2021 Flux Virtual Congress Detailed Program

Friday, September 17, 2021

Computational Modelling in Development

6:00am – 12:00pm PDT (1:00pm – 7:00pm GMT)

Workshop Organizers:

- Alexandra Cohen, New York University
- Tobias Hauser, University College London

Workshop Description:

The "Computational Modeling in Development" workshop will provide a didactic, hands-on introduction to computational modeling in development for researchers with limited prior knowledge in modelling. Following an introduction to principles of computational modelling in the first session, the second session will consist of participants completing practical tutorials in small groups led by trainee facilitators. The workshop will conclude with a panel discussion on the promises and pitfalls of computational modelling in development.

Concurrent Practical Tutorials

Tutorial 1: Inferring cognitive models of reinforcement learning from choice data

Led by: Maël Lebreton & Stefano Palminteri

Tutorial Description: In the first part of the tutorial the instructors will briefly first present the behavioural task (two-armed bandit), the computational models and the data structure. In a second step, the instructors will describe the analytical pipeline and the corresponding codes. The attendees

will then be asked to perform the analyses and some predefined 'exercises' (including calculating correlations and simulation experiments). In the last part the instructors will comment on the results, debrief, answer questions and put the results in a broader perspective.

Programming language: MATLAB/Octave

Tutorial 2: Uncovering heterogeneity in preferences and behavior with finite mixture models

Led by: Adrian Bruhin

Tutorial Description: Finite mixture models enable us to uncover the heterogeneity in preferences and behavior parsimoniously. Unlike most econometric models that postulate a single representative agent, they assume that the population comprises a finite number of distinct types of individuals. By estimating a finite mixture model, we can uncover the relative size and average parameters of each of these types. Furthermore, we also obtain a classification of each individual into the type best fitting her behavior. Thus, finite mixture models allow us to focus on the most relevant part of heterogeneity – namely the distribution of distinct types of individuals – without having to estimate at the individual level. This tutorial provides an introduction to finite mixture models in two parts. The first part introduces the basic concepts and highlights some applications. Subsequently, the second part features a tutorial in the context of voluntary blood donation.

Programming language: R

Tutorial 3: An introduction to drift diffusion modeling

Led by: Wenjia (Joyce) Zhao & Ian Krajbich

Tutorial description: Drift diffusion models are widely applied in psychology and neuroscience to study time-course of decision making. They have been used successfully in a range of perceptual and preferential tasks (for an incomplete list, see https://u.osu.edu/ratcliffmckoon/the-diffusion-model-for-non-specialists/). This tutorial provides a primer on the theoretical framework of the model, as well as example code for model fitting and analyses.

Programming language: Python package (HDDM) and also likely some R

Tutorial 4: Computational models of human gaze data

Led by: Angela Radulescu

Tutorial description: This tutorial will cover the theory and practice of fitting computational models to human gaze data. We will treat gaze data as an observable consequence of a latent selective attention process. We will build generative models of gaze that make real-time predictions about where participants will look, conditional on past choices, observations. and current attentional state. Modeling frameworks we will discuss include reinforcement learning and approximate Bayesian inference (e.g. particle filtering).

Programming language: Python

Tutorial 5: Computational modeling of goal-directed and habitual reinforcement-learning strategies

Led by: Claire Smid & Wouter Kool

Tutorial description: Human behavior is sometimes guided by habit, and sometimes by goal-directed planning. Recent advances in computational cognitive science have formalized this as a distinction between model-free and model-based reinforcement learning. In this tutorial, we will teach you how to use model fitting techniques to distinguish between these forms of decision making in humans across the developmental lifespan.

Programming language: Python (through Google colab)

FIT'NG All Ages: Advantages and Challenges of Longitudinal Fetal, Infant, and Toddler Neuroimaging

6:00am – 12:00pm PDT (9:00am – 3:00pm EST)

The fee to attend this workshop is $20 and can be purchased with your Flux Congress Registration.

Meeting Organizers:

FIT'NG (Fetal, Infant, Toddler Neuroimaging Group)
Sarah Shultz, PhD, Emory University/Marcus Autism Center (co-chair)
Dustin Scheinost, PhD, Yale University School of Medicine (co-chair)
Zeena Ammar, Emory University/Marcus Autism Center
Cat Camacho, Washington University in St. Louis
Aiden Ford, Emory University/Marcus Autism Center
Roxane Licandro, Vienna University of Technology
Kelly Vaughn, University of Texas Health Science Center at Houston

Meeting Description:
Longitudinal MRI is essential for quantifying trajectories of brain change in typical development and in neurodevelopmental disorders. Rapid changes in brain anatomy and physiology during the prenatal, infant and toddler period necessitate longitudinal measurement but also present unique challenges for data acquisition, processing, and analysis. This satellite meeting will provide a forum for discussing these challenges and identifying possible solutions. Session 1 will focus on challenges relating to data collection (choice of sequence parameters and equipment, data acquisition procedures, and participant recruitment and retention) and data analysis (approaches to segmentation and parcellation, registration, and curve fitting). In Session 2, expert panelists will provide a 'behind the scenes' look at important decision points and strategies adopted in their own research designs, stimulating a live discussion of solutions to challenges inherent in longitudinal neuroimaging. Finally, Session 3 will showcase new and exciting work utilizing longitudinal approaches discussed in preceding sessions.

Speakers

Jonathan O'Muircheartaigh, PhD
Cassie Hendrix, PhD
Cynthia Rogers, MD
Georg Langs, PhD
Lilla Zöllei, PhD

Kathryn Mills, PhD
Catherine Limperopoulous, PhD
Lana Vasung, MD, PhD
Jana Hutter, PhD
Weili Lin, PhD
Mirella Dapretto, PhD
Nadine Gaab, PhD
Sean Deoni, PhD
Gregor Kasprian, MD
Richard Bethlehem, PhD

Saturday, September 18, 2021

Congress Opening Remarks

6:00am – 6:30am PDT (9:00am – 9:30am EST)

Symposium #1 - How does the developing brain organize experience to model the world?

6:30am – 8:00am PDT (9:30am – 11:00am EST)

Kate Nussenbaum, New York University, "*Adaptability of positive and negative learning rates across development*"

Christine Coughlin, University of Texas at Austin, "*Developmental differences in brain function during memory-guided inference*"

Thomas Wills, University College London, "*Neural correlates for the consolidation and specificity of hippocampal memories during post-natal development*"

Theresa Cheng, University of Oregon, "*Neural correlates for the consolidation and specificity of hippocampal memories during post-natal development*"

Young Investigator Award Talk

8:00am – 8:30am PDT (11:00am – 11:30am EST)

Kate Mills, University of Oregon

Kate Mills is an Assistant Professor in the Department of Psychology at the University of Oregon. Her lab applies longitudinal methods to investigate the intertwined social, biological, and cognitive processes that underlie the development of skills needed to navigate the social environment.

Symposium #2 - Transdiagnostic approaches to developmental disorders: Beyond the boundaries of diagnosis

8:30am – 10:00am PDT (11:30am – 1:00pm EST)

Speakers:

Danyal Akarca, University of Cambridge
Danielle Bassett, University of Pennsylvania
Corina Greven, Donders Institute for Brain Cognition and Behaviour
Essi Viding, University College London

Trainee Dissertation Award Talk

10:30am – 11:00am PDT (1:30pm – 2:00pm EST)

Dr. Cameron Ellis, Yale University

Dr. Cameron Ellis completed his PhD in Psychology in 2021 from Yale University (by way of Princeton University), working with Dr. Nicholas Turk-Browne. He received his BSc from University of Auckland (New Zealand) in 2013. In his research, he studies how basic building blocks of cognition emerge and mature in the infant brain, and seeks to understand how infants are adapted to the challenges they face during development. In his dissertation, he developed methods for conducting fMRI with awake, behaving infants and pursued three directions: 1) how the visual system is organized early in life, long before visual abilities reach maturity, 2) how attention enables infants to sift through a world full of complexity, and 3) how infants can learn so much yet remember so little of their early life experiences.

Trainee Session – Career Perspectives Panel

11:00am – 12:30pm PDT (2:00 am – 3:30pm EST)

The Flux Trainee Committee is organizing two events under the theme of "Connecting Science and Society." Our first event will be a panel discussion where we will invite experts to share their experiences in communicating science to non-academic audiences, as well as involving citizens (i.e. your research population) in research. We hope to cover expertise on science journalism, translating science to policy-making, communicating with younger audiences, and citizen science. The speakers on our panel are:

Sabine Kastner, MD, PhD, Princeton Neuroscience Institute and Department of Psychology, Princeton University

Moira O'Neil, Senior Vice Presidents of Research Interpretation at FrameWorks Institute

Michelle Achterberg, PhD, Postdoctoral researcher at Erasmus University Rotterdam and Leiden University

Rebecca Schwarzlose, PhD, Department of Psychiatry, Washington University in St. Louis

The panel discussion will be followed by a trainee-led workshop that is exclusively open to Flux trainee members (i.e., students and post-docs). In this workshop attendees will brainstorm in small groups about a project of their own choice that aims to connect science and society. For example, attendees can devise their own science communication or citizen science project. After the workshop, attendees will pitch their initial ideas for a project and receive feedback. We encourage attendees to carry out the project within the next year, but this is not obligatory. Progress on implemented projects can be presented in poster format at Flux 2022. Trainees who attend this workshop will have a better understanding of the ways in which science and society can have mutually beneficial connections, will have networked with other trainees, and will find out whether they want to pursue future projects in which they aim to foster a connection between science and society.

Trainee Session – Connecting Science and Society Panel & Workshop

1:00pm – 2:30pm PDT (4:00pm – 5:30pm EST)

The panel discussion will be followed by a trainee-led workshop that is exclusively open to Flux trainee members (i.e., students and post-docs). In this workshop attendees will brainstorm in small groups about a project of their own choice that aims to connect science and society. For example, attendees

can devise their own science communication or citizen science project. After the workshop, attendees will pitch their initial ideas for a project and receive feedback. We encourage attendees to carry out the project within the next year, but this is not obligatory. Progress on implemented projects can be presented in poster format at Flux 2022. Trainees who attend this workshop will have a better understanding of the ways in which science and society can have mutually beneficial connections, will have networked with other trainees, and will find out whether they want to pursue future projects in which they aim to foster a connection between science and society.

Gail Rosenbaum, PhD, Staff Scientist, Geisinger Health

Marc Seal, PhD, Murdoch Children's Research Institute & The University of Melbourne, Australia

Yee Lee Shing, PhD, Department of Psychology, Goethe University Frankfurt, Germany

Andrea Niles, PhD, Chief Science Officer and Co-Founder of Youper AI

Sunday, September 19, 2021

Flash Talks #1

6:00am – 6:30am PDT (9:00am – 9:30am EST)

Cong Wang, Peking University, *"Separable neurocognitive changes underlie the development of communicative ability in adolescence"*

Max Herzberg, Washington University in St. Louis, *"The association between maternal cortisol and neonatal amygdala volume is moderated by socioeconomic advantage"*

Robert Hermosillo, University of Minnesota, *"Using Probabilistic Atlases of Functional Neural Networks in Adolescents to Improve Reliability of Group Brain-Behavior Associations"*

Vaidehi Natu, Stanford University, "*Myelin contributes to microstructural growth in human sensory cortex during early infancy*"

Nicholas Fogleman, University of North Carolina at Chapel Hill, "*Relation between intrinsic brain network organization and internalizing and externalizing behaviors in children with ADHD following methylphenidate administration"*

Dietsje Jolles, Leiden University, *"Can immaturity be adaptive? Developmental changes in the interaction between top-down control and experiential learning in a predictable task environment"*

Poster Session #1

6:30am – 8:00am PDT (9:30am – 11:00am EST)

Diversity Symposium

8:00am – 9:00am PDT (11:00am – 12:00pm EST)

Symposium #3 - Exploring the depths of the brain: The functional significance of sulcal development

9:30am – 11:00am PDT (12:30pm –2:00pm EST)

Silvia Bunge, University of California, Berkeley

Willa Voorhies, University of California, Berkeley, "*Lateral prefrontal sulcal morphology predicts individual variability in reasoning"*

Jessica Dubois, Université de Paris; NeuroSpin, "*Mapping the early folding of the human brain: MRI studies in babies and relationships to functional outcome*"

Michael Arcaro, University of California, Berkeley, "*Sulcal morphology predicts face patches in macaques"*

Gregoire Borst, Université de Paris – CNRS, "*Sulcation of the intraparietal sulcus and mathematical abilities from childhood to adulthood"*

Symposium #4 - Brain imaging of unsedated newborn infants prenatally exposed to alcohol or methamphetamine during pregnancy in Cape Town, South Africa

11:15am – 12:45pm PDT (2:15pm – 3:45pm EST)

Speakers:

Fleur L. Warton, University of Cape Town
Ernesta M. Meintjes, University of Cape Town
Josepheen Cruz, Developing Brain Institute
Sandra W. Jacobson, PhD, Wayne State University

In Cape Town, South Africa, prevalence of heavy alcohol use and fetal alcohol syndrome (FAS) in the Cape Coloured (mixed ancestry) community is among the highest in the world and methamphetamine abuse is endemic. We have previously reported growth, behavioral and structural and functional brain deficits in children and adolescents exposed prenatally to alcohol or methamphetamine. Our aim here is to determine whether the brain impairments observed in our older cohorts are already detectable in neonates and whether these mediate the behavioral deficits we have found. Detection in infancy can inform future interventions tailored to pecific affected areas, which are more effective if initiated in early childhood. We will describe how we prepared infants for scanning and traced the scans, which is more difficult and differs markedly from procedures used with children and adults.

Social Event

1:00pm – 2:30pm PDT (4:00pm – 5:30pm EST)

Symposium #5 - Multidimensional Approaches to Early Adversity Across Species

6:00am – 7:30am PDT (9:00am – 10:30am EST)

Elysia Davis, University of Denver, "*Early life exposure to unpredictable sensory signals shapes neural circuit development"*

Mar Sanchez / Kai McCormack, Spelman College "*Effects of maternal sensitivity and predictability on the development of emotional regulation and cognitive function in rhesus macaques"*

Jamie Hanson, University of Pittsburgh, "*Expanding Bioecological Conceptualizations of Unpredictability and Volatility: Connections with Behavioral and Neurobiological Development*"

Riika Korja, University of Turku, "*Predictability of maternal care and child's neuropsychological and psychosocial development – Findings from FinnBrain Birth Cohort*"

Huttenlocher Lecture

7:30am – 8:30am PDT (10:30am – 11:30am EST)

Prof. Dr. Dr. h.c. Angela D. Friederici, Director at the Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany

Angela D. Friederici is director at the Max Planck Institute for Human Cognitive and Brain Sciences (MPI CBS) in Leipzig, Germany. She is Founding director of this institute, founded in 1994. She is honorary professor at the University of Leipzig (Psychology), the University of Potsdam (Linguistics) and the Charité Berlin (Neurology) and holds a Doctor honoris Causa from the University of Mons, Belgium.

She graduated in linguistics and psychology in Bonn (Germany) and spent a postdoctoral year at MIT (USA). Prior to joining the Max Planck Society as a director, she was a professor for Cognitive Sciences at the Free University Berlin. Her research on the neural basis of language and language acquisition has received recognition across disciplines.

Flash Talks #2

9:00am – 9:30pm PDT (12:30pm – 1:00pm EST)

Tehila Nugiel, The University of Texas at Austin, *"Functional connectivity of cognitive control and learning systems in English learners"*

Saara Nolvi, University of Turku, "*Prospective association of maternal psychosocial stress during pregnancy with newborn hippocampal volume and its implications for infant social-emotional development"*

Claire Donnici, Cumming School of Medicine, University of Calgary, *"Prenatal and postnatal maternal depressive symptoms and longitudinal changes in limbic structure in young children."*

Nourhan Elsayed, Washington University in St. Louis, *"From Poverty to Cognition: Examining the Relative Contributions of Environmental, Neural and Genetics Influences"*

Simone Dobbelaar, Leiden University, *"Aggressive responses following social evaluation and the underlying motives in middle childhood: an fMRI replication design"*

Amanda Baker, University of California, Los Angeles, *"Subclinical anxiety modulates neural and behavioral response to safety decisions in early adolescence"*

Poster Session #2

9:30am – 11:00am PDT (12:30pm – 2:00pm EST)

Symposium #6 - Methodological considerations and advances in developmental neuroscience

11:00am – 12:30pm PDT (2:00pm – 3:30pm EST)

Ethan McCormick, University of North Carolina at Chapel Hill

Monica Rosenberg, University of Chicago

Chandra Sripada, University of Michigan

Petra Vertes, Cambridge University

Tuesday, September 21, 2021

Flash Talks #3

6:00am – 6:30am PDT (9:00am – 9:30am EST)

Hyesang Chang, Stanford University*, "Foundational number sense training gains are predicted by hippocampal-parietal circuits"*

Sagana Vijayarajah, University of Toronto, "*Developmental refinement of attention impacts semantic memory retrieval through adolescence"*

Finnegan Calabro, University of Pittsburgh, *"Development of dopaminergic neurophysiology supports improvements in the use of optimal reward learning strategies through adolescence"*

Tristan Yates, Yale University, *"How infants carve up continuous experience into neural events"*

Yuyan (Lillian) Xu, University of Wisconsin-Madison, *"Childhood unpredictability, reward processing, and reward-related psychopathology"*

Poster Session #3

6:30am – 8:00am PDT (9:30am – 11:00am EST)

Science of Learning Symposium

8:00am – 9:00am PDT (11:00am – 12:00pm EST)

Symposium #7 - Social motivation in flux: Understanding the development of social cognition and behavior

9:30am – 11:00am PDT (12:30pm – 2:00pm EST)

Wouter van den Bos, University of Amsterdam

Jennifer Silvers, University of California, Los Angeles

Hilary Richardson, University of Edinburgh

Hirofumi Morishita, Icahn School of Medicine at Mount Sinai

Symposium #8 - Neurodevelopmental vulnerability to psychopathology: Building resilience

11:15am – 12:45pm PDT (2:15pm – 3:45pm EST)

Lucy Vanes, King's College London, *"The role of neonatal brain structure and home environment in childhood outcomes following very preterm birth"*

Alexis Brieant, Yale University, *"Associations Among Negative Life Events, Changes in Cortico-Limbic Connectivity, and Psychopathology in the ABCD Study: Exploring Pathways to Resilience"*

Ronny Geva, Bar-Ilan University, *"Do Perinatal Neural Intergity and Precocial Exposure Shape Attention?"*

Closing Remarks

12:45pm – 1:30pm PDT (4:00pm – 5:30pm EST)