potential is reinforced by successive steps: from the rental and sale of DVDs to the television, in millions of homes around the world. Moreover, films have the uncontested power to charm their audiences and capture their attention, in view of the fact that images have overrun written words. This power of social persuasion is often exploited by the cinema industry to produce films whose plots, seemingly innocuous, hide in reality undeclared goals. Sneaking in the film's frames, neuroethics issues that orient behaviors and favor economic interests (e.g., the health care system) can also be found. Those who make movies (producers, writers, directors) are well aware of this power of persuasion. Nowadays it is even more necessary to be an aware viewer, and film critics should feel ethically responsible. Our study has shown that the cinema industry, in general, is more prone to the use and diffusion of "real scientific data" in films with neuroethics messages (compared to bioethics ones). Also, if we agree that the purpose of movies is to entertain, we believe that an excessive spectacularization and/or misuse of neuroscientific data bear consequences. We conclude that the issue presented deserves ethical consideration like any other more familiar one in neuroethics.

5. Neuronanotechnology and Neuroethics

V. A. Sironi[1] and A. Gini[2], [1]Research Institute on the History of Biomedical Thought, University of Milano Bicocca, Milan, Italy, [2]Neurobioethics Group, Pontifical Athenaeum Regina Apostolorum, Rome, Italy

The possibilities opened by the use of drugs and nanotechnology prostheses in neuroscience are of enormous extent for their theoretical, practical, and clinical implications (Akai 2004). However, they reproduce in an even more dramatic dilemma in neuroethics (MacDonald and Boyce 2009). As such, they require a thoughtful evaluation not only for the potential medical risks when applied to patients' populations but especially for the unpredictable consequences of a prospected wide application to healthy subjects (neuroenhancement). The use of neuro and psycho-nanopharmaceuticals will soon allow the monitoring of neuropsychological disorders. Moreover, the current techniques of deep brain stimulation are likely to become obsolete as nanotechnology develops further, opening the prospect of neuromodulation and selectively targeting of neurons and functional pathways electively predetermined. This will enable us both to better understand the functional mechanisms of the brain and to obtain better therapeutic results on specific cerebral disorders. Interesting perspectives in the use of neuronanotechnogy have been recently suggested for the treatment of criminality and mental illness (Wolfe 2006). What is of more concern is that permanent neuroprostheses implanted in the brain for biotechnological integration will be employed not only to treat diseases of the central nervous system but also to produce improvement of brain performance (neuroenhancement). The reversibility of neuronanotechnology interventions (both pharmacological and prosthetic) will be the primary focus of these applications. The nonmedical use (neuroenhancement) should also be evaluated from the perspective of an evolution that is not only individual but collective, biological, and cultural. Social and legal implications must also be considered. Specifically, some ethical aspects on the use of neuronanotechnology should be emphasized: (a) in diseases for which effective therapies already exist, only if the trial proves a real benefit for the patient and for society at large; (b) in comatose patients, in addition to being authorized by relatives, may be allowed only if there is scientific evidence of an expected possible positive effect; (c) in healthy subjects, neuropharmaceuticals with neuroenhancement properties, must be evaluated and permitted only in exceptional and selected cases, outside of military perspectives, excluding an individual and noncontrolled use.

9. The Clinical and Ethical Practice of Deep Brain Stimulation—Results of an International Survey of DBS Experts

M. Christen[1,2], M. Bittlinger[3], C. Ineichen[1], and S. Muller[4], [1]Institute of Biomedical Ethics, University of Zürich, Zürich, Switzerland, [2]Psychology Department, University of Notre Dame, Notre Dame, Indiana, USA, [3]Humboldt Universität Berlin, Berlin, Germany, [4]Charité-Universitätsmedizin Berlin, Berlin, Germany

Question: Deep brain stimulation (DBS) has become a standard therapy for some forms of severe movement disorders and is investigated for other neurological and psychiatric disorders, although many scientific, clinical and ethical issues are still open. In order to obtain an overview of the global practice on DBS, we have performed a survey among researchers and clinicians that addresses a broad spectrum of clinical and ethical problems currently discussed in the DBS literature.
Methods: The survey was performed in two waves each of them including two follow-ups. In the first wave, researchers were addressed who published about DBS in Parkinson's disease since the early 1990s. The second wave addressed clinicians emerging from a global search of DBS centers. In total, 679 persons with valid e-mail addresses were approached; 113 (16.6%) delivered analyzable answers. The survey questionnaire was based on our previous research in DBS and cross-checked by a board of internationally renowned DBS researchers. The survey was anonymized.
Results: The majority of respondents were experienced DBS experts (median age 48 years) who were active in the field for at least 10 years (65.6%, excluding "no answer") and had operated on more than 100 patients (69.9%). Some main findings are: (1) The spectrum of DBS indications grows fast; 62.8% of the respondents work in centers that offer (therapy or research) interventions for at least one psychiatric indication (OCD [obsessive-compulsive disorders], Tourette, major depression). (2) Less disciplines than expected are involved in patient selection (mainly neurosurgery and neurology); in particular, psychiatrists are always involved

only in 25.7% of the cases. (3) The main fear of patients refers to surgery complications (42.5%), whereas "personality change" is less frequently mentioned as a frightening outcome (9.7%). But the respondents consider apathy and personality changes as relatively common side effects (17.7%/11.5% of the respondents believe that more than 10% of the patients may suffer from these side effects), whereas surgical problems are considered to occur very rarely (2.7%). (4) Of the respondents 38.1% confirm the existence of a "satisfaction gap," that is, report that in more than 10% of the cases the patients' expectations are not fulfilled. (5) A large majority of the respondents consider DBS to be a safe and successful intervention in movement disorders, superior to medication-based interventions. They claim that more patients should be able to profit from this intervention. (6) A large majority evaluates the growth in further DBS indications as unproblematic and considers obsessive-compulsive disorders, Tourette syndrome, major depression, and epilepsy to be the most promising applications, whereas schizophrenia, Alzheimer's disease, and autism are considered to be least promising.

Conclusion: Our survey expresses evaluations of a generally very experienced sample of DBS experts who are optimistic with respect to the current use and potential of DBS. Mismatch with respect to patient fears and risks and the issue of a satisfaction gap require closer investigation. In particular, the process of patient information and selection may have to rely on a broader set of experts.

Outlook: In order to expand and validate the results of our survey, we have created an address database of ∼500 DBS centers that are currently addressed in a second survey, including also a shortened version of the questionnaire for analyzing health service research issues along the lines done for a pilot study for Switzerland.

10. Has Neuroscience Really Demonstrated Gender Dimorphism? Ethical and Philosophical Reflections and Implications for Communication and Education

A. Gini[1], C. Taddei-Ferretti[2], and C. Alessio[3], [1]Neurobioethics Group, Pontifical Athenaeum Regina Apostolorum, Rome, Italy, [2]Institute of Cybernetics, CNR, Pozzuoli, Italy, [3]University of Salerno, Salerno, Italy

Are men from Mars, active, rational, aggressive, and women from Venus, passive, emotional, nurturing? And has this alleged diversity been demonstrated by modern neuroscience? Once discourses about the difference between the sexes began, brain weight was its measure, while nowadays the measure is functional neuroimaging. Actually, science has not been able to produce convincing evidence of a "female brain" and a "male brain." In order to clarify this controversial issue, we have reviewed the recent neuroscience literature and found that, according to the "gender similarities hypothesis" (Hyde 2005), the likeness in the brain of both sexes is by far more compelling than its supposed difference. Moreover, it is now universally accepted that the brain is an organ with plasticity and adaptability found also in adulthood, far from being immutable. The neuroscientific literature seems also to confirm that different upbringings play an important role in modulating the nervous systems of boys and girls. From childhood men and women are constantly bombarded by the axioms, prejudices, and platitudes about the differences between the sexes, and that incessant hammering that passes through the family, the school, the entire society, and, last but not least, science and its narrative journalism eventually impresses on their minds the image and identity of women or men. Philosophically it is necessary, in neuroscience and particularly so in gender studies, to rediscover the concept of human person, a category that represents a novelty introduced by Christianity. From an ethical perspective it is of utmost importance, giving that education and stereotypes heavily contribute by assigning roles and promoting gender differences in our societies, to consider the neuroscience study design before going to the conclusions, often based on biased premises. With respect to education and communication, we argue that neuroscientific data can be used to make the case for gender differences. Contrary to common belief, neuroscientists may not completely understand, for example, how significant the activation of the right prefrontal cortex in a specific task might be, although they always try to provide an explanation for experimental data. Unfortunately, the limitations of some neuroscience research do not prevent popular writers from extrapolating the results to demonstrate that males and females are hard-wired to feel and think differently, and that for the same reason they should be taught mathematics and literature otherwise. Therefore, far from supporting the existence of significantly different male and female brains, much of the research on the topic is not only deeply flawed, but dangerously misleading. If we look around in our societies to try and explain gender inequality, the attribution to some brain differences between men and women seems to appeal more than the claim of discrimination based on gender.

12. Neuroethics and the Globalisation of Neuroscientific Research

M. A. Anderson[1,3], J. R. Shook[2,3], and J. Giordano[1,3,4,5], [1]Georgetown University, Washington, DC, USA, [2]EdM Program Science and the Public, University at Buffalo, Buffalo, New York, USA, [3]Center for Neurotechnology Studies, Potomac Institute for Policy Studies, Arlington, Virginia, USA, [4]Human Science Center, Ludwig Maximilians Universität, Munich, Germany, [5]Department of Electrical and Computational Engineering, University of New Mexico, Albuquerque, Nnew Mexico, USA

Neuroscientific and neurotechnological research is becoming an ever more prominent domain of a number of nations' (e.g., China, Russia) overall scientific and technological agenda. Clearly, such neuroscientific advances in medicine, public life, and national security can be leveraged on the world stage to affect economic, sociocultural,