

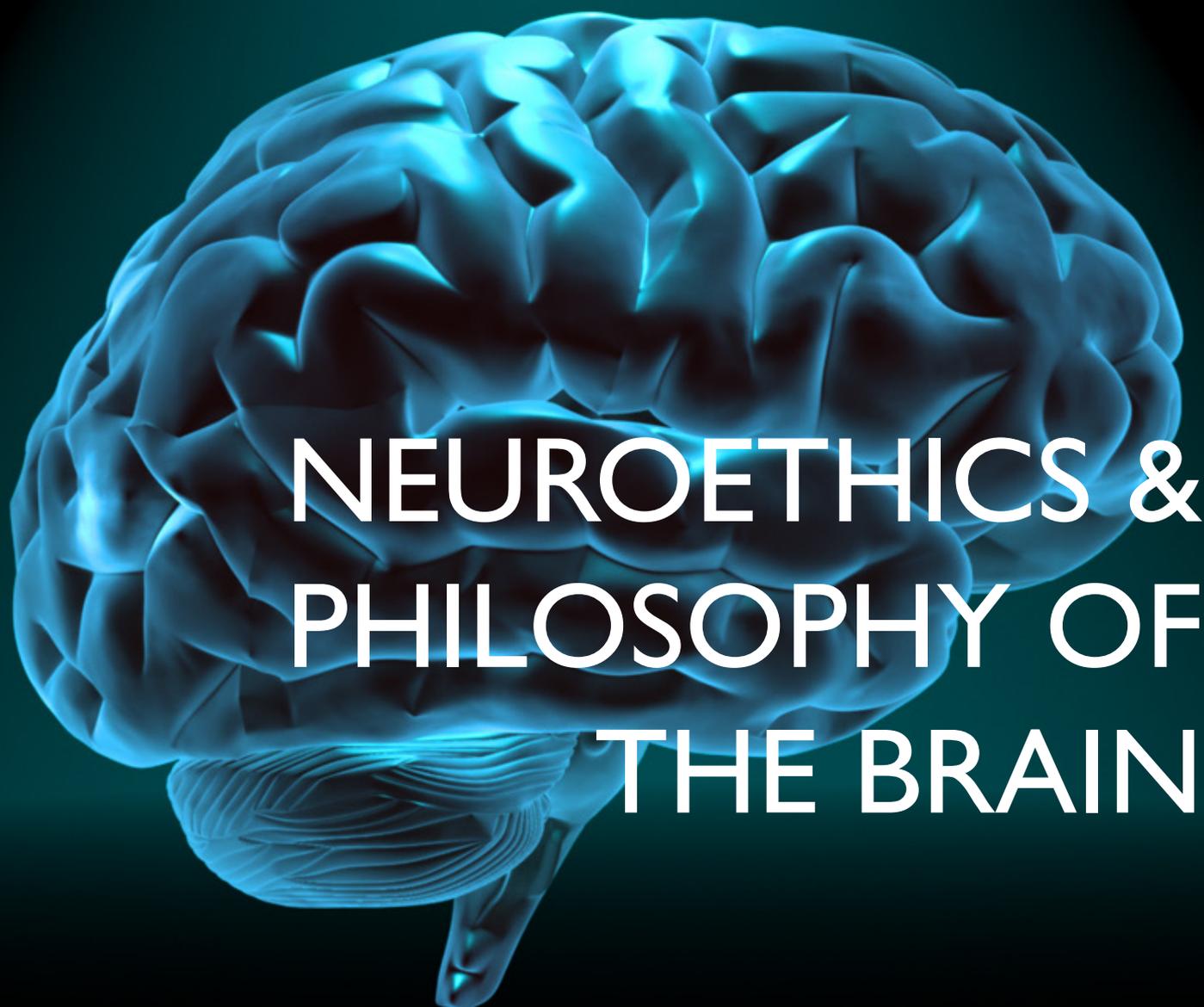


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Human Brain Project

*Approaching future issues*



# NEUROETHICS & PHILOSOPHY OF THE BRAIN

Centre for Research Ethics & Bioethics

*A collection of books and articles*

*Third edition*

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# NEUROETHICS & PHILOSOPHY OF THE BRAIN

Understanding the human mind and brain is one of the greatest challenges facing science in the 21st century. Neuroscience, philosophy, psychology and psychiatry all offer different models for understanding how the mind and the brain work, explanations that often come with particular sets of philosophical, ethical and social issues.

In order to address these issues, we need research in neuroethics and neurophilosophy. This research can be divided into fundamental neuroethics/neurophilosophy ('neuroscience of ethics'), and applied neuroethics/neurophilosophy ('ethics of neuroscience'). The former is primary to the latter, in that adequate applied research must be based on solid theory.

In our research we use a conceptual approach to neuroethics and neurophilosophy, focusing primarily on fundamental research questions, notably concerning consciousness, human identity, and the self. We are developing a theoretical framework for neuroethics within which practical issues can fruitfully be analysed. We are developing a theoretical framework for neuroethics to make analysis of practical issues fruitful. We examine the concepts that neuroscience uses and the impact that neuroscientific language and categories has on ethics and society

We investigate applications of neuroscience and ethical assessments of neuroscientific research. Current PhD projects look at how we can use neuroimaging and other methods to understand [how the mind works in people who can't use their behaviour to communicate](#) and [what it is like to be unconscious](#). We are also part of the European Community (FET) Flagship [Human Brain Project](#) where we look at the ethical and social questions that are raised when we model the human brain, e.g. through the method of simulation.

The CRB neuroethics research team is an international, multi-disciplinary group. Our backgrounds allow us to approach these issues from theoretical, philosophical, social, bio-political and clinical perspectives. We collaborate closely with neuroscientists to understand the ethical and philosophical questions that neuroscience brings.

We have long standing collaborations with [Collège de France](#) and the [Pasteur Institute](#) in Paris, the Centro de Investigaciones Filosóficas ([CIF](#)) and the Institute of Cognitive Neurology ([INECO](#)) in Buenos Aires. We also work with [Universidad Central de Chile](#) the [Coma Research Group](#) in Liege, the [Canada Research Chair of Mind, Brain Imaging and Neuroethics](#) in Ottawa, the Neuroethics Group of the [Pellegrino Center for Clinical Bioethics](#) of the Georgetown University in Washington DC, the [Bioethics Unit](#) of the Italian National Institute of Health in Rome, the [KTH](#) Royal Institute of Technology in Stockholm and the [Karolinska University Hospital](#) in Stockholm.

Uppsala, April 2016



Kathinka Evers,  
Centre for Research Ethics & Bioethics (CRB), Uppsala University

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# PEER REVIEWED ARTICLES

**Salles A, Sobre la neuroética, Forthcoming, Revista Latinoamericana de Filosofía, 2016;XL(1)**

**Abstract:** Introduction to a special issue devoted to neuroethics. This article provides an overview of the main issues raised by recent neuroscientific advances and the different approaches used to understand and discuss them.

**Farisco M, Evers K, Salles A, Big Science, Brain Simulation and Neuroethics, In Press, AJOB Neuroscience, 7(1): 1–2, 2016**

**Abstract:** The ethical analysis of brain simulation is a relatively new field of research, which is gaining an increasing multidisciplinary interest. However, at present the debate revolves mainly around the practical concerns raised by emerging neuro-technology, concerns that are not fundamentally different from those raised by emerging technologies in general. The authors suggest that while valuable, this common approach is not enough to fully capture the issues at stake and propose the examination of conceptual understandings of the brain and of simulation in order to better grasp the ethical implications of simulation technology in particular.

**Evers K, The Responsible Brain: Free Will and Personal Responsibility in the Wake of Neuroscience, In Press. Forthcoming 2016 in: Revista Latinoamericana de Filosofía, 2016; XLII(1), Otoño 2016.**

**Abstract:** This article examines the neuroethical problem of free will that consists in explaining how the socially crucial conception of human beings as free and responsible can be combined with neuroscientific findings on human beings and their behaviour. Within neuroscience, the experience of free will has been considered 'illusory' by virtue of being (1) a brain construct, or (2) causally determined, or (3) non-consciously initiated. This article analyses these positions and suggests a neurophilosophical view on free will according to which, rather than posing a new threat to our unalienable notions of free will and personal responsibility, neuroscience can offer empirical support for them.

**Evers K, Neurotechnological assessment of consciousness disorders: five ethical imperatives, In Press. Forthcoming 2016 in: Dialogues in Clinical Neuroscience, 2016;18(2), DCNS 69**

**Abstract:** Disorders of Consciousness (DOCs) cause great human suffering and material costs for society. Understanding of these disorders has advanced remarkably in recent years, but uncertainty remains with respect to the diagnostic criteria and standards for care. One of the most serious problems concerns misdiagnoses, their impact on medical decision-making, and on patients' wellbeing. Recent studies of DOC patients use neurotechnology to assess residual consciousness in DOC patients that traditional behavioural diagnostic criteria are unable to detect. The results show an urgent need to strengthen the development of new diagnostic tools and more refined diagnostic criteria. If residual consciousness may be inferred from robust and repeated results from neurotechnological communication with DOC patients, this also raises ethical challenges. With reference to the moral notions of beneficence and fundamental rights, five ethical imperatives are here suggested in terms of diagnosis, communication, interpretation of subjective states, adaptation of living conditions and care.

**Sallin K, Lagercrantz H, Evers K, Engström I, Hjern A, Petrovic P, [Resignation Syndrome: Catatonia? Culture-Bound?](#), Front. Behav. Neurosci., 29 January 2016**

**Abstract:** Resignation syndrome (RS) designates a long-standing disorder predominately affecting psychologically traumatized children and adolescents in the midst of a strenuous and

lengthy migration process. Typically a depressive onset is followed by gradual withdrawal progressing via stupor into a state that prompts tube feeding and is characterized by failure to respond even to painful stimuli. The patient is seemingly unconscious. Recovery ensues within months to years and is claimed to be dependent on the restoration of hope to the family. Descriptions of disorders resembling RS can be found in the literature and the condition is unlikely novel. Nevertheless, the magnitude and geographical distribution stand out. Several hundred cases have been reported exclusively in Sweden in the past decade prompting the Swedish National Board of Health and Welfare to recognize RS as a separate diagnostic entity. The currently prevailing stress hypothesis fails to account for the regional distribution and contributes little to treatment. Consequently, a re-evaluation of diagnostics and treatment is required. Psychogenic catatonia is proposed to supply the best fit with the clinical presentation. Treatment response, altered brain metabolism or preserved awareness would support this hypothesis. Epidemiological data suggests culture-bound beliefs and expectations to generate and direct symptom expression and we argue that culture-bound psychogenesis can accommodate the endemic distribution. Last, we review recent models of predictive coding indicating how expectation processes are crucially involved in the placebo and nocebo effect, delusions and conversion disorders. Building on this theoretical framework we propose a neurobiological model of RS in which the impact of overwhelming negative expectations are directly causative of the down-regulation of higher order and lower order behavioral systems in particularly vulnerable individuals.

**Farisco M, [“Cerebral Communication” With Patients With Disorders of Consciousness: Clinical Feasibility and Implications](#), *AJOB Neuroscience*, 2015;6(2):44-46**

**Abstract:** Recent neuroscientific and neurotechnological developments give us the possibility of detecting covert awareness in patients behaviorally diagnosed as in vegetative state/unresponsive wakefulness syndrome (VS/UWS). Starting from this detection of conscious brain activity, a potential new tool for communicating with these patients is under investigation by the scientific community. Several conceptual and ethical issues urge specific attention.

**Melo Martin I, Salles A, [Moral Bioenhancement: Much Ado about Nothing?](#), *Bioethics*, 2015;29(4):223-232**

**Abstract:** Recently, some have proposed moral bioenhancement as a solution to the serious moral evils that humans face. Seemingly disillusioned with traditional methods of moral education, proponents of bioenhancement believe that we should pursue and apply biotechnological means to morally enhance human beings. Such proposal has generated a lively debate about the permissibility of moral bioenhancement. We argue here that such debate is specious. The claim that moral bioenhancement is a solution – whether permissible or not – to the serious moral problems that affect human beings is based on several problematic framing assumptions. We evaluate here three of such assumptions: the first rests on a contested understanding of morality, the second consist in a mistaken conception of human moral problems, and the third relates to problematic presuppositions grounding the interpretation of existent scientific evidence presented to defend moral bioenhancement. Once these framing assumptions are identified and critically evaluated, it becomes clear that the moral bioenhancement debate is misguided.

**Gini A, Larrivee D, Farisco M, Sironi VA, [Keeping the human: neuroethics and the conciliation of dissonant values in the 21st century](#), *Neuroscience and Neuroeconomics* 2015;4:1-10**

**Abstract:** Studied since antiquity, the human brain has recently been the inspiration for an international neuroscientific entrepreneurship, the Human Brain Project in Europe and the Brain Research through Advancing Innovative Neurotechnologies initiative in the USA. Different in their approach, both regard the human brain as one of the greatest challenges of 21st century science and the organ that makes us “human”. However, it is mainly the necessity of developing new therapies that affect up to a billion people worldwide, which has propelled

the search for extensive expertise and investment in neuroscience research. The debate on ethical and social policy issues as well as the research and medical strategies of such gigantic efforts has involved participants as diverse as neuroscientists, philosophers, scholars in ethics and law, politicians, and the general public, rendering modern neuroscience an interdisciplinary and conflictual endeavor. In fact, the brain is described as the biological underpinning of our thoughts, emotions, perceptions, free willed actions, and memories, features unique to our humanity. In this review, three neuroscientists and a philosopher from the neuroethics community provide their perspectives for an up-to-date survey of salient neuroethical issues, ie, modulation of free will and neuropharmaceuticals and neurotechnologies that enhance cognitive capacities, as well as an introduction of the reader to the controversial new discipline of neuroethics. Written for nonexperts in the field, it is intended to reflect on and to impart information helpful in understanding the challenges and the perils of modern neuroscience, whose tools are so powerful as to jeopardize what is uniquely “human” through willful mind manipulation. We conclude that, for any future effort to “recreate” the mind and, at the same time, keep what is uniquely ours, it will be necessary to reflect ethically and review carefully man's past best efforts at self-understanding.

**Farisco M, Laureys S, Evers K, [Externalization of Consciousness. Scientific Possibilities and Clinical Implications](#), in: Geyer M, Ellenbroek B, Marsden C (eds), *Current Topics in Behavioural Neurosciences*, 2015; 19: 205-222, doi: 10.1007/7854\_2014\_338**

**Abstract:** The paper starts by analyzing recent advancements in neurotechnological assessment of residual consciousness in patients with disorders of consciousness and in neurotechnology-mediated communication with them. Ethical issues arising from these developments are described, with particular focus on informed consent. Against this background, we argue for the necessity of further scientific efforts and ethical reflection in neurotechnological assessment of consciousness and ‘cerebral communication’ with verbally non-communicative patients.

**Dudai Y, Evers K, [To Simulate or not to Simulate: What are the questions?](#), *Neuron*, 2014;84(2):254-261**

**Abstract:** Simulation is a powerful method in science and engineering. However, simulation is an umbrella term, and its meaning and goals differ among disciplines. Rapid advances in neuroscience and computing draw increasing attention to large-scale brain simulations. What is the meaning of simulation, and what should the method expect to achieve? We discuss the concept of simulation from an integrated scientific and philosophical vantage point and pinpoint selected issues that are specific to brain simulation.

**Farisco M, Evers K and Petrini C, [Biomedical research involving patients with disorders of consciousness: ethical and legal dimensions](#), *Ann Ist Super Sanità*, 2014;50(3):221-228**

**Abstract:** The directive 2001/20/UE and the research involving patients with docs. Research involving patients with disorders of consciousness (DOCs) deserves special ethical and legal attention because of its Janus-faced nature. On the one hand, it raises concerns about the risk to expose the involved subjects to disproportionate risks not respecting their individual dignity, particularly their right to be cared for; on the other hand, research is an essential tool in order to improve the clinical condition of patients with DOCs. The present paper concerns the ethical and legal dimensions of biomedical research involving patients with disorders of consciousness. In particular, it focuses on informed consent to experimental treatments, which is a challenging issue both from an ethical and legal point of view. The first part reads the Directive 2001/20/EU in the light of the experimentation of patients with DOCs, and suggests a revision in order to better assess the issue of informed consent. The particular case of informed consent for observational studies of non-communicative patients. The second part presents an informed consent form for studies through video-recording of patients unable to communicate their own consent. This form has been elaborated by the bioethics unit of the project “Review of the nosography of vegetative states: application of methods of behavioral analysis to individuals in coma or vegetative state” developed at the Italian National Institute of

Health. Relevance of the suggested form. The paper describes the conceptual framework of the form for informed consent to studies through video-recording, which is a relevant example of what issues should be included in an informed consent for any type of studies through video-recording of patients unable to express their own consent. The article has been sent on November the 7th 2013, before the adoption of the Regulation (EU) no. 536/2014 (and consequent abrogation of the Directive 2001/20/EU) and the release of the new edition of the Italian Code of Medical Ethics.

**Farisco M, Petrini C, [Misdiagnosis as an ethical and scientific challenge, \*Ann Ist Super Sanità\*, 2014;50\(3\):229-233](#)**

**Abstract:** Difficulties of behavioral assessment of consciousness. An astonishingly high rate of misdiagnosis between vegetative state/unresponsive wakefulness syndrome and minimally conscious state has been detected. This raises the issue of the adequacy of the consciousness' assessment in patients with disorders of consciousness. The behavioral assessment of consciousness could be not able to detect covert awareness, which is increasingly identified by the instrumental assessment. Ancillary methods. Neurotechnology, particularly neuroimaging, provides relevant data concerning the neurological underlying condition of patients with DOCs, but the instrumental approach has still to assess some technical issues. Ethical considerations. A correct diagnosis of a DOC is not only an instrumental issue, but also an ethically relevant demand to the scientific community. Finally, an integration between behavioral and instrumental assessments seems to be the most adequate strategy in order to decrease the rate of misdiagnosis.

**Farisco M, Petrini C, [On the Stand. Another Episode of Neuroscience and Law Discussion From Italy, \*Neuroethics\*, 2014; 7\(2\):243-245](#)**

**Abstract:** After three proceedings in which neuroscience was a relevant factor for the final verdict in Italian courts, for the first time a recent case puts in question the legal relevance of neuroscientific evidence. This decision deserves international attention in its underlining that the uncertainty still affecting neuroscientific knowledge can have a significant impact on the law. It urges the consideration of such uncertainty and the development of a shared management of it.

**Farisco M, [In Need of Meta-Scientific Experts?, \*AJOB Neuroscience\*, 2014; 5\(2\):20-52](#)**

**Abstract:** A recent Italian case shows that the interpretation of neuroscientific evidence is often uncertain and debated. Judges and courts have to deal with this uncertainty. We suggest as a strategy to assess it the involvement of meta-scientific experts who can help lay people (as judges and juries presumably are, in science) to understand the formal and conceptual limitation of neuroscience.

**Farisco M, Alleva E, Chiarotti F, Macrì S, Petrini C, [Clinicians' attitudes towards patients with disorders of consciousness: a survey, \*Neuroethics\* 2014; 7\(1\):93-104](#)**

**Abstract:** Notwithstanding fundamental methodological advancements, scientific information about disorders of consciousness (DOCs)—e.g. Vegetative State/Unresponsive Wakefulness Syndrome (VS/UWS) and Minimally Conscious State (MCS)—is incomplete. The possibility to discriminate between different levels of consciousness in DOC states entails treatment strategies and ethical concerns. Here we attempted to investigate Italian clinicians' and basic scientists' opinions regarding some issues emerging from the care and the research on patients with DOCs. From our survey emerged that Italian physicians working with patients with DOCs give a central role to ethics. Current Italian regulation regarding basic research conducted in patients with DOCs apparently risks to be inadequate to support scientific advancement, and would deserve a different assessment compared to ordinary treatments. We think the results of our survey deserve attention from an international audience because they exemplify the difficulty to define a shared approach to the issues related to patients with DOCs and the

necessity to better assess both the ordinary and experimental treatment of patients with DOCs at the ethical and legal level.

**Gutierrez-Arenas O, Eriksson O, and Hellgren Kotaleski J, [Segregation and crosstalk of D1 receptor-mediated activation of ERK in striatal medium spiny neurons upon acute administration of psychostimulants](#), *PLoS Computational Biology*, 2014;10(1): e1003445**

**Abstract:** Development and regeneration of the nervous system requires the precise formation of axons and dendrites. Kinases and phosphatases are pervasive regulators of cellular function and have been implicated in controlling axodendritic development and regeneration. We undertook a gain-of-function analysis to determine the functions of kinases and phosphatases in the regulation of neuron morphology. Over 300 kinases and 124 esterases and phosphatases were studied by high-content analysis of rat hippocampal neurons. Proteins previously implicated in neurite growth, such as ERK1, GSK3, EphA8, FGFR, PI3K, PKC, p38, and PP1a, were confirmed to have effects in our functional assays. We also identified novel positive and negative neurite growth regulators. These include neuronal-developmentally regulated kinases such as the activin receptor, interferon regulatory factor 6 (IRF6) and neural leucine-rich repeat 1 (LRRN1). The protein kinase N2 (PKN2) and choline kinase alpha (CHKA) kinases, and the phosphatases PPEF2 and SMPD1, have little or no established functions in neuronal function, but were sufficient to promote neurite growth. In addition, pathway analysis revealed that members of signaling pathways involved in cancer progression and axis formation enhanced neurite outgrowth, whereas cytokine-related pathways significantly inhibited neurite formation.

**Gutierrez-Arenas O, [Handling and analyzing meshed rendering of segmented structures from 3D image stacks in Blender](#), *Neuroinformatics*, 2014;12(4):3-6**

**Abstract:** Volume electron microscopy (EM) is an aggregate of techniques (e.g. FIB-SEM, SBF-SEM) which are evolving toward easing the trade-off between resolution and field of view size so that increasingly large volumes of tissue can be imaged at just a few nanometer resolution. These technical developments have been driven by the necessity of characterizing spatially extended structures with functionally relevant supramolecular elements that are several orders of magnitude smaller. Neuronal microcircuits with their intracellular organelles and synaptic specializations stand out among these demanding biological objects. With the increasing image throughput, the bottleneck in the pipeline is the segmentation of both the neurites (axon and dendrites) and the organelles and synaptic structures from the collected 3D EM image stack. In both cases, iterations between human curation and machine learning procedures are the norm

**Nair AG, Gutierrez-Arenas O, Eriksson O, Jauhainen A, Blackwell KT and Hellgren Kotaleski J, [Modeling intracellular signaling underlying striatal function in health and disease](#). In “*Computational Molecular Neurosciences: Novel approaches to understanding diseases of the nervous systems*”, 2014;123: 277-304**

**Abstract:** Striatum, which is the input nucleus of the basal ganglia, integrates cortical and thalamic glutamatergic inputs with dopaminergic afferents from the substantia nigra pars compacta. The combination of dopamine and glutamate strongly modulates molecular and cellular properties of striatal neurons and the strength of corticostriatal synapses. These actions are performed via intracellular signaling networks, containing several intertwined feedback loops. Understanding the role of dopamine and other neuromodulators requires the development of quantitative dynamical models for describing the intracellular signaling, in order to provide precise unambiguous descriptions and quantitative predictions. Building such models requires integration of data from multiple data sources containing information regarding the molecular interactions, the strength of these interactions, and the subcellular localization of the molecules. Due to the uncertainty, variability, and sparseness of these data, parameter estimation techniques are critical for inferring or constraining the unknown parameters, and sensitivity analysis evaluates which parameters are most critical for a given observed macroscopic behavior. Here, we briefly review the modeling approaches and tools that have

been used to investigate biochemical signaling in the striatum, along with some of the models built around striatum. We also suggest a future direction for the development of such models from the, now becoming abundant, high-throughput data.

**Salles A, [Neuroethics in a “Psy” World: the Case of Argentina](#), *Cambridge Quarterly of Healthcare Ethics*, 2014;23:3**

**Abstract:** Given the cultural psychoanalytic tradition that shapes the thought of Argentines and their current skepticism with regard to neurosciences when it comes to understanding human behavior, this article addresses the question of whether a healthy neuroethics can develop in the country.

**Salles A, [Las diferencias sexuales y la discusión neuroética](#), *Debate Feminista*, 2014; 25:49: 94-116**

**Abstract:** En este capítulo, me propongo indagar este entrecruzamiento conceptual entre el feminismo y la neuroética. En la primera parte, presentaré algunos de los temas más recurrentes de la neuroética, para luego señalar los matices diferentes introducidos por el feminismo. En la segunda parte me concentro en algunas inquietudes feministas sobre la investigación neurocientífica de las diferencias sexuales, en particular las relacionadas con la manera como se lleva a cabo y las consecuencias de sus resultados. Finalmente, en la tercera parte sugiero que es hora de trascender las etiquetas y nos propongamos hacer una neuroética lo suficientemente crítica e intelectualmente honesta como para que esté atenta a todo tipo de consideración moralmente significativa incluyendo, por supuesto, las de género.

**Evers K & Sigman M, [Possibilities and limits of mind-reading: A neurophilosophical perspective](#), *Consciousness and Cognition*, 2013;22:887–897**

**Abstract:** Access to other minds once presupposed other individuals' expressions and narrations. Today, several methods have been developed which can measure brain states relevant for assessments of mental states without 1st person overt external behavior or speech. Functional magnetic resonance imaging and trace conditioning are used clinically to identify patterns of activity in the brain that suggest the presence of consciousness in people suffering from severe consciousness disorders and methods to communicate cerebrally with patients who are motorically unable to communicate. The techniques are also used non-clinically to access subjective awareness in adults and infants. In this article we inspect technical and theoretical limits on brain-machine interface access to other minds. We argue that these techniques hold promises of important medical breakthroughs, open up new vistas of communication, and of understanding the infant mind. Yet they also give rise to ethical concerns, notably misuse as a consequence of hypes and misinterpretations.

**Salles A, [On the Normative Implications of Social Neuroscience](#), *RECERCA: Revista di Pensament I Anàlisi*, 2013;13:29-42**

**Abstract:** Within the last decades, brain science has been offering new insights into the relationship among diverse psychological processes and the neural correlates of our moral thought and behavior. Despite the distinction between the explanatory/descriptive nature of science and the normative nature of morality, some neuroethicists have claimed that neuroscientific findings have normative implications. In this paper, I identify three interpretations of the claim. The first focuses on neuroscience's role in explaining the origin of morality and of moral values and how neurobiology is the bases of moral behavior. A second version is about the role that neuroscientific knowledge can play in showing the psychological plausibility of the moral psychology underlying some ethical approaches. Finally, a third version advances that neuroscience could play a role in determining the moral plausibility of some normative approaches. My aim is to delineate each version and highlight the issues raised to suggest that while neuroscience might provide information regarding the nature of moral reasoning, its role in the normative discussion itself is still quite limited.

**Achával D, Villarreal M, Salles A, Bertomeu MJ, Costanzo E, Goldschmidt M, Castro M, van der Poel I, Nemeroff C, Guinjoan SM, [Activation of brain areas concerned with social cognition during moral decisions is abnormal in schizophrenia patients and unaffected siblings](#), *Journal of Psychiatric Research*, 2013; 47(6):774-782**

**Abstract:** Moral decision-making involves complex social cognitive processes which are known to be altered in patients with schizophrenia and first-degree relatives. Traditional philosophical views on human moral behavior have distinguished between utilitarian views (which emphasize outcomes) and deontological approaches (defining what is right to do according to certain norms). Since emotions have been suggested to play a determining role in moral behavior, we hypothesized patients with schizophrenia and unaffected siblings would make more utilitarian choices and show faulty activation of brain areas concerned with emotion regulation during such tasks. Unexpectedly, all participants (n = 13 per group) made the same proportion of utilitarian and deontological decisions. Brain activation common to all groups induced by moral decisions included two circumscribed portions of right ventromedial and dorsolateral prefrontal cortex, adding to previous evidence on a right prosencephalic cognitive network involved in ethical decisions. However, brain activation induced by moral decisions was different in healthy persons, schizophrenia patients, and nonpsychotic siblings in regards to areas directly concerned with emotion processing. These results seem to underscore the role of acquired norms in moral decisions, a frequently overlooked concept in the neurobiological characterization of human ethical behavior, and add to previous evidence of abnormal social cognitive processing in schizophrenia.

**Farisco M, [The Ethical Pain: Detection of pain and suffering in patients with disorders of consciousness](#), *Neuroethics*, 2012; 6(2):265-276**

**Abstract:** The intriguing issue of pain and suffering in patients with disorders of consciousness (DOCs), particularly in Unresponsive Wakefulness Syndrome/Vegetative State (UWS/VS) and Minimally Conscious State (MCS), is assessed from a theoretical point of view, through an overview of recent neuroscientific literature, in order to sketch an ethical analysis. In conclusion, from a legal and ethical point of view, *formal guidelines* and a *situationist ethics* are proposed in order to best manage the critical scientific uncertainty about pain and suffering in DOCs and ensure the best possible care for the patient.

**Farisco M, Petrini C, [The Impact of Neuroscience and Genetics on the Law: A Recent Italian Case](#), *Neuroethics*, 2012;5(3):317-319**

**Abstract:** The use of genetic testing and neuroscientific evidence in legal trials raises several issues. Often their interpretation is controversial: the same evidence can be used to sustain both the prosecution's and defense's argument. A recent Italian case confirms such concerns and stresses other relevant related questions.

**Salles A, [Reflexiones sobre la bioética y la biotecnología](#), *Perspectivas Bioéticas*, 2012; 17(32):81-95**

**Abstract:** New biomedical technologies and research have raised a number of ethical issues and created a polarized debate about how to understand and solve them. Here, I present two rival approaches regarding how to look at biotechnology: the neoconservative and the progressive approaches. I explore some of their underlying assumptions and consider the role that similar approaches play in shaping the public perception and discussion of the ethical issues raised by biotechnology in Latin American countries.

**Salles A, Melo Martin I, [Disgust in Bioethics](#), Cambridge Quarterly of Healthcare Ethics, 2012; 21(2): 267-280**

**Abstract:** We propose to advance the dialogue by clarifying the different ways in which disgust is used when dealing with bio-ethical issues, particularly those issues that relate to new biotechnological developments. We argue that discussions involving this concept are muddled because of a failure to clarify the particular content of the emotion and its manifestations, or because disputants are using disgust in different ways. We identify here four main uses of the concept of disgust. In some cases, disgust is used as an example to illustrate the proper role of emotional sensibility in bioethical thinking. In other cases, disgust is discussed as a possible source of moral knowledge that can help us discern the permissibility of biomedical practices or technologies. Disgust is also used as a rhetorical device to bring forth opposition or rejection of such practices or biotechnological advances. Finally, disgust is used in the bioethics literature as a tool that, on grounds of irrationality or ignorance, allows one to dismiss the concerns of those who appeal to disgust when rejecting new biomedical technologies. Of course, the different uses of disgust are interrelated, and sometimes more than one of these uses is found in the same work. We believe however, that these diverse uses have different normative implications, and thus it is important to clarify what it is that one wants to achieve when using the concept of disgust.

**Melo Martin I, Salles A, [On Disgust and Human Dignity](#), Journal of Value Inquiry, 2011; 45(2):159-168**

**Abstract:** In this paper, critically examine Nussbaum's claim that moralized disgust necessarily presents a threat to the dignity of human beings. Without calling into question Nussbaum's account of human dignity and of the emotion of disgust, we have seen that whether dignity can be conceptualized as an inalienable characteristic possessed by all human beings or as a characteristic tied to the development and exercise of the central human capabilities, moralized disgust need not be incompatible with respect for the dignity of human beings. However, the fact that moral disgust need not present a threat to the equal respect and dignity of all human beings does not support the claim that there is wisdom in repugnance. It might well be that disgust is not very reliable and thus not a particularly good moral guide. Also, it might be that, as Nussbaum suggests, the link of disgust with the desire to remain pure can result in a failure to move us to engage socially, to protest against wrongdoing, and to right wrongs. If so, disgust might not be a valuable emotion for social reform. Hence, there might be good reasons to question the value of disgust as a response to moral wrongs, but a concern that disgust inevitably threatens human dignity does not seem to be one of them

**Buchser WJI, Slepak TI, Gutierrez-Arenas O, Bixby JL, Lemmon VP, [Kinase/phosphatase overexpression reveals pathways regulating hippocampal neuron morphology](#), Mol Syst Biol., 2010; 6:391. doi: 10.1038/msb.2010.52**

**Abstract:** The convergence of corticostriatal glutamate and dopamine from the midbrain in the striatal medium spiny neurons (MSN) triggers synaptic plasticity that underlies reinforcement learning and pathological conditions such as psychostimulant addiction. The increase in striatal dopamine produced by the acute administration of psychostimulants has been found to activate not only effectors of the AC5/cAMP/PKA signaling cascade such as GluR1, but also effectors of the NMDAR/Ca(2+)/RAS cascade such as ERK. The dopamine-triggered effects on both these cascades are mediated by D1R coupled to Golf but while the phosphorylation of GluR1 is affected by reductions in the available amount of Golf but not of D1R, the activation of ERK follows the opposite pattern. This segregation is puzzling considering that D1R-induced Golf activation monotonically increases with DA and that there is crosstalk from the AC5/cAMP/PKA cascade to the NMDAR/Ca(2+)/RAS cascade via a STEP (a tyrosine phosphatase). In this work, we developed a signaling model which accounts for this segregation based on the assumption that a common pool of D1R and Golf is distributed in two D1R/Golf signaling compartments. This model integrates a relatively large amount of

experimental data for neurons in vivo and in vitro. We used it to explore the crosstalk topologies under which the sensitivities of the AC5/cAMP/PKA signaling cascade to reductions in D1R or Golf are transferred or not to the activation of ERK. We found that the sequestration of STEP by its substrate ERK together with the insensitivity of STEP activity on targets upstream of ERK (i.e. Fyn and NR2B) to PKA phosphorylation are able to explain the experimentally observed segregation. This model provides a quantitative framework for simulation based experiments to study signaling required for long term potentiation in MSNs.

**Evers K, [Personalized medicine in psychiatry: ethical challenges and opportunities, Dialogues in Clinical Neuroscience: Personalized Medicine: Prediction, Prevention, Participation, 2009;11\(4\):427-433](#)**

**Abstract:** Pharmacogenomic developments hold promise for personalized medicine in psychiatry with adjusted therapeutic doses, predictable responses, reduced adverse drug reactions, early diagnosis, and personal health planning. The prospects are exciting, but at the same time, these new techniques stand faced with important scientific, ethical, legal, and social challenges that need to be met in order for the scientific advances to be responsibly applied. This review discusses the ethical balance between challenge and opportunity of personalized medicine in psychiatry under the aspects of adequacy, cost:benefit ratio, and therapeutic equity. It is argued that the promising nature of these therapeutic possibilities makes it all the more important to avoid exaggerating the expectations, and that a sophisticated social infrastructure needs to be developed in order to ensure the realistic and responsible application of personalized medicine in psychiatry.

**Evers K, [Philosophical challenges for neuroethics. European Neuropsychopharmacology, Journal of the European College of Neuropsychopharmacology, 2008;18\(4\): S202](#)**

**Abstract:** Neuroethics is an area concerned with the possible benefits and dangers of modern research on the brain. Researchers in neuroethics have focused mainly on applied neuroethics, such as ethical issues involved in neuroimaging techniques, cognitive enhancement, or neuropharmacology. Another important, less prevalent, scientific approach is fundamental neuroethics: how knowledge of the brain's functional architecture and its evolution can deepen our understanding of identity, consciousness and intentionality, including the development of moral thought and judgment.

**Evers K, [Toward a philosophy for neuroethics. An informed materialist view of the brain might help to develop theoretical frameworks for applied neuroethics, EMBO reports 2007;8:S1, S48– S51](#)**

**Abstract:** Early in the twenty-first century, neuroscience has developed into a major research field that is rapidly spawning new academic disciplines. One of these is neuroethics, which has been described by Adina Roskies as an “unexplored continent lying between the two populated shores of ethics and of neuroscience” and “a new area of intellectual and social discourse”. However, neuroethics is not a new research area: for a long time, ethicists have dealt with problems arising from advances in neuroscience, although not necessarily under the label of neuroethics.

**Evers K, Kilander L, Lindau M, [Insight in Frontotemporal Dementia. Conceptual Analysis and Empirical Evaluation of the Consensus Criterion “Loss of Insight” in Frontotemporal Dementia. Brain & Cognition, 2007;63:13-23](#)**

**Abstract:** The objective of this study was to suggest a new formulation of the core research diagnostic consensus criterion “loss of insight” in frontotemporal dementia (FTD). Eight patients with FTD (diagnoses made by interviews, medical and neuropsychological examination, CT scan, and regional cerebral glucose metabolism measured by positron emission tomography (PET) participated in the study). The results indicated that insight was present in three out of eight patients, and that insight appears to be a heterogeneous concept. Two types of insight emerged: Emotional insight associated with frontotemporal functions, and cognitive insight,

related to posterior cognitive functions. These results suggest that loss of insight should not serve as a core criterion on FTD, but serves well as a supportive criterion of the disease.

**Evers K, [Perspectives on Memory Manipulation – Using Beta-blockers to Cure Post-Traumatic Stress Disorder](#), special issue on neuroethics, *Cambridge Quarterly of Healthcare Ethics*, 2007;16:138-146**

**Abstract:** The human mind strives to maintain equilibrium between memory and oblivion and rejects irrelevant or disruptive memories. However, extensive amounts of stress hormones released at the time of a traumatic event can give rise to such powerful memory formation that traumatic memories cannot be rejected and do not vanish or diminish with time: Post-traumatic stress disorder may then develop. Recent scientific studies suggest that beta-blockers stopping the action of these stress hormones may reduce the emotional impact of disturbing memories or prevent their consolidation. Using such an intervention could, in principle, help people who suffer from post-traumatic stress disorder, but the idea of doing so is controversial. I shall here discuss memory manipulation in this perspective.

**Illes J, Blakemore C, [Hansson MG](#), Hensch T, Leshner A, Maestre G, Magistretti P, Quirion R, Strata P, [International perspectives on engaging the public in neuroethics](#), *Nature Reviews Neuroscience* 2005; 6:977-982**

**Abstract:** With an ever-increasing understanding of the brain mechanisms associated with core human attributes and values, there is an increasing public interest in the results of neuroscience research and the ways in which that new knowledge will be used. Here, we present perspectives on engaging the public on these issues on an international scale, the role of the media, and prospects for the new field of neuroethics as both a focus and a driver of these efforts.

**Evers K, [Neuroethics: A Philosophical Challenge](#), *The American Journal of Bioethics*, 2005; 5(2):31-2**

**Abstract:** Bioethics, of which neuroethics is a part, is indeed a question of interpreting scientific data and placing these in ethical, legal and social contexts, but it is also a question of carrying out broad and thorough conceptual analyses of key notions. The challenges posed by scientific discovery are three-fold: to the scientific and the socio-cultural levels of interpretation, a more general philosophical level of interpretation must be added, analyzing the meaning of neuroscientific terms and theories and their relations to how the same or similar terms are used in other disciplines, and in ordinary, non-scientific. In the case of neuroscience, this level will largely be constituted by traditional philosophy of mind, and the more modern neurophilosophy.

**Borge OJ, Evers K, [Aspects on Properties, Use and Ethical Considerations of Embryonic Stem Cells – a short review](#), joint publication in *Stem Cell Biology and Clinical Applications*, *Cytotechnology* 2003;41: 59-68**

**Abstract:** Mammalian embryonic stem cells have the potential to differentiate into all cell types of an adult individual. The culturing of human embryonic stem cells renders possible studies that were previously only available in animal models. Embryonic stem cells constitute a particularly attractive tool for studies of self-renewal, commitment, differentiation, maturation and cell-cell interaction. There is currently considerable hope that studies of embryonic stem cells will lead to new therapies; either by themselves, through cell replacement strategies, or by generating results assisting other fields of research to reach clinical results. There are, however, considerable challenges to be met before embryonic stem cells can be used in large-scale clinical trials. Stem cell research is an area that has given rise to much debate internationally, within science, law and politics as well as within philosophy and ethics.

The ethical attitudes expressed in the public debate over stem cell research notably divide over three important distinctions: (1) Reproductive versus therapeutic cloning; (2) Using already existing embryos versus producing new embryos for research purposes; (3) Production of embryos from eggs and sperm versus through somatic-cell nuclear transfer. The potential medical benefits that may result from embryonic stem cell research arguably support a continued development in this area. However, some opponents argue that this research offends the (relative or absolute) moral status of an unborn human. Furthermore, the research would probably prove to be a both time consuming and very expensive method for treating disease. Thus, the questions arise whom the new technique would benefit and at what cost, if ever developed

**Evers K, [European Perspectives on Therapeutic Cloning](#), *The New England Journal of Medicine*, 2002;346(20):1579-1582**

**Abstract:** Although recent advances in stem-cell research hold promise for therapeutic use, this promise has been accompanied by social, political, economic, legal, religious, and ethical questions. These questions have touched a raw nerve, and numerous laws and regulations have been implemented or are being considered in order to control the use and spread of this new technology. The legal situation is particularly complex in Europe, where each country is governed through both national legislation and the international European legislation passed by the European Union. Since there are deep social and political disparities among countries within the union, that stem in part from cultural and religious differences, it is not surprising that a patchwork of legislation and regulation is emerging. These legislative and regulatory initiatives address two main ethical questions. First, does the production or use of human embryos in research threaten human dignity? And second, might therapeutic cloning lead to a commercialization of human eggs or embryos? In this article, I will discuss the ways in which these questions are being addressed in Europe.

**Evers K, [The Importance of Being a Self](#), *The International Journal of Applied Philosophy*, 2001:15(1)**

**Abstract:** A traditional belief is that there is but one self to a body, and that each of us has a single biography and personality. Varieties of this monistic view have dominated most of mankind's intellectual history in philosophy, science, religion, and psychology, as well as legal and social theory. It has been challenged by appeal to those people whom psychiatry labels "multiple," or "dissociated" personalities who, some claim, are "multiple selves." This may be adequate if the self is explained by reference to personality. But if the self is characterized in terms of self-awareness, its numerical identity will be independent of that of the individual's personality. On this account, the self is a biological ability that forms the basis of subjective reality without determinately enumerating the subject living it. The concept is ambiguous and contextually sensitive; its meaning can vary with circumstances.

On conceptual, ethical and existential grounds, a minimal conception of the self should be adopted without thereby excluding complementary stronger notions of the self. In principle, one organism could thus simultaneously be one and many selves in different meanings of that term. In human societies, the importance of being a self can hardly be overestimated, and any denial of this status must therefore carefully be considered.

**Evers K, [Korsakoff Syndrome: The Amnesic Self](#), *The International Journal of Applied Philosophy*, 1999:13(2)**

**Abstract:** The belief that memory is essential to the self is common. Extreme amnesia, e.g., Korsakoff Syndrome, is held to dissolve the afflicted person's self. This belief is a misconception that rests on a confusion of epistemic with ontological relevance. Epistemically, memory is relevant to the self: a subject's self-knowledge partly depends on memories of past experiences. However, it is not by virtue of these memories that the subject is a self: ontologically, memory is irrelevant to that status. The fact that an individual's conception of herself as existing through time is wanting does not prevent that individual from being a self at a given point in time. As the past is there whether or not it is remembered, so the self is there whether or not it

remembers. If instead we define the self as awareness of being a subject of experience, the self may survive even the most extreme forms of amnesia. Being a self is an important social value, a prerequisite of numerous legal or moral rights. This in itself is questionable, like the social exclusion it may entail. Denying an amnesic person a self is therefore more than a logical mistake: it is a social exclusion that can also be questioned on ethical grounds.

**Evers K, [The Identity of Clones, Journal of Medicine and Philosophy, 1999;24\(1\): 67–76](#)**

**Abstract:** A common concern with respect to cloning is based on the belief that cloning produces identical individuals. This is a fundamental misunderstanding of what type of identity-relation cloning involves. The concept “identity” is ambiguous, and the statement that cloning produces “identical” individuals is not meaningful unless the notion of identity is clarified. This paper distinguishes between numerical and qualitative; relational and intrinsic; logical and empirical identity, and discusses the empirical individuation of clones in terms of genetics, physiology, perception, cognition and personality. I argue that the only relation of identity cloning involves is qualitative, intrinsic and empirical: genetic indiscernibility, unlikely to include identity under other aspects mentioned. A popular argument against cloning claims our “right” to a “unique identity”. This objection either implies (absurdly) the right not to be an identical twin, or assumes (incorrectly) that cloning involves identity other than genetic. Either way, the argument is untenable.

# BOOKS AND BOOK CHAPTERS

**Salles A. (forthcoming) La neurociencia y la identidad: un debate abierto. In eds J.C. Siurana et al. El mejoramiento humano (Valencia: Editorial Comares).**

**Abstract:** Large brain projects worldwide, such as the American BRAIN initiative and the European Human Brain Project, are generating vigorous moral discussions on a number of topics. They range from how responsible research should be carried out and how to ethically use the findings, to critical questions about the impact of neuroscientific findings on human lives in general and subjective human experiences in particular. One important concern that has been voiced is that advances in brain research can potentially threaten human identity either by substantially altering it or by directly undermining it. In this paper, the author identifies and presents some of these identity related concerns.

**Salles A, (forthcoming) Brain Imaging and Privacy Concerns. In Eds. M. Farisco and K. Evers Neurotechnology and Direct Brain Communication (New York, Routledge).**

**Abstract:** In this chapter, the author highlights some efforts to approach the issue of functional neuro-imaging and its possible threat to privacy in the neuroethics literature. Two main approaches or strategies are usually used in the discussion: the first strategy consists in a description and discussion of what neuro-imaging can and cannot do with a focus on the technical and methodological problems that bedevil the technology. The second strategy focuses on the metaphysical assumptions about the mind underlying concerns on the subject of neuro-imaging and mental privacy. Sometimes these two strategies are used jointly. There is a third strategy, less common in the neuroethics literature, that brackets technical, methodological, and metaphysical issues to put the focus on the discussion of normative questions. The questions raised are: why would neuroimaging's impinging on privacy be problematic? What is valuable about mental privacy? Would it be morally undesirable to have less of it? My main aim is to outline the first two strategies clarifying their implications for the privacy debate, and then focus more on the third. I end by proposing to expand the normative discussion to incorporate some of the issues raised by a recent account of privacy as contextual integrity.

**Salles A, (forthcoming) Neuroethics and Context: A Case Study. In eds Karen Rommelfanger and Syd Johnson Routledge Handbook of Neuroethics.**

**Abstract:** In this chapter, the author attempts to make explicit some of the salient topics and challenges shaping the development of neuroethics in Argentina. I begin with a brief description of some of the neuroscientific research carried out in the country. Next, I focus on some of the most prevalent cultural and socio-political considerations that play a role in how neuroethical issues are identified, perceived, and approached in Argentina. Finally, I briefly explain some of the neuroethical concerns that attract more attention locally or are deemed to be particularly relevant in the country.

**Farisco M, Evers K (Eds.), [Neurotechnology and direct brain communication. New insights and responsibilities concerning speechless but communicative subjects](#), Routledge. Taylor&Francis Group. London and New York 2016**

**Abstract:** Neurotechnology and Direct Brain Communication focuses on recent neuroscientific investigations of infant brains and of patients with disorders of consciousness (DOC), both of which are at the forefront of contemporary neuroscience. The prospective use of neurotechnology to access mental states in these subjects, including neuroimaging, brain simulation, and brain computer interfaces, offers new opportunities for clinicians and researchers, but has also received specific attention from philosophical, scientific, ethical, and legal points of view. This book offers the first systematic assessment of these issues, investigating the tools neurotechnology offers to care for verbally non-communicative subjects

and suggesting a multidisciplinary approach to the ethical and legal implications of ordinary and experimental practices. The book is divided into three parts: the first and second focus on the scientific and clinical implications of neurological tools for DOC patient and infant care. With reference to these developments, the third and final part presents the case for re-evaluating classical ethical and legal concepts, such as authority, informed consent, and privacy. Neurotechnology and Direct Brain Communication will appeal to researchers and postgraduate students in the fields of cognitive science, medical ethics, medical technology, and the philosophy of the mind. With implications for patient care, it will also be a useful resource for clinicians, medical centres, and health practitioners.

**Evers K, [Can we be epigenetically proactive?](#) in T. Metzinger & J. M. Windt (2015) (Eds). Open MIND. Frankfurt am Main: MIND Group. doi: 10.15502/9783958570238;**

**Abstract:** The human brain is an essentially evaluative organ endowed with reward systems engaged in learning and memory as well as in higher evaluative tendencies. Our innate species-specific, neuronally-based identity disposes us to develop universal evaluative tendencies, such as self-interest, control-orientation, dissociation, selective sympathy, empathy, and xenophobia. The combination of these tendencies may place us in a predicament. Our neuronal identity makes us social, but also individualistic and self-projective, with an emotional and intellectual engagement that is far more narrowly focused in space and time than the effects of our actions. However, synaptic epigenesis theories of cultural and social imprinting on our brain architecture suggest that there is a possibility of culturally influencing these predispositions. In an analysis of epigenesis by selective stabilisation of synapses, I discuss the relationships between genotype and brain phenotype: the paradox of non-linear evolution between genome and brain complexity; the selection of cultural circuits in the brain during development; and the genesis and epigenetic transmission of cultural imprints. I proceed to discuss the combinatorial explosion of brain representations, and the channelling of behaviour through “epigenetic rules” and top-down control of decision-making. In neurobiological terms, these “rules” are viewed as acquired patterns of connections (scaffoldings), hypothetically stored in frontal cortex long-term memory, which frame the genesis of novel representations and regulate decision-making in a top-down manner. Against that background I propose the possibility of being epigenetically proactive, and adapting our social structures, in both the short and the long term, to benefit, influence, and constructively interact with the ever-developing neuronal architecture of our brains.

**Salles A, Rationality and the Moral Significance of Emotions. In Inherent and Instrumental Values: Excursions in Value Inquiry, Abbarno J (ed.) (Lanham, Maryland: University Press of America, 2015)**

**Abstract:** This chapter addresses the connection usually made between the moral significance of the emotions and their rational status. My purpose in this discussion is to consider the issue in the light of the proposal of Patricia Greenspan and to outline a view that agrees with her broad conclusions about the moral justification of emotions, while somewhat departing from her with respect to the rationality of morally significant emotions. I do not deny that often emotions are rationally justified, nor that many morally relevant emotions might be rational rather than irrational or just non-rational. However, I suggest that for at least some cases of emotion, their being rationally justified is a condition for them to be morally justified.

**Salles A & Evers K (eds), [La Vida Social del Cerebro](#), Editorial Fontamara, 2014, ISBN 978-607736-058-2**

**Abstract:** La vida social del cerebro, de la colección Derecho Salud y Bioética de la editorial Fontamara, contiene los trabajos realizados por un grupo de autores provenientes de disciplinas en neurociencias, medicina y filosofía. De esta forma, las coordinadoras Arleen Salles y Kathinka Evers —directora del Programa de Neuroética del Centro de Investigaciones Filosóficas en Buenos Aires y la codirectora de The Human Brain Project, respectivamente—

invitan a la reflexión sobre preguntas que plantea el conocimiento del cerebro y su naturaleza social.

Así, por ejemplo, se presenta el marco científico de las bases neuronales de la empatía y la posibilidad de regular la respuesta empática; los efectos de la pobreza sobre el desarrollo del cerebro; las cuestiones éticas planteadas por la lectura de la mente y la potenciación moral; los aportes de la neurociencia a la comprensión y el tratamiento de los trastornos de la conciencia; la muerte y el debate sobre la relevancia del conocimiento del cerebro y la deliberación moral. Animados por el deseo de fomentar un diálogo racional, los autores presentan visiones orientadas al avance en la comprensión de la naturaleza del cerebro y sus implicaciones éticas, sociales y legales.

**Salles A, Melo Martin I, Como salvar a la humanidad: tomando una pastilla? In La vida social del cerebro, Salles A, Evers K (eds) (Mexico: Editorial Fontamara, 2014)**

**Abstract:** In this chapter, we focus on the moral bioenhancement debate. In particular, we discuss how the notion of enhancement is used by both opponents and proponents of the practice, and how the scientific evidence is used by proponents to support claims about the plausibility and moral permissibility of the practice. We argue that careful philosophical analysis suggests the view that moral bioenhancement is not a solution to a problem but rather, that it might be a problem in itself.

**Salles A, El cerebro de quién? Algunas reflexiones sobre la neurociencia de las diferencias sexuales, in Vazquez R, et al., Bioética y Genero, Editorial Fontamara, Mexico DF, 2014**

**Abstract:** In this chapter, I discuss issues raised by recent neuroscientific studies on sex differences. While I agree on the importance of bringing scientific knowledge to bear on a number of issues, including potential sex differences in the brain, I argue that an interdisciplinary discussion of methodological concerns, of the limitations of the technology used to reach the relevant conclusions, an examination of the quality of the information and of its interpretive framework is necessary.

**Farisco M, Neuroscienze e diritto di cura di pazienti con disturbi della coscienza, in L. Palazzani-R. Zannotti (cur.), [Il diritto nelle neuroscienze. Non siamo il nostro cervello](#), Giappichelli, Torino 2013, pp. 165-181.**

**Abstract:** Uno degli ambiti più interessanti delle neuroscienze contemporanee è senz'altro lo studio della coscienza umana, intesa non in senso etico-morale (in inglese conscience), bensì in un senso che possiamo generalmente definire cognitivo (in inglese consciousness). I cosiddetti consciousness-studies fondati sulle indagini neuroscientifiche costituiscono uno degli ambiti di maggior impatto extra-scientifico delle neuroscienze, nel senso che le teorie e le visioni maturate nell'indagine scientifica della coscienza, data la particolare rilevanza (personale e sociale) di quest'ultima, oltre al comunque sempre opinabile valore epistemologico, assumono una risonanza etica, antropologica e anche teologica. In quanto segue ci concentreremo sulle più recenti indagini strumentali relative ai disordini della coscienza (in particolare stato vegetativo e stato di minima coscienza) evidenziandone i potenziali contributi per una teoria complessiva della coscienza e le possibili implicazioni per il diritto di cura dei pazienti interessati, con specifico riferimento alla questione del dolore.

**Farisco M, The Posthuman Condition, in Runehov ALC, Oviedo L, [Encyclopedia of Sciences and Religions](#), Springer, Heidelberg, 2013; 1815-1817.**

**Abstract:** "Posthuman condition" (PC) is a complex and multifaceted concept that covers many assumptions and definitions of human being and becoming. These definitions are generally inspired by the development of contemporary technoscience. We can talk about a substantial ambiguity of the concept of PC, which can be declined according to two fundamental meanings: human has become posthuman because of the hybridization with technology (we could name

this concept of PC “cultural posthumanism”); human is going to be overtaken by a new posthuman form of life emerging from the huge changes driven by technology (we could name this concept of PC “transhumanism” or “hyperhumanism” or “hyperbolic posthumanism” or “speculative posthumanism”).

**Farisco M, [Filosofia delle neuroscienze. Cervello, mente, persona](#), Edizioni Messaggero Padova, Padova 2012 (Edizione spagnola in pubblicazione).**

**Abstract:** Nel presente lavoro, prescindendo dagli aspetti tecnici del sapere neuroscientifico, l'autore mette in evidenza il crescente primato esplicativo delle neuroscienze riguardo la conoscenza della natura umana; delinea come possibile alternativa a tale primato: la concezione del cervello come sistema plastico condizionato dall'ambiente esterno; avanza la tesi di un ripensamento dell'identità umana, superando gli antichi steccati tra il sé e l'altro da sé (l'altro biologico, ma anche l'altro tecnologico), senza con ciò giungere a negare qualsiasi presupposto identitario.

**Farisco M, [Ancora uomo. Natura umana e postumanesimo](#), Vita&Pensiero, Milano 2011**

**Abstract:** Il testo propone una ricostruzione storicoteoretica della prospettiva postumanistica, evidenziandone i principali snodi concettuali, a partire dalla *Neue Anthropologie*, dal pensiero di Foucault e di Deleuze, passando per la biologia evuzionistica e l'infofilosofia fino a giungere alla tecnoscienza contemporanea, intesa come luogo di collisione e commistione del sapere e dell'agire umano. Accanto a tale ricognizione si propone una problematizzazione della semantica del postumano, sottolineandone il limite critico in una concezione riduttiva e riduzionista della natura umana, della quale, per contro, si propone un recupero del significato classico secondo il suo concetto non naturalistico, per il quale essa non è riducibile a semplice e statica materia, ma è da intendersi come ciò che ha in sé il principio di movimento e di quiete. Una natura umana così intesa comprende in sé gli attributi principali del pensiero postumanistico, in particolare dinamismo e ibridazione, restando nel contempo inscritta in un orizzonte ancora antropologico.

**Evers K, [Neuroethics](#), in *Encyclopedia of Sciences and Religions*, Springer Science + Business Media B.V., Dordrecht. Published online.**

**Summary:** This chapter describes the discipline of neuroethics and some of its most recent developments; what makes neuroethics distinctive and how it is relevant to the scholarly area called “Science and Religion”. It also describes ethical principles that guide this discipline some of its key-values of this discipline/sub-discipline and its views on concepts such as human being, life, reality, knowledge, truth, perception, time, consciousness, rationality/reason, mystery, self and meaning.

**Evers K, *Uma Nova Visão do Cérebro: o Aparecimento da Neuroética*, in Curado & Oliveira (eds.) 2010, [Pessoas Transparentes: Questões Actuais de Bioética](#), Edições Almedina, Coimbra, Portugal, 2010:77–92**

**Abstract:** The 21<sup>st</sup> century has seen neuroscience develop rapidly and a new academic discipline emerge: *neuroethics*, the attempt to explain moral judgment in partly neurobiological terms. Neuroethics inspires hope as well as apprehension, and historic awareness is essential in order to determine the nature and *raison d'être* of this young research area. This article presents neuroethics together with a dynamic model of the human brain and mind upon which neuroethics can fruitfully be constructed. Scientific theories about human nature and mind in the 19<sup>th</sup> and 20<sup>th</sup> centuries were occasionally caught in two major traps: ideological hijacking and psychophobia, notably in the form of naïve eliminativism, and naïve cognitivism. To avoid them, neuroethics needs to build on the sound scientific and philosophical foundations of *informed materialism*, that adopts an evolutionary view of consciousness as an irreducible part of biological reality, an evolved function of the brain and a suitable object of scientific study; and

acknowledges that adequate understanding of conscious, subjective experience must take both subjective information obtained by self-reflection and objective information obtained from anatomical and physiological observations and measurements into account

**Evers K, [Neuroética. Cuando la materia se despierta](#), Katz editores, 2010**

**Abstract:** ¿Por qué la evolución de las funciones cognitivas superiores produjo seres morales en lugar de seres amorales? ¿Qué significa para un animal "actuar como un agente moral"? ¿De dónde viene nuestra predisposición a producir juicios morales? Surgida del avance reciente de las neurociencias, la neuroética ha hecho suya la tarea de investigar las respuestas a preguntas de ese tipo. Porque el cerebro no es -como muestran las neurociencias- una especie de procesador que recibe datos del entorno y los elabora produciendo resultados de manera estrictamente determinista; es, antes bien, dinámico y variable, activo de manera consciente y no consciente, y su arquitectura está sujeta al impacto social, en especial debido al considerable peso de las improntas culturales almacenadas en él epigenéticamente. Esta nueva concepción del cerebro introduce modificaciones profundas en nociones fundamentales tales como las de conciencia, identidad, yo, integridad, responsabilidad personal y libertad. Interfaz entre las ciencias empíricas del cerebro, la filosofía del espíritu, la ética y las ciencias sociales, la neuroética se ocupa de los beneficios y los peligros potenciales de las investigaciones modernas sobre el cerebro y se interroga también acerca de la conciencia, el sentido de sí y los valores.

**Evers K, [Neuroéthique. Quand la matière s'éveille](#). Éditions Odile Jacob, Paris, 2009**

**Abstract:** Les neurosciences bouleversent aujourd'hui notre compréhension du cerveau et conduisent à un renouvellement de la philosophie morale. Ainsi est née tout récemment la neuroéthique. Neuroéthique fondamentale, tout d'abord. Qu'est-ce qu'avoir une conscience, être une personne ? Sommes-nous libres ? Qu'est-ce qu'être responsable ? D'où naissent les normes et les valeurs ? Aucune de ces grandes questions fondamentales ne peut plus être posée sans prendre appui sur la science du cerveau et de son architecture fonctionnelle. Neuroéthique appliquée, également : quels problèmes éthiques soulèvent les nouveaux moyens d'investigation et d'intervention sur le cerveau, comme la neuro-imagerie ou la neuropharmacologie ? Ce livre offre une présentation très claire — la première en français — de cette nouvelle discipline. L'auteur y développe un matérialisme éclairé, attentif tout à la fois aux contraintes du naturalisme scientifique et au respect de la personne humaine.

# HBP REPORTS

## **Dudai Y, Evers K, Second report on simulation, brain, body and environment, the Human Brain Project, 2016**

**Abstract:** Brains are inherently influenced by context. We propose a taxonomy for such context, based on the source of information, from either within the body (intracorporeal) or outside the body (extracorporeal). These types of context must be taken into account in modelling and ultimately in simulating the brain. Many of the difficulties in qualitatively, let alone quantitatively, estimating the effect of context, or lack of context, on realistic brain function, stem from our lack of knowledge concerning the meaning and resolution of information in both intracorporeal and extracorporeal context that is obligatory for proper operation, and in the context of brain modeling and simulation, particularly from the daunting complexity required to simulate an intracorporeal but extraencephalic context that is sufficiently identical to the operating human body. Furthermore, we do not yet know what is the role of context in permitting or even generating types of consciousness. All in all, such gaps of knowledge notwithstanding, we posit that a large-scale brain simulation project, even if successful in the far future, will never be satisfactorily completed in the absence of incorporation of bodily, social and environmental contexts.

## **Dudai Y, Evers K, First report on how far brain simulation can explain mechanisms of the mind, the Human Brain Project, 2015**

**Abstract:** Simulation is a powerful method in science and engineering. In neuroscience, problem-oriented computer simulations of specific systems and functions of the brain are extensively used to test predictions, validate conclusions and models, and to guide hypothesis-driven experiments and new models at various levels of analysis. Rapid advancements in neuroscience and in computing draw increasing attention to large-scale brain simulations. Against this background, we raise the question: ‘how far can brain simulation contribute to the explanation the brain and the mind?’ We delineate three types of issues that relate to the potential explanatory power of large-scale brain simulations. We note that, whereas some types of issues are expected to be resolved with the advance of neuroscience and computing technology, others pose more profound and long-lasting conceptual obstacles that should be taken into account in managing the expectations from the approach.

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