

GEHIRN & KOGNITION – BRAIN & COGNITION

NEUROETHICS

INTERDISCIPLINARY SEMINAR WS 2009/10

venue: Seminar room, basement of the Bernstein Center Freiburg (Hansastraße 9a)

time: Jan 12 & 19, 09:15-18:00 Uhr

What is Neuroethics and what can/should it achieve?

(Boris Essmann)

- Roskies, A. (2002), »Neuroethics for the New Millenium«. Neuron 35: 21-23.
- Farah, M. J. (2002), »Emerging ethical issues in neuroscience«. Nature Neuroscience 5(11): 1123-9.
- Synofzik, M. (2005), »Die neuen Möglichkeiten der Neurowissenschaften und ihre ethischen Implikationen«. Ethik in der Medizin 17(3): 206-219.
- Zusätzlich: Fuchs, T. (2006), »Ethical issues in neuroscience«. Curr Opin Psychiatry 19(6): 600-7.
- Illes, J. und S. J. Bird (2006), »Neuroethics: a modern context for ethics in neuroscience«. Trends Neurosci 29(9): 511-7.]

Ethical Aspects of Neuroenhancement

Ethics

(Katharina Heining)

- President's Council on Bioethics (2003), Beyond Therapy - Biotechnology and the Pursuit of Happiness. A Report of the President's Council on Bioethics. Washington.
- DeGrazia, D. (2000), »Prozac, enhancement, and self-creation«. Hastings Center Report 30(2): 34-40.
- DeGrazia, D. (2005), »Enhancement technologies and human identity«. Journal of Medicine and Philosophy 30(3): 261-83.
- Elliott, C. (2000), »Pursued by Happiness and Beaten Senseless. Prozac and the American Dream«. Hastings Center Report 30(2): 7-12.
- Greely, H., B. Sahakian, et al. (2008), »Towards responsible use of cognitive-enhancing drugs by the healthy«. Nature 456(7223): 702-5.

Neuroscience

(Joel Jarowyi)

- Lehrer, J. (2009) "Small, furry ...and smart. Nature 461,862-864
- This talk should include an explanation of knock-out mice and the mechanistic background of genetic cognition enhancement.

Identity and Personality as Criteria for the Ethical Evalulation of Interventions in the Human Brain

Merkel, R., G. Boer, et al. (2007), Intervening in the Brain. Berlin: Springer, S. 189-287. (Wolfgang Haberl)

Non-invasive BMIs

Neuroscience:

(Anna Dittrich)

- Wolpaw J and McFarland D (2004)
Control of a two-dimensional movement signal by a noninvasive brain-computer interface in humans.
Proc Natl Acad Sci U S A. 101(51):17849-54.
- Birbaumer N, Ghanayim N, Hinterberger T, Iversen I, Kotchoubey B, Kubler A, Perelmouter J, Taub E, Flor H (1999) A spelling device for the paralysed. *Nature*. 398(6725):297-8.

- Kubler A, Kotchoubey B, Hinterberger T, Ghanayim N, Perelmouter J, Schauer M, Fritsch C, Taub E, Birbaumer N (1999) The thought translation device: a neurophysiological approach to communication in total motor paralysis. *Exp Brain Res*. 124(2):223-32.
- Pfurtscheller G, Muller GR, Pfurtscheller J, Gerner HJ, Rupp R (2003) 'Thought'--control of functional electrical stimulation to restore hand grasp in a patient with tetraplegia. *Neurosci Lett*. 351(1):33-6
- This talk should include an explanation of EEG recording.

Ethics:

(Anna Dittrich)

- Birbaumer, N. (2005): Nur das Denken bleibt: Neuroethik des Eingeschlossen-Seins. In: E.-M. Engels & E. Hildt (Hrsg.) *Neurowissenschaften und Menschenbild*. Paderborn: Mentis, S. 77-94.
- Kübler, A. et al. (2006): Locked in – freigegeben für den Tod. Wenn nur das Denken und Fühlen bleiben – Neuroethik des Eingeschlossenseins. *Zeitschrift für medizinische Ethik* 52(1), S. 57-70.

Invasive BMIs

Neuroscience

(Sarit Pati Goswami)

- Hochberg LR, Serruya MD, Friehs GM, Mukand JA, Saleh M, Caplan AH, Branner A, Chen D, Penn RD, Donoghue JP (2006) Neuronal ensemble control of prosthetic devices by a human with tetraplegia. *Nature*. 442(7099):164-71. (including comments in the same Nature issue)
- Kennedy PR, Bakay RA, Moore MM, Adams K, Goldwaithe J (2000) Direct control of a computer from the human central nervous system. *IEEE Trans Rehabil Eng*. 8(2):198-202.
- Kennedy PR and Bakay RA (1998) Restoration of neural output from a paralyzed patient by a direct brain connection. *Neuroreport* 9(8):1707-11.
- This talk should include an explanation of techniques for single-cell recordings in behaving subjects. Further technical details can also be found e.g. in: Chapin JK (2004), Using multi-neuron population recordings for neural prosthetics. *Nat Neurosci*. 7(5):452-5.

Ethics:

(Man Yi Yim)

- Maguire, G. Q. und E. M. McGee (1999), »Implantable Brain Chips? Time for Debate«. *Hastings Center Report* 29: 7-13.
- Foster, K. R. (2005), Engineering in the Brain. In: *Neuroethics: Defining the Issues in Theory, Practice and Policy*, hrsg. von J. Illes. Oxford: Oxford University Press, S. 185-199.
- Hildt, E. (2005), Computer, Körper und Gehirn: Ethische Aspekte eines Wechselspiels. In: *Neurowissenschaften und Menschenbild*, hrsg. von E.-M. Engels und E. Hildt. Paderborn: mentis, S. 121-137.
- Müller, O., Clausen, J., Maio, G. (2009): Der technische Zugriff auf das Gehirn. Methoden – Herausforderungen – Reflexionen. In: *Das technisierte Gehirn. Neurotechnologien als Herausforderung für Ethik und Anthropologie*, hg. von O. Müller, J. Clausen, G. Maio. Paderborn: mentis, S. 11-19.

Imaging the Brain

Neuroscience:

(Alexander Niederbühl)

- Haynes, J.-D., Sakai, K., Rees, G., Gilbert, S., Frith, C., & Passingham, R. E. (2007). Reading hidden intentions in the human brain. *Current Biology*, 17(4), 323-328.
- Haynes, J.-D., & Rees, G. (2006). Decoding mental states from brain activity in humans. *Nature Reviews Neuroscience*, 7(7), 523-534.
- Langleben DD, Loughhead JW, Bilker WB, Ruparel K, Childress AR, Busch SI, Gur RC. (2005) Telling truth from lie in individual subjects with fast event-related fMRI. *Hum Brain Mapp*. 26(4):262-72.
- Davatzikos C, Ruparel K, Fan Y, Shen DG, Acharyya M, Loughhead JW, Gur RC, Langleben DD (2005) Classifying spatial patterns of brain activity with machine learning methods: application to lie detection. *Neuroimage*. 28(3):663-8.
- Farwell LA and Donchin E (1991) The truth will out: interrogative polygraphy ("lie detection") with event-related brain potentials. *Psychophysiology* 28(5):531-47.

- Farwell LA, and Smith SS (2001) Using brain MERMER testing to detect knowledge despite efforts to conceal. *J Forensic Sci.* 46(1):135-43.
- This talk should include an explanation of the fMRI technique

Ethics

(Carolyn Nieder)

- Fuchs, T. (2006), »Kosmos im Kopf? Neurowissenschaften und Menschenbild«. Zeitschrift für Medizinische Ethik 52: 3-14.
- Illes, J., E. Racine, et al. (2005), A picture is worth a 1000 words, but which 1000? In: Neuroethics: Defining the Issues in Theory, Practice and Policy, hrsg. von J. Illes. Oxford: Oxford University Press, S. 149-168.
- Farah, M. und P. R. Wolpe (2004), »Monitoring an Manipulating Brain Function. New Neuroscience Technologies and Their Ethical Implications«. Hastings Center Report 34(3): 35-45.
- Wolpe, P. R., K. R. Foster, et al. (2005), »Emerging neurotechnologies for lie-detection: promises and perils«. American Journal for Bioethics 5(2): 39-49.
- Turner, D. und B. Sahakian (2006), »Ethical questions in functional neuroimaging and cognitive enhancement«. Poiesis & Praxis: International Journal of Technology Assessment and Ethics of Science 4(2): 81-94.

Outlook / Visions

a) Neuronal Networks in vitro/Hybrid Systems

(Oscar Cota)

- DeMarse TB, Wagenaar DA, Blau A, Potter SM (2001) The neurally controlled animat: biological brains acting with simulated bodies. *Autonomous Robots* 11:305-310
- Potter SM (2001) Distributed processing in cultured neuronal networks. *Prog Brain Res* 130:49-62
- Zeck, G. & Fromherz, P. (2001): Noninvasive neuroelectric interfacing with synaptically connected snail neurons immobilized on a semiconductor chip. *PNAS* 98 (18): 10457-62
- Fromherz, P. (2001): Interfacing von Nervenzellen und Halbleiterchips. *Physikalische Blätter* 57 (2): 43-8
- Siehe auch: http://www.bme.ufl.edu/research/projects/detail_researchproject.php?RP_id=5

b) Neurobionics and Identity

(Undine Burmeister)

- Birnbacher, D. (2006): Hirngewebstransplantationen und neurobionische Eingriffe - anthropologische und ethische Fragen. In: D. Birnbacher (Hg.) Bioethik zwischen Natur und Interesse. Frankfurt: Suhrkamp, S. 273-293.

c) BMIs for external behavioural control (Roborats)

(Daniel Althof)

- Talwar SK, Xu S, Hawley ES, Weiss SA, Moxon KA, Chapin JK (2002) Rat navigation guided by remote control. *Nature*. 417(6884):37-8.
- Brain2Brain Communication Project Neural Engineering Lab, Department of Biomedical Engineering, Johns Hopkins University - See http://www.jhu.edu/nthakor/people_pages/hongbo/main.html

d) Cyborgs / Concept of Human Being / Enhancement

(Ulrich Froriep)

- Zoglauer, T. (2003): Der Mensch als Cyborg? Philosophische Probleme der Neuroprothetik. *Universitas* Vol. 58, S. 1267-1278.
- Wolpe, P. R. (2002): Neurotechnology, cyborgs, and the sense of self. In: S. Marcus (Hg.) Neuroethics: mapping the field ; conference proceedings, May 13 - 14, 2002, San Francisco, California. New York, NY: Dana Press, S. 159-167.