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The Human Sciences after the Decade of the Brain

New perspectives on the neuro-turn in the social sciences and humanities

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Teaching Neuroscience?

A Critical Perspective on the Status of Neuroscience and Neuroethics in German Science Education

Alexander Bergmann (Leipzig)

The rise of neuroscience in the last two decades and the ongoing cross-linking to other fields of research led to important new but also controversial perspectives on mental processes such as perception, language, intuition, and reasoning. There is a broad discussion on recent research findings and their socio-scientific impact, which is not only limited to the neuroscientific community, but also affects the public dialogue. Questions are raised about emerging technological opportunities, philosophical and ethical challenges or necessities for political actions.

The educational system should empower learners to be responsible-minded citizens and to participate in a democratic society. This also encompasses scientific literacy and decision-making on technological development and research in sciences (Bybee 1997, 2002). There is a demand for implementing neuroscientific issues and neuroethical discourses in science lessons. Moreover we should investigate and improve the way learners understand the main ideas of neuroscientific statements.

With regard to curricular modifications and research activities in the field of science teaching, we critically analyze the efforts to implement neuroscientific issues in science education over the last decade.

Furthermore, the theory of experientialism is introduced, a subject-oriented framework for research and teaching (Lakoff & Johnson 1998, Gallese & Lakoff 2005, Gropengießer 2007). It describes learning as a process based on metaphors and analogies. The main idea is that learners use a broad set of individual pre-concepts, including conceptual metaphors, to explain complex scientific phenomena. These pre-concepts often interfere with a correct understanding of science topics. Analyzing and reflecting metaphors and analogies used by the learner's offers a significant potential for processes of learning and understanding.

We present an overview of recent research findings on the learners´ conceptual metaphors in the field of neuroscience. Particular attention is paid to an ongoing interview study of German Tenth-graders' conceptual metaphors on emotion, consciousness, decision---making, and memory. At The conference, pathways of teaching neuroscience will be presented, based on both a theoretical analysis and the first empirical data of our interview study.

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Strangers in neuroscientific research.

On the role of social scientists and ethicists as advisors in ethical, legal and social aspects of the Human Brain Project

Markus Christen (Zürich)

In cooperation with Nicola Biller-Andorno (Zürich), Berit Bringedal (Oslo), Hironori Matsuzaki (Oldenburg) and Alberto Rábano (Madrid)

The increasing importance of neuroscience since the "decade of the brain" shows up in the emergence of "big neuroscience", which has two characteristics: a large number of interacting researchers from various disciplinary backgrounds that are answerable to a large public funding source; and a decisive role of information technology as an instrument to structure and guide scientific activities. An exemplification of this development is the "Human Brain Project" (HBP) that started in 2013 and that aims to generate significant impact not only within neuroscience, but also for society as a whole due to medical and technological innovations.

In analogy to other large-scale initiatives spearheaded by the "Human Genome Project", the project involves research dedicated to ethical, legal and social aspects (ELSA) of neuroscience research. Some of the ELSA activities are integrated into the HBP, but beside this, an independent advisory ELSA Committee has been created that is responsible for a long term oversight of fundamental ethical, legal and social implications of HBP-research. It advises the Executive Committee and the Board of Directors in the HBP and shares views with other major European Ethics Bodies.

In our contribution, we outline the challenges when representatives of humanities and social scienc-es are attributed such an "advisory role" within large-scale neuroscience. These challenges can be grouped into three categories: a) informational challenges (e.g., how can ELSA members obtain and understand the relevant information on the activities within the HBP?), b) organizational challenges (e.g., how can such a committee be integrated into the workflow and research processes within the HBP?) and c) expectation challenges (e.g., what are the expectations towards such a committee with respect to its advisory role both from the perspective of the HBP and the European Commission?).

In our paper, we will delve into these three challenges based on the experiences made so far within the HBP ELSA Committee using selected case studies. One case study involves the use of "big data" in clinical and cognitive neuroscience given the special significance and risks of neurological and psychi-atric data for human rights and freedom – in particular when specific individual consent is missing and the data is widely used through technological platforms. We also will discuss potential conse-quences when ELSA recommendations collide with particular interests, e.g. due to the economic exploitation of findings, which raises the questions of who invests and who profits. The contribution shall express our interest in sharing our experiences with and learning from others helping us to make good use of the committee's potential.

The Theory of Brain-Sign

A New Theory of the Brain

Philip Clapson (London)

In a paper published in 2013 in the journal *Neuron*, under the title 'The New Science of Mind and the Future of Knowledge', the Nobel Laureate, Eric Kandel, states that 'The unity of consciousness – our sense of self – is the greatest remaining mystery of the brain. As a philosophical concept, consciousness continues to defy consensus.'

Since mind depends foundationally upon consciousness, and science depends foundationally upon the mind, this perfectly illustrates the parlous condition of neuroscience as a science.

In recent years I have developed a new neurobiological theory: the *theory of brain-sign*. The theory aims to do two things. (1) It rejects the notion of consciousness because it is not a scientific category. Adherence to it inhibits the development of neuroscience. (2) It provides a scientifically feasible account of how brains communicate with each other for the purpose of collective action in uncertain or imprecise tasks. It can be seen, therefore, as the physical foundation of the social sciences.

The theory proposes that brain-sign is derived by the brain from its causal orientation toward the world at each moment. Thus the mysterious arrival in the world of mental states is superseded by a scientific explanation of why there is any brain phenomenon at all, and how the phenomenon is to be interpreted. But it also proposes the interpretation is the brain's self-description of its causal states. Thus brain-sign is both the brain's means of inter-organism communication about what in the world has caused its causal orientation, and the self-explanation of its condition. 'We are', as brain-sign, wholly the brain's product.

The brain's function is to control the body in its relation to the world for survival and reproduction. Survival chances increase by organisms being able to act collectively. Consciousness theory presupposes that the spatial separation between organisms presents a problem of how to understand another organism's actions in collective activity. Hence the need for mental states: sight, hearing, sensation, feeling, thought. Brain-sign theory rejects these mentalist inventions. In collective action, individuals are bound together as one unit by the intermediary physical conditions of molecular transmission, electromagnetic radiation and compression waves. Cooperating with another is literally performing as one physical unit, via the impact of the intermediary conditions on each organism's senses

We take it we do see and understand. However, that you and I seem to see the tree does not mean we do. How could a physical brain see anything? Our conviction about seeing and understanding is the way our brains communicate. Our brains signify their mutual current causal orientation as the brain-sign of our seeming to see the tree. Our conviction

about seeing is part of that sign, not a verification of mental life. Hence as organisms we can pick apples together. Eating apples aids our survival.

Signs are ubiquitous in biology, and they are wholly physical.

Five Ways of `Neuralizing' Psychology

Guillermo Del Pinal (Bochum)
In cooperation with Marco Nathan (Denver)

The last few decades have witnessed much discussion among both scientists and philosophers regarding the relation between neuroscience and psychology. Specifically, while some enthusiastically endorse the prospects of advancing psychology through neuroscience, others adopt a more skeptical attitude. The aim of this article is to contribute to this ongoing debate by distinguishing and critically assessing various popular projects that are advanced as ways of `neuralizing' psychology:

(i) Neuroscience explains how psychological processes are implemented; it tells us where and how psychological tasks are computed in the brain.
(ii) Neuroscience provides new knowledge about human psychology and answers traditional psychological questions.
(iii) Neuroscience `sets the agenda' for psychology, in the sense that it specifies the questions that psychology should ask and provides the framework to assess them.
(iv) Neuroscience can `reduce' psychology, in the sense that all psychological explanations can, in principle, be extended and improved by reformulating them at the level of neuroscience. Hence, psychological explanations, in the long run, will be eliminated and replaced by neuroscientific ones.

Project (i) seems utterly unassailable: the claim that psychological processes are implemented in the brain is so weak that even a substance dualist could (and should) accept it. Now, surely, a hard-core advocate of the so-called `autonomy' of psychology is likely to reply that discovering the location and processes of neural implementation is irrelevant for psychology. Yet, provided that we are interested in discovering where and how cognitive processes are implemented, knowing the neural mechanism underlying a psychological process will provide us with relevant information regarding the nature and function of said `higher' processes. Project (ii) does not merely presuppose that neuroscience can shed light on the implementation of psychological functions; in addition, it is claimed that neuroscience sometimes directly answers psychological questions. For example, one might ask why the accuracy and reliability of memory in humans tends to decrease with age, and the answer is likely to be neither psychological nor cognitive/computational but, rather, neuroscientific. While (ii) is more ambitious than (i), it remains plausible and widely accepted. On the other hand, (iii) and (iv) seem unrealistic, overly ambitious, and misguided. (iii) presupposes that psychologists should `defer' to neuroscientists the choice of which questions to pursue, a suggestion that appears both implausible and unwarranted. Likewise, (iv), seems unreasonably strong: the claim that psychological explanations can be disposed of and replaced by neuroscientific ones is unrealistic, when interpreted as a description of the current state of science, or unwarranted, when understood `in principle,' along the lines of eliminative materialism and other reductive proposals. In sum, we are left with an unpalatable choice between

proposals that are either trivial or implausible. We conclude by providing a way out of such impasse. Specifically, we suggest a fifth way of characterizing the relationship, that, when properly construed, sets out an ambitious, albeit achievable, goal for cognitive neuroscience:

(v) Neuroscience provides evidence that discriminates between competing cognitive hypotheses, even when no bona fide psychological evidence is available.

Simply put, the psycho-neural interface require a `dynamic' interaction between neuroscience and psychology. As we show, the two disciplines can influence one another without presupposing any kind of implausible reductive interaction.

Histories of the brain.

Towards a critical interaction of the humanities and the neurosciences.

Mattia Della Rocca (Pisa)

Several scholars from the humanities seems divided between an "apocalyptic" and an "integrated" point of view about the so-called neuroturn, the «neuroscience revolution» that every field of knowledge shifted towards at the dawn of third millennium. A major point of this debate is about the quasi-deterministic explanation in biological terms of complex phenomena by the reification of them with the cerebral activity underpinning it, a cultural trend called "neurogenetic determinism" or "neuroessentialism (cfr. Rose, 2005; Racine et al. 2005; Reiner, 2011). As it was recently pointed out (cfr. Churchland, 2013), authors and researchers in human and social sciences have been deeply involved in this debate, mostly finding themselves polarized between two positions (with some significant exceptions: cfr. Choudhury & Slaby, 2011): the first, a firm criticism of any heuristic value from cognitive neurosciences for the understanding of historical situated knowledge like philosophy, arts, cultural and social studies; the second, a passionate adhesion – sometimes verging to methodological reduction – to neuroscience keywords, evidences, explanations and models. Nevertheless, it is precisely at the clash of this two points of view that a general epistemological break (à la Bachelard) reveals itself, showing how strong is the need for another – and critical – interaction between neurosciences and the humanities, based on the acceptation of the historical dimension of neurosciences, both in its goals and its methods.

At least two reasons can be found for this new interdisciplinary shift. First, as recently stated by several authors (Smail, 2014), while humanities of course could profit in different ways of neuroscience insights about the basis and the evolution of cognition and behavior, neurosciences should learn from and with humanities to develop a historical approach to its very own target: the human brain, that through phylogenesis acquired a highly dynamic plasticity, becoming an organ extremely sensitive to its environment – even to the cultural and social dimension of it – and whose functions cannot be explained without being situated in their contexts (cfr. Fasolo, 2014).

Second, history of neurosciences can offer to contemporary neuroscience research trends (mostly focused on in silico models, and often openly flawed by deterministic and reductionist assumptions) a broader and sound perspective to rethink the validity of their programs and methodologies, recognizing their essential epistemological plurality (and denouncing social and ideological influences in scientific agenda: cfr. Cooter, 2014; Della Rocca, 2014).

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Free will between philosophy and neuroscience

A platform for interdisciplinary dialogue?

Anna Drodzewska (Louvain-la-Neuve)

The discussions on free will, until recently were almost exclusively confined to the domain of philosophy. With the recent advancements in neuroscience, they gained new life, and entered a much broader debate. The experiments conducted by Benjamin Libet (1983, 1985) were a beginning of a new trend in neuroscience, inspiring scientists for decades now. Researchers who followed Libet (e.g. Haggard [2001, 2002, 2004, 2006], Soon et al. [2008]) aimed to show that it might not be the conscious us, who are responsible for our actions but, in fact, some neuronal processes. Additionally these experiments convinced scientists that a conclusive answer to the question of free will might be in reach. However, plenty of philosophers disagree with such conclusions. When it comes to those deeply philosophical issues, we should ask ourselves, what can bring better results- individual research in different domains, or close nit cooperation between neuroscientists and philosophers. In our talk we would like to defend the latter view while showing the most common problems we ourselves encounter as an interdisciplinary research group on the topic.

The contrasting approaches and different methodologies can make the cooperation difficult. Some of the arguments embedded in the domain specific language can be challenging for others to grasp. Additional negative factors in cooperation come from the preconceptions about the respective fields. For example, the precursor of research on free will, Libet, thought that philosophy is mainly busy with presenting vague and abstract problems, while neuroscience will in fact solve the puzzle. This approach is still present but the cooperation between philosophers and neuroscientists becomes increasingly more popular, and a middle ground, accommodating both the research done in neuroscience, as well as the conceptual side of the problem discussed by philosophy is sought after. However, in order to progress, some of the problems, especially those regarding terminology and some assumptions about both fields need to be cleared out.

The problem of terminology is probably the most pressing one, as both fields use the same or similar terms, yet the precise meaning of those expressions seems to be field dependent. We aim to show how both domains could benefit from a more unified vocabulary. Clearly defining some of the terms used, in the case of the free will debate, the most notable example being the term “free will” itself, would create a stable platform of dialogue and avoid plenty of confusion. In our presentation we will give an overview of some of those ambiguities, along with the roots of confusion that the different applications are causing. We will show how small changes can greatly improve the interdisciplinary communication and create a space for the, necessary in our opinion, interdisciplinary discourse.

We will conclude by showing examples on how neuroscientific experiments can put empirical boundaries on conceptual issues from philosophy, and how, conversely, philosophy can correct some of the common problems in neuroscientific experiments, focusing mainly on the problem of free will.

The neuroscience of ethics beyond the "is/ought" orthodoxy

The dual-process theory of moral judgment example

Nadia El Eter (Montpellier)

The main idea of this presentation is to reject the classical critical "is/ought" of the neuroscience of ethics. Since the emergence of Neuroethics and more particularly neuroscience of ethics concerned to reveal the neural and psychological basis of our morality, critics have been focusing on non-complementarities between neuroscience and ethics. The problem of differing nature between the two is formulated by the classical philosophical terms "is/ought". Nevertheless, this new field has no negligible empirical evidence supporting a new way to think our moral problems. No doubt the nature of the field in question is beyond this superficial "is/ought" approach. We suppose that to know the nature of Neuroscience of ethics we need to examine the empirical and internal logic of explanations proposed. For this we choose Dual-process theory of moral judgment developed by Greene et al. since 2001. This theory is very representative of this kind of research, because it reveals the interdisciplinary structure of the new field, attested by the presence of three levels: neural, psychological and philosophical. The second justified reason of this choice is that this theory does actually support normative moral philosophy conclusion. This paper will be concerned to deny the "is/ought" orthodoxy as a superficial conception of the scientific nature of cognitive neuroscience and the normative nature of moral philosophy. In order, I'll be focusing on the common thread supporting the transit between each level of the theory: neural, psychological and philosophical. Neuroscience of ethics has an internal mechanism that allowed it to explain our moral judgment coherently. This mechanism is supported by an architectural relation between the data of neuroscience, psychological explanation and philosophical frame. This will conclude to draw a portrait for Neuroscience of ethics as an interdisciplinary field and typical example of the "neuro-turn" in a large classical discipline.

Key words: Is/ought – dual-process theory – cognitive neuroscience – moral psychology – normativity – moral judgment.

Social neuroscience and social phenomena

Beyond empathy and theory of mind

Denis Forest (Paris)

Social neuroscience is a fast-expanding sub-field of cognitive neuroscience (Cacioppo, Visser and Pickett, 2006) that has drawn criticism from sociologists who reject both methodological individualism and a naturalistic worldview (Ehrenberg, 2008). But instead of thinking that social neuroscience is doomed to failure because of reasons of principle, we could ask what kind of conception it has of social relations and whether it would be possible to expand or revise it in order to answer current objections. My talk will have both a genealogical and an exploratory purpose. In its genealogical part, I shall focus on how and why social phenomena have been reduced to interpersonal relations within the field of social neuroscience - "people thinking about thinking people" or "other minds in the brain" (Fletcher et. al., 1995). In particular, this has to do with the obvious connection of social neuroscience with social psychology, with the idea of blending ethology and neurophysiology (Brothers, 1990), and with the background of the Machiavellian hypothesis on the evolution of the human brain (Byrne and Withen, 1988). But, as it has become increasingly obvious that human social cognition requires more than empathy and mind reading (Tomasello et. al., 2005), it is now possible to shift attention to other phenomena and to modify significantly the agenda of social neuroscience. In the exploratory part of the talk, I will try to show how taking into account phenomena like triadic relations, shared intentionality (Saxe, 2006) and the awareness of norm violations (Xiang, Lorenz and Montague, 2013) can contribute to the definition of a quite different way of investigating the human brain. In particular, it becomes possible to look at structures like dorsal medial prefrontal cortex and the anterior insula from the point of view of a non-atomistic individualism.

The neural net as a paradigm for human self-understanding

Yvonne Förster-Beuthan (Lüneburg)

In my talk I would like to discuss the neural net as a metaphor that serves as a paradigm in human self-understanding and simultaneously is expanded to a metaphysical structure. This expansion I will argue, is possible because the image of the neural net is far more virtual and less body-bound than that of the brain.

The neural net as it appears in computer-simulations and scientific representations has entered the common way, how we picture ourselves and the world. From science reports in media to novels, cinema and artworks the neural net works as a strong image. I will analyse examples of how the neural works as a paradigm of how the human is defined. Fernando Vidal described brainhood as an „anthropological figure of modernity" in 2009. I want to take this line of reasoning one step further and show that the neural net and its pictorial instantiations is paradigmatic in contemporary art and popular culture.

The difference to the term brainhood lies in the abstract character of the image. While brain still evokes the image of an organ that belongs to a body, the neural net suggests multiple forms of implementation and is closer to the virtual than the brain. The neural net as an image is highly dependent from neuroscientific modelling and it implies concepts like self-organization, emergence, plasticity, artificial intelligence. Images of neural nets are dynamic visualizations of intelligent structures that are not body-bound. Like the images from methods like fMRi it fascinates the audience because it suggests possibilities of cognitive enhancement and artificial life. After having discussed examples from art and popular culture (film, fashion, advertisment) I will turn to philosophical theories of embodiment and discuss the paradigm of the neural net from a philosophical perspective. The images of the neural net figure as a metaphysical dimension.

Other than the concept of information (which has been visualized famously in the Movie „Matrix" from 1999) the neural net lends itself to far more plastic and imaginative realizations. I will argue that it implicitly produces the idea of a cognitive structure as metaphysical dimension. Still, the neural net is a structure that needs implementation. The way it is visualized suggest an organic structure. Therefore the concept of embodiment will be applied to discuss the use of the neural-net-metaphor in philosophical perspective. The image of the neural net presents cognition as disembodied, which in turn reflects on the contemporary idea of what is human. The neural net does not only reflect a specific idea of what is human but also an idea of the metaphysical basis of being. I would like to analyse the process of imagination in which a very small constituent of the human brain advances to represent a metaphysical structure. In its course this image leaves behind the human origin and the embodied nature of cognition. In my talk I would like to discuss this evolution of a metaphor – the neural net.

Against Neuroscience Imperialism

Roberto Fumagalli (Bayreuth)

Keywords: Disciplinary Imperialism; Reductionism; Eliminativism; Free Agency; Interdisciplinary Integration; Decision-Making.

Over the last two decades, there has been significant philosophical and methodological discussion of so-called disciplinary imperialism, the systematic attempt to apply some discipline's methods and findings to model and explain phenomena that were formerly deemed to be within the scope of other disciplines. The involved authors provided sophisticated conceptualizations of this notion (e.g. Clarke and Walsh, 2009 and 2013, Mäki, 2009 and 2013) and engaged in detailed debates concerning specific instances of disciplinary imperialism (e.g. Cartwright, 1999, on physics imperialism, Dupré, 1983 and 1994, on economics imperialism). In recent years, several authors advocated so-called 'neuroscience imperialism' (henceforth, NI), an instance of disciplinary imperialism whereby neuroscience methods and findings are applied to model and explain phenomena investigated by other disciplines. Calls in favors of NI target a wide range of disciplines, including psychology (e.g. Bickle, 2003, Churchland, 1981), economics (e.g. Camerer et al., 2005, Glimcher, 2011), and philosophy (e.g. Libet, 1999, Soon et al., 2008, on our commonsense conception of free agency).

There are at least two reasons why NI deserves detailed philosophical scrutiny. First, some instances of NI exemplify the defining features of disciplinary imperialism in especially clear terms, and thus make NI an ideal test case for philosophical accounts of disciplinary imperialism. And second, NI contributions have potentially widespread implications for modelling and theorizing across a range of both natural and social sciences. To date, however, NI has not received detailed attention by philosophers, and the discussion concerning its identification and normative evaluation is relatively underdeveloped. In this paper, I aim to remedy this situation by articulating a precise characterization of NI and by providing a normative assessment of prominent calls in its favour. In doing so, I draw on two sets of influential NI contributions, which respectively target the economic modelling of choice and our commonsense conception of free agency.

The contents are organized as follows. In Section 1, I identify and assess several criteria that have been proposed to ground a normative evaluation of disciplinary imperialism. I shall consider in turn the objection from: (i) the disunity of science; (ii) disciplinary autonomy; (iii) counterfactual scientific development; and (iv) cumulative constraints. I shall argue that such objections provide informative criteria for evaluating the normative merits of several instances of disciplinary imperialism, but do not enable us to explicate why exactly recent calls for NI are disputable and should be resisted. In Sections 2 and 3, I articulate and defend two claims that, I argue, undermine prominent calls for NI. First, the proponents of NI significantly overstate the evidential and explanatory import of neuroscience methods and findings for the disciplines they target. And second, prominent

calls for NI point to an untenable reductionist position, which rests on empirically and normatively implausible presuppositions. This does not imply that applications of neuroscience methods and findings to other disciplines are inherently misguided. Still, it challenges the proponents of NI to qualify their imperialistic calls and ground such calls on more plausible empirical and normative foundations.

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Brain. Art. Salvation.

Gerd Grübler (Dresden)

Brain research has become a popular topic which has led to a permanent presence of neuro issues both in the academic field and in the wider public. Part of this is "neuro-bunk": fictitious roles are ascribed to the brain, as for instance performing as an agent, making plans, etc. Disenchanting such and similar phrases by the analysis of incorrect language use can be an important contribution coming from philosophy. However, although this kind of criticism is justified from the formal point of view it completely misses the point of the brain hype.

Applying a conception of philosophical analysis that combines insights in the role of popularization processes in the history of science with the systematical understanding of the importance of total views or weltanschauung for the origin of moral and other evaluations I want to make plausible that the neuro movement, as other science movements before, needs to be seen as a rather classical search for metaphysical sureness and moral vindication.

Seen this way, it becomes obvious that the metaphorical, as opposed to 'correct', use of language is a core means of spreading out the concepts of a science or field of knowledge over the whole society. And this will lead both to the invading of other cultural sectors and to the reshaping of everyday speaking and thinking. As a result a society will show more interest in and support for the respective science; and this science will establish itself as the most plausible way of revealing the 'actual' truth or 'real reality' behind the apparently given. We can see this, for instance, in 17th century when the (then so called) New Science using the paradigm of mechanical engineering flourished; or in 19th century when evolutionary biology became a model for literally everything. And we see it today with the neurosciences. For an example of the spreading out to other cultural sectors we might have a look in the field of fine arts where we already find neuro motives. Some examples from painting, sculpturing, and the technology of brain-painting might be introduced here.

It is important to note that all these movements of the past contained an implicit metaphysical message and motivation and, so to say, a promise of consolation – sometimes strictly denied by their proponents. I like to argue that the neuro movement today is no exception from that rule and I will try to show this by analyzing both the theoretical consequences of neuro or brain constructivism and the practical aims of neuro research. In that, current popular authors in neuro philosophy who consciously or unwillingly reproduce classical ontological patterns will be an issue as well as the trans-human tendencies of currently ongoing research projects. As one result we will find that the neuro movement, far from being a revolutionary alternative to traditional approaches, is a typical or 'normal' phenomenon of European philosophical and religious thinking.

Hope and Fear after the Decade of the Brain

What discourse analysis of mainstream media can tell about the Neuro-Turn.

Oonagh Hayes (Tübingen)

Culturally, historically and even medically, the brain isn't like any other organ of the body. Thus, medical intervention in the central nervous system is bound to raise fondamental ethical questions. Analysing which forms of expression these questions and their emotional associations adopt, this paper aims to show which kind of emotions are being called upon and by which means (figures of speech, pictures, video settings) neurological contents has been communicated after the decade of the brain, based on examples about deep brain stimulation (DBS).

Not only may DBS, as a neurosurgical operation, recall infamous periods of psychosurgery, but as an intervention in the functions of the central nervous system it has potential to be seen as much as a threat to an individual's personality, as a high-tech solution for so to speak mechanical problems. Of course, either views are far off the mark when considering DBS in a medical and scientific way, but these apprehensions can hardly be averted in communication about a therapy that affects the brain, be it sick.

While medical researchers are not exempt of emotional projections, the latter find far more pronounced forms of expression when they are relayed by mainstream media. The processing of scientific contents to make it accessible to a lay public as well as market strategies of publication lead journalists to go for sensational emotional approaches and to magnify spectacular stories, often thereby resorting to classical motives. These range from ECT, lobotomy and powerlessness of patients in mental institutions on the one hand, to belief in a neat and luminous progress on the other hand, as many pictures (photos or animations) illustrate. Furthermore, these motives obviously overlap with some found in – and spread by – fiction, adding in clarity and giving a wide scope of variations of central themes. Ultimately, these motives sketch a feedback of the broad public on scientific work both in medicine and in humanities.

By means of historical methods applied to communication of neurosciences, a picture of contemporary society will reveal itself through fears and hopes, and most of all, through beliefs about and representations of the brain after the neuro-turn.

From neural “is” to moral “ought”?

A critique of Greene's case for utilitarianism

Nora Heinzelmann (Cambridge)

In 2001, Joshua Greene and his colleagues published an article in Science in which they reported how they had used functional MRI in order to identify the neuronal correlates that underlie moral decision-making. The study was highly inuential and contributed a great deal to the neuro-turn in the social sciences and humanities. For one thing, strands of research that have traditionally not been concerned with empirical findings are now more and more under pressure to take them into account, sometimes even to substantially revise received views.

For example, in his recent monograph, Greene (2013) relies heavily on neuroscientific evidence in order to draw conclusions for moral philosophy. In particular, he claims to establish that utilitarianism is superior to rival views, notably Kantian ethics. One of his main arguments is, roughly, that certain moral theories and in particular Kantian ethics can be debunked on the basis of cognitive processes that drive speci_c moral judgements. My paper develops two points against Greene's argument. First, from a methodological perspective, it criticises that the empirical _ndings do not sufice to draw the normative conclusions that Greene wishes to establish. The main reason is that the evidence can be interpreted in a variety of ways and that many of these do not uniquely support utilitarianism against alternative theories.

Second, from a semantic perspective, I argue that Greene's argument relies on a highly questionable understanding of the meaning of certain philosophical terms, like \deontology", \utilitarianism", or \Kantian ethics". In particular, the way in which these conceptions are operationalised in empirical research undermines the alleged significant implications for normative ethical theory. I therefore conclude that Greene's case against moral theories rivalling utilitarianism should be rejected. Generalising from this example, I argue for several methodological caveats and desiderata that should guide any interdisciplinary inquiry on the borderline of normative and neuroscientific research.

Neuro-Regimes of Education

Brain-based learning, human enhancement – and their visual culture

Dirk Hommrich (Hamburg)

Today, pedagogy understood as educational work, as profession or as educational science faces a milestone of its theoretical and practical development. Of course, historically the problem of how to describe our growing up as mindful bodily beings has always been a challenge of interdisciplinarity and transdisciplinarity (keyword "nature vs. nurture"). But the contemporary juncture, which seems to be similar to a smoldering "science war" within education, lies far away from intellectual debates like the positivist dispute of the 1970s and 1980s: Nowadays' bifurcation of educational thinking is ess an academic debate and more of a quarrel about administrative, economic and political claims regarding the educational system. Given the historical context of the so-called "New Control" ("Neue Steuerung"), "transition from input- to output-control" and the numerous voices calling for an "evidence-based education policy" in Germany/Europe the importance of evidence-driven methods in educational domains is constantly rising. Next to this it is striking that "competence-orientation", "human capital" and "governing by numbers" are timely companions of evidence-based concepts like brain-based learning & teaching (BBLT). – Therefore the first section of the proposal gives a short introduction into what might be called an 'evidence-based regime of education' and describes both connections to and aspects of BBLT and cognitive human enhancement (HE).

A second step of my argument focuses on these two domains of 'brain-based education': it reviews the contentious professional adoption of BBLT approaches on the one side and subtle theories and practices of HE on the other side. This comparison leads to a conceptual framework for two different discourses of 'brain-based education'. While BBLT seems to be a kind of collective reform science, neuro-enhancement rather seems to represent self-experimentation and individual 'experimentalization'. Although these topics are not the same, both of them shall be outlined as twofold 'neuro-regimes of education' that promise to deliver effective results, better performance and efficient output of educational settings.

The third part of my presentation will give some visual examples for those contexts by presenting 'pictorial lessons' from the popular science magazine "Gehirn und Geist", which has attended neuroscientific research and topics of brain research and psychology for the laypeople since 2002. I will argue that a close look at the visual culture of "Gehirn und Geist" and its twelve-year popular media coverage uncouples the neuro-regime of BBLT from the neuro-regime of cognitive (and emotional) HE. Finally, my concluding remarks will outline both a critique (of the separation) of these discourses and a critique of their visual (i.e. pictorial) representation.

Appreciation Problems of Neuroeconomics

Paul Hoyningen-Huene (Hannover)

Neuroeconomics is a new sub-discipline of economics. Its subject matter is the neuronal foundations of economic behavior. Many standard economists are critical of neuroeconomics; they doubt, partly in principle, that neuroeconomics is capable of contributing to the progress of economics proper. I will try to reconstruct and make plausible the main arguments of standard economists against neuroeconomics, mainly in positive economics. One argument claims that neuroeconomics is necessarily irrelevant to standard economics because of conceptually diverging goals of these two disciplines. Another argument claims that neuroeconomics is irrelevant to standard economics for empirical reasons.

Given these reservations of standard economists, I shall formulate five recommendations to neuroeconomists. First, neuroeconomists should realize that in standard microeconomics, predictions have a much higher status than causal explanations whereas in the neurosciences the reverse is true. Second, neuroeconomists should become clear whether they want to positively contribute to, or criticize and/or change, or simply don't care about standard economics. For these alternatives, different strategies are advisable. Third, if neuroeconomists want to positively contribute to standard economics, they should realize that their work may often be devaluated as merely heuristic if their results can be reproduced by methods of standard economics. In addition, neuroeconomics does often not contribute to standard or behavioral economics but rather exploits their results for neuroscientific purposes without any benefit for economics proper. Fourth, if neuroeconomists want to criticize and/or change standard economics, they should use the same strategies that behavioral economists successfully used in the preceding decades for the same purpose. Fifth, neuroeconomists who do not care about their influence upon standard economics can still gain high academic recognition.

In summary, neuroeconomics can gain greater appreciation within standard economics only if it can produce novel predictions of interesting economic behavior.

Neurophilosophy or Philosophy of Neuroscience?

What neuroscience and philosophy can and can´t do for each other.

Michael Jungert (Munich)

While the remarkable scientific progress in many fields of neuroscience is beyond dispute, there are many serious doubts and concerns about the (proposed) relevance of neuroscience for the social sciences and humanities (see e.g. Bennett/Hacker 2003, Legrenzi/Umilta 2011, Satel/Lilienfeld 2013, and Tallis 2014). Within philosophy, two recently developed sub-disciplines attempt to deal with the problems and prospects brought up by neuroscience. The philosophy of neuroscience tries to apply classical questions and models from the philosophy of science to neuroscience, for instance to shed light on its specific explanatory strategies. Whereas this view is sometimes considered to be a more skeptical or even destructive one, so called neurophilosophy takes another approach. Here, neuroscientific findings are applied to classical philosophical issues such as the nature of emotion (Bermond 2008), the concept of morality (Walter 2004, Churchland 2011), or the nature of consciousness (Mandik 2007), in order to gain empirically informed philosophical concepts and theories.

In this talk, I will evaluate the prospects and results of both approaches by examining the following questions:

- Which methods and theoretical assumptions are used in neurophilosophy and in philosophy of neuroscience respectively?
- What are the explanatory aims of both disciplines?
- What is the theoretical basis of neurophilosophy´s claim to integrate neuroscientific findings into philosophical theory?
- In a nutshell: what can philosophy learn from neuroscience and vice versa?

The answers to these questions will be developed by focusing on two fields of research that currently attract a lot of philosophical interest: Moral psychology and memory research. Both fields are of interest to neurophilosophy as well as to the philosophy of neuroscience. By analyzing some key arguments and debates, taking into account the abovementioned questions, the prospects and limits of connecting philosophy and neuroscience will become clearer.

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Yet another new discipline?

A quantitative approach to neuroethics.

Jon Leefmann (Mainz)

In cooperation with Elisabeth Hildt (Chicago) and Clément Levallois (Lyon)

Alongside the established disciplines of neuroscience and moral philosophy, in the last decade neuroethics has emerged as a label for a relatively new kind of research on ethical issues related to the brain. This field of research comprises a complex and partly confusing scenery of scholars, scientific institutions, ethicists and practitioners with different disciplinary backgrounds and different research agendas. This variety has given rise to different accounts about the central issues and the role of the discipline of neuroethics. For example, cognitive scientist Martha J. Farah gave a rather short definition of what she considers neuroethics to amount to: "social, legal, and ethical implications of cognitive neuroscience" (Farah, 2007, p. 363). Another view is held by ethicist Eric Racine, according to whom neuroethics is not restricted to ethical questions in cognitive neuroscience but is a much broader field, central to which is clinical neuroscience and the aim to improve patient care (Racine, 2010). Others conceive of the field not only as a subfield of traditional bioethics that is concerned with questions relating to the human brain, but claim a greater independence of neuroethics from bioethics (Levy, 2011; Roskies, 2002). Definitions of this kind describe the discipline as "the examination of how we want to deal with the social issues of disease, normality, mortality, lifestyle, and the philosophy of living *informed by our understanding of underlying brain mechanisms*." (Gazzaniga, 2005, p. xv). Following this conceptualization some representatives of neuroethics have suggested new theoretical frameworks for the discipline, which do not equally apply to other subfields bioethics and which promote the idea of 'naturalizing' the normative realm of ethical reasoning by taking into consideration results from empirical research from psychology and the neurosciences.

To assess these research agendas from an empirical point of view we present a study that tracks the development and institutionalization of neuroethics between 1995 and 2012 by the use of scientometric methods. This quantitative approach allows for displaying the temporal development, structure and disciplinary institutionalization of the field and for analyzing the reciprocal shaping of neuroethics and its related disciplines. Using the Mainz Neuroethics Database we compare the purported varieties of the self-understanding of neuroethics and its criticisms with the factual development of the field.

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The emergence of money

How neurosciences can shed light on the genesis of a complex human institution.

Germain Lefevbre (Paris)

Money raises a fundamental question: why and how intrinsically useless objects can acquire a positive exchange value in a society? In our current work, we seek to elucidate the set of cognitive processes that have made money-emergence possible, as well as to investigate their neural underpinnings. To this aim, we deploy neurocomputational modeling of human behavior on a money emergence task, adapted from an economical model of money emergence based on gametheoretical micro-foundations. In this sense, we explore money emergence in the framework of strategic learning. Beyond the analysis of biological basis underlying money emergence in particular and strategic social learning in general, our work provides an opportunity to question the epistemological place of neurosciences in our understanding of social behaviours.

How Relevant is Neuroscience to Philosophy of Mind?

Işık Sarıhan (Budapest)

The interaction between neuroscience and philosophy have two main aspects. One concerns the philosophers' interest in the issues that arise within neuroscience, the findings of the field and the claims made by neuroscientists, and the philosophers' function as a conceptual and logical corrector or aide towards a more accurate science. The other aspect concerns the relevance of the findings of neuroscience for the resolution of philosophical debates. In this talk, I will be largely concerned about the latter aspect. Especially since 1980s and the emergence of "neurophilosophy", more and more philosophers have been closely following the findings of neuroscience and relevant sciences, and bringing home morals for philosophical questions. The aim of this talk is to discuss whether these attempts succeed or not in working towards a resolution of philosophical debates. I will mention various attempts from philosophy of perception, the problem of consciousness and the free will debate, and I will argue that most such attempts are not successful in trying to answer questions like whether psychology can be reduced to neuroscience, whether we have free will, or whether we see the external world directly in perception. The failure is not due to any problems with the neuroscientific data itself, but it results from an ability of the philosophical questions to evade the data, that is, the data mentioned fails to settle the philosophical debates conclusively. This has a reason: If those philosophical questions could be settled by empirical evidence, they wouldn't be philosophical questions in the first place, they could be reframed as scientific, empirical questions. What makes these questions persisting philosophical questions is precisely that there is no way to settle them through empirical evidence, rather, they are conceptual questions, some of them also with phenomenological aspects, and their solution lies in conceptual analysis and phenomenological reflection. This aspect of philosophical questions also has an interesting implication: If a philosophical question cannot be settled by empirical experimentation, this means that the truth sought-after by the question being this or that does not make a difference to our observation of how the world causally works and therefore does not make a difference to our causal interaction with it. So, unless the answer to a philosophical question has an ethical dimension, it seems to make little or no practical relevance for scientific investigation or for our lives. Discussion of this implication will constitute the second part of the talk.

Whatever happened to social agents?

An empirical approach to the traditional 'Structure vs. Agency' debate.

Alex Tillas (Düsseldorf)

In this paper I present a philosophical argument about the 'Structure vs. Agency' debate – one of the central debates in social sciences. My task here is not to argue for the primacy of either of the two but rather to show that this traditional debate could be recast in light of cognitive neuroscientific evidence. I start by putting forth an empirically vindicated view about the nature of thinking, in the light of which the traditional debate as well as the notion of 'social agency' is rendered redundant. In particular, I argue that regardless of our phenomenology, thinking – a prerequisite for 'sociologically non-trivial actions' – does not occur in our minds freely, let alone spontaneously. Rather, thinking is a process realised by associationistically conditioned neuronal systems. In this sense, thinking is contingent upon the weightings of the synaptic connections between neuronal groups grounding it. In turn, socialisation is essentially a process of adjusting the appropriate synaptic connection weightings. Thus, there is little value in arguing over the primacy of structure or agency as the main determinants of social behavior, since agency is itself culturally conditioned or structured. Specifically, I argue that both conscious (concepts) and unconscious (intuitions) determinants of sociologically non-trivial actions derive from perceptual encounters with our socio-physical environment. In turn, both of these factors structurally saturated. In turn, agents – in the way social scientists use the term – simply do not exist. Taken at face value, the picture above might seem bleak to the extent that agents are presented as unable to act autonomously. However, this is not the case with regards to simple actions. In support of this claim, I present neuroscientific evidence about how agency is established. Namely, I examine evidence showing that volition strongly depends on inhibition of motor programmes (voluntary and involuntary movements) antagonistic to a given chosen course of action. In this sense, we still qualify as agents if only with regards to sociologically trivial actions.

Keywords: Structure; agency; concepts; intuitions; decision-making; actions

Acting as External Frontal Lobe

The teenage brain as 'evidence-based' parenting advice

Ties van der Werff (Maastricht)

In the past ten years, a new explanation to account for adolescent behavior has fuelled enthusiasm amongst parents, journalists, pedagogues, and family coaches: the teenage brain. The teenage brain tells the complicated story of GnRH hormones triggering a restructuring of adolescent brains, making teenage brains particularly plastic. The teenage brain is used by as pedagogues and family coaches to tell parents what they should do with their (problematic) teenagers: parents should, for example, act as the *external frontal lobe* of their teenagers. Talking about prefrontal cortices, pruning and grey matter, it's not at all obvious that such a scientific and technical discourse can play an important role in helping parents to answer questions of how to be a good parent – in short, questions of ethics. How is the teenage brain, with all its scientific technicalities, made *valuable* for parents? What does it mean to be a good external prefrontal cortex? And, since the concept of the teenage brain promises to 'finally solve the mystery of adolescence', does parental advice based on the teenage brain challenge existing ideas of good parenting, or lead to new parenting norms?

The teenage brain as the latest evidence in the history of science-based parenting advice, carries considerable credibility and authority. Experts from 'soft' social science disciplines such as pedagogy seem therefore eager to incorporate this new knowledge into their work and advice. But this scientization of pedagogy alone does not explain the wide and diverse uptake of the teenage brain as parenting advice. Based on an STS and empirical philosophy informed analysis of the appropriation of the teenage brain in the field of pedagogy and Dutch public discourse, I show how the teenage brain is able to reconcile different (and sometimes conflicting) parental norms. To show how the factual claim of the teenage brain becomes aligned with existing ideas of good parenting, I introduce the notion of 'moral repertoire'. I argue that the appropriation of the teenage brain in pedagogy shows that the explanatory force of such neurobiological claims depends for a great part on how actors are able to incorporate it into existing moral repertoires. As such, I aim to develop a better understanding of the role values and norms play in the dissemination, appropriation and stabilization of neuroscience knowledge, thereby implying a co-evolution of techno-science and morality or techno-moral change (Swierstra et al., 2009).

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NESSHI-Project:

The NESSHI project aims to provide the first comprehensive assessment of the effects of the decision neurosciences in transforming European social sciences and humanities (SSH). By decision neurosciences we refer to the specific subfield of cognitive neuroscience that focuses on elucidating the neural processes underlying individuals' observed choices. Decision neurosciences have increasingly attracted the attention of SSH researchers interested in how agents, citizens or consumers assess, deliberate, choose and select in a variety of contexts. In particular, the emerging areas of neuroeconomics, neuromarketing and neurophilosophy are based on the neuroscience of decision-making. As a result, SSH models, definitions of concepts, and standards of proofs, are now challenged to become "neurologically plausible". How do SSH negotiate this "neuroscientific turn", and how and to what extent does it impact their societal relevance?

The NESSHI project is a joint venture of researchers from the universities of Oxford (United Kingdom), Leiden (The Netherlands), Paris II Panthéon Assas (France) and Mainz (Germany). The German part of the NESSHI project is funded for three years by the German Research Foundation (DFG).