

**FONDAZIONE PRADA PRESENTS "HUMAN BRAINS," A MULTIDISCIPLINARY PROJECT DEDICATED TO BRAIN STUDIES**

Milan, 22 October 2020 — In 2018 Fondazione Prada undertook a multidisciplinary project for the study of scientific themes in depth. These reflections engendered "Human Brains," a program of exhibitions, debates and publishing activities that will take place from November 2020 to November 2022. The project is the result of a complex research conducted in collaboration with a scientific board chaired by Giancarlo Comi and composed of researchers, physicians, psychologists, linguists, philosophers, popularizers and curators, such as Jubin Abutalebi, Massimo Cacciari, Viviana Kasam, Udo Kittelmann, Andrea Moro, and Daniela Perani.

As stated by Miuccia Prada, President of Fondazione Prada, "I have been thinking about this project for years, and finally we are ready to commit to this intent, thanks the support of a group of philosophers, scientists and researchers that form the scientific board of 'Human Brains'. During the 25 year-long activity of Fondazione Prada, I have always wished to work on relevant cultural ideas. This specific project devoted to neuroscience is maybe our most important so far: for a visual art institution such as the Fondazione Prada, dealing with science is a true challenge, as it will have to give voice and shape to the ideas of the researchers. This dialogue that starts now to embody the project 'Human Brains' underlines the importance of cooperation, in order to give value and disseminate meaningful studies and practices for our present."

The "Human Brains" initiative is centered on the brain, a unique organ for the complexity of its functions, which are fundamental to characterize human beings. The scope of the investigation will survey different fields: from neurobiology to philosophy, from psychology to neurochemistry, from linguistics to artificial intelligence and robots. The brain will be analyzed from an anatomical-functional point of view, while also focusing on the brain aging processes and on neurodegenerative diseases.

As stated by Giancarlo Comi, President of scientific board of "Human Brains", "the path of understanding the mechanisms that allow our brain to produce thought and feel emotions, to create admirable works, has roots far back in time, but has had an incredible acceleration in the last fifty years thanks to science. 'Human Brains' wants to start from these roots and project into the future using the scientific method, with an approach at the same time rigorous but open, aware that not all questions can be answered."

An open project in constant evolution, "Human Brains" aims to experiment new collaboration and dialogue methods among scientists and scholars thus testing innovative communication formats addressed to a heterogeneous and international public. In this convergence of distant perspectives and scientific and cultural approaches, the human brain will be declined in the plural—as expressed by the title—to underline its intrinsic complexity and the



irreducible singularity of each individual. The fundamental historical and conceptual milestones that contributed to the identification of the brain as a place of thought will be analyzed throughout the project, as well as the key theme of the relationship between mind and brain. Furthermore, the nervous basis of sensations, emotions, memory and superior functions such as consciousness, language, creativity and abstract thinking will be at the center of the investigation. A few more complex themes—such as subconscious and freedom of decision—will be delved into by shedding light on the science’s crucial role in dealing with these themes as well as its limitations. The project will deal extensively with technological developments in neuroimaging and with techniques of functional exploration of the brain. Neurobiology and neurophysiology studies will be equally delved into, with their interconnection, the messages they exchange and their super-specializations.

The first part of “Human Brains” will be featured from 9 to 13 November 2020 during the online conference “Culture and Consciousness” on an interactive platform linked to Fondazione Prada’s website: humanbrains.fondazioneprada.org. The conference will be structured in five daily discussions taking place from 7 to 9 pm CET and focused on the study of consciousness in neurosciences. Each panel will include a debate between two scholars coordinated by one or more moderators.

As pointed out by Massimo Cacciari, member of the scientific board of “Human Brains”, “the definition of consciousness in neurobiological terms is quite simple: a set of nerve processes that allow an individual to perceive the internal and external world. However, how a set of processes that involve the brain as a whole can become Jasper’s self-conscious self, aware of its unity and being in antithesis with the external world and with others, remains one of the central questions of human being. Such a complex issue can only be addressed from different points of view and this is what we will do with the ‘Culture and Consciousness’ conference”.

The first two discussions will see neuroscientist Mavi Sánchez-Vives and neurobiologist Jean-Pierre Changeux, moderated by neurologist Giancarlo Comi, and neurobiologist Eve Marder with neuroscientist Antonio Damasio, moderated by neurologist and neuroscientist Daniela Perani. They will explore the biological fundaments of consciousness, from the neurofunctional mechanisms to neurochemical and molecular basis, and they will carry on in-depth analysis of connectivity as a cerebral substrate of consciousness state and the revolutionary techniques that allow investigating the brain in vivo.

Two discussions between neurolinguist Andrea Moro and cognitive psychologist Stanislas Dehaene will be moderated by cognitive neurologist Jubin Abutalebi, while the anthropologist Ian Tattersall and neuroscientist Idan Segev will be moderated by neuroscientist Katrin Amunts. They will examine the concept of consciousness in relation to anthropology, the key role of language and its connection to the emotional and affective



sphere to then reflect on the future evolution of research and on the attempts to create thinking machines.

Philosopher Michele Di Francesco and psychiatrist and neuroscientist Giulio Tononi will hold the final discussion, moderated by scientific journalist Vivian Kasam; it will be a crucial moment to confront different perspectives and approaches to the complex question of consciousness. Moreover, Giancarlo Comi and Massimo Cacciari will reflect on the contributions of all the previous discussions.

The second chapter of “Human Brains,” scheduled for Autumn 2021 at Fondazione Prada’s venue in Milan, consists of an international conference accompanied by an exhibition project. The intent of this conference is to compare some of the most prestigious neuroscience international institutions on the progress of research and on the future developments in terms of normal and pathological aging of our brain. In fact, despite the great developments in medicine, neurodegenerative diseases cannot benefit from therapies to influence their evolution significantly. A strategical and coordinated combination of stakeholders and the contribution of technological and methodological innovation is fundamental to support possible positive developments in this field. Several international institutions will contribute to the project: Harvard Medical School, Brigham and Women’s Hospital, Ann Romney Center for Neurological Diseases, Boston, US; Hôpital de la Salpêtrière, Sorbonne University, Neurology department and ICM, Paris, France; IRCCS Ospedale San Raffaele, Milan, Italy; Juntendo University Hospital, Department of Neurology, Tokyo, Japan; Karolinska University Hospital, Department of Clinical Neuroscience, Stockholm, Sweden; German Center for Neurodegenerative Diseases (DZNE) within the Helmholtz Association, Bonn, Germany; Max Planck Institute of Neurobiology, Munich, Germany; Montreal Neurological Institute-Hospital, MC Gill Research and teaching Institute, Canada; Ruijin Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Department of Neurology and Institute of Neurology, China; UCSF Weill Institute for Neuroscience, University of California, San Francisco, US; University College London Hospitals NHS Foundation Trust, National Hospital for Neurology and Neurosurgery Faculty of Brain Sciences, Institute of Neurology, Department of Brain Repair and Rehabilitation, UK; Weizmann Institute of Science, Tel Aviv, Israel; and Yale School of Medicine, New Haven, US.

On the occasion of the 2022 Venice Art Biennale, Fondazione Prada’s venetian venue will host an exhibition entirely dedicated to brain studies that will mark the third phase of “Human Brains” project. The immersive exhibition, curated by Udo Kittelmann in dialogue with the scientific board, will represent an attempt to translate into an exhibition form the history of the studies on human thinking and the current scientific research up until future challenges, linked to the developments of molecular medicine and the analysis of microscopical mechanisms that make up our brain activity.



Information

HUMAN BRAINS – CULTURE AND CONSCIOUSNESS

Online Conference

5 daily streamed live discussions

9 – 13 November 2020 (7 – 9 pm CET)

humanbrains.fondazioneprada.org

Press Contacts

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HUMAN BRAINS – CULTURE AND CONSCIOUSNESS

**VIRTUAL MEETING (9 – 13 NOVEMBER 2020)
SCIENTIFIC PROGRAM**

Monday, 9 November 2020, 7 – 9 pm (CET)

Discussion 1 | Neurobiological Bases of Consciousness

Speakers

Mavi Sánchez-Vives (Barcelona, Spain) | *In the Search for Consciousness: Brain Processing of Real and Virtual Worlds*

Jean-Pierre Changeux (Paris, France) | *The Connectomics of Conscious Processing: From the Molecular to the Cultural Level*

Moderator

Giancarlo Comi (Milan, Italy)

Tuesday, 10 November 2020, 7 – 9 pm (CET)

Discussion 2 | Functional and Structural Neuroimaging

Speakers

Eve Marder (Waltham, Massachusetts, U.S.) | *Individual Differences and Differential Resilience*

Antonio Damasio (Los Angeles, California, U.S.) | *On the Biology of Feeling and Consciousness*

Moderator

Daniela Perani (Milan, Italy)

Wednesday, 11 November 2020, 7 – 9 pm (CET)

Discussion 3 | The Languages of Human Consciousness

Speakers

Andrea Moro (Pavia, Italy) | *Impossible Languages: Infinity as the Fingerprint of the Human Mind*

Stanislas Dehaene (Paris, France) | *Human Singularity: Which Aspects of Consciousness Are Shared with Other Primates and Which Are Unique?*

Moderator



Jubin Abutalebi (Milan, Italy)

Thursday, 12 November 2020, 7 – 9 pm (CET)

Discussion 4 | Evolution of Culture: How Far We Will Go? (From Anthropology to Technology)

Speakers

Ian Tattersall (New York City, New York, U.S.) | *Culture as the Ultimate Expression of Evolution*

Idan Segev (Lausanne, Switzerland) | *Design for a Creative Brain*

Moderator

Katrin Amunts (Düsseldorf, Germany)

Friday, 13 November 2020, 7 – 9 pm (CET)

Discussion 5 | Consciousness: The Still Open Questions (Two Different Perspectives)

Speakers

Michele Di Francesco (Pavia, Italy) | *Fifty Years of Consciousness: A Philosophical History*

Giulio Tononi (Madison, Wisconsin, U.S.) | *Consciousness and Our Place in Nature*

Moderator

Viviana Kasam (Milan, Italy)

Concluding remarks

Massimo Cacciari (Milan, Italy)

Giancarlo Comi (Milan, Italy)



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DISCUSSION 1 | NEUROBIOLOGICAL BASES OF CONSCIOUSNESS

Speakers

Mavi Sánchez-Vives (Barcelona, Spain) | *In the Search for Consciousness: Brain Processing of Real and Virtual Worlds*

Jean-Pierre Changeux (Paris, France) | *The Connectomics of Conscious Processing: From the Molecular to the Cultural Level*

Moderator

Giancarlo Comi (Milan, Italy)

MAVI SÁNCHEZ-VIVES (Barcelona, Spain)

In the Search for Consciousness: Brain Processing of Real and Virtual Worlds

Biographical notes (short version)

Mavi Sánchez-Vives, medical doctor and PhD in Neurosciences is ICREA Research Professor at the IDIBAPS (Institute of Biomedical Research August Pi i Sunyer) in Barcelona where she is the Head of the Systems Neuroscience Group. She is co-Director of the EVENT Lab (Experimental Virtual Environments in Neuroscience and Technology) at the University of Barcelona, where she is Adjunct Professor of the Department of Basic Psychology. She previously held a position as Associate Professor of Physiology at the Medical School and Group leader at the Institute of Neurosciences of Alicante (University Miguel Hernandez-CSIC). Dr. Sánchez-Vives was a postdoctoral fellow at Rockefeller University and at Yale University. Her main interests include the generation of brain rhythmic activity and neurotechnology for brain interfacing. She also leads a line of research on multisensory integration in virtual reality and "embodiment" of virtual bodies and its applications in medicine and psychology, being one of the founders of Virtual Bodyworks Inc. She is currently a partner in the Human Brain Project and in the Graphene flagship, leading in the first one a workpackage on "Brain networks underlying cognition and consciousness".

Biographical notes (extended version)



Maria V. Sánchez-Vives, M.D., PhD in Neurosciences, has been ICREA Research Professor at IDIBAPS (Institut d'Investigacions Biomèdiques August Pi i Sunyer) in Barcelona since 2008, and is the Head of Systems Neuroscience. She is also co-Director of the Event Lab (Experimental Virtual Environments in Neuroscience and Technology) and Adjunct Professor of the Dept of Basic Psychology at the University of Barcelona.

Dr. Sánchez-Vives is a neuroscientist in the field of cortical networks who has led an independent laboratory since 2000. After medical school, she completed a doctorate in Neurosciences on the plastic changes of ionic currents after axonal injury, obtaining a strong training in membrane biophysics, intracellular electrophysiology and calcium imaging. During her postdoctoral stay in the USA, first at Rockefeller University and later at Yale University, she investigated the thalamocortical system involved both in vision and in the generation of brain rhythms. She used her biophysical background for the understanding of visual processing, demonstrating the role of potassium currents on the psychophysical phenomena. Under the supervision of Dr D.A. McCormick, she also studied the thalamic network generating sleep rhythms such as spindle waves, contributing to disentangling this circuitry and in particular the role of gabaergic inhibition publishing articles in *Science* and *Journal of Neuroscience*. She then moved on to the study of the cerebral cortex network, finding that the isolated cerebral cortex was able to spontaneously generate slow oscillations, a highly influential study. Since then, she has explored in detail mechanisms that underlie the generation of slow oscillations, their impact on synaptic transmission, and the alteration of slow oscillations in different pathologies. Based on her findings on slow oscillations, she proposed the novel idea that slow oscillations are the default activity pattern of the cerebral cortex. She also has experience in computational models of cortical function, neurotechnology for brain recordings and interfacing, and the use of virtual reality to understand brain function, with a focus on virtual "embodiment", being author of a highly cited article entitled "From presence to consciousness through virtual reality".

She has been recipient of several competitive awards: pre and postdoctoral FPI fellowships, NATO postdoctoral fellowship, American Epilepsy Foundation, Human Frontiers Science Foundation Grant Program and Albert Pi i Sunyer Award. Her independent research has been supported by national and international agencies. She has been Principal Investigator in several European projects (Presencia, VERE, SF, BEAMING) and coordinator of CORTICONIC and Flag-Era SloW Dyn. She is a principle investigator in the FET Flagships: Human Brain Project and Graphene. In the former, she leads the workpackage "Networks underlying cognition and consciousness", and in the second, her team explores graphene microtransistors for brain interfacing.

She has authored over a hundred peer-reviewed journal papers, and over 300 presentations at conferences, including numerous invited talks and plenary talks. In the last 10 years she has given 62 invited seminars in Europe, including Spain, France, the UK, Italy, Germany, Poland, Sweden, Switzerland, Netherland, as well as the USA, Israel, China, Singapore, Japan and Australia. She has also been organizer of various summer schools, workshops and



symposia, and local organizer of the conference “Understanding Consciousness” (Barcelona, 2018). She has supervised twenty-two doctoral theses.

On the innovation front, she has authored two patents, and is one of the three founders of Virtual Bodyworks Inc.

Active in outreach activities, she has organized conference series in Barcelona open to the public, Brain Fairs, talks (Caixa Forum, CCCB, etc.), and has appeared on radio and television programs and in scientific documentaries, and for these activities she was elected member of the European Dana Alliance for the Brain. She is also a member of the Expert Network of the World Economic Forum and was a speaker at TEDx and Frontiers Forum. She is Editor in Chief of Frontiers in Systems Neuroscience.

JEAN-PIERRE CHANGEUX (Paris, France)

The Connectomics of Conscious Processing: From the Molecular to the Cultural Level

Biographical notes (short version)

Jean-Pierre Changeux is Honorary Professor at the Collège de France and at the Pasteur Institute Department of Neuroscience, Paris and member of International Faculty at the Kavli Institute for Brain & Mind University of California San Diego. At the advent of the era of molecular biology, Jean-Pierre Changeux pioneered the study of the role of conformational changes linking topographically distinct sites in regulatory processes. His PhD studies, carried under the supervision of Jacques Monod, provided the experimental basis for the formal model of allosteric interactions in regulatory proteins, put forward in a joint paper that had become one of the most quoted papers of the scientific literature.

His main contributions and discoveries in the course of the past 50 years are centered on the general theme of receptors and their allosteric transitions, primarily in the nervous system and were initiated by the first identification of a neurotransmitter receptor: the nicotinic acetylcholine receptor. His seminal work on the nicotinic receptor and its allosteric modulation has pioneered new fields of research in signal transduction mechanisms, molecular pharmacology and chemical communications in the nervous system and their pathology.

The publication of his book *Neuronal Man: The Biology of The Mind* in 1985 brought Changeux to celebrity status among the wider public. Since then he has authored and co-authored several other books directed towards the non-scientific public, in particular *Conversations on Mind Matter and Mathematics* with the mathematician Alain Connes (1998), *What Makes Us Think* with the philosopher Paul Ricoeur (2002), *Physiology of truth* (2005), *The Enchanted Neurons* with the composers Pierre Boulez and Philippe Manoury (2019).



Jean-Pierre Changeux's academic accolades include the Gairdner foundation award in 1978, the Louis Jeantet Prize for Medicine in 1993, the Goodman and Gilman Award in drug receptor pharmacology in 1994, the National Academy of Sciences Award in Neurosciences in 2007, the Albert Einstein World Award of Science in 2018.

Biographical notes (extended version)

Jean-Pierre Changeux is Honorary Professor at the Collège de France & at the Pasteur Institute Department of Neuroscience, Paris. At the advent of the era of molecular biology, Jean-Pierre Changeux pioneered the study of the role of conformational changes linking topographically distinct sites in regulatory processes. His PhD studies, carried under the supervision of Jacques Monod, provided the experimental basis for the formal model of allosteric interactions in regulatory proteins, put forward in a joint paper that had become one of the most quoted papers of the scientific literature. Throughout a long career, Changeux has consistently built upon and extended his early theory, to spawn many new and flourishing fields of investigation.

His main contributions and discoveries in the course of the past 50 years are centered on the general theme of receptors and their allosteric transitions, primarily in the nervous system and were initiated by the first identification of a neurotransmitter receptor: the nicotinic acetylcholine receptor. He combined approaches from supposedly disparate disciplines of pharmacology, molecular biology and developmental biology as well as behavioural and pathological studies, as and when required.

His contributions to understanding the regulation of acetylcholine receptors in turn contributed to advancing our understanding of the nature of long-term synaptic plasticity within neural networks and on the neural bases of cognitive functions up to conscious processing. They have also inspired a number of other theoreticians and experimentalists. His seminal work on the nicotinic receptor and its allosteric modulation has pioneered new fields of research in signal transduction mechanisms, molecular pharmacology and chemical communications in the nervous system and their pathology. The publication of his book *Neuronal Man: The Biology of The Mind* in 1985 brought Changeux celebrity status among the wider public. Since then he has authored or co-authored several other books directed towards the non-scientific public. Notably, *Conversations on Mind Matter and Mathematics* with the mathematician Alain Connes (1998), *What Makes Us Think* with the philosopher Paul Ricoeur (2002), *Physiology of truth* (2005), *The Enchanted Neurons* with the composers P.Boulez and P.Manoury (2019) which initiated an instructive dialogue between neuroscience and other disciplines.

Jean-Pierre Changeux's academic accolades include the Gairdner foundation award in 1978, the Wolf prize in 1983, the Louis Jeantet Prize for Medicine in 1993, the Goodman and Gilman Award in drug receptor pharmacology in 1994, the Balzan Prize in 2001, the National Academy of Sciences Award in Neurosciences USA in 2007, the Olav Thon international research award



in biomedicine, Oslo, Norway, 2016, the Albert Einstein World Award of Science, Hong Kong, 2018, the Goldman-Rakic Prize in Cognitive Neuroscience, New-York 2018.

GIANCARLO COMI (Milan, Italy)

Biographical notes

Giancarlo Comi is honorary professor of neurology at the Università Vita Salute San Raffaele and founder and director of the Institute of Experimental Neurology at the Scientific Institute San Raffaele, Milan, Italy. He is the President of the European Charcot Foundation (ECF), and since 2013 has served as vice chair of the Progressive Multiple Sclerosis Alliance and co-chair of the Industry Forum of the Alliance. He has been holding the office of president of the European Neurology Society, of the Italian Society of Neurology and of the Italian Society of Clinical Neurophysiology. He is fellow of the European Academy of Neurology (EAN).

In recent years, Professor Comi has received the 'Gh. Marinescu' honorary award from the Romanian Society of Neurology, and has been awarded honorary memberships of the Russian Neurological Academic Society, the European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS), the European Neurological Society (ENS), the Sociedad Espanola de Neurologia, the Société Française de Neurologie. He also received in 2015 the Charcot Award for MS Research from the MS International Federation (MSIF). In the past year Professor Comi was awarded the Gold Medal of 'Benemeranza Civica' from the City of Milan and has been recently conferred the honor of merit as Official by the President of Italy.

He has been principal investigator of many phase II and III multiple sclerosis clinical trials. Prof. Comi has authored and co-authored more than 1000 articles in peer-reviewed journals, and edited several books, with an h-index of 115. He has been organizer and/or invited speaker for more than 500 conferences, both nationally and internationally. He is co-editor of Neurological Sciences and member of the editorial boards of many international journals.



Tuesday, 10 November 2020, 7 – 9 pm (CET)

DISCUSSION 2 | FUNCTIONAL AND STRUCTURAL NEUROIMAGING

Speakers

Eve Marder (Waltham, Massachusetts, US) / *Individual Differences and Differential Resilience*

Antonio Damasio (Los Angeles, California, US) | *On the Biology of Feeling and Consciousness*

Moderator

Daniela Perani (Milan, Italy)

EVE MARDER (Waltham, Massachusetts, US)

Individual Differences and Differential Resilience

Biographical notes (short version)

Eve Marder is the Victor and Gwendolyn Beinfield Professor of Neuroscience at Brandeis University, Waltham, Massachusetts. Marder was President of the Society for Neuroscience, a member of the National Academy of Sciences, the National Academy of Medicine, and the American Academy of Arts and Sciences. She has received numerous prizes and awards including the Salpeter and Gerard Prizes from the Society for Neuroscience, the Neuroscience Prize from the National Academy of Sciences and the Gruber and Kavli Awards. She has received Honorary Doctorates from Bowdoin College and Tel Aviv University.

Marder studies the dynamics of small neuronal networks. Her work was instrumental in demonstrating that neuronal circuits are not “hard-wired” but are reconfigured by neuromodulatory neurons and substances to produce a variety of outputs. Her lab combines experimental and modeling and theoretical studies. Her lab pioneered studies of homeostatic regulation of intrinsic membrane properties, and stimulated work on the mechanisms by which brains remain stable while allowing for change during development and learning. Marder now studies robustness of circuits to perturbations.

Biographical notes (extended version)

Eve Marder is the Victor and Gwendolyn Beinfield University Professor at Brandeis University Waltham, Massachusetts. She obtained a B.A degree from Brandeis University in 1969, a Ph.D. from the University of California, San Diego in 1974, and did postdoctoral research at the University of Oregon and the École normale supérieure in Paris, France before assuming her faculty position in 1978. Marder was President of the Society for Neuroscience (2008),



and of the NINDS Council, National Academy of Sciences Council, numerous Study Sections, and Advisory Boards for institutions in the USA and abroad. Marder is a member of the National Academy of Sciences, the National Academy of Medicine, the American Academy of Arts and Sciences, and Fellow of the Biophysical Society, the American Physiological Society, and the American Association for the Advancement of Science. She received the Miriam Salpeter Memorial Award for Women in Neuroscience, the W.F. Gerard Prize from the Society for Neuroscience, the George A. Miller Award from the Cognitive Neuroscience Society, the Karl Spencer Lashley Prize from the American Philosophical Society, Honorary Doctorates from Bowdoin College and Tel Aviv University, the Gruber Award in Neuroscience, the Education Award from the Society for Neuroscience, the Kavli Award in Neuroscience, and the National Academy of Sciences Award in Neuroscience. Marder served on the NIH working group for the Obama BRAIN Initiative, and is now on the BRAIN advisory Council. Marder has served on many editorial boards. She was Editor-in-Chief of *Journal of Neurophysiology*, and most was a Deputy Editor at *eLife* in its early years. Marder studies the dynamics of small neuronal networks, and her work was instrumental in demonstrating that neuronal circuits are not “hard-wired” but can be reconfigured by neuromodulatory neurons and substances to produce a variety of outputs. She combines experimental work with insights from modeling and theoretical studies. With Larry Abbott, her lab developed the programmable dynamic clamp. Her lab pioneered studies of homeostatic regulation of intrinsic membrane properties, and stimulated work on the mechanisms by which brains remain stable while allowing for change during development and learning. Marder now studies how similar network performance can arise from different sets of underlying network parameters, with its relevance for differential resilience in the population to environmental perturbation and disease. Marder has published numerous research reports, editorials, and opinion pieces. She was the subject of a recent scientific biography by Charlotte Nassim entitled “Lessons from the Lobster”, MIT Press.

ANTONIO DAMASIO (Los Angeles, California, US)

On the Biology of Feeling and Consciousness

Biographical notes (short version)

Antonio Damasio is Dornsife Professor of Neuroscience, Psychology and Philosophy, and Director of the Brain and Creativity Institute at the University of Southern California in Los Angeles.

Trained as both neurologist and neuroscientist, Damasio has made seminal contributions to the understanding of brain processes underlying emotions, feelings, and consciousness. His work on the role of affect in decision-making has made a major impact in neuroscience,



psychology, and philosophy. He is the author of several hundred scientific articles and is one of the most cited scientists worldwide.

Damasio's recent work addresses the evolutionary development of mind and the role of life regulation in the generation of cultures. His book on the subject is *The Strange Order of Things: Life, Feeling, and the Making of Cultures* (2018–2019). He is the author of *Descartes' Error*, *The Feeling of What Happens*, *Looking for Spinoza*, and *Self Comes to Mind*, which are translated and taught in universities worldwide.

Damasio is a member of the National Academy of Medicine and a Fellow of the American Academy of Arts and Sciences. He has received numerous prizes, among them the Paul MacLean Award for Outstanding Neuroscience Research in Psychosomatic Medicine (2019), International Freud Medal (2017), the Grawemeyer Award (2014), the Honda Prize (2010), and the Asturias Prize in Science and Technology (2005). In 2003 he received the Nonino Prize as Master of Our Time. In 2013 the Escola Secundária Antonio Damasio was dedicated to him in his native Lisbon.

Biographical notes (extended version)

Antonio Damasio is Dornsife Professor of Neuroscience, Psychology and Philosophy, and Director of the Brain and Creativity Institute at the University of Southern California in Los Angeles.

Trained as both neurologist and neuroscientist, Damasio has made seminal contributions to the understanding of brain processes underlying emotions, feelings, and consciousness. His work on the role of affect in decision-making has made a major impact in neuroscience, psychology, and philosophy. He is the author of several hundred scientific articles and is one of the most eminent psychologists of the modern era (see Damasio, A. Feelings and Decisions. In: R. Sternberg, S. Fiske, D. Foss (Eds.), *Scientists Making a Difference: One Hundred Eminent Behavioral and Brain Scientists Talk about Their Most Important Contributions*, 2016). He is one of the most cited scientists worldwide. [Web of Science H Index is 99; with 50,089 citations and Google Scholar H Index is 159; with 204,296 citations.] Damasio's recent work addresses the evolutionary development of mind and the role of life regulation in the generation of cultures. His book on the subject is *The Strange Order of Things: Life, Feeling, and the Making of Cultures* (2018-2019). His most recent articles are Bittersweet: The Neuroscience of Ambivalent Affect (Vacarro, A.G., Kaplan, J.T. and Damasio, A. (2020) *Perspectives of Psychological Science*, 15(5), 1187-1199) and Homeostasis and Soft Robotics in the Design of Feeling Machines (Man, K. and Damasio, A. (2019) *Nature Machine Intelligence*, 1, 446–452). His new book *Feeling and Knowing* will appear in early 2021 (Pantheon/Knopf).

Damasio is a member of the National Academy of Medicine and a Fellow of the American Academy of Arts and Sciences. He has received numerous prizes, among them the Paul MacLean Award for Outstanding Neuroscience Research in Psychosomatic Medicine [2019], International Freud Medal [2017], the Grawemeyer Award [2014], the Honda Prize [2010],



and the Asturias Prize in Science and Technology [2005]. In 2003 he received the Nonino Prize as Master of Our Time.

He holds Honorary Doctorates from several leading Universities, some shared with his wife Hanna, e.g. the École Polytechnique Fédérale de Lausanne [EPFL], 2011 and the Sorbonne [Université Paris Descartes], 2015.

In 2013 the Escola Secundária Antonio Damasio was dedicated in his native Lisbon. In 2017 Damasio was appointed to the Council of State of Portugal, to the seat vacated by Antonio Guterres, now Secretary General of the United Nations.

Damasio is the author of *Descartes' Error*, *The Feeling of What Happens*, *Looking for Spinoza* and *Self Comes to Mind*, which are translated and taught in universities worldwide. For more information go to the Brain and Creativity Institute website at dornsife.usc.edu/bci/ and to www.antoniodamasio.com.

DANIELA PERANI (Milan, Italy)

Biographical notes (short version)

Daniela Perani, MD, Neurologist and Radiologist, Full Professor of Neuroscience, Director of the Doctoral (PhD) Course in Cognitive Neuroscience, Director of the School of Specialization in Neuropsychology, Vita-Salute San Raffaele University, Milano, Italy. Prof. Perani has coordinated several National and International Research Projects in Neurology and Neuroscience. She is one of Top Italian Scientist (<https://www.topitalianscientists.org/home>) and ranks as first female scientist in the field of Neuroscience and Neurology. Her research area is cognitive neuroscience, addressing the functional correlates of language, bilingualism, executive functions, perception and memory systems using neuroimaging, with a special focus on *in vivo* molecular imaging of neurological diseases. Her current research focus is on neurodegenerative dementias, applying imaging biomarkers for early and differential diagnosis and risk of progression. She is the author of more than 280 full papers in peer reviewed journals, with H1 83 (Scopus), 96 (Scholar), and 37322 citations.

Biographical notes (extended version)

Daniela Perani is Neurologist and Radiologist, Professor of Neuroscience at San Raffaele University, Milan. She obtained the degree in Medicine and Surgery, the Specializations in Neurology and Radiology at the State University of Milan. She is Director of the School of Specialization in Neuropsychology and the Coordinator of the Doctoral Course in Cognitive Neuroscience at the San Raffaele University, Milan. She was Honorary Research Fellow at the MRC Cyclotron Unit and Department of Neurology, Royal Post-Graduate Medical School, Hammersmith Hospital, University of London, London. She has been visiting



professor at the Department of Brain and Cognitive Sciences Massachusetts Institute of Technology, Cambridge, MA USA and at the of Department of Cognitive Neuroscience, UCSD, USA, Advisory Board Member at the Max Planck-Institut für Neuropsychologische Forschung, Leipzig (Germany) and invited Scientist at the Académie de France. She was participant or coordinator of several National and International Research Projects dealing with neurology and neuroscience topics (among those: European Project on "Recovery from aphasia", European Project "PET evaluation on Dementia", Collaborative Research Project HFSP "MRI techniques for functional mapping of the human brain: integration with PET and MEG/EEG", Bilateral French-Italian Project CNR/CNRS: PET and fMRI in brain language representations in bilinguals e polyglots, European joint study "Imaging of language functions in the brain", RTD project: "Network for efficiency and standardization of dementia diagnosis", RTD project: "Connectivity in language rehabilitation in stroke, European Framework Program Network of Excellence "Diagnostic Molecular Imaging for dementia diagnosis", European Specific Targeted Research Project Tuning the Brain for Music, EU Framework Programme for Research and Technological Development "Diagnostic Enhancement of Confidence by an International Distributed Environment" , EU Framework Program HEALTH " Understanding the role of neuroinflammation in neurodegenerative diseases" .

Her main research field is functional molecular and structural neuroimaging focusing on cognition and neurology. Main topics are the representation of language in the brain, neurolinguistics of bilingualism, the functional correlates of motor representations and the cerebral mechanisms of execution, observation, and imagery of actions, the functional correlates of music perception, music representations and emotion. In addition, her research concerns the evaluation of the functional cerebral alterations associated with specific neurological disorders, i.e. changes in glucose metabolism and neurotransmission. The aim is to provide imaging tools confirming and supporting clinical diagnosis, particularly in the early or preclinical phase of dementia. Her research also deals with brain functional reserve and the neurobiological correlates influencing the clinical onset and progression of dementia, as well as the application of **in vivo** molecular neuroimaging to explore in vivo the neurotransmission systems in different types of neurodegenerative diseases and cerebral inflammatory processes, aiming at the collection of pathogenetic evidences useful for diagnosis and treatment monitoring. For the publications' list see [here](#).



Wednesday, 11 November 2020, 7 – 9 pm (CET)

DISCUSSION 3 | THE LANGUAGES OF HUMAN CONSCIOUSNESS

Speakers

Andrea Moro (Pavia, Italy) | *Impossible Languages: Infinity as the Fingerprint of the Human Mind*

Stanislas Dehaene (Paris, France) | *Human Singularity: Which Aspects of Consciousness Are Shared with Other Primates and Which Are Unique?*

Moderator

Jubin Abutalebi (Milan, Italy)

ANDREA MORO (Pavia, Italy)

Impossible Languages: Infinity as the Fingerprint of the Human Mind

OUTLINE

The capacity to generate new and potentially infinite meanings by rearranging a finite number of words is the fingerprint of all and only human languages. The rules governing this capacity are subject to restrictions which are identical for all languages, and the question has always been raised as to whether they have a conventional or biological nature. Neurosciences provided the decisive data in favor of the biological hypothesis, showing that “the boundaries of Babel” are an expression of our brain structure. The consequences of this discovery are enormous and span from the evolutionary considerations—discerning men from all other animals—to the capacity to comprehend reality, dismantling in fact the idea that ingenious or superior languages exist, which gave rise to racism in the XX century.

Biographical notes (short version)

Andrea Moro is Professor of General Linguistics at the Scuola Universitaria Superiore IUSS - Pavia. He obtained a Ph.D. in Linguistics at the University of Padua, specialized at the University of Geneva in theory of syntax and comparative syntax. A Fulbright student, he was visiting scientist at MIT and Harvard for several times. He studies the structure of human languages and its relationship with the brain: in the first field, by comparing the syntax of sentences with the verb *to be* across languages he discovered symmetry-breaking phenomena in natural languages; in the second, he discovered that “impossible languages” are ruled out by neurobiological networks and explored the relationship between sound and syntax by proving that sound is represented also in inner speech and by measuring the correlates of basic syntactic structures independently of sound. His many articles and essays



are published by major journals and publishing companies. As a novelist he wrote *Il Segreto di Pietramala* (2018) which was awarded the “Flaiano International Prize” for Literature in 2018.

Biographical notes (extended version)

Andrea Moro (Pavia, 1962) graduated in Classical Literature at the Università di Pavia, obtained a Ph.D. in Linguistics at the Università di Padova and a Diplôme d'études supérieures (DES) in “Théorie de la syntaxe et syntaxe comparative” at the Université de Genève in 1993. He has been visiting scientist at the “Department of Linguistics and Philosophy” at MIT in 88/89 - as a Fulbright Student - in 91/92, in 07/08 and in 08/09; and at the “Department of Linguistics” at Harvard University in 05/06 and 06/07. He has been Associate Professor of History of Linguistics at the University of Bologna, Full Professor of General Linguistics at University San Raffaele in Milan and he is presently professor, former director of the Department of Cognitive, Social and Behavioural Sciences and deputy Rector at the School of Advanced Studies where he funded and directed the Neurocognition, Epistemology and Theoretical (NEtS) Syntax Research Center for six years. As the scientific coordinator of the Linguistic Unit, he contributed to the foundation of the Department of Cognitive Sciences at the Istituto Scientifico H “San Raffaele” in 1993 in Milan. He is a member of the Academia Europaea (London) and the Pontifical Academy of Lettere e Arti (Vatican City).

His main fields of research are theoretical syntax and neurolinguistics. In the former field, he explored clause structure, by focusing on expletives, unaccusativity, locality and syntactic movement, and the relation between syntax and semantics, by focusing on predication, existential sentences, definiteness effect, quasi-copular sentences. In the latter, he studied the relation between syntax and the brain as it emerges from neuroimaging and electrophysiological techniques. Among his major contributions are the discovery of inverse copular sentences, the principle of Dynamic Antisymmetry, i.e. of symmetry-breaking phenomena in human syntax, the neurobiological correlated of “possible” vs. “impossible languages”, the effect of negation on premotor cortex activity, the electrophysiological representation of inner speech and the electrophysiological isolation of basic syntactic structures from sound information.

Among his publications, some books: *The raising of predicates* (Cambridge University Press, 1997); *Dynamic Antisymmetry* (The MIT press, 2000), *I confini di Babele, Il edizione* (Il Mulino, 2015; trad. ingl. *The boundaries of Babel*, MIT Press 2015), *Breve storia del verbo essere* (Adelphi, 2010; Engl. transl. *A short history of “be”*, MIT Press, 2018), *Parlo dunque sono* (Adelphi 2012; trad. ing. *I speak therefore I am*, Columbia University Press 2016), *The Equilibrium of Human Syntax* (Routledge, 2013), *Impossible Languages* (The MIT Press, 2016), *La razza e la lingua: sei lezioni sul razzismo* (La nave di Teseo 2019). He also published several papers as a single author and in collaboration, including: “Syntax and the Brain. Disentangling Grammar by Selective Anomalies”, *NeuroImage* 13, pagg. 110–118, 2001;



"Neural correlates for the acquisition of natural language syntax", *NeuroImage*, 17, pp. 700-709, 2002; "Broca's area and the language instinct," *Nature neuroscience*, vol.6, pp. 774-781 e "Negation in the brain: modulating action representations", *NeuroImage*, "Sound representation in higher language areas during language generation", *Proceedings of the National Academy of Science (PNAS)*, 112 (6), pp. 1868-1873 2015; "On the similarity between syntax and actions", *Trends in cognitive science*, 2014 Mar;18(3):109-10, 2014; "Clause structure folding and the wh-in situ effect", *Linguistic Inquiry*, Volume 42, Number 3, Summer 2011, pp. 389-412, 2011; "Language, mind and Brain", *Nature Human Behaviour*, Vol. 1 DOI: 10.1038/s41562-017-0184-4, "High gamma response tracks different syntactic structures in homophonous phrases". *Nature Sci Rep* 10, 7537 <https://doi.org/10.1038/s41598-020-64375-9>. His first novel, "Il segreto di Pietramala" (La Nave di Teseo, 2018), was awarded the international Flaiano prize for literature.

STANISLAS DEHAENE (Paris, France)

Human Singularity: Which Aspects of Consciousness Are Shared with Other Primates and Which Are Unique?

OUTLINE

The intervention will focus on two main points of analysis.

First, the most basic aspects of consciousness can and should be studied in both human and non-human animals. All sorts of visual illusions are shared by humans and monkeys, and allow us to make a stimulus conscious or unconscious at will. By using brain-imaging and neuronal recordings, we can then track the fate of a conscious stimulus. Such studies have been extraordinarily successful in identifying "signatures of consciousness"—brain signals that are characteristic of conscious processing. This research program, which he described in his book "Consciousness and the brain," has progressed to such an extent that they can now be used in the clinic, to help decide whether a given patient is or is not conscious.

Second, the human brain has a richer representational capacity than that of other primates – and as a consequence, it is likely that the contents of our consciousness are richer. We possess an evolutionary novel combinatorial language ability, which allows us to create novel concepts by recombination of previous ones. As he explained in his book "How we learn," humans possess a remarkable capacity to learn nested tree structures: even a young baby already acts as a scientist who experiments and extracts "laws" that compress information in the external world. Dehaene argues that this ability underlies our enhanced capacities for language, mathematics, music, and the conscious representation of ourselves and others."

Biographical notes (short version)

Stanislas Dehaene received his training in mathematics at the École normale supérieure in Paris, then completed a PhD in cognitive psychology.



He has been working since 1997 at NeuroSpin (Service Hospitalier Frédéric Joliot of the Commissariat à l'Energie Atomique), a brain imaging center in Orsay, near Paris, where he directs the Cognitive Neuroimaging Unit (UNICOG) since 2001. In September 2005 he was appointed full professor of the newly created chair of Experimental Cognitive Psychology at the Collège de France in Paris. Dehaene's interests concern the cerebral bases of specifically human cognitive functions such as language, calculation, and reasoning. His main scientific contributions include the study of the organization of the cerebral system for number processing. In fact, he demonstrated the central role played by the region of the intraparietal sulcus in understanding quantities and arithmetic (the number sense).

Dehaene is the author of over 100 scientific publications in major international journals. He has received several international prizes including the McDonnell Centennial Fellowship and the Grand Prix from the Louis D. Foundation of the Institut de France (with Denis Le Bihan). He has published the book *The Number Sense* (1997), which has been translated in eight languages. He has also edited three books on brain imaging, consciousness, and brain evolution, and has authored two general-audience films on the human brain. He is the associate editor of *Cognition*, an international journal of Cognitive Science.

Biographical notes (extended version)

Stanislas Dehaene received his training in mathematics at the École normale supérieure in Paris, then completed a PhD in cognitive psychology with Jacques Mehler, postdoctoral studies with Michael Posner, as well as neuronal modelling studies with Jean-Pierre Changeux. He has been working since 1997 at the Orsay brain imaging center near Paris (Service Hospitalier Frédéric Joliot of the Commissariat à l'énergie atomique), where he directs the Cognitive Neuroimaging Unit since 2001. In September 2005 he was elected as a full professor on the newly created chair of Experimental Cognitive Psychology at the Collège de France in Paris.

Stanislas Dehaene's interests concern the cerebral bases of specifically human cognitive functions such as language, calculation, and reasoning. The team uses a variety of experimental methods, including mental chronometry in normal subjects, cognitive analyses of brain-lesioned patients, and brain-imaging studies with positron emission tomography, functional magnetic resonance imaging, and high-density recordings of event-related potentials. Formal models of minimal neuronal networks are also devised and simulated in an attempt to throw some links between molecular, physiological, imaging, and behavioral data. Stanislas Dehaene's main scientific contributions include the study of the organization of the cerebral system for number processing. Using converging evidence from PET, ERPs, fMRI, and brain lesions, Stanislas Dehaene demonstrated the central role played by a region of the intraparietal sulcus in understanding quantities and arithmetic (the number sense). He was also the first to demonstrate that subliminal presentations of words can yield detectable cortical activations in fMRI, and has used these data to support an original theory of conscious and nonconscious processing in the human brain. With neurologist Laurent Cohen, he also studied the neural networks of reading and demonstrated the crucial role of the left occipito-temporal region in word recognition (the visual word form area). Stanislas Dehaene is the author of over 100 scientific publications in major international journals.



He has received several international prizes including the McDonnell Centennial Fellowship and the Louis D. prize of the French Academy of Sciences (with D. Lebihan). He has published the book *The Number Sense*, which has been translated in eight languages. He has also edited three books on brain imaging, consciousness, and brain evolution, and has authored two general-audience films on the human brain. He is the associate editor of *Cognition*, an international journal of Cognitive Science.

JUBIN ABUTALEBI (Milan, Italy)

Biographical notes (short version)

Prof. Jubin Abutalebi is a cognitive neurologist and Associate Professor of Neuropsychology at the Faculty of Psychology, University Vita Salute San Raffaele, Milan, Italy, and Full Professor at the University of Tromsø, Norway. Jubin Abutalebi is worldwide known for his landmark research on the cerebral organization of bilingualism, and in particular how the human brain acquires, accommodates and controls multiple languages in order to become a perfect second language speaker. Jubin Abutalebi is currently the editor-in-chief of the prestigious international journal *“Bilingualism: Language and Cognition”* (Cambridge University Press).

Biographical notes (extended version)

Jubin Abutalebi was born in Vienna (Austria) from Persian parents, and grew up in Germany. He earned his MD with Summa cum Laude at the University of Brescia Medical School (Italy) in 1998, and specialized with Summa Cum Laude in Neurology at the University Vita Salute San Raffaele in Milan (Italy) in 2003. He graduated with a PhD in Neurolinguistics at the Faculty of Education at the University of Hong Kong (Hong Kong) in 2014. Prof. Abutalebi has, furthermore, done both clinical and research activities in the Neurology Dept. of the University Vita Salute San Raffaele and abroad in prestigious institutes such as the Dept. of Experimental Neurology at the Charité Hospital, Humboldt Universitaet Berlin, Germany, the Istitute Universitaire de Gériatrie, Université de Montréal, Canada, and the University of Hong Kong (Hong Kong). Prof. Abutalebi is a world leading figure in the study of the brain and language relationship and his researches have been published in the main international neuropsychological, neuroimaging and neurosciences journals. He currently directs the Centre of Neurolinguistics and Psycholinguistics (CNPL) at the University Vita Salute San Raffaele (<https://www.univr.it/en/ricerca/centri/cnpl>) which was founded in 2016 to pursue high-quality research devoted to the study of language as related to mind and brain. CNPL uses a highly interdisciplinary approach that comprises cognitive neuroscience, experimental psychology, linguistics and neuropsychology, as well as a number of complementary non-invasive tools such as behavioral measures, functional (fMRI) and structural neuroimaging (VBM, DTI), and neurostimulation (tDCS).



Thursday, 12 November 2020, 7 – 9 pm (CET)

DISCUSSION 4 | EVOLUTION OF CULTURE: HOW FAR WE WILL GO? (FROM ANTHROPOLOGY TO TECHNOLOGY)

Speakers

Ian Tattersall (New York, USA) | *Culture as the Ultimate Expression of Evolution*

Idan Segev (Lausanne, Switzerland) | *Design for a Creative Brain*

Moderator

Katrin Amunts (Düsseldorf, Germany)

IAN TATTERSALL (New York, Usa)

Culture as the Ultimate Expression of Evolution

OUTLINE

While culture is not strictly unique to modern human beings, human culture has been transformed by the unique sensibility produced by our symbolic cognitive system. That symbolic capacity allows us to deconstruct our worlds into a vocabulary of abstract symbols that we can then rearrange, to imagine new ones; and although archaeology teaches us that this amazing capacity was surprisingly suddenly and recently acquired, it has had profound cultural consequences. So profound that, while modern complex culture is only one of many pinnacles in the natural world, it is clearly the ultimate expression of being human.

Biographical notes (short version)

Ian Tattersall is a paleoanthropologist and primatologist who is currently Curator Emeritus at the American Museum of Natural History in New York City. His research interests are threefold: in how we recognize species and the relationships among them in the human fossil record; in the systematics and ecology of the lemurs of Madagascar (the beautiful species *Propithecus tattersalli* is named for him), and in how human beings became the extraordinary cognitive entity they are. He has done fieldwork in countries as diverse as Madagascar, Vietnam, Yemen, Mauritius, and Surinam, and in addition to over 400 scientific papers and books he has written extensively for the public, his most recent books (all with Rob DeSalle) being *Troublesome Science: The Use and Misuse of Genetics and Genomics in Understanding Race* (2018), *The Accidental Homo sapiens: Genetics, Behavior, and Free Will* (2019) and *A Natural History of Beer* (2019). As a museum curator his whole career he has also curated numerous exhibitions at the AMNH and elsewhere, from *Ancestors: Four Million Years of Humanity* (1984) to the *Anne and Bernard Spitzer Hall of Human Origins*.



Biographical notes (extended version)

Ian Tattersall is currently Curator Emeritus in the Division of Anthropology of the American Museum of Natural History in New York City, where he spent his entire career, with adjunct Professorships at Columbia University and the City University of New York. Born in England and raised in East Africa, he has carried out both primatological and paleontological fieldwork in countries as diverse as Madagascar, Vietnam, Surinam, Yemen and Mauritius. Trained in archaeology and anthropology at Cambridge University in the UK (B.A and M.A. in 1967 and 1970, respectively), and in geology and vertebrate paleontology at Yale University in the USA (M.Phil 1970 and PhD 1971), Tattersall has concentrated his research since the 1960s in three main areas: the analysis of the human fossil record and its integration with evolutionary theory; the study of the ecology and systematics of the lemurs of Madagascar, and the origin of human cognition, publishing over 400 scientific papers on these and related subjects. In collaboration with Jeffrey H. Schwartz, he is the author of three of the four volumes of *The Human Fossil Record*, published between 2002 and 2005, and with Winfried Henke is the editor of the two editions of the comprehensive three-volume *Handbook of Paleoanthropology*, published in 2007 and 2015. He is a Fellow of the American Association for the Advancement of Science, and serves on numerous editorial and advisory boards. Tattersall is also a prominent interpreter of human paleontology to the public, with numerous trade books to his credit, among them *A Natural History of Wine* (2015, with R. DeSalle), *The Strange Case of the Ricketty Cossack and Other Cautionary Tales from Human Evolution* (2015), *Masters of the Planet: The Search for Our Human Origins* (2012), *The Brain: Big Bangs, Behaviors and Beliefs* and *Race? Debunking a Scientific Myth* (2012 and 2011, both with R. DeSalle), *Paleontology: A Short History of Life* (2010), *The World from Beginnings to 4000 BCE* (2008), *Human Origins: What Bones and Genomes Tell Us About Ourselves* (with Rob DeSalle, 2007), *The Monkey in the Mirror* (2002), *Extinct Humans* (with Jeffrey Schwartz, 2000), *Becoming Human: Evolution and Human Uniqueness* (1998), *The Last Neanderthal: The Rise, Success and Mysterious Extinction of Our Closest Human Relatives* (1995; rev. 1999) and *The Fossil Trail: How We Know What We Think We Know About Human Evolution* (1995; 2nd. ed. 2009) as well as several articles in *Scientific American* and the co-editorship of the definitive *Encyclopedia of Human Evolution and Prehistory*. He is also co-author (with Rob DeSalle) of *A Natural History of Wine* (2015) and *A Natural History of Beer* (2019). He lectures widely at venues around the world, and, as curator, has also been responsible for several major exhibits at the American Museum of Natural History, including *Ancestors: Four Million Years of Humanity* (1984); *Dark Caves, Bright Visions: Life In Ice Age Europe* (1986); *Madagascar: Island of the Ancestors* (1989); *The First Europeans: Treasures from the Hills of Atapuerca* (2003); the highly acclaimed *Hall of Human Biology and Evolution* (1993), and most recently the successor *Hall of Human Origins* (2007).



IDAN SEGEV (Lausanne, Switzerland)

Design for a Creative Brain

OUTLINE

Although the brain of each species is unique, the human brain has one outstanding characteristic that sets it apart from all others. It is extraordinarily creative, constantly generating new ideas, new science, new art, and innovative technologies. But what makes our brain so creative? What are the fundamental features and design principles of the human brain that underlie our powerful capability to create? This is probably the most challenging enigma in brain research—and the most intriguing. Five biologically based ideas on the brain-origin of human creativity will be considered, including the role of its enormous number of neurons, the highly dense intra- and inter-region connectivity, and the importance of the slow development of the brain. Interwoven throughout this presentation, beautiful (and artistic) brain images will be presented that have recently emerged from new technologies (such as the connectomics and computer simulations from the Blue Brain Project). These technologies help us better understand what makes us so creative.

Biographical notes (short version)

Prof. Idan Segev is the David & Inez Myers Professor in Computational Neurosciences and a member of the Edmond and Lily Safra Centre for Brain Sciences (ELSC) at the Hebrew University of Jerusalem. He published more than 100 scientific papers in top journals including, *Science*, *Nature*, *Neuron* and *PNAS*, and has supervised more than 50 Ph.D. students. His research team utilizes computational and theoretical tools to study: (i) What kind of computing devices are human neurons (obtained from fresh tissue following brain surgery at hospitals); (ii) Network structure and dynamics, as part of the EPFL's "*Blue Brain Project*", whereby a whole piece of the mammalian cortex is simulated in details in the computer; (iii) Brain and Art - Idan Segev takes a keen interest in the connection between art and the brain. He co-edited an "Artists" book with original brain-inspired etchings by ten top Israeli artists and has recently co-edited a special research topic (open access via *Frontiers* journals) on "Art and Brain". Segev serves as a Chief Editor of *Frontiers in Neuroscience* scientific journal where he developed the *Frontiers for young minds*, FYMs, a unique freely available scientific journal for 10-15 years old kids, in which top scientist, including Nobel laureates, present their state-of-the-art work and kids serve as reviewers for these articles. FYMs has above 6 million views. In September 2019, the Hebrew FYMs was inaugurated in Israel with more than 1000 Israeli kids and family participating and top researchers lecturing and already 150,000 views of the Hebrew articles.

Biographical notes (extended version)



Idan Segev is David & Inez Myers Professor in Computational Neuroscience at the Hebrew University of Jerusalem (HU) where he received his B.Sc. (1973) in Math and Ph.D. (1982) in experimental and theoretical neurobiology. He presently heads the Department of Neurobiology and is a member of the recently founded Edmond and Lily Safra Centre for Brain Sciences (ELSC) at the Hebrew University. He also served as the Director of the International [Max Planck-Hebrew University Center for Sensory Processing of the Brain in Action](#). In 1998, Segev has initiated the prestigious international EU course in Computational Neuroscience (starting in Crete, Greece then in Trieste Italy and in a variety of European loci). His work is published in the top journal such as *Science*, *Nature*, *Neuron*, *PNAS* and he received several awards including “best teacher” in numerous international brain-courses and in 2019, he won the Italian Casella prize (University of Pavia, [here](#)). Idan Segev takes a keen interest in the connection between art and the brain; he co-edited an “Artists” book with original etchings by ten top Israeli artists prompted by an encounter with HU researchers and he also recently co-edited a set of scientific papers on this topic (Brain and Art with $\frac{3}{4}$ of million viewers [here](#)). Few years ago Segev established “an artist in residence” position at the HU where artists and scientists interact to discuss aspects of creativity and mutual processes common to Science and the Arts.

Segev’s research [team](#) utilizes computational and theoretical tools to study how neurons, the elementary microchips of the brain, compute and dynamically adapt to our ever-changing environment. Segev is a world leader in modeling neurons, dendrites, dendritic spines and the synapses that they receive, and in describing analytically and computationally the integrative functions of neurons and local cortical circuits), including learning and plasticity process in these neurons and circuits. He recently started modelling live and active human neurons and circuits, while working with Neurologists at hospitals where living tissue is dissected following brain operation.

In the last 12 years, Segev’s group worked jointly with the teams of Henry Markram and Felix Schurmann at the EPFL, Switzerland, in an endeavor to model a whole piece of the mammalian cortex (the *Blue Brain Project*, BBP), with the ultimate goal to unravel how local fine variations within the cortical network underlie specific behavioral functions (network dynamics) which may give rise to certain brain diseases or to a healthy and “individual” brains. Segev was a central figure also in helping to define and refine the EU flagship Human Brain Project (HBP) and he was closely involved with the establishment of the Theoretical Neuroscience Institute in Paris, EITN, under the HBP.

Segev is the Chief Editor of “[Frontiers in Neuroscience](#)”, one of the largest scientific journal in brain research worldwide and he is a co-Chief Editor of *Frontiers for Young Minds* ([FYM](#)s) – an open access journal whereby articles are written by prominent scientists (including Nobel laureates) and reviewed by 10-15 years old kids – the target audience for this unique journal, with more than 6 million kids viewers of this journal to date. In 2019 he established the Hebrew version of [FYM](#)s with already 150,000 Hebrew readers of this unique journal.



KATRIN AMUNTS (Düsseldorf, Germany)

Biographical notes (short version)

Katrin Amunts is a German neuroscientist, and well known for her work in human brain mapping. In order to better understand the organizational principles of the human brain, she and her team have created the cytoarchitectonic Juelich-Brain atlas, as a basis to integrate multi-level and multi-scale brain data into a common reference brain, and use methods of high-performance computing to generate ultra-high resolution human brain models. Katrin Amunts is a full professor for Brain Research, and director of the C. and O. Vogt Institute of Brain Research, Heinrich-Heine University Duesseldorf (since 2013), and director of the Institute of Neuroscience and Medicine (INM-1), Research Center Juelich. Since 2016, is is the Scientific research director of the European flagship, the Human Brain Project. She did a postdoctoral fellowship at the C. & O. Vogt Institute of Brain Research at Duesseldorf University, Germany, and the set up a new research unit for Brain Mapping at the Research Center Juelich, Germany. In 2004, she became professor for Structural-Functional Brain Mapping, and in 2008 a full professor at the Department of Psychiatry, Psychotherapy and Psychosomatics at the RWTH Aachen University as well as director of the Institute of Neuroscience and Medicine (INM-1) at the Research Center Juelich. Katrin Amunts is a member of the editorial board of *Brain Structure and Function*. She was member of the German Ethics Council 2012-2020. Katrin Amunts is the programme speaker of the programme *Decoding the Human Brain* of the Helmholtz Association, Germany. Since 2017 Katrin Amunts is co-speaker of the graduate school *Max-Planck School of Cognition* and since 2018 she is a member of the International Advisory Council *Healthy Brains for Healthy Lives*, Canada.

Biographical notes (extended version)

Katrin Amunts brings into the present project a 20-year history in architectonic mapping of the human brain. Her team is developing a virtual brain model that is based on microstructure (i.e., cytoarchitecture), the molecular organization, functional data (fMRI, PET) and connectivity. This work has been conducted together with Karl Zilles and his team mainly in Juelich and Duesseldorf (Germany). From the very beginning of her career Katrin Amunts was interested in understanding the relationship between the microstructure of the human brain and functional systems such as motor control, language and vision. While scientists have been studying brain cytoarchitecture for more than 100 years, its centrality and importance have increased rapidly during the last 10-15 years with the advance of modern imaging techniques. She is thoroughly familiar with neuroanatomy, and cytoarchitectonic investigations. She has personally performed all steps of cytoarchitectonic investigations including dissection, histological processing, image analysis and visualization. Katrin Amunts mapped several brain regions including Broca's region, parts of the visual cortex, the limbic



system including the hippocampus and entorhinal cortex, and oversee all cytoarchitectonic mapping projects. She is board certified in anatomy. This development has led to an urgent need for novel, reliable and detailed cytoarchitectonic maps as anatomical reference that for the creation of topographical maps of brain functions – whether in health or in psychiatric and neurological brain disease. Approximately 200 areas and nuclei have been mapped until now; the maps are unique. Published maps are included in major international databases and software packages (e.g., SPM, FSL, the PALS database), and are freely available for the neuroscientific community. The software tool *anatomy toolbox* that her and Zilles' teams have developed for localizing functional activations obtained in fMRI or PET studies have been downloaded more than 35 000 times during the first 5 years of its existence. It became one of the most widely distributed tools in the functional imaging community. This multimodal human brain model will replace during the next decade the cytoarchitectonic brain atlas, which Korbinian Brodmann published in 1909 (Zilles and Amunts, *Nature Reviews Neuroscience*, 2010). Methods that she and her team have developed to better understand the cortical architecture in the human brain have been successfully translated to brain of non-human primates. Most recently, they have introduced a new method for understanding the connectivity of the human brain, which represents a major advance in the context of high-resolution fiber tract mapping, i.e. polarization light imaging. PLI increases the spatial resolution per volume of available fiber tracking methods by a factor of 1000. It therefore represents an independent tool to test and verify fiber tracking performed through diffusion analysis, and has the potential to bridge the gap between the macroscopic via the mesoscopic to the microscopic, cellular levels of analysis. Katrin Amunts oversee the development of software for calculating field orientation maps and tractography in the human brain, and, together with Karl Zilles she coordinates the histological processing. Katrin Amunts is also leading the Cecile and Oskar Vogt Institute at Heinrich Heine University Düsseldorf, deeply committed to providing well-crafted courses, and responsible coordinator and initiator of a new master study course "Translational Neuroscience". The Vogt Institute in Düsseldorf is world-famous for its brain collections, which include histological sections of human brains, those of great apes, monkeys, bats, and other species. It hosts a unique historical collection of brain sections, which we will digitize, and more and more open to the research community. Her team contributes substantially to the EU FET Flagship HBP, and is responsible for developing the HBP-Human Brain Atlas, and research on human brain organization. As the chair of the Science and Infrastructure Board and Scientific Research Director of the HBP, she is coordinating the whole project with its 12 subprojects, developing research plans (total volume of 88 Mio. Euro planned for three years), review, outreach activities, and many more. It is a fascinating, but also challenging project with more than 100 partners from 19 European countries. International collaborations are key element of her research career from the very beginning. She is serving in advisory boards (e.g., for the Organisation of Human Brain Mapping), contributing as a PI (e.g., International Consortium for Human Brain Mapping), participating in international initiatives



regarding human brain atlasing, computing and neuroinformatics. Katrin Amunts is co-organizer of an international workshop series on brain-inspired computing.



Friday, 13 November 2020, 7 – 9 pm (CET)

DISCUSSION 5 | CONSCIOUSNESS: THE STILL OPEN QUESTIONS (TWO DIFFERENT PERSPECTIVES)

Speakers

Michele Di Francesco (Pavia, Italy) | *Fifty Years of Consciousness: A Philosophical History*

Giulio Tononi (Madison, Wisconsin, US) | *Consciousness and Our Place in Nature*

Moderator

Viviana Kasam (Milan, Italy)

Concluding remarks

Massimo Cacciari (Milan, Italy)

Giancarlo Comi (Milan, Italy)

MICHELE DI FRANCESCO (Pavia, Italy)

Fifty Years of Consciousness: A Philosophical History

OUTLINE

"How it is that anything so remarkable as a state of consciousness comes about as a result of irritating nervous tissue, is just as unaccountable as the appearance of Djinn when Aladdin rubbed his lamp." (T.H. Huxley, *Lessons in Elementary Physiology*, London: Macmillan, 1866.)

This quote shows the bafflement of the Neuroscientist facing the relationship between consciousness and its physical basis. It dates back to the 19th century and the science of the mind has since made enormous progress. One would therefore expect that the bafflement is now completely overcome. However, from a philosophical point of view, *the germ* of the challenge (conceptual rather than scientific) grasped by Huxley is still present in the contemporary debate.

The purpose of this contribution is to describe this surprising situation. To do so—after a short Prologue dedicated to the Cartesian identification between mind and consciousness, which enshrines the birth of the philosophy of mind in the modern sense— three periods or phases of philosophical reflection will be examined, associated to three ways of conceiving a metaphysical theory of consciousness/conceptions of how to offer a



metaphysical theory of consciousness.

- (a) The phase of classical cognitive science (1970s and 1980s), when the mind is analyzed in terms of computations on representations, distinguishing intentionality and consciousness. In classical cognitive science the bet is to build naturalized theories of representation/intentionality, postponing the solution of the intractable problem of consciousness to better times. Another important aspect from the point of view of cognitivist computational psychology is the primacy of sub-personal processes compared to personal ones. Consciousness is no longer (as in Descartes) primary data, but something that must be explained.
- (b) The phase of the first scientific theories on consciousness (1980s and 1990s), which aroused enormous interest but also generated the objection of the *qualia*/phenomenal character: the two faces of Aladdin's lamp problem. By what means can an objective theory of subjectivity exist, and by what means can the subjective, private and "ineffable" experience that constitutes our conscious experiences sprout from the physical and biological interactions that constitute the "matter" of the mind.
- (c) The current phase (first two decades of the 21st century) with a (surprising) return of the idea that it is necessary to start from consciousness to understand the mind. This turning point is based on the doctrine of *phenomenal intentionality*, according to which some mental states are intentional *by virtue* of their phenomenal character, and on the thesis of *cognitive phenomenology*: the idea that all cognitive states have a phenomenological component. An interesting consequence of the new centrality of consciousness is the emergence of panpsychism: the thesis according to which consciousness, as a first and immediately known fact, is the fabric of the world, its intrinsic nature.

Biographical notes (short version)

Michele Di Francesco is full professor of Logic and Philosophy of Science and pro-rector for the development of humanities projects of the School for Advanced Studies IUSS Pavia. Membre associé of the Institut Jean-Nicod (CNRS, EHESS, ENS), in Paris, he is a past Director («Rettore») of the IUSS and a past Dean of the Faculty of Philosophy the Vita-Salute San Raffaele University in Milan.

He is the president of the Italian Society of Neuroethics and Philosophy of Neuroscience, and a Past President of the European Society for Analytic Philosophy and of the Italian Society for Analytic Philosophy. He is the author of eleven books and about one hundred



scientific articles/book chapters; he edited various books and conference proceedings. His most recent books are *The Self and Its Defences. From Psychodynamics to Cognitive Science*, London, Palgrave Macmillan 2016, (with Massimo Marraffa and Alfredo Paternoster) and *Filosofia della mente. Corpo, coscienza, pensiero*, Rome, Carocci Editore 2017 (with Massimo Marraffa and Alfredo Tomasetta).

His main fields of research are the philosophy of mind and the philosophy of cognitive science, and in particular the philosophical problems of subjective experience (such as the nature of the Self and the place of consciousness in the natural order), the extended-mind model of cognition, and the philosophical basis of cognitive neuroscience.

Biographical notes (extended version)

Michele Di Francesco is full professor of Logic and Philosophy of Science at the School for Advanced Studies IUSS Pavia. *Membre associé* of the Institut Jean-Nicod (CNRS, EHESS, ENS), in Paris, he is a past Director («Rettore») of the IUSS and a past Dean of the Faculty of Philosophy the Vita-Salute San Raffaele University in Milan which he contributed to found in 2002. He studied at the State University of Milan («Laurea» and Ph.D. in Philosophy) and Geneva («Certificat de spécialisation»). Member of Wolfson College and Academic Visitor of the Subfaculty of Philosophy at Oxford University (1988), he was invited researcher at the Department of Philosophy of the University of Geneva (1990-1992), and associate professor at the Universities of Palermo (1992/93), Turin and Eastern Piedmont (1993-2003), and full professor at the Vita-Salute San Raffaele University in Milan (2004-2013). He is the president of the Italian Society of Neuroethics and Philosophy of Neuroscience, and a Past President of the European Society for Analytic Philosophy and of the Italian Society for Analytic Philosophy, a co-founder and former director of CRESA (Research Centre for Experimental and Applied Epistemology) at the San Raffaele University, where he directed the PhD Program in Philosophy and Cognitive science, and the Doctoral School in Philosophy and science of the mind.

He is the author of eleven books and about one hundred scientific articles and book chapters; he edited various books and conference proceedings. His most recent books are *The Self and Its Defences. From Psychodynamics to Cognitive Science*, London, Palgrave Macmillan 2016, (with Massimo Marraffa and Alfredo Paternoster) and *Filosofia della mente. Corpo, coscienza, pensiero*, Rome, Carocci Editore 2017 (with Massimo Marraffa and Alfredo Tomasetta).

He is also the author of *L'io e i suoi sé. Identità personale e scienza della mente*, Raffaello Cortina Editore, Milan 1998; *La coscienza*, Laterza, Roma Bari 2000; *Introduzione alla filosofia della mente*, Carocci, Rome 2002; Michele Di Francesco, Giulia Piredda, *La mente estesa. Dove finisce la mente e comincia il resto del mondo?*, Mondadori Università, Milan 2012.

His main fields of research are the philosophy of mind and the philosophy of cognitive science, and in particular the philosophical problems of subjective experience (such as the



nature of the Self and the place of consciousness in the natural order), the extended-mind model of cognition, and the philosophical basis of cognitive neuroscience.

As far as his teaching activity is concerned, Michele Di Francesco is professor of 'Philosophy of mind' at the School for Advanced Studies IUSS Pavia, and is coordinator of the Neurophilosophy curriculum of the Joint MS Degree IUSS/University of Pavia in Psychology, Neurosciences and Human Sciences, where he teaches 'Philosophy of mind'. He also teaches 'Philosophy of cognitive science' at the Faculty of Philosophy of the Vita-Salute San Raffaele University of Milan.

GIULIO TONONI (Madison, Wisconsin, US)

Consciousness and Our Place in Nature

OUTLINE

What is consciousness, and what is its neural substrate in the brain? Why are certain parts of the brain important for consciousness, but not others that have even more brain cells and are just as complicated? Why does consciousness fade with dreamless sleep even though the brain remains active? Does consciousness always fade when patients become unresponsive after brain damage, during generalized seizures, during general anesthesia, or even in deep sleep? And are newborns, animals, and intelligent computers conscious? Integrated information theory (IIT) is an attempt to answer these and other questions in a principled manner. IIT starts not from the brain, but from consciousness itself - the world of experience - and derives from it what it takes for a system to be conscious. The results of this exploration account for many empirical findings, generate counterintuitive predictions, and have already led to the development of promising new tests for the practical assessment of consciousness in non-communicative subjects. They also spur a reassessment of our own place in nature.

Biographical notes (short version)

Giulio Tononi received his medical degree and specialized in Psychiatry at the University of Pisa, Italy. After serving as an Army medical officer, he obtained a Ph.D. in neuroscience as a fellow of the Scuola Superiore. He is currently Professor of Psychiatry, Distinguished Professor in Consciousness Science, Director of the Wisconsin Institute for Sleep and Consciousness and the David P. White Chair in Sleep Medicine at the University of Wisconsin-Madison. His laboratory studies consciousness and its disorders as well as the mechanisms and functions of sleep. His main contribution to the study of consciousness has been the development of the *integrated information theory*, a comprehensive theory of what consciousness is, what determines its quantity and quality, and how it emerges from causal structures. His main contribution to the study of sleep has been the development of the



synaptic homeostasis hypothesis, which states that the function of sleep is to renormalize synaptic strength, counterbalancing a net increase of synaptic strength due to plasticity during wakefulness.

Biographical notes (extended version)

Giulio Tononi received his medical degree and specialized in Psychiatry at the University of Pisa, Italy. After serving as a medical officer in the Army, he obtained a Ph.D. in neuroscience as a fellow of the Scuola Superiore, based on his work on sleep regulation. From 1990 to 2000, he was at The Neurosciences Institute, first in New York and then in San Diego. He is currently Professor of Psychiatry, Distinguished Professor in Consciousness Science, the David P. White Chair in Sleep Medicine at the University of Wisconsin-Madison, and the Director of the Wisconsin Institute for Sleep and Consciousness. His laboratory studies consciousness and its disorders as well as the mechanisms and functions of sleep. For his work on the latter, he has received the 2011 NIH Director's Pioneer Award, the 2017 Farell Prize for outstanding lifetime contribution to sleep medicine and the 2018 Bernese Sleep Award.

Dr. Tononi's main contribution to the study of sleep has been the development of a comprehensive hypothesis about the function of sleep, the *synaptic homeostasis hypothesis*. According to the hypothesis, sleep serves to renormalize synaptic strength, counterbalancing a net increase of synaptic strength due to plasticity during wakefulness. Without sleep, such progressive increase in synaptic strength would lead to unsustainable costs in terms of energy, space, cellular supplies, and would saturate the ability to learn. In short, sleep is the price to pay for plasticity during wakefulness.

Dr. Tononi's main contribution in the study of consciousness has been the development of the *integrated information theory (IIT)*. This is a comprehensive theory of what consciousness is, what determines its quantity and quality, and how it emerges from causal structures such as neural networks. The theory provides a parsimonious account of many neuropsychological observations, among them why certain parts of the brain give rise to experience and others do not, why consciousness vanishes during slow wave sleep and seizures despite continuing neural activity, and how unconscious processes interact with conscious ones. The theory has implications for the unfolding of consciousness across development and phylogeny, and predicts which ingredients are necessary and sufficient to construct sentient machines.

Dr. Tononi is a frequent lecturer and invited speaker at scientific symposia. He is the author of >300 scientific peer-reviewed publications, co-editor of the volumes *Selectionism and the Brain* (with Olaf Sporns) and *The Neurology of Consciousness* (with Steven Laureys), and author of the following books on consciousness and its neural basis: *A Universe of Consciousness* (with Gerald M. Edelman), *Galileo and the Photodiode*, *PHI: A voyage from the brain to the soul* and *Sizing Up Consciousness: Towards an Objective Measure of the Capacity for Experience* (with Marcello Massimini).



VIVIANA KASAM (Milan, Italy)

Biographical notes

Viviana Kasam, MA at McGill University, Montreal, chairs BrainCircleItalia—a non-profit organization aimed at spreading the most cutting-edge research in neuroscience—that she founded in 2010 with the support of Nobel Prize Rita Levi Montalcini and Pietro Calissano, at the time president of EBRI (European Brain Research Institute). In 2019 she founded BrainCircleLugano, which works on the Ticinese territory with the same goals.

Kasam has been a Member of the Board of the Hebrew University of Jerusalem for ten years and was appointed Knight of the Italian Republic for work merits.

Journalist specialized in scientific divulgation, she contributed to *Il Corriere della Sera* and the newspapers of the group, as well as to Rai, the Italian public broadcasting network, both for radio and television. She is one of the founders of Canale 5 television channel.

Kasam has organized conferences, seminars, forums, online and television events, documentaries, classes in theaters (Piccolo Teatro and Teatro Franco Parenti in Milan, Eliseo and Palladium theaters in Rome), and film festivals focused on neurosciences in collaboration with the Presidency of the Republic, the Municipality of Milan and Rome, and the major international universities and research center.

She curated the exhibition “Il colore del pensiero” (2011) that traveled throughout Europe and was set up in Milan in Corso Vittorio Emanuele and in Paris in front of Petit Palais.

She held a course on scientific communication at Università Tor Vergata in Rome.

Kasam was awarded several prizes for her journalistic and television activity, including Premio Italia, Women of Europe Award, Premio Onda TV, Premio Venezia and Premio Guidarello.

MASSIMO CACCIARI (Milan, Italy)

Concluding remarks

OUTLINE

As we want to make the appearance of the surrounding world *transparent*, so we want to be *transparent* to ourselves, as part of that world—that is, to know the processes and the forms in which we perceive, think, decide.

However, as what we know draws an area that protrudes on each side to the *unknown*, so the conscious proves always and non-occasionally connected to the *un-conscious*. It is necessary to become conscious of our unconscious. Not only personal, but archetypical



(genomic?) and cognitive. Our Self does not coincide with conscious, nor it is a Director or the sole Author of our mental events. Consciousness orientates, it does not determine. The consciousness has a biological base, it is a natural phenomenon, brain “physics” subtend every mental event—how can we doubt all of that? Problems all arise “in the aftermaths” of these almost obvious considerations. The *gift of Self, the appearance of subjectivity*, can be explained on the basis of the general “laws” of evolution, or does it represent a

discontinuity? Natura facit saltus? In its infinite *power* does it not incessantly transcend the limits of our seeing and fore-seeing?

Moreover: how to interpret the corporeal-mental nexus? According to a “superstitious” version of the principle of causality (Jauch, Feynman, Wheeler, etc.)? Every reductionism seems to fall in insurmountable logical aporias, even before they deal with the pertaining paradigms of contemporary physics: it necessarily tends to nullify the term which is “reduced-to”; it sprouts from a dualist position to resolve itself into monism. The mental dimension must *first* be brain-mind (the Ego cogito must *be* in order to think), but brain-mind only exists if *represented* in the mental dimension. The brain-mind meant as a unique *causing substrate* resolves itself in a *metaphysic* of the object itself.

The perspective that carries the most flourishing research in psychology, philosophy and epistemology and is linked to contemporary physics, is centered upon the terms of interaction and connection. Links—among distinct elements—that cannot be explained in deterministic terms. The biological rooting does not imply any rigid causality.

Biographical notes (short version)

Massimo Cacciari is Professor Emeritus in Philosophy at the Vita-Salute San Raffaele University in Milan, where he founded the Philosophy department in 2002 together with Father Luigi Verzé. From 1998 to 2005 he was Director of the Department of Philosophy at the Academy of Architecture of Lugano.

He received several prestigious awards such as the Hannah Arendt Award for Political Philosophy in 1999, the Gold Medal from Círculo de Bellas Artes in Madrid in 2005, the Honorary Degree in Political Sciences from the University of Bucharest in 2007.

He cofounded and co-directed magazines that marked the political, cultural and philosophical context in Italy between the 1960s and the 1990s, such as *Angelus Novus*, *Contropiano*, *Laboratorio politico*, *Centauro*, *Paradosso*.

His books—most of which were translated in the major European languages and some even in Japanese—range from classical to contemporary philosophy, from aesthetics to political philosophy, from epistemology to law. Among the last publications: *Doppio ritratto. San Francesco in Dante e in Giotto*, Milan, 2012; *The Withholding Power: An Essay on Political Theology*, Milan, 2013; *Generare Dio*, Il Mulino, Bologna, 2017; *La mente inquieta. Saggio sull'Umanesimo*, Einaudi, Turin, 2019.



Biographical notes (extended version)

Massimo Cacciari graduated in Philosophy at University of Padua in 1967 with a thesis on *Critique of Judgement* by Kant with professors Sergio Bettini and Dino Formaggio. Former tenured professor in Artistic Literature and then Aesthetics at the University of Architecture of Venice, he then became full professor of Aesthetics in 1985 and was Director of the Department of Philosophy at the Academy of Architecture of Lugano from 1998 to 2005. In 2002 he founded with Father Luigi Verzé the Department of Philosophy at the Vita-Salute San Raffaele University in Milan, where he was appointed first Dean and is Professor Emeritus in Philosophy since 2012.

Cacciari held lessons, courses and conferences in many universities and institutions throughout Europe. He received prestigious awards such as the Hannah Arendt Award for Political Philosophy in 1999, the Darmstadt Academy Award (2002), the Gold Medal from Círculo de Bellas Artes in Madrid (2005), the Gold Medal "Pio Manzù" from the President of the Italian Republic (2008), the Premio De Sanctis for essay writing, the Honorary Degree in Architecture from the University of Genoa (2002), in Political Sciences from the University of Bucharest (2007), and in Classical Philology from Alma Mater in Bologna (2014).

He has been awarded the honorary citizenship of Sarajevo for his political and cultural action during war and the siege on the city, and of Siracusa for his work on Plato and Neoplatonism.

He cofounded and co-directed magazines that marked the political, cultural and philosophical context in Italy between the 1960s and the 1990s, such as *Angelus Novus*, *Contropiano*, *Laboratorio politico*, *Centauro*, *Paradosso*.

Among his publications: *Krisis*, Milan, 1976; *Dallo Steinhof*, Milan, 1980; *Icone della legge*, Milan, 1985; *The Necessary Angel*, Milan, 1986; *Zeit ohne Kronos*, Klagenfurt, 1986; *Drama y duelo*, Madrid, 1987; *Méridiéens de la decision*, Paris, 1992; *Geofilosofia dell'Europa*, Milan, 1994; *L'Arcipelago*, Milan, 1996; *Le dieu qui danse*, Paris, 2000; *Hamletica*, Milan, 2009; *The Unpolitical*, Yale University Press, 2009; *Doppio ritratto. San Francesco in Dante e in Giotto*, Milan, 2012; *The Withholding Power: An Essay on Political Theology*, Milan, 2013; *Generare Dio*, Il Mulino, Bologna, 2017; *La mente inquieta. Saggio sull'Umanesimo*, Einaudi, Turin, 2019. His theoretical research is focused in his "trptych": *Dell'Inizio*, Milan, 1990; *Della cosa ultima*, Milan, 2004; *Labirinto filosofico*, Milan, 2014.

GIANCARLO COMI (Milan, Italy)

Concluding remarks

Biographical notes

Giancarlo Comi is honorary professor of neurology at the Università Vita Salute San Raffaele and founder and director of the Institute of Experimental Neurology at the Scientific Institute



San Raffaele, Milan, Italy. He is the President of the European Charcot Foundation (ECF), and since 2013 has served as vice chair of the Progressive Multiple Sclerosis Alliance and co-chair of the Industry Forum of the Alliance. He has been holding the office of president of the European Neurology Society, of the Italian Society of Neurology and of the Italian Society of Clinical Neurophysiology. He is fellow of the European Academy of Neurology (EAN).

In recent years, Professor Comi has received the 'Gh. Marinescu' honorary award from the Romanian Society of Neurology, and has been awarded honorary memberships of the Russian Neurological Academic Society, the European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS), the European Neurological Society (ENS), the Sociedad Espanola de Neurologia, the Société Française de Neurologie. He also received in 2015 the Charcot Award for MS Research from the MS International Federation (MSIF). In the past year Professor Comi was awarded the Gold Medal of 'Benemeranza Civica' from the City of Milan and has been recently conferred the honor of merit as Official by the President of Italy.

He has been principal investigator of many phase II and III multiple sclerosis clinical trials. Prof. Comi has authored and co-authored more than 1000 articles in peer-reviewed journals, and edited several books, with an h-index of 115. He has been organizer and/or invited speaker for more than 500 conferences, both nationally and internationally. He is co-editor of Neurological Sciences and member of the editorial boards of many international journals.