NATIONAL ACADEMIES Sciences Engineering Medicine

Forum on Neuroscience and Nervous System Disorders

Exploring the Bidirectional Relationship between Artificial Intelligence and Neuroscience: A Workshop

March 25, 2024 | 2:00–5:00pm ET | Hybrid

March 26, 2024 | 9:30am–4:00pm ET | Hybrid

ATTENDEE PACKET

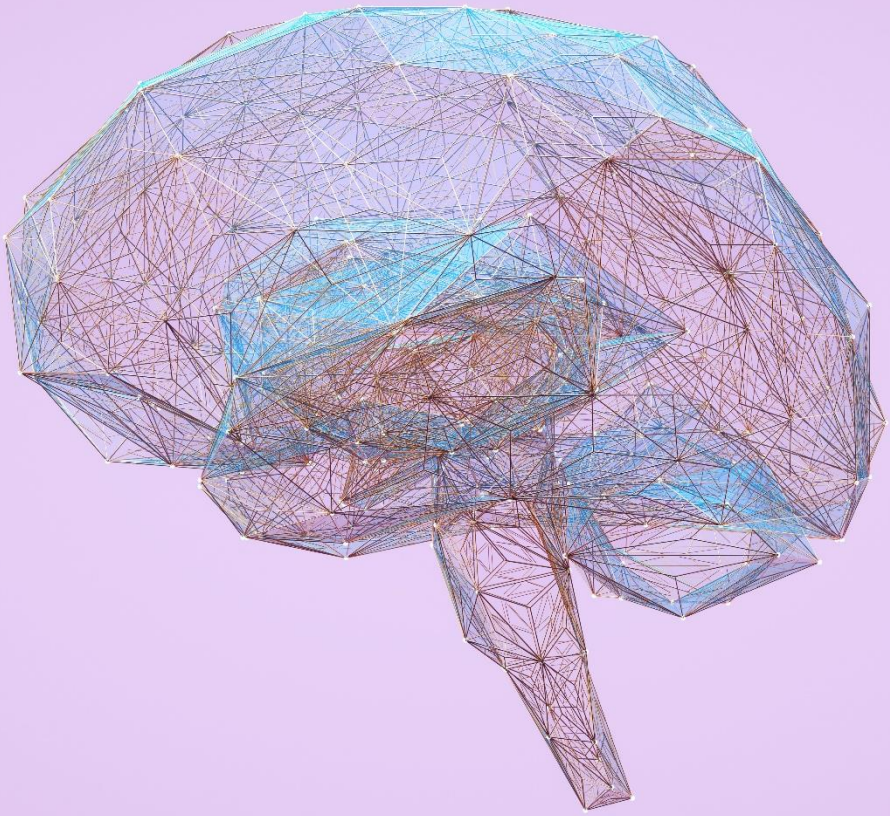


Table of Contents

Exploring the Bidirectional Relationship between Artificial Intelligence and Neuroscience

A Workshop

Monday, March 25, 2024: 2:00 pm – 5:00 pm ET
Tuesday, March 26, 2024: 9:30 am – 4:00 pm ET

Objectives

- Explore the bidirectional relationship between neuroscience and AI, including the contributions neuroscience has made to the development of AI and the utilization of AI to further understanding of the brain.
- Discuss the utility and limitations of AI in basic, translation, and clinical neuroscience research.
- Examine the potential for autonomy and agency in AI systems, and the associated implications for the field of neuroscience.
- Discuss the key role of neuroscience in equipping regulators and the public with knowledge and resources for the responsible use of AI in research, clinical, and general applications.
- Consider research priorities and public education needs regarding the role of neuroscience in AI and AI in neuroscience research.

MONDAY, MARCH 25, 2024

2:00pm **Introductory Remarks**

Frances Jensen, University of Pennsylvania, *Forum on Neuroscience and Nervous System Disorders Co-chair, Planning Committee Member*

John Krystal, Yale University, *Forum on Neuroscience and Nervous System Disorders Co-chair*

2:05pm **Workshop Overview**

Magali Haas, Cohen Veterans Bioscience, *Workshop Co-chair*

Terrence Sejnowski, Salk Institute for Biological Sciences, *Workshop Co-chair*

2:15pm **Keynote Presentation: Brains & AI**

Terrence Sejnowski, Salk Institute for Biological Sciences, *Workshop Co-chair*

2:35pm **Session 1: The Bidirectionality of Neuroscience and Artificial Intelligence (AI)**

Objective:

- Explore the contributions that neuroscience has made to the development, utilization and understanding of AI and complex models such as LLMs.
- Discuss the utility and limitations of AI in basic, translation, and clinical neuroscience research.
- Consider how can advances in generative AI be harnessed to enhance our understanding of human affective, cognitive, and conative states, while ensuring responsible and ethical use in research and applications.
- Examine the potential for intelligence, autonomy, and agency in AI systems, and the associated implications for the field of neuroscience.

2:35pm **Session Overview**

Jonathan Cohen, Princeton University, *Session Moderator, Planning Committee Member*

Topic 1a - The Unique Role of Neuroscience in the Past, Present, and Future of AI

2:40pm **Speaker Presentations**

Ankit Patel, Rice University

Ellie Pavlick, Brown University

3:05pm **Moderated Panel and Audience Q&A**

3:20pm **BREAK**

Topic 1b - The Impact of AI on Neuroscientific Discoveries

3:30pm **Speaker Presentations**

Jim DiCarlo, Massachusetts Institute of Technology

Viktor Jirsa, Institut de Neurosciences des Systèmes; Human Brain Project; EBRAIN

3:55pm **Moderated Panel and Audience Q&A**

Topic 1c - Navigating the Intersection of AI and Neuroscience

4:10pm **Speaker Presentation**

Jay McClelland, Stanford University

4:20pm **Moderated Panel and Audience Q&A**

4:55pm **Recap of Day 1 Themes & Preview of Day 2**

Magali Haas, Cohen Veterans Bioscience, *Workshop co-chair*

Terrence Sejnowski, Salk Institute for Biological Sciences, *Workshop co-chair*

5:00pm **Adjourn Day 1**

TUESDAY, MARCH 26, 2024

9:30am **Day 2 Welcome**

Magali Haas, Cohen Veterans Bioscience, *Workshop co-chair*

Terrence Sejnowski, Salk Institute for Biological Sciences, *Workshop co-chair*

9:35am **Session 2: R&D Considerations for Neuroscience & AI**

Objectives:

- Discuss what methodologies should be established to assess the "co-evolution" of the human brain with AI models.
- Explore safeguards to ensure the responsible development and use of AI in neuroscience research.
- Explore the advantages of utilizing AI in drug development and generating more targeted therapies.
- Consider strategies to ensure the development and usage of representative datasets to generate AI algorithms that are applicable to diverse populations.

9:35am **Session Overview**

Bill Martin, The Janssen Pharmaceutical Companies of Johnson & Johnson, *Session Moderator, Planning Committee Member*

9:40am **Speaker Presentations**

Jana Schaich Borg, Duke University

Olga Troyanskaya, Princeton University (Zoom)

Edward Chang, University of California, San Francisco (*Zoom*)

Lee Lancashire, Cohen Veterans Bioscience

Gayle Wittenberg, The Janssen Pharmaceutical Companies of Johnson & Johnson

10:20am **Moderated Panel and Audience Q&A**

10:50am **BREAK**

11:00am **Session 3: Impact of AI in Medical & Clinical Environments**

Objectives:

- Discuss what health professionals and individuals with lived/living experience would need and/or want from the medical application of AI.
- Explore neuroscience-related health professionals can contribute to developing representative, innovative, and effective AI systems for healthcare.
- Consider the role of causal AI in healthcare.

11:00am **Session Overview**

Frances Jensen, University of Pennsylvania, *Session Moderator, Forum on Neuroscience and Nervous System Disorders co-chair, Planning Committee Member*

11:05am **Speaker Remarks**

Ruogu Fang, University of Florida

Michael Abràmoff, University of Iowa; Digital Diagnostics (*Zoom*)

Brian Litt, University of Pennsylvania

Alison Darcy, Woebot Health

Brian Anderson, Coalition for Health AI (CHAI)

11:30am **Moderated Panel and Audience Q&A**

12:10pm **LUNCH BREAK**

12:50pm **Session 4: Communication & Engagement with the Public & Lived/Living CNS Disorder Experience**

Objectives:

- Discuss how individuals with lived/living experience and the general public perceive AI and what they hope to see achieved with AI in the future.
- Consider how neuroscientists and artificial intelligence engineers can collaborate to educate the public regarding artificial intelligence and its use in research, clinical care, and general applications.
- Explore how communication campaigns can be designed to reach underrepresented populations and rural communities.
-

12:50pm **Session Overview**

Katie Sale, American Brain Coalition, *Session Moderator, Planning Committee Member*

12:55pm **Speaker Remarks**

Jennifer French, Neurotech Network

Matthew Guggemos, iTherapy LLC

Ehsan Hoque, University of Rochester; *Planning Committee Member*

Susan Gonzales, AI and You (*Zoom*)

John Wilbanks, The Broad Institute of MIT and Harvard

1:20pm **Moderated Panel and Audience Q&A**

2:00pm **BREAK**

2:10pm **Session 5: Regulatory & Policy Advocacy and Engagement**

Objectives:

- Review the current and proposed regulatory frameworks governing the use of AI in neuroscience.
- Discuss the key role of neuroscience in equipping regulators and policymakers with knowledge and resources for the responsible use of AI in research, clinical, and general applications.

2:10pm **Session Overview**

Michael Littman, National Science Foundation; *Session Moderator, Planning Committee Member*

2:15pm **Speaker Presentations**

John Ngai, BRAIN Initiative

Nita Farahany, Duke University; *Planning Committee Member*

Eva Weicken, Fraunhofer HHI

Wade Shen, White House Office of Science, Technology, and Policy; ARPA-H (*Zoom*)

2:35pm **Moderated Panel and Audience Q&A**

3:10pm **Session 6: Synthesis & Opportunities to Move Forwards**

Objectives:

- Examine the core themes that have been highlighted during the workshop.
- Discuss which topics may not have been examined during previous discussions and should be considered in the future.
- Consider what opportunities and collaborations may be needed to continue to bolster the relationship between neuroscience and artificial intelligence to inspire innovation.

3:10pm **Session Overview**

Magali Haas, Cohen Veterans Bioscience, *Workshop co-chair*

Terrence Sejnowski, Salk Institute for Biological Sciences, *Workshop co-chair*

3:15pm **Moderated Panel Discussion**

Pat Churchland, University of California San Diego (*Zoom*)

Sean Hill, Centre for Addiction and Mental Health; EPFL; University of Toronto

Jesús Mantas, Biogen; IBM

Kevin Miller, Google Deepmind, *Planning Committee Member*

Anindita Saha, Food and Drug Administration

3:55pm **Concluding Remarks**

Magali Haas, Cohen Veterans Bioscience, *Workshop co-chair*

Terrence Sejnowski, Salk Institute for Biological Sciences, *Workshop co-chair*

4:00pm **Adjourn Workshop**

This event was planned by the following experts: Magali Haas, Cohen Veterans Bioscience; Terrence Sejnowski, Salk Institute for Biological Science; Jonathan Cohen, Princeton University; Nita Farahany, Duke University; Ehsan Hoque, University of Rochester; Frances Jensen, University of Pennsylvania; Michael Littman, National Science Foundation; Bill Martin, Janssen Research & Development; Kevin Miller, Google DeepMind; Kathryn Richmond, Allen Institute; Katie Sale, American Brain Coalition.

Note: The planning committee's role is limited to organizing the event. A proceedings based on the event will be prepared by an independent rapporteur.

Forum on Neuroscience and Nervous System Disorders

The Forum on Neuroscience and Nervous System Disorders was established in 2006 to provide a venue for building partnerships, addressing challenges, and highlighting emerging issues related to brain disorders, which are common, major causes of premature mortality, and, in aggregate, the largest cause of disability worldwide. The Forum's meetings bring together leaders from government, industry, academia, disease advocacy organizations, philanthropic foundations, and other interested parties to examine significant—and sometimes contentious—issues concerning scientific opportunities, priority setting, and policies related to research on neuroscience and brain disorders; the development, regulation, and use of interventions for the nervous system; and related ethical, legal, and social implications.

Forum members meet several times a year to exchange information, ideas, and differing perspectives. The Forum also sponsors workshops (symposia), workshop proceedings, and commissioned papers as additional mechanisms for informing its membership, other stakeholders, and the public about emerging issues and matters deserving scrutiny. Additional information is available at www.nas.edu/NeuroForum.

MEMBERS

Frances Jensen, MD, *co-chair*
University of Pennsylvania

John Krystal, MD, *co-chair*
Yale University

Rita Balice-Gordon, PhD
Muna Therapeutics

Deanna Barch, PhD
Washington University in St. Louis

Diane Bovenkamp, PhD
BrightFocus Foundation

Katja Brose, PhD
Chan Zuckerberg Initiative

Teresa Buracchio, MD
Food and Drug Administration

Sarah Caddick, PhD
Gatsby Charitable Foundation

Rosa Canet-Avilés, PhD
California Institute for Regenerative Medicine (CIRM)

Maria Carrillo, PhD
Alzheimer's Association

Michael Chiang, MD
National Eye Institute

Tim Coetzee, PhD
National Multiple Sclerosis Society

Beverly Davidson, PhD
Children's Hospital of Philadelphia

Nita Farahany, JD, PhD
Duke University

Eva Feldman, MD, PhD
University of Michigan

Brian Fiske, PhD
The Michael J. Fox Foundation for Parkinson's Research

Joshua Gordon, MD, PhD
National Institute of Mental Health

Morten Grunnet, PhD
Lundbeck

Magali Haas, MD, PhD, MSE
Cohen Veterans Bioscience

Richard Hodes, MD
National Institute on Aging

Stuart Hoffman, PhD
Department of Veterans Affairs

Yasmin Hurd, PhD
Icahn School of Medicine at Mount Sinai

Steven Hyman, MD
Broad Institute of MIT and Harvard

Michael Irizarry, MD
Eisai

George Koob, PhD
National Institute on Alcohol Abuse and Alcoholism

Walter Koroshetz, MD
National Institute of Neurological Disorders and Stroke

Robert Malenka, MD, PhD
Stanford University

Husseini Manji, MD, FRCPC
Oxford University; Duke University; UK Government Mental Health Mission

Hugh Marston, PhD
Boehringer Ingelheim

Bill Martin, PhD
Janssen Research & Development

John Ngai, PhD
National Institute of Health's Brain Research through Advancing Innovative Neurotechnologies (BRAIN®) Initiative

Gentry Patrick, PhD
University of California San Diego

Steve Paul, MD
Karuna Therapeutics

Kathryn Richmond, MBA, PhD
Allen Institute

M. Elizabeth Ross, MD, PhD, FANA
American Neurological Association

Marsie Ross, PharmD
Harmony Biosciences

Katie Sale, BA
American Brain Coalition

Raymond Sanchez, MD
Cerevel Therapeutics

Terrence Sejnowski, PhD
Salk Institute for Biological Studies

Sarah Sheikh, MSc, BMBCh
Takeda

Sarah Shnider, PhD, MSc
One Mind

David Shurtleff, PhD
National Center for Complementary and Integrative Health

John Spiro, PhD
Simons Foundation

Alessio Travaglia, PhD
Foundation for the National Institutes of Health

Nora Volkow, MD
National Institute on Drug Abuse

Doug Williamson, MBChB, MRCPsych
Acadia Pharmaceuticals, Inc

Richard Woychik, PhD
National Institute of Environmental Health Sciences

Stevin Zorn, PhD
MindImmune Therapeutics

Forum Staff

Sheena Posey Norris, MS, PMP
Director, Forum on Neuroscience and Nervous System Disorders

Eva Childers, PhD
Associate Program Officer

Maya Thirkill, MPH
Associate Program Officer

Kimberly Ogun, BS
Senior Program Assistant

Clare Stroud, PhD
Senior Board Director, Board on Health Sciences Policy

Upcoming Events

Exploring the Bidirectional Relationship between Artificial Intelligence and Neuroscience (March 25-26, 2024)

Recent Events

Mitigating Health Disparities in Brain Disorders Starting with Basic Science: A Workshop (2023)

Exploring the Adoption of Implantable Brain Stimulation into Standard of Care for Central Nervous System Disorders: A Workshop (2023)

Addressing Health Disparities in Central Nervous System Disorders: A Virtual Workshop Series (2023)

Toward a Common Research Agenda in Infection-Associated Chronic Illnesses: A Workshop to Examine Common, Overlapping Clinical and Biological Factors (2023) *A collaboration with the Forum on Microbial Threats*

Multimodal Biomarkers for Central Nervous System Disorders: Development, Integration, and Clinical Utility: A Workshop (2023)

Exploring Sleep Disturbance in Central Nervous System Disorders (2022)

Exploring Psychedelics and Entactogens as Treatments for Psychiatric Disorders: A Workshop (2022)

Sponsoring Members of the Forum on Neuroscience and Nervous System Disorders

ACADEMIA

The George & Anne Ryan Institute for Neuroscience at the University of Rhode Island
University of Rhode Island

GOVERNMENT

California Institute for Regenerative Medicine
Department of Veterans Affairs
Food and Drug Administration
National Center for Complementary and Integrative Health
National Eye Institute
National Institute of Environmental Health Sciences
National Institute of Mental Health
National Institute of Neurological Disorders and Stroke
National Institute on Aging
National Institute on Alcohol Abuse and Alcoholism
National Institute on Drug Abuse
National Institutes of Health BRAIN Initiative
National Science Foundation

INDUSTRY

Acadia Pharmaceuticals
Boehringer Ingelheim
Cerevel Therapeutics
Eisai
Harmony Biosciences
Janssen Research & Development, LLC
Karuna Therapeutics
Lundbeck Research USA, Inc
Takeda

NONPROFIT ORGANIZATIONS

Alzheimer's Association
American Brain Coalition
BrightFocus Foundation
Cohen Veterans Bioscience
Foundation for the National Institutes of Health
Michael J. Fox Foundation for Parkinson's Research
National Multiple Sclerosis Society
One Mind
Paul G. Allen Frontiers Group
Simons Foundation Autism Research Initiative

PRIVATE FOUNDATION

Gatsby Charitable Foundation
Wellcome Trust

PROFESSIONAL SOCIETY

American Neurological Association

Biosketches of Speakers

Michael Abràmoff, M.D., Ph.D.

Michael D. Abràmoff, MD, PhD, is a fellowship-trained retina specialist, computer scientist and entrepreneur. Michael Abràmoff, MD, PhD, (Gold Fellow, ARVO and Fellow, IEEE) is the Robert C. Watzke, Professor of Ophthalmology and Visual Sciences at the University of Iowa, with a joint appointment in the College of Engineering. Dr. Abràmoff is also Founder and Executive Chairman of Digital Diagnostics, the Autonomous AI diagnostics company that was the first in any field of medicine to get FDA clearance for an autonomous AI, where the AI makes a medical decision without human oversight, and which, in primary care, it can instantaneously diagnose diabetic retinopathy and diabetic macular edema at the point of care. Dr. Abràmoff developed an ethical foundation for autonomous AI that was used during the design, validation, of AI and regulatory and reimbursement pathways for autonomous AI. The results of randomized controlled trials show that autonomous AI increases clinician productivity, lowers cost, and improves health equity, patient outcomes, and care access. Finally, he is founder of the Healthcare AI coalition, representing many healthcare AI companies, and a founding member and treasurer of FDA's Collaborative Community on Ophthalmic Imaging. As the author of over 400 peer-reviewed publications in this field, he has been cited over 47,000 times (h-index 80) and is the inventor on 25 issued patents and many patent applications. Dr. Abràmoff has mentored dozens of engineering graduate students, ophthalmology residents, and retina fellows. His passion is to use autonomous AI to improve the productivity and accessibility of healthcare.

Email: abramoff@digitaldiagnostics.com

Brian Anderson, Ph.D.

Dr. Brian Anderson is the Chief Digital Health Physician at MITRE, where he leads research and development efforts across major strategic initiatives in digital health alongside industry partners and the U. S. Government. Anderson is responsible for cofounding the Coalition for Health AI (CHAI), which is developing a set of consensus-driven standards and guardrails for Health AI as well as supporting a network of Health AI Assurance Labs. He also leads MITRE's largest R&D effort in Oncology, where he led the initial development of mCODE and the use of AI in more efficient and inclusive clinical trial design. Anderson is an internationally recognized author and expert in digital health and is regularly engaged as a speaker on digital health innovation, health standards development, clinical decision support systems, and interoperability. Prior to joining MITRE, Anderson led the Informatics and Network Medicine Division at Athenahealth. He has also served on several national health information technology committees in partnership with the Office of the National Coordinator.

Email: briananderson@mitre.org

Edward Chang, M.D.

Edward Chang, M.D., is the Joan and Sanford Weill Chair and Jeanne Robertson Distinguished Professor of Neurological Surgery at the University of California, San Francisco. Dr. Chang's clinical expertise lies in surgical therapies for epilepsy, pain, and brain tumors. He specializes in advanced neurophysiologic brain mapping methods, including awake speech and motor mapping, to safely perform neurosurgical procedures in eloquent areas of the brain. His research focuses on the discovery of cortical mechanisms of high-order neurological function in humans. Dr. Chang's laboratory has demonstrated the detailed functional organization of the human speech cortex and has translated those discoveries towards the development of a speech neuroprosthetic device to restore communication for people living with paralysis. Dr. Chang is the 2015 Blavatnik National Laureate in Life Sciences and a member of the National Academy of Medicine.

Email: edward.chang@ucsf.edu

Pat Churchland

Pat Churchland recognized that speculative philosophical approaches to questions about knowledge, consciousness, and decision-making could benefit from emerging data in the neurosciences. Her first book (1986), Neurophilosophy: Towards a Unified Science of the Mind-Brain (MIT Press) made the case for incorporating data from neuroscience, evolutionary biology, and genetics in developing theories about our mental life. Extending those ideas, she collaborated with physicist/neuroscientist Terry Sejnowski to publish The Computational Brain (MIT Press 1992). The book's central idea is that brains have many levels of organization from neurons to circuits to systems, and explanatory hypotheses at many levels can draw on computational principles. As one of the first comprehensive treatments of the subject, this book was widely read and republished in 2017.

Her later work focused on social neuroscience, especially in mammals and birds, drawing on data showing that social attachment is mediated by neuropeptides oxytocin and vasopressin. Her hypothesis was that social attachment is the neural platform for moral norms that are learned after birth (BrainTrust: What Neuroscience Tells Us about Morality (Princeton UP 2011), Touching a Nerve: The Self as Brain (Norton, 2013) and Conscience: The Origin of Moral Intuition (Norton, 2019).

Email: pschurchland@ucsd.edu

Alison Darcy, Ph.D.

Alison Darcy, Ph.D., is a clinical research psychologist and health tech designer who has reimagined how psychotherapy can be delivered for the way we live today. Her deep clinical expertise, pioneering mindset, and passion for accessible design are grounded in a 25 year track record studying and developing solutions that engage people in a therapeutic process. Alison's training at University College Dublin (UCD), Stanford School of Medicine, and with the American Psychiatric Association, along with her experience leading AI pioneer Andrew Ng's Health Innovation Lab, helped her advance the shift from conventional face-to-face therapy to complementary AI-

powered interventions. In 2017 she introduced the first scientifically-informed mental health chatbot, Woebot, to make high quality therapy radically accessible. Alison is a vocal advocate for the safe and effective use of AI in healthcare. She also established the practices for Woebot studies and trials that have helped push the entire field forward, and made Woebot Health the single most mentioned digital therapeutics company in the peer-reviewed scientific literature today. Named to the inaugural TIME100 AI List recognizing the 100 most influential individuals advancing AI, and the recipient of the 2023 UCD Alumni Award in Social Sciences, Alison is also an Adjunct Faculty member in the Psychiatry and Behavioral Sciences Department of Stanford's School of Medicine.

Email: alison@woebothealth.com

Jim DiCarlo, M.D., Ph.D.

Jim DiCarlo, M.D., Ph.D., is a Professor of Systems and Computational Neuroscience at the Massachusetts Institute of Technology. His research team's primary goal is to discover and artificially emulate the brain mechanisms that underlie human visual intelligence. Over the past 20 years, using the non-human primate animal model organism, DiCarlo and his collaborators have helped develop our contemporary, engineering-level understanding of the neural mechanisms that underlie visual information processing in the ventral visual stream — a complex series of interconnected brains areas — and how that processing supports core cognitive abilities such as object and face recognition. He and his collaborators aim to use this newly emerging scientific understanding to guide the development of more robust artificial vision systems ("AI"), to reveal new ways to beneficially modulate brain activity via modulations of images striking our eyes, to expose new methods of accelerating visual learning, to provide a basis for new neural prosthetics (brain-machine interfaces) to restore lost senses, and to provide a scientific foundation to understand how sensory processing is altered in conditions such as agnosia, autism and dyslexia.

DiCarlo trained in biomedical engineering, medicine, systems neurophysiology and computing at Northwestern (BSE), Johns Hopkins (MD/PhD), and Baylor College of Medicine (Postdoc). He served as Head of MIT's Department of Brain and Cognitive Sciences from 2012 to 2021, and he is currently the Director of the MIT Quest for Intelligence (2021-present) where and his leadership team are working to advance interdisciplinary research at the interface of natural and artificial intelligence. DiCarlo is an Alfred P. Sloan Research Fellow, a Pew Scholar in Biomedical Sciences, a McKnight Scholar in Neuroscience, and an elected member of the American Academy of Arts & Sciences.

Email: dicarlo@mit.edu

Ruogu Fang, Ph.D.

Ruogu Fang, Ph.D., is a tenured Associate Professor and Pruitt Family Endowed Faculty Fellow in the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida. Her research revolves around the integration of artificial intelligence (AI) and deep learning with the intricacies of the human brain. Her research encompasses two principal themes: AI-empowered precision brain health and brain/bio-inspired AI. Her work involves addressing compelling questions, such as using machine learning techniques to quantify brain dynamics, facilitating early Alzheimer's disease diagnosis through novel imagery, predicting personalized treatment outcomes, designing precision interventions, and leveraging principles from neuroscience to develop the next generation of AI. Fang's current research is also rooted in the confluence of AI and multimodal medical image analysis. She is the PI of NIH NIA RF1 (R01-equivalent), NSF Research Initiation Initiative (CRII) Award, NSF CISE IIS Award, Ralph Lowe Junior Faculty Enhancement Award from Oak Ridge Associated Universities (ORAU). She has also received numerous recognition.

She was selected as the Rising Stars (Engineering) by the Academy of Science, Engineering, and Medicine of Florida (ASEMFL), inaugural recipient of the Robin Sidhu Memorial Young Scientist Award from the Society of Brain Mapping and Therapeutics, Best Paper Award from the IEEE International Conference on Image Processing, University of Florida Herbert Wertheim College of Engineering Faculty Award for Excellence in Innovation, UF BME Faculty Research Excellence Award, among others. Fang's research has been featured by Forbes Magazine, The Washington Post, ABC, RSNA, and published in Lancet Digital Health. She is an Associate Editor of the Journal Medical Image Analysis, a Topic Editor of Frontiers in Human Neuroscience, and a Guest Editor of CMGI. She is a reviewer for The Lancet, Nature Machine Intelligence, Science Advances, etc. Her research has been supported by NSF, NIH, Oak Ridge Laboratory, DHS, DoD, NVIDIA, and the University of Florida. At the heart of her work is the Smart Medical Informatics Learning and Evaluation (SMILE) lab, where she is tirelessly dedicated to creating groundbreaking brain and neuroscience-inspired medical AI and deep learning models. The primary objective of these models is to comprehend, diagnose, and treat brain disorders, all while navigating the complexities of extensive and intricate datasets.

Email: ruogu.fang@bme.ufl.edu

Jennifer French

Jennifer French lives with tetraplegia due to a spinal cord injury as a result of a snowboarding accident. She is an early user of an experimental implanted neural prosthesis for paralysis and is the Past-President and Founding member of the North American SCI Consortium. She is the Founder and Executive Director of Neurotech Network, a nonprofit organization that focuses on education and advocacy of neurotechnologies. Jennifer has been featured in several media outlets and is an accomplished writer and speaker addressing organizations such as the National Academy of Sciences, the World Science Festival, and TEDx Talks. French has helped launch successful divisions in such organizations as Bombardier Capital and Connection, as well as several nonprofit organizations and patient/community

engagement programs. French holds a bachelor's degree in aviation science and an MBA. She serves on several Boards including the IEEE Neuroethics Initiative, Institute of Neuroethics, OpenMinds platform, BRAIN Initiative Multi-Council Working Group, and the American Brain Coalition. She is also an organization representative within the FDA CDRH Patient and Caregiver Connection Program and new TAP program, faculty member for the NeuroTech Course, and co-lead on the new Implantable Brain Computer Interface Collaborative Community. She is the current Chair of the CDMRP Spinal Cord Injury Research Program programmatic committee. She is the author of On My Feet Again (Neurotech Press, 2013) and is co-author of Bionic Pioneers (Neurotech Press, 2014). Her latest TED talk is available: https://www.youtube.com/watch?v=tkspAQW_2sQ.

Email: jfrench@neurotechnetwork.org

Susan Gonzales

Susan Gonzales is the founder & CEO of AIandYou, launched in 2019. She launched AIandYou, a nonprofit, to educate marginalized communities about artificial intelligence and prepare them for the opportunities and challenges of AI - in easy-to-understand language. She brought years of experience in technology, policy, and community outreach to AIandYou. Previously, Susan was a policy exec with Facebook and other tech, and telecom companies. Susan's career in policy has been centered on technology and marginalized communities. Today, Susan is at the epicenter of the AI ecosystem in D.C. and globally. She co-chairs AI Education and Awareness on the National AI Advisory Committee (NAIAC), advising President Biden and the Administration on the National AI Initiative. Susan was recently appointed to the National Institute of Science and Technology (NIST) AI Safety Consortium. Susan recently co-authored Enhancing AI Literacy for the United States, NAIAC recommendation to the White House, 2023, and A Pathway to Equity and Inclusion in AI, World Economic Forum 2022. She sits on the Boards of Equal AI, the Sandberg Family Foundation, Leanin.org, and the Eva Longoria Foundation.

Email: susan@aiandyou.org

Matthew Guggemos

Matthew Guggemos, Co-Founder and CTO of iTherapy, LLC, is a distinguished professional in the intersection of technology, neuroscience, and therapy. With an energetic commitment to enhancing communication and learning through innovative solutions, Matthew has dedicated his career to developing tools and platforms that support individuals with diverse learning and communication needs. His work is particularly impactful in the realm of autism and language development, where he leverages the latest advancements in artificial intelligence and digital therapeutics to create accessible and engaging learning environments. Matthew's expertise extends beyond technological development; he is also an advocate for integrating neuroscience principles into practical applications, aiming to bridge the gap between cutting-edge research and real-world therapeutic practices. His contributions to the field are driven by a passion for understanding the neural underpinnings of language and communication and translating these insights into tangible benefits for individuals

and communities.

For the Neuroscience Forum Membership Meeting and the Workshop on Exploring the Bidirectional Relationship Between Artificial Intelligence and Neuroscience, Matthew brings a unique perspective that combines technical prowess with a deep understanding of cognitive and neural mechanisms. His insights into the application of AI in therapeutic contexts and its potential to revolutionize neuroscience make him a unique participant and speaker in discussions that aim to advance the frontier of knowledge in these intersecting domains.

Email: matthew@itherapyllc.com

Sean Hill, Ph.D.

Sean Hill, Ph.D., is a neuroscientist, Professor at the University of Toronto Faculty of Medicine, and inaugural Scientific Director of the Krembil Centre for Neuroinformatics at the Centre for Addiction and Mental Health. He is an expert in the field of neuroinformatics and is known for developing large-scale computational models of brain circuitry. His specific expertise is in data-driven learning health systems for mental health, where he applies machine learning and artificial intelligence techniques, as well as multi-scale modeling of the brain to improve the understanding and treatment of mental health disorders. He obtained his PhD in Computational Neuroscience from the University of Lausanne, Switzerland and has held various research and leadership positions in organizations such as The Neurosciences Institute, IBM Thomas J. Watson Research Center, Blue Brain Project, International Neuroinformatics Coordinating Facility, and the EU Human Brain Project. He is an advocate of global collaboration on data sharing in brain research and has authored over 100 peer-reviewed publications and multiple patents.

Email: Sean.hill@camh.ca

Viktor Jirsa, Ph.D.

Viktor Jirsa, Ph.D., is Director of the Inserm Institut de Neurosciences des Systèmes at Aix-Marseille-Université in Marseille, France. Dr. Jirsa received his PhD in 1996 in Theoretical Physics and Applied Mathematics and has since then contributed to the field of Theoretical Neuroscience, in particular through the development of large-scale brain network models based on realistic connectivity. His work has been foundational for network science in brain medicine and the use of personalized virtual brain models in epilepsy. He is Scientific Director of the clinical trial EPINOV, evaluating the use of virtual brain technology in epilepsy surgery. Dr. Jirsa serves as Chief Science Officer of the European digital neuroscience infrastructure EBRAINS (https://ebrains.eu) and lead investigator in the Virtual Brain Twin Project (https://www.virtualbraintwin.eu/). Dr. Jirsa has been awarded several international prizes for his research including the first HBP Innovation prize (2021) and Grand Prix de Recherche en Provence (2018) and has published more than 160 scientific articles.

Email: viktor.jirsa@ebrains.eu

Lee Lancashire, Ph.D.

Lee Lancashire, Ph.D., possesses over two decades of expertise in machine learning and statistics, being involved in early neural network applications within large healthcare datasets. Before becoming the Chief Data and AI Officer at Cohen Veterans Bioscience, leading the data science department, he founded and directed the machine learning and statistical data analysis team at Thomson Reuters' IP&Science business. There, he globally managed analytical projects across large pharma, government bodies, academia, and non-profits, focusing on leveraging cutting-edge machine learning for disease profiling, biomarker discovery, patient stratification, and identifying drug targets.

Email: Lee.Lancashire@cohenbio.org

Brian Litt, M.D.

Brian Litt, M.D., is the Perelman Professor of Neurology, Neurosurgery and Bioengineering at the University of Pennsylvania. He divides his time equally between the Schools of Medicine and Engineering, as the founding director of both Penn's Center for Neuroengineering and Therapeutics and a cross-campus medical technology initiative, Penn's Center for Health, Technology and Devices (Penn Health-Tech). He has served on the faculty at Johns Hopkins University, Emory University and the Georgia Institute of Technology, in addition to Penn.

Dr. Litt is a neurologist who treats patients with epilepsy. His research focuses on NeuroEngineering: materials, hardware, imaging, algorithms, data science, machine learning, and high-speed computing for neural interfaces and devices. His laboratory translates basic science into new diagnostic and therapeutic technologies, with a focus Epilepsy and other brain network disorders. Dr. Litt also works on international collaboration for data sharing and integration at scale, and training underrepresented groups in STEM and neuro-related fields. He specializes in translating health technologies to industry, and its interface with academia. Dr. Litt holds a substantial portfolio of patents, advises, contributes to and has co-founded a number of device companies including Neuropace, MC10, Blackfynn, Hyperfine, Butterfly Systems, and Jonathan Rothberg's 4Catalyzer companies. Dr. Litt has trained over 80 PhD students, Postdocs, and many more clinical trainees. He has won a number of awards for his research and mentoring, most recently an NIH Pioneer Award, and the NINDS Landis Award for mentoring.

Email: littb@pennmedicine.upenn.edu

Jesús Mantas

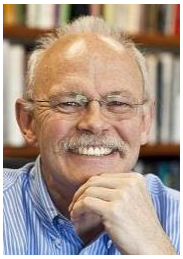
Jesús Mantas serves as an Independent Director and Chair of the Compensation and Management Development Committee on the Board of Biogen (NASDAQ:BIIB), a leading biotechnology company focused on neuroscience. He also serves as a member of the Audit Committee. Additionally, he holds the position of Global Managing Partner in IBM Consulting, where he is responsible for Business Transformation Services, leading the $10B unit in transforming and operating mission-critical businesses with digital technology and AI. In his previous role as Global Managing Partner of Strategy, Innovation, and Corporate Development, he defined IBM Consulting's new market strategy, offerings, ecosystem, acquisition, and thought leadership, successfully executing these initiatives. Prior to his current roles, Mantas held various leadership positions at IBM, including General Manager of IBM Business Process Outsourcing, General Manager of IBM Consulting in Latin America, and Managing Partner of North America Enterprise Market, among others. Before joining IBM, Mantas was a partner in the High Technology Practice of PricewaterhouseCoopers Consulting. He also worked for Ernst & Young and led supply chain systems for Procter & Gamble in Spain.

Mantas is renowned for his innovative abilities, track record in transforming global businesses, developing leadership, and changing culture. He is also recognized for his advocacy for the Hispanic community, behavior science, and brain health.In addition to his service on the board of Biogen, Mantas serves on the boards of HITEC and NACME, non-profits focused on leadership development and diversity in technology careers. He is a Limited Partner in several investment funds and was a founding member of the World Economic Forum’s Global AI Council.

Mantas holds degrees in Telecommunications and Business Administration from the Universidad Politécnica de Madrid. He was also an adjunct professor in the MBA program at the University of California, Irvine, and served as an officer in the Air Force of Spain.

Email: jmantas1@gmail.com

James (Jay) McClelland, Ph.D



James L. (Jay) McClelland, Ph.D., received his Ph.D. in Cognitive Psychology from the University of Pennsylvania in 1975. He served on the faculty of the University of California, San Diego, before moving to Carnegie Mellon University in 1984. He was a founding Co-Director of the Center for the Neural Basis of Cognition, a joint project of Carnegie Mellon and the University of Pittsburgh. In 2006 McClelland moved to the Department of Psychology at Stanford University, where he founded the Center for Mind, Brain, and Computation in 2007. He is currently the Lucie Stern Professor in the Social Sciences and Director of the Center for Mind, Brain, Computation and Technology at Stanford and a consulting research scientist at DeepMind.

Over his career, McClelland has contributed to both the experimental and theoretical literatures, using neural networks to model human perception, cognitive development, language learning, and the neurobiology of memory. With David Rumelhart,

McClelland led the effort leading to the publication in 1986 of the two-volume book, Parallel Distributed Processing, in which the neural-network-based parallel distributed processing framework for modeling human cognitive abilities was laid out and applied to a wide range of topics in cognitive psychology and cognitive neuroscience. In recent years his research has focused on using contemporary deep learning approaches to capture human reasoning and mathematical abilities.

McClelland is a member of the National Academy of Sciences and a corresponding Fellow of the British Academy. He has received the David E. Rumelhart prize for contributions to the theoretical foundations of Cognitive Science, the NAS Atkinson Prize in Psychological and Cognitive Sciences, and the Heineken Prize in Cognitive Science; he and Rumelhart jointly received several awards including the Distinguished Scientific Contribution Award from the American Psychological Association.

Email: jlmcc@stanford.edu

John Ngai, Ph.D.

John J. Ngai, Ph.D., is the Director of the NIH's Brain Research Through Advancing Innovative Neurotechnologies® (BRAIN) Initiative. Dr. Ngai earned his bachelor's degree in chemistry and biology from Pomona College, Claremont, California, and Ph.D. in biology from the California Institute of Technology (Caltech) in Pasadena. He was a postdoctoral researcher at Caltech and at the Columbia University College of Physicians and Surgeons before starting his faculty position at the University of California at Berkeley. Over 27 years as a Berkeley faculty member, Dr. Ngai trained 20 undergraduate students, 24 graduate students, and 15 postdoctoral fellows in addition to teaching well over 1,000 students in the classroom. His work has led to the publication of more than 80 scientific articles in some of the field's most prestigious journals and 10 U.S. and international patents. Dr. Ngai has received many awards including from the Sloan Foundation, Pew Charitable Trusts, and McKnight Endowment Fund for Neuroscience. As a faculty member, Dr. Ngai served as the director of Berkeley's Neuroscience Graduate Program, Helen Wills Neuroscience Institute, and Functional Genomics Laboratory. He also provided extensive service on NIH study sections, councils, and steering groups, including as previous co-chair of the NIH BRAIN Initiative Cell Census Consortium Steering Group. Dr. Ngai oversees the long-term strategy and day-to-day operations of the NIH BRAIN Initiative as it strives to revolutionize our understanding of the brain in both health and disease.

Email: john.ngai@nih.gov

Ankit B. Patel, Ph.D.

Ankit B. Patel, Ph.D., is currently an Assistant Professor at the Baylor College of Medicine in the Dept. of Neuroscience, and at Rice University in the Dept. of Electrical and Computer Engineering. Ankit develops first principles theories of how neural networks learn and represent functions. He works with neuroscientists, psychologists, and neurosurgeons to build a bridge between artificial and real neuronal networks, using theories and experiments about artificial nets to help understand and make testable predictions about real brain circuits. He also applies this understanding of NNs to various applications in Neuro- and Bio-Medical applications.

Ankit returned to academia after spending 6 years in industry, building real-time inference systems trained on large-scale data for ballistic missile defense (MIT Lincoln Laboratory), and high-frequency trading. He is co-founder and CEO of Audit AI, a company that translates his lab's findings into efficient scalable algorithms for debugging, auditing and certifying blackbox AI. Ankit received his graduate and undergraduate degrees in Computer Science and Applied Mathematics from Harvard University.

Ellie Pavlick, Ph.D.

Ellie Pavlick, Ph.D., is an Assistant Professor of Computer Science at Brown University. She received her PhD from the University of Pennsylvania in 2017, where her focus was on paraphrasing and lexical semantics. Ellie's research is on cognitively-inspired approaches to language acquisition, focusing on grounded language learning and on the emergence of structure (or lack thereof) in neural language models. Ellie leads the Language Understanding and Representation (LUNAR) lab, which collaborates with Brown's Robotics and Visual Computing labs and with the Department of Cognitive, Linguistic, and Psychological Sciences.

Email: ellie_pavlick@brown.edu

Anindita (Annie) Saha

Anindita (Annie) Saha is the Associate Director for Strategic Initiatives for the Digital Health Center of Excellence (DHCoE) at the Food and Drug Administration (FDA). She is leading strategic initiatives in moving care into the home, Artificial Intelligence, and international collaborations for the DHCoE to advance health equity. This includes the use of patient-generated data and managing bias in DHTs and improve transparency. Additionally, Annie helped incubate and continues to support to advance the science and adoption of patient input as evidence, including patient preference information (PPI), clinical outcome assessments (COAs). Previously, Annie was the Director of the Partnerships team in CDRH where she oversaw a broad program portfolio, supporting several strategic partnership and regulatory science programs. Ms. Saha started as a researcher in the Office of Science and Engineering Laboratories in imaging display technologies. Ms. Saha has a Bachelor of Science in Bioengineering and Minor in History from the University of Pittsburgh.

Email: Anindita.Saha@fda.hhs.gov

Wade Shen

Wade Shen is the director of the Proactive Health Office at ARPA-H where he manages a portfolio of R&D programs that aim to dramatically increase the health span of Americans by increasing their capacity to avoid disease and the symptoms of disease for as long as possible.0

Wade comes to ARPA-H with extensive experience in academic R&D, startups and in public service. In government, he served as Director of the National AI Initiative Office (NAIIO) at the White House in the Office of Science and Technology Policy (OSTP) and as program manager at DARPA where he ran a portfolio of AI/data science and hardware for AI programs. Wade was cofounder of Actuate, a nonprofit organization dedicated to bringing the ARPA model of innovation to societal applications outside of national security. Wade was also a researcher and manager at MIT's Lincoln Laboratory, where he worked on and oversaw research in AI and natural language understanding. Wade was co-founder and CTO of Vocentric Corporation, an embedded speech and speaker recognition startup.

Email: wade.shen@arpa-h.gov

Jana Schaich Borg, Ph.D.

Jana Schaich Borg, Ph.D., is an Associate Research Professor at Duke's Social Science Research Institute, co-Director of Duke's Moral Artificial Intelligence Lab, co-Director of Duke's Moral Attitudes and Decision-Making Lab, and was formerly the Director of Duke's Master in Interdisciplinary Data Science Program. Dr. Schaich Borg is also an affiliate of Duke's Center for Cognitive Neuroscience, Duke's Institute for Brain Science, and Duke Science & Society.

Dr. Jana Schaich Borg uses neuroscience, computational modeling, and emerging technologies to understand how we make social judgments, and to develop strategies to improve social connection and intersubjective moral decision-making. She draws on her work in humans to design technical and operational strategies for developing artificial intelligences (AIs) that behave ethically and that have positive impacts on society. Her book "Moral AI and How We Get There" (co-authored with Walter Sinnott-Armstrong and Vincent Conitzer; Penguin Books) discusses critical issues we need to tackle for AI's potential to be realized without harming society, and offers tactical strategies for doing so. Overall, Dr. Schaich Borg's research draws on concepts and methods from diverse fields, relies heavily on interdisciplinary collaboration, and is strongly influenced by her experience training aspiring data science leaders. Dr. Schaich Borg received her PhD in Neuroscience from Stanford University, and her B.A. in Philosophy of Neuroscience from Dartmouth College.

Email: js524@duke.edu

Olga Troyanskaya, Ph.D.

Olga Troyanskaya, Ph.D., is a professor at the Lewis-Sigler Institute for Integrative Genomics and the Department of Computer Science at Princeton University, where she has been on the faculty since 2003. In 2016 she became the deputy director of Genomics at the Center for Computational Biology at the Flatiron Institute of the Simons Foundation. Her lab employs machine learning and modeling techniques to decode genomes and understand cellular specificity, genotype-phenotype relationships, and cellular networks. Through developing integrative analyses and modeling of complex molecular-level changes captured via diverse multi-omics techniques, including in experimental and clinical context, the approaches enable systems-level molecular views of human health and complex diseases. Most recently, Dr. Troyanskaya conceived of Princeton Precision Health, which was launched in early 2023. Princeton Precision Health aims to create collaborations from seemingly unrelated disciplines in pursuit of innovative research and its translation to equitable health policy. Dr. Troyanskaya holds a Ph.D. in Biomedical Informatics from Stanford University, has been honored as one of the top young technology innovators by the MIT Technology Review, and is a recipient of the Sloan Research Fellowship, the National Science Foundation CAREER award, the Overton award from the International Society for Computational Biology, and the Ira Herskowitz award from the Genetic Society of America.

Eva Weicken, M.D.

Eva Weicken, M.D., is the Chief Medical Officer in the Department of Artificial Intelligence at Fraunhofer Heinrich Hertz Institute for Telecommunications in Berlin. She studied medicine at the Ludwig-Maximilians-University in Munich and completed her residency in neurology, including intensive care and psychiatry rotations. After many years of clinical practice and with the growing presence of AI in medicine, she wanted to delve deeper into this field. In her research, she is particularly interested in finding solutions for the safe, fair, and effective use and implementation of AI in health, which requires an interdisciplinary approach. She is taking an active role in the international standardization initiative WHO/ITU/WIPO Global Initiative of AI for Health (previously ITU/WHO FG-AI4H) as co-chair of the working group "Clinical Evaluation of AI for Health" and in the overall management. Further engagements at a national level within this field include the "German Standardization Roadmap for Artificial Intelligence" and other projects focused on the validation of AI in health.

Email: eva.weicken@hhi.fraunhofer.de

John Wilbanks, Ph.D.

John Wilbanks, Ph.D., works at the intersection of data, software, policy, and science. He is currently the Head of Product for the Data Sciences Platform at the Broad Institute. Additionally, he serves as a senior advisor to the Milken Institute's FasterCures and as a senior fellow at the Datasphere Initiative. Previously, he held the position of Head of Data at Biogen Digital Health, where he led teams in conducting real-world digital studies, developing data products, and implementing data science software platforms. Before Biogen, he served as the Chief Commons Officer

at Sage Bionetworks, where he led efforts in unlocking informed consent for mobile-centered clinical studies adopted by Apple, Android, the US National Institutes of Health, and more. He was also a co-principal investigator on multiple transformative NIH awards during his time at Sage. Dr. Wilbanks technical background includes various roles such as working in technology standards at the World Wide Web Consortium, serving as a visiting scientist at the MIT Project on Mathematics and Computation, founding and being CEO of a knowledge graph bioinformatics company, and working in computer-human interface for voice and pen recognition. His policy background includes advocating for open science at Creative Commons and serving on the national advisory board.

Email: jwilbank@broadinstitute.org

Gayle Wittenberg, Ph.D.

Gayle Wittenberg, Ph.D., is VP and Head of Neuroscience Data Science and Digital Health at Janssen R&D, focused on embedding data science and digital health to add value to the pipeline end-to-end across the Neuroscience portfolio. She and her team leverage molecular data, deep phenotyping, digital health and real-world data to enable decision-making and solution development for Neuroscience compounds from target identification to product launch.

Gayle has over 15 years of experience across the pharmaceutical and diagnostics industries, driving data science research into products. Gayle joined Janssen Neuroscience in 2011 as Director, Integrative Solutions and Informatics. She founded and was Head of Translational Research and Precision Medicine, Research IT in 2016. She created and led the Intelligent Automation team in Pharm IT in 2019, before moving back to the NS TA as Senior Director, Neuroscience Data Science. Prior to Janssen, Gayle was Head of Personalized Healthcare at Siemens. She earned her doctorate linking Computational and Experimental Neuroscience at Princeton University in 2003.

Email: gwittenb@its.jnj.com

Biosketches of Planning Committee Members

Magali Haas, M.D., Ph.D., M.S.E

Planning Committee Co-Chair

Magali Haas, M.D., Ph.D., M.S.E., is Founder and Board Chair of Cohen Veterans Bioscience, a non-profit biomedical and technology research organization based in New York City whose mission is to fast-track diagnostics and therapeutics to advance precision brain health with a focus on the "invisible wounds" of post-traumatic stress and traumatic brain injuries. She leads the National TBI Action Alliance. Dr. Haas is also Founder and Scientific Lead of the Brain Health Nexus, a global initiative to galvanize science and data collaboration, to optimize brain health across the life course and prevent and treat brain diseases and disorders, through the establishment of a brain health index. Dr. Haas has over 15 years of pharmaceutical executive experience, predominantly at Johnson & Johnson, where she assumed broad end-to-end leadership roles in early and late-stage neuroscience clinical development, translational medicine, diagnostics and integrative solutions. She serves on several international advisory boards including The European Platform for Neurodegenerative Diseases (EPND), VirtualBrainCloud, Krembil Centre for Neuroinformatics (based in Canada), and IMEC for nanoelectronics. She is a frequent speaker and invited participant at conferences and symposia around the world. Dr. Haas earned her BS in bioengineering from the University of Pennsylvania, an MS in biomedical engineering from Rutgers University, and her MD and PhD in neuroscience with distinction from Albert Einstein College of Medicine.

Terrence Sejnowski, Ph.D.

Planning Committee Co-Chair

Terrence Sejnowski, PhD, is the Francis Crick Professor at The Salk Institute for Biological Studies, where he directs the Computational Neurobiology Laboratory, and a Distinguished Professor of Biology and Neurosciences at the University of California, San Diego, where he is co-Director of the Institute for Neural Computation. He is the President of the Neural Information Processing Systems (NeurIPS) Foundation, which organizes the largest annual conference on machine learning and artificial intelligence. Dr. Sejnowski pioneered computational neuroscience and his long-range goal is to build linking principles from brain to behavior using computational models. This goal is being pursued with a combination of theoretical and experimental approaches at several levels of investigation ranging from the biophysical level to the systems level. His laboratory has developed new methods for analyzing the sources for electrical and magnetic signals recorded from the scalp and fMRI brain imaging by blind source separation using independent components analysis (ICA) and delay-differential analysis (DDA). Dr. Sejnowski has published over 500 scientific papers and 12 books, including "The Computational Brain" with Patricia Churchland and "The Deep Learning Revolution." His Massive Open Online Course (MOOC) with Barbara Oakley, "Learning How to Learn", is based on the principles of learning in brains and has been viewed by over 3 million learners in over 200 countries; their new three-MOOC

specialization, "Uncommon Sense Teaching," is aimed at helping teachers navigate the complexities of two major learning systems in brains. He received the IEEE Neural Network Pioneer Award in 2002 and the Gruber Prize in Neuroscience in 2022 and has received honorary doctorates from the University of Zurich and Princeton University. He is a member of the National Academy of Sciences, the National Academy of Engineering, the National Academy of Medicine and the National Academy of Inventors.

Email: terry@snl.salk.edu

Jonathan Cohen, M.D., Ph.D.

Jonathan Cohen, MD, PhD, is Robert Bendheim and Lynn Bendheim Thoman Professor in Neuroscience, Professor of Psychology, and Co-Director of the Princeton Neuroscience Institute at Princeton University. Dr. Cohen's laboratory focuses on the neurobiological mechanisms underlying cognitive control and their disturbance in brain and behavior disorders such as schizophrenia and depression. Cognitive control is the ability to guide attention, thought and action in accord with goals or intentions. Dr. Cohen and his colleagues are working to develop and test explicit hypotheses that will explain how these mechanisms of cognitive control work. The mechanisms of cognitive control influence attentional effects in sensory processing and goal-directed sequencing of motor output. Cognitive control's influence on the brain structures upon which these functions depend, such as the prefrontal cortex, anterior cingulate cortex, basal ganglia and brain-stem neuromodulatory dopamine and norepinephrine systems, are still poorly understood. Before joining Princeton University in 1998, Dr. Cohen worked at the University of Pittsburgh and Carnegie Mellon University.

Nita Farahany, J.D., Ph.D.

Nita Farahany, JD, PhD, is the Robinson O. Everett Professor of Law & Philosophy, Director of Duke Science & Society, and Chair of the Duke MA in Bioethics and Science Policy. From 2010-2017, she served on the U.S. Presidential Commission for the Study of Bioethical Issues. She is a widely published scholar on the ethical, legal, and social implications of the biosciences and emerging technologies, and a frequent commentator for national media and radio shows, and keynote speaker at major events and conferences including the Aspen Ideas Festival, TED, the World Economic Forum, corporate events, academic and judicial conferences. Farahany is an elected member of the American Law Institute, an elected Fellow of the American Association for the Advancement of Science, a member of the World Economic Forum Global Council, Board member and past President of the International Neuroethics Society, serves on scientific advisory boards, the Neuroethics Division of the BRAIN Initiative for NIH, the National Advisory Council of NINDS, Neuroscience Forum at the National Academies of Science, and is a co-editor-in-chief and a founding editor of the Journal of Law and the Biosciences. Farahany holds an AB (Genetics) from Dartmouth College, an ALM (Biology) from Harvard University, and a JD, MA, and PhD (Philosophy) from Duke University.

Ehsan Hoque, Ph.D.

Ehsan Hoque, PhD, is an Associate Professor of Computer Science at the University of Rochester where he co-leads the Rochester Human-Computer Interaction (ROC HCI) Lab. Dr. Hoque's research program aims to use techniques from artificial intelligence to amplify human ability. He models and captures the dynamics of human behavior and their relationships using machine learning, and design interactive systems to promote equity and access in health care and education. His work has positively impacted the lives of disadvantaged, ill, disabled, and other individuals who struggle with socio-emotional communication, such as those with autism, severe anxiety, neurodegenerative disease, PTSD, aging, and terminal illness.

Dr. Hoque earned his Ph.D. from the Massachusetts Institute of Technology in 2013, where his dissertation of 'using computers to help with conversations' was highlighted by the MIT Museum as one of MIT's most unconventional inventions. Microsoft is currently using his patent to introduce "presenter coach" in Microsoft PowerPoint. His ideas and impact of developing health interventions have been recognized through MIT Technology Review Top Innovators Under 35 Award in 2016. In 2017, Science News named him one of the one of ten early- to mid-career scientists to watch, and in 2018, he received the Early Career Award for Scientists and Engineers (ECASE)—the highest honor bestowed by the US Army Research Office for young scientists and engineers. Dr. Hoque is a Distinguished Member of the Association of Computing Machinery (ACM)—the world's largest computing society, and a senior member of the Association for the Advancement of Artificial Intelligence (AAAI)—the largest scientific society for AI.

Email: mehoque@cs.rochester.edu

Frances Jensen, M.D.

Frances Jensen, MD, is Professor of Neurology and Chairman of Neurology at the Perelman School of Medicine, University of Pennsylvania, and Co-Director of Penn Translational Neuroscience Center. She was formerly Professor of Neurology, Harvard Medical School, Director of Translational Neuroscience and senior neurologist at the Brigham and Women's Hospital and Boston Children's Hospital. After receiving her AB from Smith College and MD from Cornell Medical College, she obtained her neurology residency training at the Harvard Longwood Neurology Residency Program. Her research focuses on mechanisms of epilepsy, and the interaction of epilepsy with other disorders such as autism and dementia, to elucidate new therapies for clinical trials development. She has authored over 150 manuscripts on subjects related to her research and has been continuously funded by NIH since 1987 and was the recipient of a NIH Director's Pioneer Award in 2007 and a NIH-NINDS Javits Award in 2020. Dr. Jensen was elected as a member of the National Academy of Medicine in 2015 and the recipient of the Smith College Medal in 2020. Dr. Jensen has trained numerous clinical and basic research fellows who now hold independent faculty positions nationally and internationally. Dr. Jensen is currently President of the American Neurological Association (2020-2022) and was President of the American Epilepsy Society in 2012. She has served on multiple leadership boards including Society for Neuroscience and NIH. Dr. Jensen is a Trustee of the Franklin Institute in Philadelphia and is involved in community outreach for brain research and

education. In addition, Dr. Jensen is an advocate for awareness of the adolescent brain development, its unique strengths and vulnerabilities, as well as their impact on medical, social, and educational issues unique to teenagers and young adults, and author of the book "The Teenage Brain", released by Harper Collins in 2015/16, translated and published in over 25 languages worldwide.

Email: frances.jensen@pennmedicine.upenn.edu

Michael L. Littman, Ph.D.

Michael L. Littman, PhD, is currently serving as Division Director for Information and Intelligent Systems at the National Science Foundation. The division is home to the programs and program officers that support researchers in artificial intelligence, human-centered computing, data management, computational neuroscience, and assistive technologies, as well as those exploring the impact of intelligent information systems on society. Littman is also University Professor of Computer Science at Brown University, where he studies machine learning and decision-making under uncertainty. He has earned multiple university-level awards for teaching, and his research has been recognized with three best-paper awards and three influential paper awards. Littman is a Fellow of the Association for the Advancement of Artificial Intelligence and the Association for Computing Machinery.

Email: mlittman@nsf.gov

Bill Martin, Ph.D.

Bill Martin, PhD, is the Global Therapeutic Area Head of Neuroscience for Janssen Research & Development. Dr. Martin brings a diverse background and more than 20 years of demonstrated success in neuroscience R&D leadership to the scientific community. His experience spans drug discovery and development, scientific and business strategy, as well as company formation and growth. At Janssen, Bill has end-to-end responsibility for the neuroscience R&D portfolio from discovery, translational medicine, biomarkers and to clinical development. Prior to Janssen, Bill co-founded Blackthorn Therapeutics where he held positions of increasing responsibility, from Chief Scientific Officer and Head of R&D to President and CEO. He began his career at Merck and later joined Theravance Biopharma where he held multiple leadership positions across all aspects of Neuroscience R&D.

Bill has served on numerous Boards of Directors and Advisory Councils, including those of BlackThorn Therapeutics, the Alliance for Artificial Intelligence in Healthcare, the Coalition for the Life Sciences and Brown University's Carney Institute for Brain Science. He has held leadership positions in the Society for Neuroscience, the American Physiological Society and the International Brain Research Organization and has published extensively, with more than 75 publications in scientific journals. He graduated from Swarthmore College, earned a Ph.D. from Brown University, and conducted postdoctoral research at the Keck Center for Integrative Neuroscience at the University of California, San Francisco.

Email: WMarti14@ITS.JNJ.com

Kevin Miller, Ph.D.

Kevin Miller, PhD, is a research scientist on the Neuroscience Team at DeepMind and a postdoc at University College London with Kenneth Harris and Matteo Carandini. Dr. Millers asks questions like “Can we understand what the brain is doing well enough to reproduce it in software?” Dr. Miller’s work involves training rodents to play structured games, then carefully studying both the choices that they make and the neural signals that underlie those choices. It also involves designing software agents that play the same games as the rodents and using these agents as tools for understanding the brain. He is excited about both reinforcement learning and neural networks as tools for building software agents, and about multi-level modeling as a tool for understanding experimental data. Before moving to London, Dr. Miller did a PhD at the Princeton Neuroscience Institute with Carlos Brody and Matt Botvinick. His PhD work focused on understanding how the brain makes plans, with a focus on the orbitofrontal cortex and the hippocampus. When not in the lab, Dr. Miller can often be found hiking up a mountain, canoeing down a river, exploring a canyon, cross-country skiing, or otherwise enjoying the outdoors.

Kathryn Richmond, Ph.D., M.B.A

Kathryn Richmond, PhD, MBA, is an Executive Vice President at the Allen Institute, leading the Office of Science and Innovation and The Paul G. Allen Frontiers Group. In this role, she leads initiatives across the Institute and oversees scientific strategy, government relations, and business development. With a focus on emerging bioscience and technology areas, she has dramatically grown the Frontiers Group portfolio, overseeing >$275M in award funding to date. Through identification of high-risk, high reward opportunities, she has also formed >$50M in strategic philanthropic partnerships. Dr. Richmond frequently serves as an invited panel member, speaker and advisor on topics ranging from open science to technology development. She has convened the inaugural Bioscience and Philanthropy Summit, engaging thought pioneers, technologists, venture capital leaders and philanthropic funders from around the world. Previously, Dr. Richmond has served as a member of the executive team at the DOE Great Lakes Bioenergy Research Center. Along with a doctorate in Cell and Molecular Biology and an MBA from the University of Wisconsin, Madison, she also attended Stanford University as an American Cancer Society fellow and was funded by DARPA for breakthrough research efforts.

Email: kathrynr@alleninstitute.org

Katie Sale, B.A.

Katie Sale, B.A.**,** is the Executive Director of the American Brain Coalition (ABC), a nonprofit organization comprised of the United States' leading professional neurological, psychological, and psychiatric associations and patient organizations. The ABC seeks to advance the understanding of the functions of the brain, and to reduce the burden of brain disorders through education, public advocacy, and outreach. Ms. Sale has been the American Brain Coalition Executive Director since the ABC was incorporated in 2004. In her position as Executive Director, Ms. Sale provides executive leadership over the administration and daily operations to ensure

strong integration among all programs and advocacy activities. She provides broad guidance on operations and policy implementation. Ms. Sale participates with the board in planning and establishing program policies, objectives, and priorities as well as directing the development and implementation of the ABC's strategic action plans. Ms. Sale services the needs of the ABC's membership comprised of patients, families, neuroscientists, clinicians, industry, and government agencies.

Ms. Sale serves as an Executive Committee member on the Friends of the National Institute of Mental Health (NIMH), a member of the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative Alliance, as well as a Community Liaison Board member on the National Institutes of Health (NIH) Adolescent Brain & Cognitive Development (ABCD) Study.

Prior to joining the American Brain Coalition, Ms. Sale served as the Senior Director for Planning and Membership at the Society for Neuroscience. Ms. Sale coordinated the governance activities of the Society, supervised the Membership and Chapters & Special Programs Departments, and all functions related to the Society's corporate sponsorship, diversity programs and grants, international affairs, travel awards programs, as well as the Society's History and Women's Careers Committees.

Email: ksale@americanbraincoalition.org

Preventing Discrimination, Harassment, and Bullying Expectations for Participants in NASEM Activities

The National Academies of Sciences, Engineering, and Medicine (NASEM) are committed to the principles of diversity, integrity, civility, and respect in all of our activities. We look to you to be a partner in this commitment by helping us to maintain a professional and cordial environment. All forms of discrimination, harassment, and bullying are prohibited in any NASEM activity. This commitment applies to all participants in all settings and locations in which NASEM work and activities are conducted, including committee meetings, workshops, conferences, and other work and social functions where employees, volunteers, sponsors, vendors, or guests are present.

Discrimination is prejudicial treatment of individuals or groups of people based on their race, ethnicity, color, national origin, sex, sexual orientation, gender identity, age, religion, disability, veteran status, or any other characteristic protected by applicable laws.

Sexual harassment is unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature that creates an intimidating, hostile, or offensive environment.

Other types of harassment include any verbal or physical conduct directed at individuals or groups of people because of their race, ethnicity, color, national origin, sex, sexual orientation, gender identity, age, religion, disability, veteran status, or any other characteristic protected by applicable laws, that creates an intimidating, hostile, or offensive environment.

Bullying is unwelcome, aggressive behavior involving the use of influence, threat, intimidation, or coercion to dominate others in the professional environment.

Section 1.01 REPORTING AND RESOLUTION

Any violation of this policy should be reported. If you experience or witness discrimination, harassment, or bullying, you are encouraged to make your unease or disapproval known to the individual, if you are comfortable doing so. You are also urged to report any incident by:

- Filing a complaint with the Office of Human Resources at 202-334-3400, or
- Reporting the incident to an employee involved in the activity in which the member or volunteer is participating, who will then file a complaint with the Office of Human Resources.

Complaints should be filed as soon as possible after an incident. To ensure the prompt and thorough investigation of the complaint, the complainant should provide as much information as is possible, such as names, dates, locations, and steps taken. The Office of Human Resources will investigate the alleged violation in consultation with the Office of the General Counsel.

If an investigation results in a finding that an individual has committed a violation, NASEM will take the actions necessary to protect those involved in its activities from any future discrimination, harassment, or bullying, including in appropriate circumstances the removal of an individual from current NASEM activities and a ban on participation in future activities.

Section 1.02 CONFIDENTIALITY

Information contained in a complaint is kept confidential, and information is revealed only on a need-to-know basis. NASEM will not retaliate or tolerate retaliation against anyone who makes a good faith report of discrimination, harassment, or bullying.

Diversity, Equity, and Inclusion Statement and Guiding Principles

We, the National Academies of Sciences, Engineering, and Medicine (the National Academies), value diversity among our staff, members, volunteers, partners, vendors, and audiences. We recognize that talent is broadly distributed in society and that many perspectives enhance the quality of our work and drive innovation and impact.

We pledge to cultivate a workplace culture and climate that promotes inclusion, belonging, accessibility, and anti-racism; upholds equity; and values the participation of all who are engaged in advancing our mission.[1] By embracing the values of diversity, equity, and inclusion in our programs, institutional policies and practices, and products, we will be able to better advise the nation on the most complex issues facing society and the world.

Guiding Principles:

The following diversity, equity, and inclusion principles guide our work at the National Academies:

1. Integrate diverse perspectives and experiences into our programs, institutional policies and practices, and products.
2. Foster a culture of inclusion where all staff, members, and volunteers have full access to participation and feel welcomed, respected, valued, and a sense of belonging.
3. Approach scientific endeavors with a consideration of diversity, equity, and inclusion frameworks.
4. Cultivate mutually beneficial diverse partnerships and collaborations with a variety of communities, including, but not limited to, marginalized and underrepresented communities.

Our institutional strategy for putting these values and principles into practice are outlined in the National Academies DEI Action Plan, a comprehensive five-year plan that charts a path toward achieving our diversity, equity, and inclusion goals. The DEI Action Plan is one of many ways that we commit to systems of accountability and transparency to uphold these principles and allow for continuous learning and improvement.

[1] The National Academies' mission is to provide independent, trustworthy advice and facilitate solutions to complex challenges by mobilizing expertise, practice, and knowledge in science, engineering, and medicine.