the delivery of health care. It also reflects changes in the locus of care and burden of responsibility for health. Today, genetics, informatics, imaging and integrative technologies, such as nanotechnology, are redefining our understanding of the body, health and disease; at the same time, health is no longer simply the domain of conventional medicine, or the clinic. The 'birth of the clinic' heralded the process through which health and illness became increasingly subject to the surveillance of medicine. Although such surveillance is more complex, sophisticated and precise as seen in the search for 'predictive medicine', it is also more provisional, uncertain and risk laden.

At the same time, the social management of health itself is losing its anchorage in collective social relations and shared knowledge and practice, whether at the level of the local community or through state-funded socialised medicine. This individualisation of health is both culturally driven and state sponsored, as the promotion of 'self-care' demonstrates. The very technologies that redefine health are also the means through which this individualisation can occur – through 'e-health', diagnostic tests, and the commodification of restorative tissue, such as stem cells, cloned embryos and so on.

This series explores these processes within and *beyond* the conventional domain of 'the clinic', and asks whether they amount to a qualitative shift in the social ordering and value of medicine and health. Locating technical developments in wider socio-economic and political processes, each text discusses and critiques recent developments within health technologies in specific areas, drawing on a range of analyses provided by the social sciences.

The series has already published 13 books that have explored many of these issues, drawing on a body of novel, critical and deeply informed research undertaken by their authors. In doing so, the books have shown how the boundaries between the three core dimensions that underpin the whole series – health, technology and society – are changing in fundamental ways. This latest addition to the portfolio of work takes this matter of the reconfiguring of boundaries further, especially around

the notion of the 'normal', the 'natural', of the edges of bodily identity, and of the very meaning of 'health' itself, through its exploration of past, present and potential future practices associated with human 'enhancement'.

The book provides an extremely rich and strongly interdisciplinary interrogation of the concept of 'enhancement'. Unlike many other publications in this area, its focus is less on the philosophical or moral concerns raised by enhancement *per se*, and more on the practices and implications of enhancement for society now and in the future. Here specifically biomedical technologies – such as prosthetics or other devices – are only part of the story, as a range of technologies and techniques are mobilised in new ways that have little to do with remedial or reparative clinical intervention and much more to do with the body project, with 'self-improvement', with redefining notions of human nature itself. As the editors say in their introduction, 'All of these activities imply a logic of modification and improvement through the mastery of the body that goes beyond standard health care' (p. 4).

This book makes a major contribution to our understanding within the social sciences and humanities of the current and likely future developments in human enhancement and its implications for the meaning of health. As such, its ideas and lessons cut across many of the fields of technology that have already been examined through the other volumes published in the series. The authors have extensive and impressive expertise in this field and the editors have brought this together in an integrated and exceptionally well-organised way, such that each chapter gains value through its linkage with others. As Series Editors we are delighted to mark our latest publication with a book which will attract international interest from scholars working across a number of disciplines. It will also be of great interest to researchers and practitioners in biomedical fields, in performance studies, and be of particular value to those who have to address the challenges of human enhancement in the field of regulation and governance.

*Andrew Webster and Sally Wyatt*

# Acknowledgements

At the origin of this book and its companion Pivot volume – *Inquiring into Animal Enhancement: Model or Countermodel of Human Enhancement?* (Palgrave Macmillan, 2015) – was a series of workshops held in Paris, France between 2009 and 2011 entitled: ‘Human Enhancement – A Critical Inquiry’. The editors of these two volumes, who were also the organizers of these workshops, wish to thank the Universities Paris 1 Panthéon-Sorbonne, Paris Descartes and Paris Diderot-Paris 7 for having financed this series of workshops. Their generous support of our project made it possible to bring together scholars with different disciplinary backgrounds from many countries in a concerted and constantly evolving research query on the enhancement of humans as well as of animals.

We would also like to thank all the scholars who generously accepted our invitation to intervene, as speakers or as commentators, in our series of workshops: Gustaf Arrhenius, Bernadette Bensaude-Vincent, Florence Burgat, Pierre-Henri Castel, Christopher Coenen, Gary Comstock, Maxime Coulombe, Eric de Léséleuc, Sonia Desmoulin-Canselier, Françoise Dupeyron-Lafay, Selim Eskiizmirli, Anne Fagot-Largeault, Arianna Ferrari, Marc Fleurbaey, Jean-Paul Gaudillière, Alain Giami, Bertrand Jordan, Patrick Laure, Erik Malmqvist, Anne Marcellini, Jean-Noël Missa, Marika Moisseff, Brian Muñoz, Pascal Nouvel, Patrick Pajon, Isabelle Queval, Bernard Reber, David Rothman, Sheila Rothman, Brian Stableford, Ruud ter Meulen, Daniel Weinstock, Dan Wikler, and Myriam Winance. Not all of them appear as authors in this volume but, together with the persons who regularly took part in this series – too numerous to name here – they all contributed substantially to workshop discussions and ultimately influenced our conception of this publication project.

Last but not least, we would like to thank the Series Editors of *Health, Technology and Society* at Palgrave Macmillan, Andrew Webster and Sally Wyatt, for having guided us through the editorial process. An equally warm expression of our appreciation goes to Harriet Barker, who proposed the publication of our project as two separate books, to Holly Tyler and Dominic Walker, who assisted us through the complex phases of handling the publication of companion volumes, and to the numerous people at Palgrave Macmillan who helped us produce this book. Most of all, we thank Andrew Webster for his unfailing support in helping us bring this publication project to fruition.

# Notes on Contributors

**Sylvie Allouche** has a PhD in Philosophy and has conducted research and taught at various European universities (Paris, Lyon, Budapest, Toulon, Bristol). She is presently an assistant professor at the Catholic University of Lyon (Human Development Department and General Biology Laboratory). Her research develops along two complementary directions: (1) the various philosophical issues raised by the prospect of engineering living organisms, with a special interest for human enhancement and geo-engineering and (2) the relations between philosophy and fiction, and more specifically science fiction and television series.

**Simone Bateman** is a sociologist and Emeritus Senior Researcher of the French National Centre for Scientific Research (CNRS), working at the Centre for Research on Medicine, Science, Health, and Society (CERMES3) in Paris, France. Most of her work concerns morally controversial medical and scientific practices, primarily in the area of reproduction and sexuality (abortion, contraception, reproductive technology, neonatal intensive care), as well as other closely related practices (stem-cell research, genetic testing, experimentation on human subjects). Some of her work also concerns bioethics as a historically specific social phenomenon. She has published widely, mostly in French and English, on these topics, and has also participated in the production of reports for national and international institutions, notably a European Commission report on reproductive technology, *Fertility and the Family* (London: Fourth Estate Ltd., 1989). She was a member of the French National Ethics Committee from 1992 to 1996.

**Christopher Coenen** studied political science, history, social sciences and philosophy at the University of Heidelberg, the Humboldt University of Berlin and the Free University of Berlin. Since 2003, he has been working for the Institute for Technology Assessment and Systems Analysis (ITAS), an institute of the Karlsruhe Institute of Technology (KIT). Before moving to Karlsruhe in 2009, Coenen was based in Berlin, where he worked for the Office of Technology Assessment at the German Parliament (TAB), run by ITAS. He conducted projects on technology assessment, foresight and ELSA (ethical, legal, societal aspects of science and technology) on behalf of the German Parliament and of several European institutions.

He is also editor of the journal *NanoEthics*. His main fields of interest are the assessment of new and emerging technoscientific fields and discourses (such as human enhancement, synthetic biology, nanotechnology and converging technologies), social, philosophical, cultural and political aspects of bio-, neuro-, information, communication and other technologies, and the modern history of utopian and techno-futurist ideas.

**Françoise Dupeyron-Lafay** is Professor of 19th-century British Literature at Université Paris-Est Créteil (UPEC). She has published widely on mainstream Victorian novels and Dickens, and on Gothic, fantastic and detective works (Le Fanu, H.G. Wells, G. MacDonald, Wilkie Collins, A. Conan Doyle). She wrote *Le Fantastique anglo-saxon* (1998) and headed the CERLI (Centre d'Etudes et de Recherches sur les Littératures de l'Imaginaire, a multidisciplinary research network on the fantastic and science-fiction) from 2000 to 2007, editing the proceedings of four conferences: *Le Livre et l'image dans les œuvres fantastiques et de science-fiction* (2003), *Détours et hybridations* (2005), *Les représentations du corps: Figures et fantasmes* (2006) and *Poétiques de l'espace* (2007). She translated George MacDonald's *Lilith* (1895) into French (2007). Her monograph on Thomas De Quincey's autobiographical works, entitled *L'Autobiographie de Thomas de Quincey. Une Anatomie de la douleur*, was published in September 2010.

**Selim Eskiizmirli**, an electrical and electronics engineering graduate from Middle East Technical University (METU), Ankara, Turkey, received his PhD in Signal & Image Processing from the École Nationale Supérieure des Télécommunications (ENST-Telecom ParisTech) in 2000. His post-doctoral research, carried out in Örebro University, Sweden, where he was head of the Biologically Inspired Systems Laboratory from 2001 to 2003, involved modelling the sensory-motor information fusion in the cerebellar pathways and its applications to the control of robot limbs actuated by artificial muscles. He is presently Associate Professor in Computational Neuroscience at Paris Diderot-Paris 7 University and conducts his research activities at the CNRS unit 'Manual Dexterity in Health and Disease' of Paris Descartes University. His current research interests concern brain-machine interfaces (particularly for controlling artificial arms and hands) and their medical applications, robotics, biologically inspired sensory-motor control systems, artificial neural networks, artificial muscles and digital signal and image processing.

**Jean Gayon** is a professor at Paris 1 Panthéon-Sorbonne University and Director of the Institute of History and Philosophy of Science and

Techniques (IHPST). His work bears upon the history of modern biology (evolutionary theory, genetics, biometry), philosophy of biology (concepts of species, gene, function, chance, model organism), and the history of philosophy of science. He has also published on some social and political aspects of life and health science, more especially eugenics, notion of race, conservation biology and human enhancement. He has published a book on the history of selection theory (*Darwinism's Struggle for Survival*, 1998), 20 collective books, and 270 articles or book chapters. Gayon is a member of the German National Academy of Science 'Leopoldina', the International Academy of the History of Science, the International Institute of Philosophy, the International Academy of Philosophy of Science, and Academia Europaea.

**Jérôme Goffette** is Associate Professor in Philosophy of Medicine at the University Claude Bernard Lyon 1 and a member of the university's research unit on Science and Society, namely History, Education and Practices. His research focuses primarily on anthropotechnics and human enhancement, a topic on which he has written more than 20 articles, as well as a book *Naissance de l'anthropotechnie* [Birth of Anthropotechnics] (2006). His second area of research concerns the body and its imaginary. Among other publications on this topic, he co-edited a collective volume with Lauric Guillaud entitled *L'imaginaire médical dans le fantastique et la science-fiction* [Medical Imagination in Fantastic and Science Fiction] (2010), and published a chapter with Jonathan Simon entitled 'The internal environment: Claude Bernard's concept and Its representation in *Fantastic Voyage* (R. Fleisher)' (in M. Landers and B. Muñoz (eds) *Anatomy and the Organization of Knowledge, 1500–1850* (2012), pp. 187–205).

**Patrick Laure** is a public health physician and an associate researcher with accreditation to supervise research in sociology at the University of Lorraine (France). He develops research in epidemiology and prevention of doping behaviour and has published about a hundred scientific papers, as well as about ten books in this area, notably in French: *Éthique du dopage* [Ethics of Doping] (2002) and *Histoire du dopage et des conduites dopantes* [History of Doping and Doping Behaviour] (2004). In 1997, he proposed the concept of 'doping behaviour' to improve our understanding of the way performance-enhancing drugs are used, in sports and beyond, throughout society.

**Eric de Léséleuc** is a professor at the National Higher Institute for Special Needs Education in Suresnes, France with a PhD in Social Sciences and

Sport. He currently teaches and directs research on contemporary individualism, social uses of the body, disability, media communication and gender studies. As Deputy Director of the research group 'Health, Education and Disability' and as Head of its International Relations, he has developed collaborations with Asia, South and North America and some European countries, on topics related to the media coverage of disabled people. He has published papers in French, Spanish and English in many peer reviewed journals such as *Performance, Enhancement & Health*; *Sport in Society*; *European Journal for Sport and Society*; *Politix*; *Revista Internacional de Sociologia*; *Perception*; *Revue d'Éthique Publique*; *International Sociology*; *Sport, Education and Society*; and *Society and Leisure*.

**Anne Marcellini** is a sport sociologist specialising in adapted physical activities and health. She is Professor at the Faculty of Social and Political Sciences at Lausanne University, Switzerland. Previously she worked as Professor of Sport Sociology and Director of the Research Unit 'Health, Education and Disabling Situations' at Montpellier University, France. Her research focuses on the social participation of people with disabilities in connection with issues linking the body, identity, stigma and the social integration process. She has notably written *Des vies en fauteuil: Usages du sport dans les processus de déstigmatisation et d'intégration sociale* [Lives in Wheelchairs – Sports as a Means of Destigmatisation and Social Integration] (2005), and has directed, in collaboration with Gaël Villoing, *Corps, sport, handicaps* (Vol. 2). *Le mouvement handisport au XXIème siècle: lectures sociologiques* [Body, Sport, Disability (Vol. 2). The Disability Sport Movement in the 21st Century: Sociological Approach] (2014).

**Michela Marzano** is Professor of Philosophy at Paris Descartes University where she conducts research on applied ethics. Her work bears upon moral norms and values (autonomy, consent, dignity), bioethics (euthanasia, use of human embryos, allocation of scarce health resources) and sexual ethics (fidelity, pornography, rape). Among her publications are *G.E. Moore's Ethics. Good as Intrinsic Value* (2004); *Dictionnaire du corps* (2007); *Dictionnaire de la violence* (2011).

**Vincent Menuz** is a research associate at the Universities of Zürich (Switzerland) and Montreal (Canada), as well as a biology teacher in Geneva (Switzerland). After completing a PhD in Biology, he undertook a post-doctoral fellowship in Bioethics at the University of Montreal, mainly focused on ethical and social issues related to human enhancement. His current work targets both academic and lay audiences. On

the one hand, he explores the influence of the concept of death on the current effort to decelerate aging and extend life span. On the other, he presents the socio-ethical issues related to human enhancement to lay audiences. He is also a columnist for the *Huffington Post* (France) as well as co-founder, vice-president and senior editor of NeoHumanitas, a Swiss think-tank, whose objectives are to democratize discussions on the socio-ethical issues related to the modifications of individuals through technological interventions.

**Ruud ter Meulen** is a psychologist and an ethicist. He is Chair for Ethics of Medicine and Director of the Centre for Ethics in Medicine at the University of Bristol. Previously he worked as Professor of Philosophy and Director of the Institute for Bioethics at the University of Maastricht. He has been working on a range of issues in medical ethics, including issues of solidarity and justice in health care, ethics of human enhancement, ethical issues of health care reform and health policy, ethics of evidence-based medicine, ethical issues of long-term care and ethics of research. He was coordinator of the European ENHANCE project on the ethical, philosophical and social issues of enhancement technologies, the EPOCH project on the role of ethics in public policy-making on new biotechnologies, and the SYBHEL project on the ethical, legal and social issues of synthetic biology as applied to human health.

**Jean-Noël Missa** is Research Director at the Belgian National Fund for Scientific Research and a professor at the Université Libre de Bruxelles (ULB). Trained in both medicine and philosophy, he was Fulbright Visiting Research Scholar at New York University (NYU) from 2002 to 2003. He is Director of the Center for Interdisciplinary Research in Bioethics (CRIB) and a member of the Belgian Advisory Committee on Bioethics. Most of his work concerns the philosophy and ethics of biomedicine, particularly in the field of neuroscience and biological psychiatry. He has published widely on these topics. He is a member of the Royal Academies for Science and the Arts of Belgium. He has also been appointed as a visiting professor at several universities (Paris, Abidjan, Bogotá).

**Pascal Nouvel** is Professor of Philosophy at the University Paul-Valéry Montpellier 3 and Head of the Centre d'Éthique Contemporaine (Centre for Contemporary Ethics), a research team at that university. He has a PhD in Science (Biology) and in Philosophy. His research deals mainly with philosophy of the life sciences and more particularly with the sciences of affects, emotions and passions. He was formerly Programme



Director at the Collège International de Philosophie in Paris where he led a programme on the 'Epistemology of Affects and Feelings' that aimed to investigate the kind of knowledge contained in our affects. As a part of this research programme, he took a special interest in investigating the affect-inducing power of certain psychotropic drugs, mainly amphetamines. This research led to the publication of two books: *Histoire des amphétamines* (2009) and *Axiomatique des sentiments* (2015).

**Brian Stableford** has been a writer all his life. He has published more than 70 novels and 30 short story collections, in addition to 30 non-fiction books and more than 150 volumes of translations from the French. He is currently researching a book on the history of the French *roman scientifique* from 1700 to 1940, supplemented by approximately 150 volumes in English of previously untranslated works in that genre – a project that he hopes to complete in 2016.

**Myriam Winance** is a research scholar with the French National Institute for Health and Medical Research (INSERM), working at the Centre for Research on Medicine, Science, Health and Society (CERMES3). Her research goal is to analyse the evolution of the notion of disability through discourses and processes of care (on a macro level) and the concrete practices and experience of disability (on a micro level). She is interested in the changes in the relation between 'disability' and the notion of 'repair', as reflected over time in French disability policies. She explores the way disability has been defined throughout history through successive 'repair' schemes and the way those schemes shape the 'disabled' person and his/her rights. Concerning the analysis of concrete practices, she has launched an ethnographic and interview-based research project on the wheelchair, examining how using a wheelchair transforms a person, and how norms of action and relationship are mobilised, questioned and reinterpreted.

# Introduction

*Simone Bateman, Jean Gayon, Sylvie Allouche, Jérôme Goffette  
and Michela Marzano*

What is human enhancement? This term has become so common that it hardly seems to need clarification. And yet this is precisely the issue we raise in this book: the definition, scope and limits of human enhancement are as vague as the term is salient. Books explicitly devoted to human enhancement have already been published, mainly by philosophers, but most of these books deal with its ethical and political aspects, such as: Is it good and desirable or bad and dangerous? What moral criteria can help us shape our judgements? A selection of such books are listed at the end of the introduction; many are referred to throughout this book. Less attention, however, is devoted to questions about what exactly is being studied and how it should be approached.

What is human enhancement all about? What does ‘the improvement of human capacities’ mean? Is it relevant to distinguish current practices meant to restore health, compensate disabilities or improve appearance from enhancement practices? What practices today could be labelled as actual or potential forms of human enhancement? Are they similar to the enhancement practices envisioned by global projects or utopias such as transhumanism?

Human enhancement has become an issue of primary concern in debates about the future of contemporary societies. Yet this book does not argue for or against human enhancement, nor does it propose a detailed discussion of the ethical problems that it raises. Normative issues are not ignored, but they are not the *primum movens* of the inquiry. At the origin of this critical inquiry into human enhancement is the ambiguity of the term and the uncertain limits of its semantic domain. There is indeed no consensual definition of human enhancement: in this term, both ‘human’ and ‘enhancement’, that is, both the target and the action, are understood differently by different protagonists. How is the term

'human' understood? As human capacities, human individuals, the human condition or possibly the human species? And, even if the target is settled, is the term 'enhancement' a synonym for 'improvement', or does it mean 'augmentation', as suggested by the translation that seems to prevail now in Latin languages? Furthermore, 'enhancement' is both a descriptive term and a value-laden term, not to speak of those who consider it a normative term (that is, enhancement understood as an obligation). The semantic field of 'human enhancement' turns out to be a colourful panoply of heterogeneous practices – either actual or imagined – that generates controversies, aspirations, fears and dreams. In other words, the term is put to use in many different contexts, and is subject to unending interpretations, most of which are a justification of some end. Deciding which meaning of the term 'human enhancement' will prevail, with its respective practices, goals and justifications, will necessarily be the object of fierce competition.

Intrigued by this situation, we felt it was necessary to call on contributors from different countries and from different disciplinary backgrounds – sociology, philosophy, bioethics, political science, engineering, medicine, literary studies and also a renowned science fiction writer – to be able to comprehend human enhancement in its multiple dimensions. By doing so, we hope to have opened new routes for investigation, rather than refining pre-existing descriptions and arguments about human enhancement.

The topics examined by the authors address three fundamental aspects of human enhancement: what it means (concept), what it is (practices) and what it might be (visions of the future).

## **Human enhancement: what do we mean?**

A common feature of many concrete practices identified today as forms of human enhancement, such as off-label prescription of growth hormone or blood-doping in sports, is that they are often proposed in the context of medical care and are supported by scientific and technical progress in biology and medicine. Understandably, many scholars have therefore attempted to understand human enhancement from the perspective of what distinguishes these practices from standard medical care, usually referred to as the 'therapy-enhancement distinction'. However, a number of enhancement practices are now developing in arenas increasingly disconnected from the medical world, making this approach too narrow to provide a full view of what human enhancement might be.

The first part of the book therefore proposes novel perspectives for exploring the meaning of human enhancement, with special regard to the set of practices, goals and justifications that are implied by this term. Each chapter proposes a unique point of view from which the field of human enhancement can be comprehensively understood. One author concentrates on subjective motivations to be enhanced and their underlying social determinants (Menuz); another prefers to focus on the specific characteristics of enhancement practices (Goffette), while a third (ter Meulen) proposes a comprehensive ethical evaluation of enhancement technologies. Bateman and Gayon adopt a general framework to examine the semantics of the term 'human enhancement' in its historical and social dimensions.

In their introductory essay, Simone Bateman and Jean Gayon explore the meaning – or rather meanings – of human enhancement while keeping in mind the question 'What is at stake?' They observe that 'human enhancement' – precisely that term and not other ordinary or scientific uses of the term enhancement – emerged in the mid-1990s, becoming widespread in the early 2000s. The spectacular dissemination of the term benefited, in their view, from the superposition of three different uses, most often not clearly distinguished, but conceptually distinct: improvement of human capacities, self-improvement and improvement of human nature. The enhancement of capacities seems to have emerged as a first usage in the context of bioethics, as an expansion of previous intense debates over the *genetic* enhancement of humans. In 2002, the publication of the National Science Foundation report, 'Converging technologies for improving human performance', gave a decisive impulse to this trend, because it introduced a new set of technologies, which extended the vision of what human enhancement might be far beyond the medical arena. The second layer of meaning, self-improvement, entails the idea that enhancement technologies may also serve a personal quest for identity and authenticity. Self-improvement is not so much an explicit doctrine as it is a subjective posture regarding the desirability of enhancement. The aspiration to improve oneself is in fact so deeply rooted in contemporary culture that it could become an important driving force in the promotion of these technologies. In contrast, the third semantic layer, improvement of human nature, refers to explicit doctrines claiming that modern technologies make it possible for humans to radically alter their capacities, improve their condition and even, according to some authors (especially the transhumanists), transform the human species. Although these doctrines have roots in history, among them eugenics and the ideologies of progress, it is

the transhumanists who have been most active in promoting human enhancement as a vision of the future. Whether or not radical enhancements will be perceived by individual members of society as desirable, 'liveable' improvements of the *self* is likely to become a crucial arbitrating point in the debate.

Although acknowledging the semantic imprecision of the word 'enhancement', Jérôme Goffette claims that the term nonetheless encompasses a homogeneous set of practices, which he divides into eight categories: performance doping, use of psychostimulants (apart from medical indications), aesthetic transformations (apart from reconstructive plastic surgery), reproductive control (except in cases of reproductive dysfunction), mood modification (apart from medical indications), sex reassignment, quest for youth and immortality, and fabrication of a human being. All of these activities imply a logic of modification and improvement through the mastery of the body that goes beyond standard health care. Although enhancement and medicine may share similar resources, their respective goals are decidedly different. Hence his bold proposal: a new kind of activity is emerging, the art of 'changing and improving one's being by bodily modification'. Goffette proposes a name for this new art, 'anthropotechnics', and urges modern societies to recognise it as a full profession, with specific competencies, methods, and legal and deontological rules. In contrast with the therapy-enhancement distinction, which involves many semantic ambiguities, Goffette argues that the distinction between medicine and anthropotechnics is much clearer, and *should* be sharply made, both for conceptual and practical reasons. His focus on actual practices points to the first layer of meaning that Bateman and Gayon identify as improvement of human capacities.

Another way of encompassing the field of human enhancement is put forward by Vincent Menuz, who proposes a typology of enhancement practices based on individual motivations to be enhanced. Menuz gives an impressive table of these motivations, which he classifies into four overarching categories: (1) interventions aimed at adapting to the environment (skills in many areas such as work, sport, fighting, sexual attraction, and so on); (2) interventions aimed at fighting disease, aging and death; (3) interventions on existing or future children; and (4) interventions aimed at increasing happiness/well-being. As acknowledged by the author, this classification resembles that used by the US President's Council of Bioethics in their 2003 report on human enhancement practices entitled *Beyond Therapy*: 'Superior performance', 'Ageless bodies', 'Better children', and 'Happy souls'. But Menuz' classification is obtained

in a very different way: it is inductively extracted from an extensive array of publications on enhancement. The table provided shows that the first category, which boils down to improving performance, overwhelms all the others by the number of its sub-categories. Menuz insists that his classification is based on personal motivations: 'Prior to any biotechnological intervention, there is an appeal for it'. But the main point of the chapter is that the personal or subjective motivations to be enhanced all result from strong social pressures. These pressures are particularly important in forms of enhancement that aim to improve performance and social adaptation. Menuz' analysis confirms the importance of Bateman and Gayon's second layer of meaning of enhancement, 'self-improvement', delicately balanced between subjective perceptions and socio-cultural forces.

In his assessment of the ethical issues involved in human enhancement, Ruud ter Meulen offers a comprehensive view of human enhancement (practices and discourses) in terms of the kinds of moral concerns that they generate. He points to three major ethical challenges commonly discussed in the literature: a decrease in solidarity, a reinforcement of individualism and a weakening of individual responsibility. The first challenge might result from an unequal distribution of enhanced capacities, thus creating divisions within a society: people without enhanced capacities would be at risk of being seen as inferior and possessing fewer human rights. The second challenge is a possible loss of the sense of community with others, derived from a culture obsessed by self-improvement. The final challenge is that technological enhancement might lead people to replace individual agency and responsibility by a slavish use of drugs and other technologies to enhance their capacities. Even if these moral challenges are real, ter Meulen emphasises that these pessimistic moral scenarios are in no way inevitable. Enhancement technologies might also improve sociability (if equally shared) and generate new forms of authenticity and dignity. This will depend on the kind of society that individuals will be able to build together. Therefore, ter Meulen's attitude towards enhancement technology resembles the classical neutralist argument: technological resources are neither intrinsically good nor bad, they are what human collectivities decide to do with them.

## **Learning from enhancement practices**

The second part of the book focuses on current enhancement practices. Its purpose is not to provide an extensive account of these practices, but

rather to concentrate on a sample of actual enhancement technologies, and draw lessons from them. Several authors in the book (Eskiizmirliler, Goffette, Menuz, Missa) insist that human enhancement should not be seen exclusively or primarily as speculations about the future, but as resources and activities that are presently at our disposal. Some are well-known and widely diffused, such as doping and other technical aids for athletes. Others, such as Brain–Machine Interface (BMI) technologies, are just beginning to be applied in humans, usually in an experimental context, but they are already in a state of scientific development that allows realistic predictions about their potential for enhancement in a not-too-distant future. These case studies raise several problems that deserve close attention. Does it make sense to assess the degree of artificiality of an enhancement technology, knowing that efficient improvement of the human body often means complete incorporation of a change? How important is the process of individual and social adjustment to a given technology in attaining an improved or enhanced state? What are the social factors that lead individuals to make use of any given enhancement technology (such as doping)? The following four chapters provide some insight into these questions.

Pascal Nouvel, a biologist and philosopher, takes as his case study of human enhancement the use by athletes of erythropoietin, a hormone that controls red blood cell production. From this perspective, he challenges the relevance of the natural-artificial distinction in understanding enhancement and proposes instead a different approach. Nouvel classifies enhancement technologies according to two criteria: space and time. Is the effect of the substance, device or technological intervention localised or delocalised in the body? Is it temporary or definitive? Thus a removable prosthesis (for example, Pistorius' running blades) is localised and temporary; a doping substance (such as erythropoietin) is delocalised but temporary; a somatic genetic modification is localised and durable, possibly definitive; a germline modification is delocalised and definitive. Space and time thus provide a powerful and original way of classifying enhancement interventions, especially when they consist of clearly identifiable material entities introduced into the body. Nouvel's approach has two interesting consequences. First, it shows that the natural-artificial distinction is easily blurred when applied to enhancement. Such is the case of the ski champion Eero Mäntyranta who had inherited a mutated gene that naturally increased the rate of synthesis of erythropoietin. The same result can be temporarily obtained by injecting erythropoietin into an athlete's body, by inserting the appropriate gene in the zygote of a future child, or by selecting for the gene

in successive generations. This thought experiment leads Nouvel to a second and paradoxical observation: the most radical transformation (delocalised and durable) is precisely that which mimics a “natural” transformation’. His conclusions counter the common fantasies we have about what radically enhanced humans might look like. Although Nouvel does not draw ethical lessons from his analysis, his classification of enhancement practices in terms of space and time highlights not only the magnitude of a given modification, but also its possible irreversibility – which should be a matter of concern for an ethicist.

Time is also an important matter for Myriam Winance, Anne Marcellini and Eric de Léséleuc, but from a totally different perspective. Social scientists working on disability and sport, these authors raise the question of the time and effort it takes for someone – whether disabled or able-bodied – to adapt herself to a technical aid. From that point of view, compensation of disability and enhancement are one and the same thing. Winance *et al.* make a suggestive comparison between persons who use wheelchairs and paralympic athletes, such as Pistorius, who use running blades. In both cases, a new functional capacity is acquired. The wheelchair compensates (rather than repairs) a deficiency and therefore restores a capacity to move. Similarly Pistorius’ prostheses compensate for the loss of his natural legs and restore his capacity to move; however, his running blades are designed specifically for use in athletic events. In both cases the technical aid reduces functional inequality but the goals are different: in the first case it is integration into ordinary life, whereas in the second, it is competitive performance. Nonetheless, in both cases, the use of a technical aid involves an invisible process of adjustment to the technical aid (with physiological, psychological and social dimensions). These adaptive processes, including arrangements made with one’s social environment to make a technical aid effective, are for the most part invisible, creating the illusion that humans can be enhanced without effort through technology. Winance *et al.* call this the ‘biotechnological illusion’. This kind of analysis could be generalised and applied to a number of technological enhancements. Even doping, the effects of which seem so immediate and unintentional, requires, in the long run, a delicate adjustment that, in practice, relies both on personal experience and on professional competencies that go far beyond the athlete alone.

The next two chapters focus on two distinct kinds of technical aids that involve massive investments and research: brain-machine interfaces and doping. BMI is probably one of the fastest growing areas of research; so far it has few applications, which are mainly experimental,



but the prospects are considerable and might well entail the development of enhancements affecting numerous aspects of professional and private life, including our relations with other people. Doping, in contrast, is today probably the most frequently encountered example of enhancement, the effects of which are well-known and widely described and discussed. We have chosen these two examples because they both provide realistic case studies of enhancement as it exists today and as it might develop in the future.

The chapter on BMI is the result of a collaboration between an engineer working in computational neuroscience, Selim Eskiizmirliler, and a philosopher, Jérôme Goffette. The authors first propose a precise characterisation of what BMI technologies really are. A BMI system is a combination of software and hardware which translates neural activity into motor commands that trigger and control the operations of a machine. For the moment, brain-machine interfaces are only open loop systems, with no sensory feedback, but this limitation will probably be overcome in the near future. The best-known example is that of a monkey feeding itself with a robotic arm which it controls by means of the interface that links the arm to its brain. Similar experimental set-ups have involved persons with a disability, illustrated by a recent video in which a paraplegic woman intentionally moves a robotic arm so that she can drink from a covered cup. Eskiizmirliler and Goffette propose an impressive list of future uses of BMI systems affecting innumerable aspects of our daily lives: the acquisition of additional functional, albeit artificial, arms; the possibility of functioning on a scale larger than our body; the development of cross-human or collaborative BMI prostheses, allowing for instance a surgeon to control the acts and emotions of another surgeon at a distance. These are just a few examples to which, one imagines, the adjustment process described in the preceding chapter by Winance *et al.* might apply. The technological and economic perspectives, including their industrial and military uses, are huge, but so are the ethical problems that may arise from such uses. The authors insist that such technology generates possibilities that would certainly favour greater freedom of movement, action and interaction; but because it modifies the ordinary conditions of body ownership, it might also entail new forms of alienation, especially if an enhanced body is partly owned by a firm, for either medical or professional reasons. BMI thus offers a nice example of an enhancement technology that generates ethical ambivalence, as emphasised by Ruud ter Meulen in Chapter 4.

The chapter on doping behaviour is also the result of a collaboration of a practicing specialist, Patrick Laure (epidemiology and prevention

of doping behaviour) and a philosopher, Sylvie Allouche. The authors initially focus on doping in sport. This behaviour concerns a very limited fraction of the population but it offers a remarkably well-documented case. The chapter provides statistics concerning adults and young people: for all sports, doping affects from 5 to 15% of adults, and significantly less among younger people. Statistics also show that the major motivation for doping is competition and that its prevalence is mainly a function of the level of competition; prevalence is also higher among athletes who are most committed to their sports. Therefore, Laure and Allouche conclude that performance pressure is the 'prime mover' of doping behaviour, even if they also take into consideration the possibility that taking drugs may increase the pressure to perform. Interestingly, the authors ask whether this conclusion can be extended to doping behaviour outside sport. Data are not as abundant and as well-established in these domains. As in sport, personal involvement in an activity that is highly competitive is a key factor in doping behaviour. However, in contrast to sport, pressure to perform is less dependent on one's hierarchy in a profession; furthermore, professions that are vulnerable to fatigue or stress are more exposed to the risk of doping behaviour. Can this result be extended to other, and perhaps all, forms of technological enhancement? The case of doping, because it is so well documented, provides an important reference.

### **Visions of the future: lessons from art and fiction**

Imagination plays a major role in current representations of and reflection on human enhancement. Indeed, human enhancement does not simply modify an individual's capacities or performance; it simultaneously changes the way people relate to one another. Questioning the concept and the practices of human enhancement ultimately raises questions about the kind of society in which we wish to live tomorrow and the values we wish to promote, thus inviting us to explore the imaginary constructs disseminated by contemporary culture. Literature, art and, more particularly, science fiction have provided exceptional means for imagining social relationships in a world where human enhancement is a common practice. Scientists themselves have both influenced and made important contributions to this anticipatory literature. The third part of the book is devoted to examining these scenarios, both as cultural phenomena and as large-scale thought experiments that nourish prospective thinking.

The philosophies of progress elaborated in the 17th and 18th centuries (for example, by Francis Bacon and Nicolas de Condorcet) are often mentioned as remote ancestors of contemporary discourses on human enhancement. Indeed, they frequently insisted on the capacity of science and technology not only to give humankind the power to master the world, but also to modify human beings themselves, their bodies and their minds. Christopher Coenen points to more direct antecedents. Coenen gives detailed evidence of authors who, soon after Darwin, began to defend the idea that science alone, rather than political reforms, could radically improve the human condition, formulating the same kind of promises as today's transhumanists (such as eradication of disease, self-directed evolution, human-machine hybrids, life extended to hundreds of years, unlimited material progress, and so on). In contrast with contemporary authors who try to find in their 'precursors' a legitimization of their present discourse, this historical reconstruction identifies a precise intellectual genealogy, with a starting point (immediately after Darwin) followed by an uninterrupted series of authors to the present. The author thus concludes: contemporary conceptions of human enhancement belong to a tradition of thinking that he characterises as an 'ideology of extreme progress'. Originally, this ideology was developed as a means of weakening the existing social order with its strong religious orientation. Today, with its astounding avoidance of social problems, this ideology functions as an antidote to social progressivism, and constitutes an 'opiate' for a significant fraction of today's middle class, especially scientists and engineers. This is indeed a radical assertion, which calls to mind the similar (but distinct) history of eugenics. Eugenics also appealed to a fraction of the middle class, in this case medical doctors and also teachers, who found in it a vision of society that concurred with their biologically oriented and meritocratic values.

In a totally different vein, Françoise Dupeyron-Lafay also suggests a pessimistic view of human enhancement. A specialist of 19th-century British literature, she highlights traces of the modern dream of human enhancement in Robert Louis Stevenson's novella, *The Strange Case of Dr Jekyll and Mr Hyde*. Today, this Victorian tale is mainly known through its numerous film adaptations, which unfortunately emphasise the dramatic physical and moral transformation of the main character, leaving aside the more complex psychological and metaphysical aspects of the novella. Dupeyron-Lafay insists on two aspects that are relevant to our reflection on human enhancement. First, she emphasises Jekyll's ambivalent but nonetheless confident belief in the powers of

‘transcendental medicine’, a scientific medicine capable of producing the miracle of freeing him from his limitations. This strange mixture of science and mysticism, Dupeyron-Lafay suggests, may also be at work in contemporary visions of the future of humankind. We cannot resist here, even if we go a bit further than the author, recalling the way Julian Huxley introduces his word ‘transhumanism’ in 1957: ‘The human species can, if it wishes, transcend itself...in its entirety, as humanity. We need a name for this new belief. Perhaps *transhumanism* will serve: man remaining man, but transcending himself...’ (full quotation in Bateman and Gayon, Chapter 1). The second aspect of this tale, which Dupeyron-Lafay mentions in her title, is Jekyll’s conviction that the draught he takes will actually remove and isolate the negative aspects of himself, primarily the morally bad elements of his nature. The irony, of course, is that the drug produces a moral monster. Indeed, she points to the repressive social context of Calvinism that influenced Stevenson, and which probably accounts for Jekyll’s obsession with purifying his person of his pleasure-seeking (thus evil) self. In sum, Stevenson’s story can be read as a cautionary tale of human enhancement, with its combination of a desire for improvement and transcendence (rejuvenation, acquisition of new powers, surpassing our limitations, becoming ‘good’, and so on) and attendant fears about the process and its ultimate consequences (unreliability of our technical means, illusory scientific and technical powers, and the possibility of disaster).

In contrast with the pessimism of the two preceding chapters, the final two offer views that are the exact opposite. Both use fiction to develop their plea in favour of human enhancement, or at least to refuse its outright condemnation.

As Laure and Allouche did in Chapter 8, so Jean-Noël Missa addresses the problem of doping in sport. First he examines and challenges the ‘anti-doping philosophy’: in his view, all customary arguments are flawed. Missa does not defend indiscriminate and unregulated use of doping by athletes but, as a physician and historian of medicine himself, he argues in favour of an ‘enhancement medicine’. In contrast with Jérôme Goffette (Chapter 2), he thinks that the boundary between therapy and medicine has gradually disappeared and that, especially in the case of professional sport, it is unrealistic, hypocritical and dangerous to ignore this. He gives several reasons why the practice of doping athletes should be recognised and medically managed. What appears to be his main argument is that an athlete is more than her genes and her own courage. Professional sport has become a highly competitive activity that, as such, relies on a combination of knowledge-based

resources (professional training, hygiene, physiological knowledge, nutrition, environmental conditions, and so on) and in which drugs are one among many means to increase competitive excellence while alleviating unnecessary suffering. To support his views, Missa proposes an imaginary account of the Olympic Games held in Brussels in 2144. Suffice it here to say that Missa uses fiction to describe a state of affairs in which professional sport massively relies on the legalised use of doping, a situation in which this appears normal, morally acceptable and desirable for all agents – the public, sport institutions and the pharmaceutical companies sponsoring and coaching the athletes. At the end of the story, the narrator confesses that, although he has no doubt about the progress accomplished since the mad times during which doping was fiercely prohibited despite widespread use, he is not sure that he would like his son to become the kind of enhanced athlete that both father and son so enjoy admiring at the stadium.

Brian Stableford's final chapter confirms the interest of using fiction as a tool in making conjectures about the future of human enhancement. Initially trained as a biologist, Stableford has always been an admirer of John B.S. Haldane, a renowned biologist who occasionally engaged in speculative writing about the relationship between scientific progress – particularly in biology – and social change. Following in his footsteps, Stableford has, as a scientific writer, systematically explored the possible consequences of many forms of potential biological enhancements for individuals and societies. In his chapter, he points to the fact that he has always avoided apocalyptic scenarios: he has instead attempted 'to produce images of the future in which various kinds of biotechnologies are seen as entirely normal by the characters in the stories'. Here Stableford focuses on 'emortality' – a word that designates not immortality strictly speaking, but the scenario of an indefinite extension of the duration of life, in which death results only by accident. He tries to imagine its most probable effects on actual social attitudes. Those effects may occasionally be dramatic, but we need not assume that they will necessarily lead to tragedy, or that they are fundamentally undesirable changes. Perhaps his strongest example is his description of the effects of life extension on families and on the succession of generations: for example, the necessary changes in our rates of birth, in the ways we share the burdens and pleasure of having children and the possible consequences of these changes on our demographic and ecological environment. In our view, Stableford suggests that, if an enhancement is technically feasible and we find it desirable, then there are ways of re-organising society so as to cope with this new state of affairs.