

International Workshop The Generational Brain

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Abstracts & Participants

The concept of development in psychology and neuroscience

Vanessa Lux, Zentrum für Literatur- und Kulturforschung Berlin, Germany

The emerging field of developmental neuroscience studies structural and functional changes in the brain from infancy to old age. First results indicate an enormous plasticity of the brain over the life span as well as correspondence between structural and functional changes in the brain and behavioral changes during infancy, early childhood, adolescence, and old age. However, as the empirical data is collected at single time points to interpret observed changes as 'development' matching models of development are needed. These are often borrowed from psychology without reflecting neither the underlying concept of development, nor its historical roots, nor methodological and theoretical implications. On the other hand, in psychology, models of development are revised due to neuroscientific findings. In the paper, I examine this process of interdisciplinary exchange of the concept of development and corresponding models between neuroscience and psychology. First, I summarize briefly the history of the concept of development in psychology and its origin in neighbouring disciplines such as biology and demography. Second, I outline the historical roots, methodological preconditions and theoretical implications of models of development currently used in developmental neuroscience. Third, I discuss the influence of developmental neuroscience on developmental psychology and educational psychology.

Vanessa Lux, PhD, is a postdoctoral researcher in the interdisciplinary project "Cultural Factors of Inheritance" at the Zentrum für Literatur- und Kulturforschung Berlin. She finished her PhD in Psychology at the Free University Berlin in 2011. She is executive board member of the International Society for Theoretical Psychology, and editorial board member of *Forum Interdisziplinäre Begriffsgeschichte* und *Forum Kritische Psychologie*. Research interests: The significance of epigenetic knowledge for developmental psychology and for the concept of psychological trauma; the interplay between development and embodiment; the role of cultural concepts in neuroscientific research. Selected Publications: With Gottlieb beyond Gottlieb: The role of epigenetics in psychobiological development, *International Journal of Developmental Science* (2/2013); *Genetik und Psychologische Praxis* (2012).

Anatomical changes during development and aging

Kâmil Uludağ, Maastricht University, Netherlands

The brain undergoes dramatic changes in its microstructural composition, inter-areal connections and gross anatomy. In this talk, I will review the anatomical changes in the human brain across the lifespan. The gray matter matures first in the sensorimotor areas and then in areas involved in higher cognitive functions. In contrast to gray matter development, the white matter volume increases with age in the first decades indicating enhanced connectivity between brain areas. In elderly, both gray and white matter volume and integrity deteriorates leading to various cognitive deficiencies and neurological diseases. In summary, the anatomical changes are accompanied, caused or preceded by cognitive, behavioral and functional development.

Kâmil Uludağ, PhD in Physics, is Associate Professor in the Faculty of Psychology and Neuroscience (Department Cognitive Neuroscience) at Maastricht University, Netherlands. He completed his Ph.D. in Physics on Near-Infrared Spectroscopy (Humboldt University, Berlin) and moved for a postdoc to the Center for Functional MRI (UCSD, San Diego, USA) working on the physiological and physical basis of fMRI. In 2004, he was appointed as Group Leader at the Max Planck Institute for Biological Cybernetics, Tübingen. Since June 2010, he is Associate Professor in the Faculty of Psychology and Neuroscience (Department Cognitive Neuroscience) continuing his work on the basis of fMRI utilizing the new Ultra-High Field MRI scanners (7 and 9.4 Tesla) and got recently awarded a VIDI grant on high-resolution fMRI. In addition, he investigates the biochemical determinants of anatomical MRI contrasts in postmortem tissue and in vivo. As a physicist in the human neuroscience field, his main interest is in the development of new imaging tools that can then be used to ask novel questions concerning human brain function and anatomy.

Opportunities and challenges for current Developmental Neuroscience

Niko Steinbeis & Daniel S. Margulies, MPI for Human Cognitive and Brain Sciences, Leipzig, Germany

While developmental neuroscience can often be motivated by clinical and policy concerns, its constituent research methodologies aim to provide insights into the limits and potential of the developing brain. Our talk will address two main approaches for characterizing psychological and neural changes that occur between infancy and adolescence. Specifically, with respect to psychological change, frequently debated topics such as developmental continuity and performance versus competence can potentially gain from the insights of brain data. Whereas for neuroimaging approaches, which have gained substantial traction in recent years, the advances in describing the developing 'connectome' has been challenged by awareness of imaging artifacts related to behavioral aspects of development (such as motion). As these two fields (developmental psychology and neuroscience) continue to integrate by, for example, constraining psychological hypotheses with brain data and offering explanatory models of neuroimaging findings, the resolution of these challenges charts the development of the field itself.

Daniel Margulies, PhD, leads the Neuroanatomy and Connectivity Research Group at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig, Germany. His research investigates the organizational properties of spontaneous brain dynamics and their implications for individual variability in cognition and behaviour—focusing specifically on the prefrontal cortex. Before entering neuroscience, he studied literature and philosophy, and continues to collaborate with social scientists and historians on questions of the emergence of contemporary controversies in neuroscience. Dr Margulies has also created works of art that aim to interrogate the epistemic assumptions of cognitive neuroscience, and collaborates with visual artists on methods of representing the complexity of brain connectivity.

Niko Steinbeis, PhD is a senior researcher in the department of Social Neuroscience at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig, Germany. He obtained his PhD on the neuroscience of music and testing for the limits of analogies to language processing with regards to semantics. His current work focusses on the emergence and change of social behavior and affective experiences in children and how this can be explained by brain development. He has a growing interest in understanding critical periods in human social development.

Brains and hands as tools for cultural tasks: By-passing the mereological fallacies

Rom Harré, *Linacre College Oxford, UK/Georgetown University, Washington D.C., USA*

Neither neuroscience nor cultural psychology has provided a comprehensive account of human life. Resolving some major philosophical errors in relating how people behave to the relevant structures and processes in the brain can provide a firm foundation for a hybrid science that gives equal weight to meaning making and brain activity. Neuroscientists still fall for two mereological fallacies, invalid part-whole inferences. The first mereological fallacy is the use of predicates the meaning of which is determined in the use for wholes to some of their parts – for example 'feels', 'decides', 'plans', 'remembers' get their meanings as whole person activities and so cannot be used for whole person parts, such as hippocampi. The second mereological fallacy is the projection onto a whole as constituents of products of interactions with that whole – memories are products of certain interactions with people and it is a fallacy to project them back into that person as constituents. However, while brains are parts of human bodies it is not clear that they are parts of persons. The argument can be restyled in terms of fields of family resemblances, in such a way that it makes sense to describe the hippocampus as an organ for remembering, but does not support the claim that neuroscience is core psychology. Four main systems of concepts or 'grammars' are in everyday use and have counterparts in the language of psychology. Such systems are networks of meanings linked by three principles. (1) Taxonomies of relevant body parts are determined by the psychological role they play in everyday human life, as revealed by analyses of discursive practices. (2) People's capacities are sometimes grounded in material states of their bodies. (3) Many body parts are also identified by the role they play as tools in human activities including psychological tasks which are identified in cultural terms. Arguments are developed to show that objections to the idea that brains and their constituent organs are tools are misplaced. Hybrid psychologies are not only possible but are widespread, for example in sport science.

Rom Harré is Fellow of Linacre College, Oxford, and Distinguished Professor in the Psychology Department of Georgetown University in Washington/DC. He was for many years the University Lecturer in Philosophy of Science at Oxford. From 2009 until 2011 he served as Director of the Centre for Philosophy of Natural and Social Sciences at the London School of Economics. He began his career in mathematics and physics, turning later to the foundations of psychology. His research has been directed to the use of models and other kinds of non-formal reasoning in the sciences, as well as a long series of studies on the role of causal powers and agency concepts in both natural and human sciences. His publications include among others *Causal Powers* (with E. H. Madden), *Varieties of Realism, Modelling: Gateway to Nature*, *The Explanation of Social Behaviour* (with P. F., Secord), *Cognitive Science: A Philosophical Introduction*. He has held Visiting Professorships in many places, including Australia, Spain and Japan. He is Honorary President of the International Society for the Philosophy of Chemistry.

The social brain and the effect of peers in adolescence

Lisa Knoll, University College London, UK

Adolescence is a developmental period which is characterised by biological, cognitive and social transition. Social cognitive processes involved in relationships with family and friends change throughout adolescence, and it is proposed that a significant proportion of adolescent-typical behaviour is driven by the potential social reward of peer acceptance. Previous studies have found that adolescents show heightened risk taking behaviour when in the presence of peers, suggesting a relationship between risk taking behaviour and peer influence during adolescence. This talk will focus on the development of the social brain, and will feature data from behavioural and functional studies looking at peer influence and risk taking behaviour in adolescence.

Lisa Knoll, PhD, received her Magister degree from the University of Potsdam and the Free University Berlin. She studied German Philology, Media Science, History of Art, and German as a Foreign Language. During her PhD at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig, Germany, her research focused on the underlying brain mechanisms and structures involved in language processes in the developing brain of preschool children. Recently, she joined the Developmental Cognitive Neuroscience Group at the Institute of Cognitive Neuroscience at University College London. Sarah-Jayne Blakemore group's research focuses on brain development in human adolescence. She is particularly interested in decision-making throughout development and how social influence influences risk perception in adolescence.

Pedagogies of the brain: Mindfulness, poverty and the Adolescent Brain

Suparna Choudhury, McGill University, Montréal, Canada

Mindfulness meditation is being advocated as a promising new educational, clinical and social intervention for youth, fuelled by new evidence from neuroscience about the benefits of "growing the brain through meditation", convergent with recent data on

developmental neuroplasticity. Although still marginal and in some cases controversial, secular programs of mindfulness have been implemented with ambitious goals of improving attentional focus of pupils, social-emotional learning in 'at-risk' children and youth and not least to intervene in problems of poverty and incarceration. In this paper, I present data from an ongoing qualitative study involving interviews with teachers and mentors working with young people using mindfulness education. The analysis points to the role of neuroscience in positioning these programs as legitimate and progressive, based on state-of-the-art science. I discuss the tensions arising from their moral reframing of social problems associated with poverty and inequality.

Suparna Choudhury, PhD, is an Assistant Professor at the Division of Social & Transcultural Psychiatry, McGill University and an Investigator at the Lady Davis Institute for Medical Research. She did her doctoral research in cognitive neuroscience at University College London, postdoctoral research in transcultural psychiatry at McGill and most recently directed an interdisciplinary research program on critical neuroscience and the developing brain at the Max Planck Institute for History of Science in Berlin. Her current work investigates the production and dissemination of biomedical knowledge – in particular cognitive neuroscience – that shapes the ways in which researchers, clinicians, patients and laypeople understand themselves, their mental health and their illness experiences.

Forgetful systems: immune senescence and brain aging compared

Ohad Parnes, Berlin, Germany

The study of the underlying mechanisms of 'normal' aging has been at the centre of biomedical research for several decades now. In my talk I will discuss the way old age as a category has been conceptualized in two biomedical research fields: immunology and the neurosciences. In both cases, interest in aging has not been part of the initial theoretical and experimental foundation of the field. Historically considered, the category of old age has been superimposed upon an existing body of knowledge, enabling the re-interpretation of existing empirical data as well as the establishment of new research avenues.

In my talk, I will discuss the connection between function and physiology in the conceptualization of age and aging in the immune system and in the brain. In particular, I will discuss the notion of memory and its role in the conceptualization of aging in both systems. Interestingly, recent research indicates a closer relationship between these two processes than hitherto assumed.

Ohad Parnes studied biology, philosophy and history in Tel-Aviv. PhD 2000: Agents of life and disease. The concept of specific agency in modern biomedicine. 2004-2010 Senior Research Fellow at the ZfL. 2009-2011 Associate Professor, Central European University, Budapest. 2011-2013 Associate Professor, Department of Life Sciences, The Open University of Israel. Publications to the history and conceptual foundations of modern biomedicine, immunology and autoimmunity, genetics and epigenetics.

The neurosciences' new animism

Cornelius Borck, University of Lübeck, Germany

For the historian of the neurosciences, the opening sentence of our conference is, first and above all, a historical statement: "Brains change drastically over time." Over the course of roughly two hundred years of research, brains have been conceived, conceptualized and researched in radically different ways. Perfect spheres, mechanical apparatuses, musical organs, mobile hydrae, electrical switchboards, computers, logical machines – they all once served as models and different instantiations of brains. The advent of functional imaging brought a mimetic approach to the field, with the promise to reveal the inner workings of the living brain in action. Criticized as neo-phrenology, the representational space of the brain was morphed to its anatomy by this technology. But what happens when the field turns from conceiving the brain as a stable scientific object (though historically in different ways) to a dynamic perspective? With the turn towards the plastic brain, functional imaging now apparently provides the means to materialize rather sophisticated and complex psycho-social objects. It has hence been criticized more recently as a new form of voodoo. The talk addresses the fusion of the historically and historiographically changing brain with the dynamic brain.

Cornelius Borck is a historian of science and director of the Institute for History of Medicine and Science Studies of the University of Lübeck, Germany. Before coming to Lübeck, he held a Canada Research Chair in Philosophy and Language of Medicine at McGill University in Montreal. Earlier appointments include the research group "Writing Life, Media Technologies and the History of the Life Sciences 1800-1900" in the Faculty of Media at the Bauhaus University in Weimar, and a Karl-Schädler-Research Fellowship at the Max-Planck-Institute for the History of Science in Berlin. His research topics include mind, brain and self in the age of visualization; the epistemology of experimentation in art, science, and media; sensory prostheses and human-machine relations between artistic avant-garde and technoscience.

Functional brain images as visual icons and sites of conflict in contemporary fictional literature

Irmela Marei Krüger-Fürhoff, Zentrum für Literatur- und Kulturforschung Berlin, Germany

The colorful results of brain imaging technologies have been widely disseminated both in scientific and popular publications on brain activity, brain development and degeneration, promising a 'life view' of the very organ that is closely associated with a person's mental faculties and identity. In the context of neurodegenerative disorders such as Alzheimer's disease, brain scans are often used in addition to psychological tests. Having turned into 'cultural icons', these brain images are sometimes included in autobiographical or fictional texts on dementia. My paper analyzes how contemporary literary texts 'translate' these visual icons into language (e.g. into stories of degeneration that can be told to patients and their relatives), how they relate to 'traditional' diagnostic approaches such as psychological tests and autopsies, and how literary texts negotiate between the protagonists' desire for scientific explanations and their longing to sustain a more complex concept of identity that includes notions of persisting individual capacities, personal continuity and embodiment.

Irmela Marei Krüger-Fürhoff, Dr., is a postdoctoral research scholar at the Zentrum für Literatur- und Kulturforschung Berlin and a lecturer at Bielefeld University. She is interested in 18th to 21st century literature and the interrelations between literary and medical discourses. Her most recent book, *Verpflanzungsgebiete. Wissenskulturen und Poetik der Transplantation*, published in 2012, explores the history of knowledge and the poetics of transplantation surgery in literature, film, medicine, immunology, and public discourse. She is currently working on scientific, artistic and autobiographical narratives of dementia.

Transgenerational brains in film

Fernando Vidal, Universitat Autònoma de Barcelona, Spain

Brains "change drastically over time." At the same, they are supposed to insure the continuity of personal identity, the conditions and features that define each of us as the person we are, rather than someone else. This apparently paradoxical predicament of personhood has inspired the fantasy of the "transgenerational brain." Thus, in Hanif Kureishi's 2002 novel *The Body*, brain transplantation allows an aging writer to inhabit a young, beautiful body. Successive surgeries result in personal immortality. The brain is here like an immaterial soul: it matures psychologically, but does not deteriorate as organic substance. Its birth date marks it as belonging to a certain generation, which is increasingly left behind by its renewable bodily receptacles. Since the 1930s, film has rehearsed such fiction. The examples are numerous; this presentation will focus on those that most explicitly explore (inter)generational issues.

Fernando Vidal is Research Professor of the Catalan Institution for Research and Advanced Studies (ICREA) at the Center for the History of Science (CEHIC) of the Autònoma University of Barcelona. He has published on various topics in the history of the human sciences, including early modern psychology, sexuality in the Enlightenment, miracles and science, psychoanalysis, psychiatry, and the progressive education movement in the early 20th century, and contemporary "neurocultures." His main books include *Piaget Before Piaget* (1994) and *The Sciences of the Soul: the Early Modern Origins of Psychology* (2011); he has edited Jean Starobinski's writings on the history of the body (*Las razones del cuerpo*, 1999), *The Moral Authority of Nature* (2004, with Lorraine Daston), *Believing Nature, Knowing God* (special issue of *Science in Context*, September 2007, with Bernhard Kleeberg), and *Neurocultures* (2011, with Francisco Ortega). He is at work on a book entitled *Being Brains*.

Against the grain: LeDoux's 'dramatic ensemble' and critically reading neuroscience

Clifford van Ommen, Massey University, New Zealand

In her 2004 text, *Psychosomatic*, Elizabeth Wilson argues that paying close attention to the neurological can contribute positively to 'critical innovation and political efficacy' (p. 16). In other words, rather than being a terrain that inevitably leads to conservative conclusions we, by reading the neurological discourse closely, may very well find articulated a materiality in excess of dubious theoretical circumscriptions. In this paper I attempt to illustrate this claim through a (mis)reading of Joseph LeDoux's *Synaptic self*, specifically his notion of the self as a 'dramatic ensemble'. Here LeDoux articulates the self as a vulnerable, constantly reiterated

achievement marked by the partial and passing play of dominances. Simultaneously, however, he attempts to escape from this account by evoking a traditional notion of the self. In this paper I articulate this play of tensions and privilege and unpack a subjectivity which resists LeDoux's flight from his own radicality.

Clifford van Ommen is Director of the Centre for Psychology at Massey University's Albany campus. He is a Clinical Psychologist and member of the International Society for Theoretical Psychology and the South African Clinical Neuropsychological Association. One of his areas of interest is the nexus of neuroscience, body studies and critical psychology. His doctorate work provided a deconstructive reading of several neuroscience texts so as to investigate this field's potential to contribute to the critical agenda.

Neuroplasticity: myth and counter-myth

Steven Rose, The Open University, Milton Keynes/University of London, UK

Within neuroscience discourse, plasticity is a humpty-dumpty word, a word with a long history albeit often presented as new-minted, so typical of the social amnesia of fast moving sciences. My framing perspective is autopoietic and it is from this perspective that I will explore the multiple meanings of neuroplasticity, from epigenetics through socio-cultural environmental experience, recovery from injury to learning and memory. I will consider plasticity through the life cycle and transgenerationally, and try to counter some persistent myths around the currently fashionable claims of neuroeducation.

Steven Rose is emeritus professor of neuroscience at the Open University and of Physick (genetics and society) at Gresham College London. His empirical research has centred on the molecular and cellular mechanisms of learning and memory. His most recent book, with sociologist Hilary Rose, is *Genes, Cells and Brains: the Promethean promises of the new biology* (Verso). In 2012 he was awarded the British Neuroscience Association prize for outstanding contributions to neuroscience.

The brain and space-time

Vasi van Deventer, University of South Africa, Pretoria, South Africa

The generational brain (as, for example, in the workshop outline) is an organism observed and researched within a world of space and time. In these studies the familiar paradox of the brain knowing itself (the impossible foundation of this onto-epistemology) is temporarily forgotten to allow the materialisation of the cybernetic brain in ever increasing detail. This paper looks at how this cybernetics gets disrupted when we remember the brain as generative of space-time and not only as generated in space and time.

Vasi van Deventer is an associate professor in the Psychology Department at the University of South Africa where he teaches research methodology, psychometric assessment and personology. He is involved in two post graduate programmes, namely research consultation at master's level and consulting psychology at doctoral level. He also supervises post

graduate students in these fields. His doctorate dissertation was on the nature and possibility of human science. His professional qualification is in clinical psychology, and in this capacity he worked with individuals suffering from brain trauma. This experience as well as his training in mathematics and physics and an interest in post-structuralism inspired his research into the individual as self-referential system.

Developing schizophrenia

John Cromby, Loughborough University, Leicestershire, UK

In the vernacular, some individuals are said to 'develop' schizophrenia. This everyday description carries an air of certainty that – if not actually reassuring, given its implications – may at least suggest confidence, both in the diagnosis and in any subsequent treatment. Yet, once we enter the realm of neuroscience, it becomes apparent that this everyday ascription conceals a mosaic of uncertainty. Research into the biology of schizophrenia already bifurcates, broadly speaking, into two strands (visible not only in neuroscience but also in biological psychiatry, genetics and epigenetics). One strand treats schizophrenia as a disease of development, something that individuals grow into – typically, as they become young adults. The other strand treats schizophrenia as a disease of neurodegeneration, as the decay, dysfunction or impairment of otherwise normal and healthy processes. Moreover, sometime after developing schizophrenia, many individuals 'recover'. Here, processes of further development and/or regeneration are presumably at play, although for the most part neuroscience seems to have less to say at this point. In a context where schizophrenia is already a contested concept – simultaneously positioned both as proof of the biological reality of mental illness and as a stark demonstration of the bankruptcy of biological psychiatry – what sense can be made of these claims to and from neuroscience? What role did (ideas of) the brain and its generative capacities play in the initial identification and subsequent development of this purported disease? Can a brain meaningfully be said to generate the experiences associated with this diagnosis? Can neurodevelopment simply be equated with neurodegeneration, or for that matter contrasted with it? And what of recovery: does this imply a new process of generation and regeneration, and if so does neuroscience shed any light on its character?

John Cromby, PhD, is Senior Lecturer in Psychology at Loughborough University, Leicestershire, UK. In his research he studies the character of experience: in particular, the way that experience is jointly constituted at the intersection of social influence and the body. Currently he is examining the intersection between the body and social influence by engaging with topics such as feeling, emotion, "depression" and paranoia, and by experimenting with methods of jointly analyzing textual data and embodied activity. Current research projects include: Exercise and mental health (Mental Health & Wellbeing, National Centre for Sport and Exercise Medicine); Feeling, affect and emotion; Moral distress in nurses (with Martin Willis).

Does Developmental Neuroscience contradict psychoanalytic theory?

Tamara Fischmann, Sigmund Freud Institute, Frankfurt/M, Germany

Both cognitive/developmental neuroscience and psychoanalysis claim as their goal the understanding of the human brain/psyche. Whereas the one is mainly interested in processes, which can be found in several subjects the other is interested in the specific functioning of single subjects. Where Freudian hypotheses offer a global architecture of the mind, neuroscientists were up until recently largely focusing on deficits of basic cognitive functioning rather than affect regulation in relationships and its aftereffects. This has changed in the last two decades and a vast amount of neuroscientific research is invested in brain functioning, such as development of neural nets and the location of specific capacities with functional PET scans to develop a neural model of behavior just as Freud had dreamed of. The dialogue with the neurosciences, devoted to the testing of hypotheses on human behaviour and neurophysiology with objective methods, has added to psychoanalytic conceptualizations on emotion, memory, sleep and dreams, conflict and trauma. To psychoanalysts as well as neuroscientists, the neurological basis of psychic functioning is of special interest. The gap between psychoanalytic finding and neuroscientific findings may be bridged as will be demonstrated by current interdisciplinary research projects.

Tamara Fischmann, PhD, PD, is Psychoanalyst and Senior Researcher at the Sigmund Freud Institute Frankfurt/M. Her research focuses on method development for empirical studies in psychoanalysis, trauma research and interdisciplinary research. Among the latter she examines the relationship between psychoanalysis and neuroscience as well as between psychoanalysis and bioethics. She has published on bioethics, trauma research, attachment, ADHD and conducted neuroimaging studies on the neurocognitive effects of psychoanalysis.