19th Annual Meeting of the
Organization for Human Brain Mapping

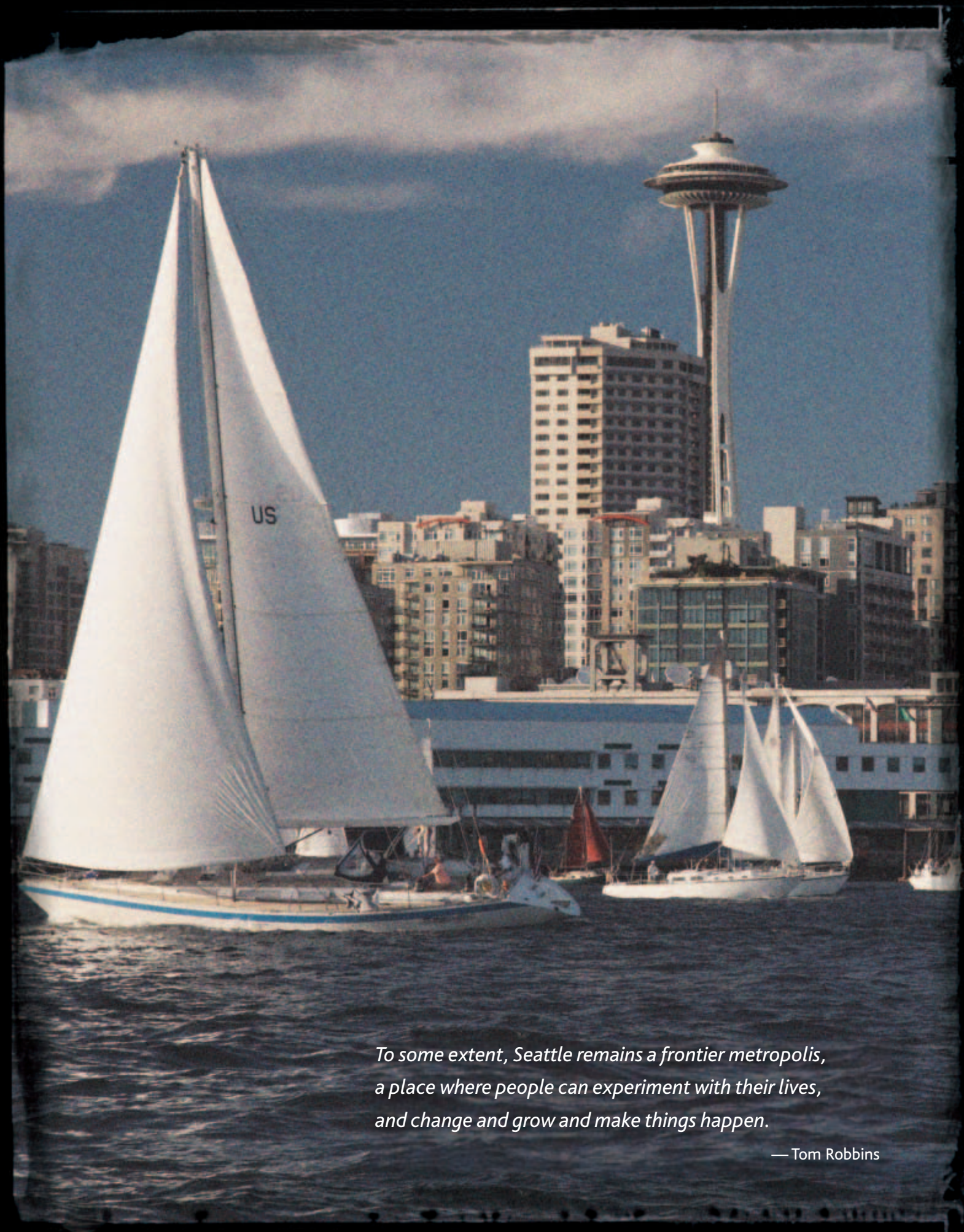
OHBM
SEATTLE 2013

June 16–20

Washington State Convention and Trade Center

Program

www.humanbrainmapping.org/OHBM2013



To some extent, Seattle remains a frontier metropolis, a place where people can experiment with their lives, and change and grow and make things happen.

— Tom Robbins

WELCOME

Welcome to Seattle, a city at the forefront of open neuroscience and information technology, and the 19th Annual Meeting of the Organization for Human Brain Mapping! It's an amazing time to be a part of the OHBM community as the field of human functional neuroimaging continues to move into the scientific mainstream in all corners of the world. We are excited to spend the next several days together learning about the latest scientific discoveries. We look forward to meeting you at one of several events designed to foster networking and collaboration.

We have several suggestions to help you make the most of your Annual Meeting experience:

- Attend one of many educational courses offered on Sunday including: Advanced fMRI, The Connectome, Introduction to Imaging Genetics, Anatomy, Computational Neuroscience and Modeling of Neurodynamics (NEW), Resting-State Brain Networks, Neuroimaging Meta-Analysis (NEW), Neuroimaging "Big Data" Challenges (NEW) and How Not to Analyze Your Data (NEW).
- Learn from the scientific education offered throughout the four days of the meeting, including the Talairach presentation, three member-initiated symposia, one LOC symposium, four daily parallel oral sessions, twelve morning workshop sessions and I-Poster presentations.
- Take on a challenge at the HBM Hackathon — a meeting-long analysis and resource building competition designed to accelerate the connection between open neuroscience and cloud computing. To learn more about the HBM Hackathon, visit http://ohbm-seattle.github.io.
- Engage in conversation with over 2,200 poster presenters sharing the latest research in a variety of disciplines.
- Attend the Town Hall session on Wednesday to contribute your perspective on how the Organization can best advance the study of human brain organization, and consider the impact of the BRAIN Initiative (Brain Research through Advancing Innovative Neurotechnologies), which will be discussed by guest Dr. Thomas Insel, Director of the National Institute of Mental Health.
- Visit with our knowledgeable exhibitors to learn about the latest products and services available for the brain mapping community.
- Enjoy the OHBM social events, including the opening reception, poster receptions, and Club Night on Wednesday at the Experience Music Project.
- During and after the meeting, utilize OHBM resources including:
  - The Annual Meeting mobile app at m.core-apps.com/ohbm2013
  - The Onsite Career Resource room where job seekers can connect with employers www.humanbrainmapping.org/2013Career
  - The Online Library, which contains program presentations from this and past OHBM meetings. https://cms.psav.com/library/ohbm/
  - E-Posters, which contain hundreds of posters that you may have missed. http://ww4.aievolution.com/hbm1301.

Don't forget to let us know how we're doing and what we can do to make your Annual Meeting experience more valuable at future meetings by completing the online evaluation forms found at www.humanbrainmapping.org/2013Evaluations.

Throughout this conference, we ask you to stay engaged, ask questions and help us shape the future of human brain mapping. If you are not yet a member of OHBM, we invite you to join our growing community by visiting the Membership area on our website at www.humanbrainmapping.org.

We thank each of you for attending the OHBM meeting and bringing your expertise to the gathering. We could not accomplish what we do without your support and leadership.

Sincerely,

Susan Bookheimer
Chair, Council

Peter Bandettini
Chair, Program Committee

Tom Grabowski
Chair, Local Organizing Committee

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OHBM 2013 PROGRAM-AT-A-GLANCE

Sunday, June 16

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602-604, Level 6

Computational Neuroscience and Modeling of Neurodynamics
611-612, Level 6

The Connectome
608-610 , Level 6

Introduction to Imaging Genetics
605-606, Level 6

Neuroimaging Meta-Analysis
613-614, Level 6

Resting State Brain Networks
618-620, Level 6

8:00 – 12:00
Half Day Educational Course

Neuroimaging 'Big Data' Challenges and Computational Workflow Solutions
607, Level 6

13:00 – 17:00
Half Day Educational Course

How Not to Analyze Your Data: A Skeptical Introduction to Modeling Methods
607, Level 6

17:30 – 19:00
Opening Ceremonies and Talairach Lecture: Marcus Raichle
6ABC, Level 6

19:00 – 21:00
Welcome Reception
4CD and North Lobby, Level 4

Monday, June 17

8:30 – 9:45
Morning Workshops

Functional Assessment Of Brain Development In The Human Fetus
608-610, Level 6

Understanding the Basis of Resting-State fMRI Connectivity Dynamics
6 ABC, Level 6

Shaping-up Nicely: Advances in Developmental and Translational Neuroimaging of the Subcortex
605-607, Level 6

10:00 – 11:30
LOC Symposium: Neural-Device Interfaces and Cortical Circuitry: Excitement in Both Directions
6ABC, Level 6

11:45 – 12:30
Keynote Lecture: Helen Mayberg
The Role of Multimodal Imaging in the Development and Refinement of Deep Brain Stimulation for Depression
6ABC, Level 6

12:30 – 13:30
Lunch

13:30 – 15:30
Poster Session
Exhibit and Poster Hall – 4AB, Level 4

13:30 – 14:15
I-Poster Session
608-610, Level 6

15:45 – 17:00
Symposium: Brain Stimulation
6ABC, Level 6

17:15 – 18:00
Keynote Lecture: Olaf Sporns
Structure and Dynamics of the Human Connectome
6ABC, Level 6

18:15 – 19:45
Oral Sessions

O-M1: Brain Stimulation Methods and Motor Behavior
602-604, Level 6

O-M2: Disorders of the Nervous System 1: Pediatric and Developmental Disorders
608-610, Level 6

O-M3: Modeling and Analysis Methods 1: Resting-State
6 ABC, Level 6

O-M4: High Resolution Imaging
605-607, Level 6

Tuesday, June 18

8:30 – 9:45
Morning Workshops

Resting State Connectivity: Views From Nonhuman Primates
6 ABC, Level 6

Functional Data-Driven Atlases of the Brain
608-610, Level 6

On the Use of Brain Network Measures to Characterize Major Mental Disorders
605-607, Level 6

10:00 – 10:45
Keynote Lecture: Russell Poldrack
Linking Mental and Neural Function Using Representational fMRI
6ABC, Level 6

11:00 – 12:30
Oral Sessions

O-T1: Higher Cognitive Functions
602-604, Level 6

O-T2: Modeling and Analysis Methods 2: Functional Modeling
6 ABC, Level 6

O-T3: Neuroimaging Genetics and Informatics
608-610, Level 6

O-T4: Language, Learning and Memory
605-607, Level 6

12:30 – 13:30
Lunch

13:30 – 15:30
Poster Session
Exhibit and Poster Hall – 4AB, Level 4

13:30 – 14:15
I-Poster Session
608-610, Level 6

15:45 – 17:00
Symposium: Bridging Brain Imaging and Gene Expression
6ABC, Level 6

17:15 – 18:00
Keynote Lecture: Cathy Price
Connecting fMRI to Lesion Studies
6ABC, Level 6

18:00 – 19:30
Poster Reception
Exhibit and Poster Hall – 4AB, Level 4

Wednesday, June 19

8:30 – 9:45
Morning Workshops

Current Directions in Neuroimaging of Language and Language-Related Disorders
605-607, Level 6

The Functional Implications of Brain Signal Variability
608-610, Level 6

The Human Connectome Project: What's in the Data and How Can I Begin Data Mining?
6 ABC, Level 6

10:00 – 10:45
Keynote Lecture: Martin Sereno
It's Maps All the Way Up
6ABC, Level 6

11:00 – 12:30
Oral Sessions

O-W1: Perception and Attention
605-607, Level 6

O-W2: Modeling and Analysis Methods 3: Structural and Diffusion
6 ABC, Level 6

O-W3: Neuroanatomy
608-610, Level 6

O-W4: Disorders of the Nervous System 2: Psychiatric Illness
602-604, Level 6

12:30 – 13:30
Lunch

13:30 – 15:30
Poster Session
Exhibit and Poster Hall – 4AB, Level 4

13:30 – 14:15
I-Poster Session
608-610, Level 6

15:45 – 17:00
Symposium:
The Challenge of Imaging Brain Connections in Animal and Man
6ABC, Level 6

17:15 – 18:00
Keynote Lecture: Van Wedeen
The Three Dimensional Structure of the Brain Pathways
6ABC, Level 6

18:15 – 19:15
Town Hall Meeting
NIH BRAIN Project: Thomas R. Insel
6ABC, Level 6

20:00 – 2:00
Club Night
EMP Museum

Thursday, June 20

8:30 – 9:45
Morning Workshops

Big Data in Neuroimaging: Big Opportunities or Just a Big Hassle – The Skeptical Neuroimagers View
6 ABC, Level 6

Microstructure Meets Function in the Same Brain in Vivo – High-Field MRI Sets the Stage
608-610, Level 6

Neurotransmitter Function and Intrinsic Brain Functional Connectivity
605-607, Level 6

10:00 – 10:45
Keynote Lecture: Angela Friederici
The Language Network: Structure and Function
6ABC, Level 6

10:45 – 12:45
Poster Session
Exhibit and Poster Hall – 4AB, Level 4

10:45 – 11:30
I-Poster Session
608-610, Level 6

12:45 – 14:00
Lunch

14:00 – 15:30
Oral Sessions

O-Th1: Lifespan Development
605-607, Level 6

O-Th2: Modeling and Analysis Methods 4: Multi-Modal
6 ABC, Level 6

O-Th3: Disorders of the Nervous System 3: Neurological
602-604, Level 6

O-Th4: Social Neuroscience, Emotion and Motivation
608-610, Level 6

15:45 – 16:45
Closing Comments and Meeting Highlights
6ABC, Level 6

16:45 – 18:15
Farewell Poster Reception
Exhibit and Poster Hall – 4AB, Level 4

GENERAL INFORMATION

CONFERENCE VENUE

Washington State Convention Center
800 Convention Place
Seattle, WA 98101-2350
Phone: 206-694-5000
Fax: 206-694-5399
Email: info@wscc.com

All events will take place at the Washington State Convention Center unless otherwise noted.

REGISTRATION HOURS

South Lobby, Level 4

Saturday, June 15: 15:00 – 18:00
Sunday, June 16: 7:00 – 19:30
Monday, June 17: 7:30 – 19:45
Tuesday, June 18: 8:00 – 18:00
Wednesday, June 19: 8:00 – 18:00
Thursday, June 20: 8:00 – 16:00

EXHIBIT HOURS

Exhibit and Poster Hall – 4AB, Level 4

Monday, June 17: 12:30 – 16:00
Tuesday, June 18: 12:30 – 19:30
Wednesday, June 19: 12:30 – 16:00
Thursday, June 20: 10:45 – 18:15

TOWN HALL MEETING

Wednesday, June 18, 18:15 – 19:15
6ABC, Level 6

All OHBM meeting attendees are encouraged to participate in this open forum where you will have an opportunity to ask questions and give the OHBM leadership feedback. Updates on future meeting sites and council elections will be presented. The Town Hall Forum will include a presentation and discussion on the United States' BRAIN Initiative.

WELCOME RECEPTION

Sunday, June 16, 19:00 – 21:00
4CD and North Lobby, Level 4

Join us for the 2013 Annual Meeting Welcome Reception. The reception will be held at the Washington State Convention Center immediately following the Opening Ceremonies and Talairach Lecture on Sunday, June 16th. **Please make sure to wear your name badge, which will serve as your ticket to the event**. Additional guest badges are $50.00 USD.

CLUB NIGHT

Wednesday, June 18, 21:00 – 2:00
EMP Museum | 325 5th Avenue N | Seattle, WA 98109

There will be a band and a DJ that will play dance music throughout the evening. The party is complimentary to registrants. **Please make sure to bring your ticket to the EMP.** Additional guest tickets are $50.00 and must be purchased at the conference registration desk.

We encourage you to use the historic Seattle Monorail for transportation to and from the event. The monorail is the most economical option and will provide service until 2:00 am.

SPEAKER READY ROOM

Room 601, Level 6

Hours:
Saturday, June 15: 15:00 – 18:00
(located in the South Lobby near Registration on Saturday only)
Sunday, June 16: 6:30 – 19:30
Monday, June 17: 7:30 – 19:45
Tuesday, June 18: 7:30 – 18:00
Wednesday, June 19: 7:30 – 18:00
Thursday, June 20: 7:30 – 16:00

INTERNET AND DOCKING LOUNGE

Level 6 Foyer

A limited number of complimentary terminals for computer access and docking stations to charge your electronic devices will be available. Please limit your time at a terminal to 15 minutes.

Hours:
Sunday, June 16: 7:30 – 19:30
Monday, June 17: 8:00 – 19:30
Tuesday, June 18: 8:00 – 19:30
Wednesday, June 19: 8:00 – 19:30
Thursday, June 20: 8:00 – 17:00

HBM Hackathon

Exhibit and Poster Hall – 4AB, Level 4

OHBM 2013 will include an integrated hack room and cloud computing contest called **The HBM Hackathon: Open Brain Mapping in the Cloud**. HBM Hackathon will include a meeting-long venue on the main poster/exhibit floor space, and dedicated cloud-accessible data and software resources that will be available to all interested attendees. The room will be available from Monday through Thursday while the Exhibits and Posters are open.

The goals of HBM Hackathon are to accelerate the development of a critical mass of cloud-based data, analytic, and computational resources for human brain mapping, and to provide OHBM attendees with access to and knowledge about them. To learn more about the HBM Hackathon, visit http://ohbm-seattle.github.io or www.humanbrainmapping.org/hackathon.

MOBILE APP

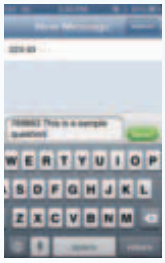
The 2013 Mobile App, powered by EventLink and created by Core-Apps LLC, is a native application for smartphones (iPhone and Android), a hybrid web-based app for Blackberry, and there's also a web-based version of the application for all other web browser-enabled phones.

How to Download:
For iPhone (plus, iPod Touch & iPad) and Android phones: Visit your App Store or Android Market on your phone and search for OHBM.

For All Other Phone Types (including BlackBerry and all other web browser-enabled phones): While on your smartphone, point your mobile browser to http://m.core-apps.com/ohbm2013. From there you will be directed to download the proper version of the app for your particular device, or, on some phones, you simply bookmark the page for future reference.

TWITTER

Join the conversation on Twitter using the hash tag **#OHBM2013**



ASK QUESTIONS ELECTRONICALLY DURING SESSIONS

Text questions to moderators while attending sessions by dialing #22333. In the message field, type in the unique code for the session you are attending followed by your question and then hit send! All session codes can be found at www.humanbrainmapping.org/questions and also next to each session description throughout this program.

E-POSTERS

It is our goal to have all poster presentations uploaded on our E-Poster format (as a pdf). To upload your poster, please go to http://ww4.aievolution.com/hbm1301/.

WIRELESS CONNECTION

Wireless connections will be available throughout the Washington State Convention Center. Please connect to the wireless network "OHBM 2013" to access the conference Wi-Fi.

ONSITE CAREER RESOURCES

A popular feature every year at OHBM are bulletin boards heavy with "positions available" notices. This year OHBM has created an electronic board at http://www.humanbrainmapping.org/2013Career Career where PIs can post positions available notices (under "Labs Looking for People") and trainees can post vitas (under "People Looking for Jobs") in advance of the meeting. OHBM has reserved room 309 (Level 3) in the Washington State Convention Center from Sunday, June 16th through Thursday, June 20th for attendees to gather and discuss employment opportunities.

EVALUATIONS ONLINE!

Conference evaluations will be conducted online only at www.humanbrainmapping.org/2013Evaluations. It is only through attendee's feedback that we can continue to improve the content, format, and schedule of the meeting. Your input is very important to us, and we urge you to fill out these quick surveys.

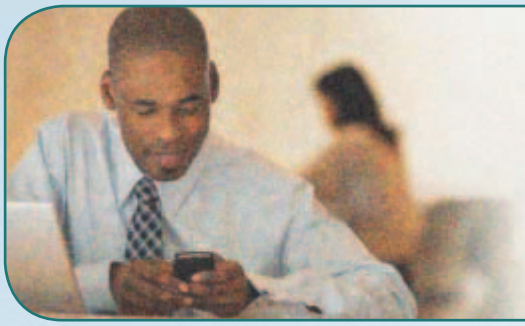
ACCME ACCREDITATION

CME CREDIT: This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through sponsorship of the Organization for Human Brain Mapping. The OHBM is accredited by the ACCME to provide continuing medical education for physicians.

The Organization for Human Brain Mapping designates this educational activity for a maximum of 38.75 *PRA Category 1 Credit(s)*™. Physicians should only claim credit commensurate with the extent of their participation in the activity. **CME forms will only be available online at www.humanbrainmapping.org/CME2013.**

EDUCATIONAL COURSES	CREDITS
Advanced fMRI (Full Day)	7.00
Anatomy (Full Day)	7.00
The Connectome (Full Day)	7.00
Introduction to Imaging Genetics (Full Day)	7.00
Resting State Brain Networks (Full Day)	7.00
Computational Neuroscience and Modeling of Neurodynamics (Full Day)	7.00
Neuroimaging Meta-Analysis (Full Day)	7.00
Neuroimaging 'Big Data' Challenges and Computational Workflow Solutions (Half Day)	3.50
How Not to Analyze Your Data: A Skeptical Introduction to Modeling Methods (Half Day)	3.50
Maximum number of possible credits earned at Educational Courses	**7.00**

ANNUAL MEETING CREDITS	
Talairach Lecture	0.75
Keynote Lectures	0.75 each
Morning Workshops	1.25 each
Oral Sessions	1.50 each
Poster Session Viewing	2.00 per day
Symposia	1.25 each
LOC Symposia	1.50
Meeting Highlights	1.00
Town Hall Forum	0.50
Total number of possible credits earned at Annual Meeting	**31.75**
TOTAL NUMBER OF POSSIBLE CREDITS	**38.75**



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Advanced fMRI – Physics, Physiology, and Pattern Information

FULL-DAY COURSE | 8:00 – 17:00
615-617, Level 6
Text Code: 769863

Organizers

Tor Wager, *University of Colorado, Boulder, CO, USA*
Nikolaus Kriegeskorte, *MRC Cognition and Brain Sciences Unit, Cambridge, UK*

Functional magnetic resonance imaging (fMRI) has taken a central role in the study of human brain function. fMRI is inherently transdisciplinary, and data acquisition and analysis are constantly evolving. Thus, there is a need for continuing education on new methods and cutting-edge neuroscientific applications of fMRI. The first part of the course covers the physics and physiology of fMRI, and the relationship between neuronal and BOLD activity patterns. The second part focuses on pattern-information analyses and how they can be used to learn about neuronal population codes and to test computational theories of brain information processing.

Learning Objectives: The course is designed to develop participants' understanding of:

1. The physics and physiology underlying fMRI, and the resulting potential and limitations of fMRI;
2. Pattern decoding, representational similarity analysis, and voxel-receptive-field modelling; and
3. Computational modeling of brain information processing and its integration into the analysis of fMRI data

Target Audience: This course is intended for an audience of research scientists with intermediate to advanced knowledge of fMRI techniques, who wish to extend the breadth and depth of their understanding of the current state of the art.

Course Schedule

8:00 – 8:10 **Introduction to the Advanced fMRI Course**
Tor Wager and Nikolaus Kriegeskorte

8:10 – 8:45 **Introduction to MRI and fMRI Physics**
Marta Correia, *Cognition and Brain Sciences Unit, Cambridge, UK*

8:45 – 9:20 **Basic Physiology of fMRI: Signal and Noise**
Gary Glover, *Stanford University, Stanford, CA, USA*

9:20 – 9:55 **The Physiology of fMRI and Its Relation to Brain Information Processing**
Amir Shmuel, *MNI, McGill University, Montreal, Canada*

9:55 – 10:00 **Questions and Discussion**

10:00 – 10:30 **Break**

10:30 – 11:40 **Pattern Decoding Analysis for fMRI: Basic Steps and Advanced Techniques**
Janaina Mourao-Miranda, *University College London, London, UK*

11:40 – 12:00 **Using Pattern Classification for Psychological Inference**
Tor Wager, *University of Colorado, Boulder, CO, USA*

12:00 – 13:00 **Lunch**

13:00 – 13:35 **Computational Neuroscience with fMRI and Coarse-Scale Contributions to Orientation Decoding**
Eli Merriam, *New York University, New York, NY, USA*

13:35 – 14:10 **Investigating Neuronal Population Codes of Visual Objects with Representational Similarity Analysis**
Dwight Kravitz, *NIH, Bethesda, MD, USA*

14:10 – 14:45 **Inferring Neuronal Tuning from fMRI: Adaptation and Pattern Information**
Geoffrey Aguirre, *University of Pennsylvania, Philadelphia, PA, USA*

14:45 – 15:00 **Questions and Discussion**

15:00 – 15:30 **Break**

15:30 – 16:05 **Voxel-Receptive-Field Modeling: Testing Computational Theories with fMRI**
Jack Gallant, *University of California-Berkeley, Berkeley, CA, USA*

16:05 – 16:40 **Engineering-Based Approaches to Machine Learning Analysis of fMRI**
Francois Meyer, *University of Colorado, Boulder, CO, USA*

16:40 – 17:15 **Depicting and Decoding Fine-Grained Cortical Representations of Auditory Stimuli**
Federico DeMartino, *Maastricht University, Maastricht, The Netherlands*

17:15 – 17:30 **Questions and Discussion**

Anatomy and Its Impact on Structural and Functional Imaging

FULL-DAY COURSE | 8:00 – 17:00
602-604, Level 6
Text Code: 769979

Organizers

Katrin Amunts, *Institute of Neuroscience and Medicine, Jülich, Germany*
Karl Zilles, *Institute of Neuroscience and Medicine, Jülich, Germany*

Results of neuroimaging studies cannot be understood without knowing the anatomy of the brain, and the way how brain structure influences the interpretation of the results through interaction with image acquisition, processing and analysis. The course will provide an introduction and critical overview of classical and modern approaches for studying the anatomy of the brain using neuroimaging techniques. It is aimed at a multidisciplinary audience, and will provide an introduction to brain macroscopy, gross anatomical landmarks and its intersubject variability, the microstructural organization of the brain including cortical segregation, and the representation of cognitive functions with respect to organization principles. Neuroimaging methods will be discussed with respect to their advantages, disadvantages and potential pitfalls as it concerns anatomy. The relevance of anatomical knowledge for the interpretation of structural and/or functional imaging data will be made explicit.

Part one will consist of talks introducing anatomical concepts and developmental aspects and show, how MRI contributes. Part two will focus on organizational principles of the brain's microstructure, and critically reflect the perspectives and limits of MR imaging with respect to microstructure. Part three will elucidate the relationship between microstructure and brain function, and provide an overview of some widely distributed neuroimaging tools in this field.

Learning Objectives: Having completed this course, participants will be able to:

1. Understand the organizational principles of the human brain on a macroscopic and microscopic level, and their changes during development;
2. Understand the advantages and limitations of neuroanatomical techniques including receptor mapping and cytoarchitectonics;
3. Understand methods for design and analysis of structural and functional MRI data, and interpret the measures they provide and their limitations; and
4. Give examples of applications of structural MRI for understanding brain function and dysfunction.

Target Audience: The prime target audience is researchers with an interest in understanding the relationship between brain structure and function. This includes researchers with limited previous anatomical knowledge. Prior experience of neuroimaging is expected. Background will be provided for those without special anatomical knowledge but some talks will address advanced issues that would be of interest to people with experience in this field.

Course Schedule

Part I: Introduction: Neuroanatomy, Development and MRI

8:00 – 8:30 **Surface Anatomy of the Brain and Landmarks**
Thomas Naidich, *Mt. Sinai Medical Center, New York, NY, USA*

8:30 – 9:00 **Development of the Cerebral Cortex**
David van Essen, *Washington University, St. Louis, MO, USA*

9:00 – 9:30 **MRT Imaging of Brain Development**
Roger Woods, *University of California-Los Angeles, Los Angeles, CA, USA*

9:30 – 10:00 **High Resolution Imaging and Anatomy**
Noam Harel, *University of Minnesota, Minneapolis, MN, USA*

10:00 – 10:30 **Break**

Part II: Microstructure and Its Interpretation in MRI

10:30 – 11:00 **Cytoarchitecture of the Human Cerebral Cortex – Challenges for MRI**
Katrin Amunts, *Institute of Neuroscience and Medicine, Research Center Jülich, Germany*

11:00 – 11:30 **Myeloarchitecture – a Window for MRI**
Robert Turner, *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

11:30 – 12:00 **Receptorarchitecture and Neural Systems**
Karl Zilles, *Institute of Neuroscience and Medicine, Jülich, Germany*

12:00 – 13:00 **Lunch**

Part III: Structure, Function and Tools for Analysing Their Relationship

13:00 – 13:30 **Functional and Structural Architecture of the Brain**
Christian Beckmann, *NL Donders Institute for Brain, Cognition & Behaviour, Radboud University Nijmegen, Nijmegen, Netherlands*

13:30 – 14:00 **Tools to Combine Structural MRI with Cytoarchitecture and Function**
Simon Eickhoff, *Heinrich-Heine University Düsseldorf, Düsseldorf, Germany*

14:00 – 14:30 **Structural and Functional Segregation of the Cortex**
Jean-Francois Mangin, *Neurospin, CEA, Gif sur Yvette, France*

14:30 – 15:00 **Anatomical Conditions and MR-Morphometry**
Christian Gaser, *University of Jena, Jena, Germany*

15:00 – 15:30 **Break**

15:30 – 16:00 **Anatomical Background of Dynamic Causal Modelling and Connectivity**
Jakob Heinzle, *University of Zurich & ETH Zurich, Zurich, Switzerland*

16:00 – 17:00 **Question and Answer – Panel Discussion**

Computational Neuroscience and Modeling of Neurodynamics

FULL-DAY COURSE | 8:00 – 17:00
611-612, Level 6
Text Code: 769980

Organizers

Michael Breakspear, *Queensland Institute of Medical Research, Brisbane, Australia*
Stefan Kiebel, *Friedrich-Schiller-University, Jena, Germany*
Jean Daunizeau, *Brain and Spine Institute, Paris, France*

Computational neuroscience is a rapidly growing field that seeks to understand the principles of neuronal dynamics and how these underpin cognition. Computational neuroscience offers fresh perspectives on the design, analysis and interpretation of functional neuroimaging data, moving beyond static designs and phenomenological heuristics. This course will provide a broad overview of the field, moving from the foundations of dynamical systems theory to large-scale computer platforms, the analysis of imaging data and models of cognitive processes such as perception and decision making.

Learning Objectives: Having completed this course, participants will be able to:

1. Summarize the use of dynamic systems theory in modelling neuroscience phenomena, ranging from single neuron models to macroscopic modelling of networks;
2. Summarize new developments and research questions in dynamic models of the brain;
3. Understand the link between models of cortical activity and theories of brain function;
4. Understand the meaning and significance of stochastic processes in cortical systems; and
5. Discuss how such computational approaches can lead to the design and analysis of cognitive neuroscience experiments.

Target audience: This course is designed to guide both cognitive neuroscientists and modellers through a variety of computational approaches. The talks introduce and motivate dynamic systems theory and other mathematical concepts as tools for modelling various neuroscience phenomena, ranging from the single neuron to the macroscopic network level. The participants do not require an explicit mathematical background to follow the course but need to bring a healthy interest in how ubiquitous neuroscience phenomena can be explained mechanistically. Examples will be given of how such approaches lead to the design and analysis of cognitive neuroscience experiments.

Course Schedule

Part I: Dynamic Systems Approach

Chair: Michael Breakspear, *Queensland Institute of Medical Research, Brisbane, Australia*

8:00 – 8:40 **Objectives of Large-Scale Computational Neuroscience**
Michael Breakspear, *Queensland Institute of Medical Research, Brisbane, Australia*

8:40 – 9:20 **Models for Dynamics from the Neural Microcircuit to Cortical Regions**
Peter Robinson, *University of Sydney, Australia*

9:20 – 10:00 **Computational Models of Resting State Activity**
Gustavo Deco, *Universitat Pompeu Fabra, Barcelona, Spain*

10:00 – 10:30 **Break**

Part II: Computational Models of NeuroImaging Data

Chair: Viktor Jirsa, *CNRS, Marseille, France*

10:30 – 11:15 **Investigating Neural Mechanisms with Modelling and Imaging**
Tim Behrens, *University of Oxford, Oxford, UK*

11:15 – 12:00 **Computational Modelling in fMRI**
John O'Doherty, *California Institute of Technology, Pasadena, USA*

12:00 – 13:00 **Lunch**

Part III: Bayesian-Based Methods

Chair: Jean Daunizeau, *Brain and Spine Institute, Paris, France*

13:00 – 13:40 **Dynamic Causal Modelling (Bayesian Inference, Model Selection)**
Jean Daunizeau, *Brain and Spine Institute, Paris, France*

13:40 – 14:20 **Dynamic Causal Modelling and Neurophysiology**
Rosalyn Moran, *Virginia Tech Carilion Research Institute, Roanoke, VA, USA*

14:20 – 15:00 **Dynamics of Perceptual Decision Making**
Sebastian Bitzer, *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

15:00 – 15:30 **Break**

Part IV: Integrative Models

Chair: Peter Robinson, *University of Sydney, Australia*

15:30 – 16:10 **Complex Brain Networks: Dynamics and Structure**
Mika Rubinov, *University of New South Wales, Australia*

16:10 – 16:50 **Platforms for Large-Scale Brain Simulations**
Viktor Jirsa, *CNRS, Marseille, France*

16:50 – 17:00 **Summary, Discussion, and Farewell**
Michael Breakspear and Jean Daunizeau

Introduction to Imaging Genetics

FULL-DAY COURSE | 8:00 – 17:00
605-606, Level 6
Text Code: 769976

Organizers

Thomas Nichols, *University of Warwick, Coventry, UK*
Jean-Baptiste Poline, *CEA, France & UC Berkeley, US*

This course will introduce the fundamentals of "Imaging Genetics," the process of modeling and understanding genetic variation in brain image data. The course begins with a three-lecture genetics tutorial in the morning, designed to give imaging practitioners a quick overview of key genetics concepts and terminology. The remainder of the course covers how imagers can use genetic variables in their analyses. Specific topics include voxel-wise genome-wide models, joint multivariate modeling of imaging and genetic data, and heritability analyses of cortical surface and thickness data. The course concludes with a case study highlighting current imaging genetics research.

Learning Objectives: Having completed this course, participants will be able to:

1. Understand the fundamentals of the molecular basis of genetic variation, and how that variation is modeled in traditional genetics studies;
2. Understand the difference between linkage, association and heritability analyses;
3. Understand the relative strengths and weaknesses of each different type of brain imaging phenotype used to find genetic association; and
5. Understand how imaging genetics can be applied to an area like major depression.

Target Audience: The course is designed for neuroimaging practitioners who do not necessarily have a background in genetics.

Course Schedule

8:00 – 8:10 **Introduction**
Jean-Baptiste Poline, CEA, *France & UC Berkeley, USA*

8:10 – 9:00 **Molecular Basis of Genetic Variation**
Elliot Hong, *University of Maryland, Baltimore, MD, USA*

9:00 – 9:45 **Structure and Analysis of Genetic Variation**
Sven Cichon, *Bonn University, Bonn, Germany*

9:45 – 10:15 **Overview of Neuroimaging Phenotypes**
Anderson Winkler, *Oxford University, Oxford, UK*

10:15 – 10:30 **Break**

10:30 – 11:15 **Nuts and Bolts of the Allen Brain Human Atlas**
Lydia Ng, *Allen Brain Institute, Seattle, WA, USA*

11:15 – 12:00 **Univariate Approaches: Multiple Testing & Voxelwise WGA**
Derrek Hibar, *University of California, Los Angeles, CA, USA*

12:00 – 13:00 **Lunch**

13:00 – 13:45 **Quantitative Traits: Heritability, Linkage & Association**
John Blangero, *Texas Biomedical Research Institute, San Antonio, TX, USA*

13:45 – 14:30 **Multivariate Approaches: Joint Modeling of Imaging & Genetic Data**
Giovanni Montana, *Imperial College, London, UK*

14:30 – 15:00 **Multivariate Phenotypes for Association and Linkage**
Peter Kochunov, *University of Maryland, Baltimore, MD, USA*

15:00 – 15:30 **Break**

15:30 – 16:15 **ENIGMA & Large Scale Imaging Association**
Jason Stein, *University of California, Los Angeles, CA, USA*

16:15 – 17:00 **Case Study: Identifying Informative Phenotypes in Large Functional Imaging Studies: An Application of Genome-Wide Complex Trait Analysis**
Tomáš Paus, *University of Toronto, Toronto, Canada*

Neuroimaging Meta-Analysis

FULL-DAY COURSE | 8:00 – 17:00
613-614, Level 6
Text Code: 769982

Organizers

Simon B. Eickhoff, *Heinrich-Heine University Düsseldorf, Düsseldorf, Germany*
Tor D. Wager, *University of Colorado, Boulder, CO, USA*

Functional neuroimaging has provided a wealth of information on the cerebral localization of mental functions. In spite of its success, however, several limitations restrict the amount of knowledge that may be gained from each individual experiment. These include a usually rather small sample size, limited reliability of an indirect signal and the need to infer knowledge from specific contrasts. Such limitations have raised some concerns, whether neuroimaging may ultimately provide fundamental insight into problems from cognitive psychology or clinical neurosciences. In turn, however, they also encouraged the development of quantitative meta-analysis approaches that allow statistically summarizing a vast amount of neuroimaging findings across a large number of participants and diverse experimental settings. Such integration then enables statistically defensible generalizations on the neural basis of psychological processes in health and disease. They also allow relating different tasks or processes to each other and modeling interacting networks. Quantitative meta-analysis therefore represents a powerful tool to gain a synoptic view of distributed neuroimaging findings in an objective and impartial fashion and address the above concerns. This course is set out to cover the burgeoning field of meta-analytic modeling and database-driven syntheses. In order to provide a comprehensive overview, this course spans both basic and advanced topics, from the foundations allowing the synthesis of neuroimaging data to cutting-edge methodological developments and emerging psychological clinical applications. This broad coverage will thus provide both a deeper understanding of the statistical and methodological underpinnings as well as concrete ideas for how to apply meta-analytic techniques to advance brain science.

Learning Objectives:

1. Methodological foundations of database-driven systems neuroscience;
2. Established and innovative approaches for multi-study integration by meta-analyses;
3. Methods for large scale data-mining and the meta-analytic investigation of brain networks;
4. Emerging approaches to cognitive psychology based on computational neurobiology; and
5. The possibilities of meta-analytic modeling provides to understand brain organization.

Target Audience: Imaging researchers interested in databases, meta-analyses and functional atlassing of the brain as well as cognitive psychologists who wish to learn about emerging computational approaches to understanding mental functions. While some background in neuroimaging will be helpful, this course does introduce basic concepts and approaches before moving on to advanced methods and applications.

Course Schedule

Part I: Methodological Foundations

8:00 – 8:30 **Coordinates and Templates**
Jack L. Lancaster, *University of Texas Health Science Center at San Antonio, San Antonio, TX, USA*

8:30 – 9:00 **Neuroimaging Activation Databases**
Angela R. Laird, *Florida International University, Miami, FL, USA*

9:00 – 9:30 **Overview of Meta-Analysis Approaches**
Thomas Nichols, *University of Warwick, Coventry, UK*

9:30 – 10:00 **Bringing New Techniques from Statistics into Neuroimaging Meta-Analysis**
Timothy Johnson, *University of Michigan, Ann Arbor, MI, USA*

10:00 – 10:30 **Break**

Part II: Informatics Approaches to Psychological Constructs

10:30 – 11:00 **Cognitive Ontologies as Top-Down Descriptions**
Jessica A. Turner, *MIND Research Network, Albuquerque, NM, USA*

11:00 – 11:30 **Text Mining and Machine Learning for Neuroinformatics**
Tal Yarkoni, *University of Colorado, Boulder, CO, USA*

11:30 – 12:00 **Inferring Mental States from Neuroimaging Data**
Russell Poldrack, *University of Texas at Austin, Austin, TX, USA*

12:00 – 13:00 **Lunch**

Part III: Applications: Understanding the Structure of the Mind

13:00 – 13:30 **Learning From the Past: Using Prior Neuroimaging Literature to Constrain Predictions of Psychological States**
Tor Wager, *University of Colorado, Boulder, CO, USA*

13:30 – 14:00 **Using Neuroimaging Meta-Analysis to Understand the Structure of Emotion**
Lisa Feldman Barrett, *Northeastern University, Boston, MA, USA*

14:00 – 14:30 **Meta-Analysis for Consolidation of the Literature: Cognitive and Clinical Applications**
Claudia Rottschy, *RWTH Aachen University, Aachen, Germany*

Part IV: Applications: Understanding the Structure of Brain Networks

14:30 – 15:00 **Meta-Analytic Connectivity: Concepts and Task-Dependent Application**
Jennifer L. Robinson, *Auburn University, Auburn, AL, USA*

15:00 – 15:30 **Break**

15:30 – 16:00 **Meta-Analytic Connectivity: Comparison to Resting-State and DTI**
Simon B. Eickhoff, *Heinrich-Heine University Düsseldorf, Düsseldorf, Germany*

16:00 – 16:30 **Co-Activation Based Seed-Region Parcellation**
Danilo Bzdok, *Research Center Jülich, Jülich, Germany*

16:30 – 17:00 **Combining Meta-Analysis with Other Modalities: Clinical and Basic Examples**
Peter T. Fox, *University of Texas Health Science Center at San Antonio, San Antonio, TX, USA*

Resting State Brain Networks

FULL-DAY COURSE | 8:00 – 17:00
618-620, Level 6
Text Code: 769981

Organizers

Bharat Biswal, *UMDNJ, Newark, NJ, USA*
Yu Feng Zang, *Hangzhou Normal University, Hangzhou, China*

This course is designed to teach users how to design, analyze, and interpret resting state brain connectivity. Due to its increasing popularity, a large number of investigators are collecting MRI data from healthy and clinical subjects during rest. A novelty of this course will be that actual data from a large study will be used to show the user, all points of the study. In the first part of the course, users will be taught how to design an experiment for a resting state study. The importance of initial instruction given and the subject's behavioral and physiological parameters including satiety, and emotional state on the baseline signal will be discussed. In the second part, pre-processing and post-processing steps their relative advantages and disadvantages will be demonstrated. During this process, their software implementation will also be demonstrated. In the third part, data integration with other clinical and connectivity measures including DTI will also be shown.

Learning Objectives: Having completed this course, participants will be able to:

1. Design a resting state study, with full knowledge as to how the various behavioral or physiological states would affect RSFC;
2. Understand the sources of variation both within and between subjects. Also, they will be aware of the various pre processing methods used, including their advantages and disadvantages;
3. Generate various measures of connectivity, including seed based, data driven approached including ICA/PCA, aggregate properties including ALFF, small world, etc. Different software implementation including AFNI, FSL, REST, GIFT and CONN will be covered;
4. Integrate the RSFC results with other measures including DTI, EEG, etc; and
5. Analyze Single subject and Group level analysis.

Target Audience: This course is designed for neuroimaging practitioners interested in resting state fMRI studies.

Course Schedule

8:00 – 8:20 **Introduction**
Bharat Biswal, *New Jersey Institute of Technology*

8:20 – 8:50 **Frequency-Dependent Analysis of Resting-State fMRI Signal**
Yu-Feng Zang, *Hangzhou Normal University*

8:50 – 9:20 **Pre-Processing Steps and Considerations**
Christian Windischberger, *Medical University of Vienna, Vienna, Austria*

9:20 – 9:50 **Analysis of Resting-State Data Using ICA**
Christian Beckmann, *NL Donders Institute for Brain, Cognition & Behaviour, Radboud University Nijmegen, Nijmegen, Netherlands*

9:50 – 10:25 **Global Correlations: What You Don't Know Will Hurt You**
Ziad Saad, *National Institute of Health, Bethesda, MD, USA*

10:25 – 10:35 **Break**

10:35 – 11:10 **Analysis: Granger Causality and Other SEM**
Xiaoping Hu, *Georgia Institute of Technology, Atlanta, GA, USA*

11:10 – 11:45 **Functional Connectomics and Network Analysis with Resting-State fMRI**
Yong He, *Beijing Normal University, Beijing, China*

11:45 – 12:25 **Putting Clinical Applications of R-fMRI Into Perspective**
Mike Milham, *Child Mind Institute, New York, NY, USA*

12:25 – 13:25 **Lunch**

13:25 – 14:00 **Functional Brain Organization in Typical and Atypical Development: Insights from Resting-State fMRI**
Vinod Menon, *Stanford University, Stanford, NJ, USA*

14:00 – 14:35 **Combining Diffusion-Based Structural Connectivity with RSFC: Methodological Approaches**
Paul Taylor, *African Institute for Mathematical Sciences, Cape Town, South Africa*

continued on page 18

Resting State Brain Networks, *continued*

14:35 – 15:10 **Multimodal Integration: Combining DTI and fcMRI**
Ching-Po Lin, *National Yang-Ming University, Taipei*

15:25 – 16:00 **Integrating Intracranial Electrodes and Diffusion Tractography to Study Resting State Networks**
Timothy Ellmore, The City College of New York, New York, NY, USA

16:00 – 16:45 **Case Study: Single Subject and Group Analysis**
Suril Gohel and Xin Di, *UMDNJ, Newark, NJ, USA*

16:45 – 17:00 **Resting State Studies: A Pharmaceutical Industry Perspective**
Richard Baumgartner, *Merck Inc*

The Connectome

FULL-DAY COURSE | 8:00 – 17:00
608-610, Level 6
Text Code: 769865

Organizers

Ed Bullmore, *University of Cambridge, Cambridge, UK*
Randy McIntosh, *Rotman Research Institute, Toronto, Canada*

This course provides an introduction to the emerging science of brain 'Connectomics', the study of large-scale networks of structural and functional brain connections. Brain imaging data can provide powerful information for building maps of the 'Human Connectome'.

The first part of the course, Building Connectomes, will provide methodological introductions to the types of data that can be used to define the connectome, including diffusion MRI, resting state FMRI, EEG and MEG.

Session II, Processing Connectomes, will introduce methods for modelling distributed brain networks, progressing from introductory concepts to more advanced discussions of challenging issues such as defining network nodes, integrating across modalities and grouping across individuals.

Connectomics raises new challenges for informatics and visualisation and Session III will include talks highlighting approaches to mining and visualising these complex datasets.

Finally, Session IV will review how the connectomics approach has already provided novel insights into human brain organisation and its breakdown in disease.

Learning Objectives: Having completed this course, participants will be able to:

1. Understand network modelling methods for connectomics;
2. Give examples of approaches to visualising connectomes; and
3. Give examples of applications of connectomics to understanding brain function and dysfunction.

Target Audience: The target audience is researchers with an interest in using human imaging data for studying the connectome. Prior experience of human neuroimaging is expected. Background will be provided for those without experience of network modelling but some talks will address advanced methodological issues that would be of interest to people with experience in this field.

Course Schedule

8:00 – 8:10 **Welcome**

Part I. Building Connectomes

8:10 – 8:35 **Diffusion Tractography and Structural Measures**
Heidi Johansen-Berg, *University of Oxford, Oxford, UK*

8:35 – 9:00 **Overview of Intrinsic Connectivity Networks**
Vince Calhoun, *University of New Mexico, Albuquerque, NM, USA*

9:00 – 9:25 **EEG/MEG and Brain Networks**
Jan-Mathijs Schoffelen, *Radboud University, Nijmegen, Netherlands*

9:25 – 9:50 **MRI Acquisition and Analysis Strategies for Connectomics**
Anastasia Yendiki, *Martinos Center for Biomedical Imaging, Charlestown, MA, USA*

9:50 – 10:20 **Break**

Part II. Processing Connectomes

10:20 – 10:45 **Overview of FMRI Network Modelling Methods in Task and Rest**
Randy McIntosh, *Rotman Research Institute, Toronto, ON, Canada*

10:45 – 11:10 **Edge-Based Parcellation: Concept and Validation**
Steve Petersen, *Washington University, St. Louis, MO, USA*

11:10 – 11:35 **Advanced Network Modelling I: Dynamic Models; Multimodal Integration**
Mark Woolrich, *University of Oxford, Oxford, UK*

11:35 – 12:00 **Advanced Network Modelling II**
Gael Varoquaux, *INSERM, Neurospin, Gif-sur-Yvette, France*

12:00 – 12:30 **Panel Discusssion**

12:30 – 13:30 **Lunch**

Part III. Mining and Visualising Connectomes

13:30 – 13:55 **Complex Network Models to the Human Connectome**
Ed Bullmore, *University of Cambridge, Cambridge, UK*

13:55 – 14:20 **Data Mining and Visualisation**
Angela R. Laird, *Florida International University, Miami, FL, USA*

14:20 – 14:45 **Neuroinformatics for Connectomics**
David van Essen, *Washington University, St. Louis, MO, USA*

14:45 – 15:15 **Break**

15:15 – 15:40 **State-Dependent and Disease-Related Variations in Functional Networks**
Silvina Horovitz, *NINDS, NIH, Bethesda, MD, USA*

15:40 – 16:05 **Brain Networks in Health and Disease**
Alex Fornito, *University of Melbourne, Melbourne, Australia*

16:05 – 16:30 **The Future of Connectomics**
Olaf Sporns, *Indiana University, Bloomington, IN, USA*

16:30 – 17:00 **Panel Discussion**

Neuroimaging 'Big Data' Challenges and Computational Workflow Solutions

FULL-DAY COURSE | 8:00 – 17:00
607, Level 6
Text Code: 769983

Organizers

Ivo D. Dinov, *UCLA, Los Angeles, CA, USA*
Jack D. Van Horn, *UCLA, Los Angeles, CA, USA*

There are Peta bytes of neuroimaging data, 10,000's of computational algorithms reported in the literature, 1,000's of independently developed software tools, and 100's of protocols for analyzing structural, functional, diffusion and spectroscopic neuroimaging data. The demand for sophisticated data management skills, choice of appropriate software tools and reliable computational protocol, and the broad gamut of possible result interpretations require significant multidisciplinary expertise and robust computational infrastructure. Rather than presenting a forum for discussing the theoretical and methodological aspects of neuroimaging and brain mapping, the focus of this education workshop will be on training, practical usage, functionality and applications illustrating tool utilization, software scope and limitations, and available computational infrastructure.

This course will include paired training and application demonstrations on using different graphical and script-based pipeline workflow architectures to manage, process, analyze and visualize large volumes of neuroimaging and genetics data. Attendees will learn to use several concrete end-to-end pipeline workflow solutions for imaging (sMRI, fMRI, DTI) and phenotypic (demographic, genetic, clinical) data in development, aging and pathology. Examples of workflow solutions that will be demonstrated include the LONI Pipeline, Neuroimaging in Python (NiPy), Pipeline system for Octave and Matlab (PSOM) and SWIFT.

Learning Objectives: Having completed this course, participants will be able to:

1. Understand the benefits of employing a pipeline workflow infrastructure for large-scale Neuroinformatics, and identification of differences between alternative workflow architectures;
2. Gain the ability to find, modify, execute, monitor and interpret the results of common computational pipeline protocols; and
3. Have a working knowledge of validating, sharing and reviewing computational neuroimage processing protocols as pipeline workflows.

Target Audience: Three types of learners would benefit from this training workshop – experienced investigators (interested in sharing their computational protocol with wider audiences), novice users (looking for high-throughput data processing capabilities), neuroimaging system administrators (searching for distributed, computationally efficient and efficient mechanism to support heterogeneous image computing cluster systems).

Course Schedule

8:00 – 8:25 **The Pipeline Workflow Environment**
Ivo Dinov, *UCLA, Los Angeles, CA, USA*

8:30 – 8:55 **PTSD/TBI Morphometrics Using the Pipeline**
David Gutman, *Emory University, Atlanta, GA, USA*

9:00 – 9:25 **Single Subject fMRI Workflow**
Satrajit Ghosh, *MIT, Cambridge, MA, USA*

9:30 – 10:00 **Neuroimaging in Python (NiPy) Architecture**
Jarrod Millman, *University of California, Berkeley, Berkeley, CA, USA*

10:00 – 10:30 **Break**

10:30 – 10:55 **Pipeline System for Octave and Matlab (PSOM)**
Pierre Bellec, *l'institut de gériatrie de Montréal, and Université de Montréal, Montréal, QC, Canada*

11:00 – 11:25 **Configurable PSOM Pipeline for the Analysis of Connectomes (C-PAC)**
Cameron Craddock, *Virginia Tech Carilion Research Institute, Roanoke, VA, USA*

11:30 – 11:55 **The Swift Parallel Scripting Language and Computational Neuroscience Applications**
Justin Wozniak, *Argonne National Laboratory, Argonne, IL, USA*

11:55 – 12:00 **Conclusion/Evaluations**

How Not to Analyze Your Data: A Skeptical Introduction to Modeling Methods

HALF-DAY COURSE | 13:00 – 17:00
607, Level 6
Text Code: 769984

Organizers

Tom Nichols, *University of Warwick, Coventry, UK*
Victor Solo, *Electrical Engineering, University of New South Wales, Sydney, Australia*

While the explosive growth of neuroimaging over the last 20 years is now a commonplace, less remarked is the similar growth of neuroimaging data analysis methodology. Indeed since the beginning of the HBM conference about 20% of the posters have been on methodology demonstrating emphatically the enduring importance of methodology.

Further the intense recent interest in connectivity has put pressure on the methodology to deal coherently with the complementary information supplied by different modalities such as MEG, EEG, DTI and so on.

But even though the whole neuroimaging community of necessity uses methods, only fractions are experts. Yet rigorous science requires the scientist to be critical of all aspects of the science and this includes methodology. But how to do this for those who lack the expertise without handing all responsibility to the 'quants'?

This course will tackle that challenge from a number of angles. But an underlying theme will be a bottom-up approach that starts with realistic neuroimaging data and allows the issues to thereby emerge naturally.

Learning Objectives: Having completed this course, participants will be able to:

1. Learn to view neuroimaging methodology from a coherent framework rather than in an adhoc way;
2. Learn simple model criticism techniques including residuals analysis to help deconstruct neuroimaging data analyses; and
3. Understand how to use the physics behind methods to help formulate critical approaches to data analysis.

Target Audience: PhD students, Post-doctoral fellows and junior faculty in all neuroimaging sub disciplines.

Course Schedule

13:00 – 13:30 **Introduction and Philosophy and Examples of Skeptical Neuroimaging**
Victor Solo, *University of New South Wales, Sydney, Australia*

13:30 – 14:00 **Efficient Modeling of fMRI Data Avoiding Misspecification, Bias and Power Loss**
Martin Lindquist, *Johns Hopkins University, Baltimore, MD, USA*

14:00 – 14:30 **Building Confidence in fMRI Results with Model Diagnosis**
Tom Nichols, *University of Warwick, Coventry, UK*

14:30 – 15:00 **Beyond Univariate Analyses: Multivariate Modeling of Functional Neuroimaging Data**
DuBois Bowman, *Emory University, Atlanta, GA, USA*

15:30 – 16:00 **Network Modelling and Connectivity in Functional Neuroimaging – Keeping It Real**
Mark Woolrich, *University of Oxford, Oxford, UK*

16:00 – 16:30 **Avoiding Bias in Longitudinal Image Processing**
Martin Reuter, *MIT, Boston, MA, USA*

16:30 – 17:00 **Direct Non-Invasive Measurements of Neural Currents with MEG and EEG**
Matti Hamalainen, *Martinos Center, Harvard Medical School, Boston, MA, USA*

17:30 – 19:00

Opening Ceremonies and Talairach Lecture

6ABC, Level 6
Text Code: 341872

Please join us for the OHBM Scientific Program Opening Ceremonies. The Wiley Young Investigator Award will be presented, as well as the presentation of the "Editor's Choice Awards."

Talairach Lecture: Brain Activity Mapping

Marcus E. Raichle, MD, *Washington University School of Medicine, St. Louis, MO, USA*

Human brain activity mapping has been with us for over a century. Since the 1970s brain imaging, coupled with principled assessments of human behavior has been dominant. To understand the human brain in health and disease the challenge now is to integrate this work with other levels of inquiry.

19:00 – 21:00

Welcome Reception

Washington State Convention Center, 4CD and North Lobby, Level 4

Join us for the 2013 Annual Meeting Welcome Reception. The reception will be held at the Washington State Convention Center immediately following the Opening Ceremonies and Talairach Lecture on Sunday, June 16th. **Please be sure to wear your badge, as that will serve as your ticket to the event.** Additional guest badges are $50.00.

ASK QUESTIONS ELECTRONICALLY DURING SESSIONS

Text questions to moderators while attending sessions by dialing #22333. In the message field, type in the unique code for the session you are attending followed by your question and then hit send! All session codes can be found at www.humanbrainmapping.org/questions and also next to each session description throughout this program.

Morning Workshop

Functional Assessment Of Brain Development In The Human Fetus

8:30 – 9:45
608-610, Level 6
Text Code: 342764

Organizer

Moriah E. Thomason, *Merrill Palmer Skillman Institute; Pediatrics; Perinatology Research Branch, NIH/NICHD/DHHS, Wayne State University, Detroit, MI, USA*

The organization of the brain is highly plastic in fetal life. Establishment of healthy neural functional systems during the fetal period is essential to normal growth and development. Across the last several decades, remarkable progress has been made in understanding the development of human fetal functional brain systems. This is largely due to advances in minimally invasive imaging methodologies. Fetal neuroimaging began in the 1950-70's with fetal electroencephalography (EEG) applied during labor. Later, in the mid-1980's, magnetoencephalography (MEG) emerged as an effective approach for investigating fetal brain function. Most recently, in the late 1990's, functional magnetic resonance imaging (fMRI) has arisen as an additional powerful approach for examining fetal brain function. This session will cover methodologies, results, limitations and possible future directions for functional fetal neuroimaging research. We will address important insights into the functional organization of the human brain at the beginning of human life that have arisen from MRI and MEG methodologies and will identify important targets for future research.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Enhanced understanding of the highly plastic functional organization of the human brain in fetal life;
2. Expanded discourse about human brain development to include the critical programming that occurs in the human fetal brain; and
3. Demonstration of advances in fetal functional neuroimaging that have broad applications for neuroscience research as a whole.

fMRI of Functional Connectivity in the Fetus

Moriah E. Thomason, *Merrill Palmer Skillman Institute of Child and Family Development; Pediatrics; Perinatology Research Branch, NICHD/NIH/DHHS, Wayne State University, Detroit, MI, USA*

Signal Artifacts and Their Correction in Fetal fMRI

Colin Studholme, *Biomedical Image Computing Group, Departments of Pediatrics, Bioengineering, and Radiology, University of Washington, Seattle, WA, USA*

Time Matters: The Developmental Trajectory of Fetal Brain Dynamics

Hubert Preissl, *MEG Center, University of Tübingen;, Tübingen, Germany and SARA-Research-Center, University of Arkansas for Medical Sciences, Little Rock, AR, USA*

Functional MRI Exploration of the Fetal Auditory Processing

Renaud Jardri, *University Medical Centre of Lille, Pediatric Psychiatry Dept., Fontan Hospital, CURE Unit, Lille, France*

Morning Workshop

Understanding the Basis of Resting-State fMRI Connectivity Dynamics

8:30 – 9:45
6 ABC, Level 6
Text Code: 343708

Organizers

Daniel A. Handwerker, *Section on Functional Imaging Methods, NIMH, Bethesda, MD, USA*
Catie Chang, *Section on Advanced Magnetic Resonance Imaging, NINDS, Bethesda, MD, USA*

Resting-state fMRI has become a promising tool for better diagnosing and monitoring many mental and neurological disorders, as well as for elucidating the functional architecture of the human brain. Although resting-state fMRI is widely applied toward such clinical and scientific goals, many questions regarding analysis practices and interpretation remain open. One such question is the potential biological significance of dynamic changes in connectivity patterns observed at short temporal scales (on the order of seconds to minutes), and how this dynamic behavior may impact the acquisition, analysis, and interpretation of resting-state data. To better understand the biological significance of connectivity dynamics, our session will focus on studies aimed at determining relationships between connectivity changes and measures of neuronal activity, cognition, and behavior. The four speakers in this symposium probe changes in fMRI connectivity using distinct approaches. Shella Keilholz investigates the neural basis of resting-state dynamics using simultaneous MRI and microelectrode recordings; Olaf Sporns will describe how computational models of neuronal networks predict changes in network connectivity across time; Javier Gonzalez-Castillo conducts behavioral interventions (i.e., tasks with different cognitive demands) to evaluate whether dynamic changes in fMRI resting state connectivity at short time scales correlate with experimentally controlled changes in mental processes; and Stephen LaConte applies real-time fMRI to determine whether subjects can modulate resting state networks, and also uses network activity levels to control experimental events. These talks will provide perspectives on new ways to study spontaneous activity and how to best link the insights from task-based and resting fMRI studies.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Learn about current research attempting to elucidate the potential biological significance of fMRI resting state connectivity dynamics;
2. Gain awareness of how dynamic changes in resting state connectivity can inform analysis practices and interpretation of resting state data; and
3. Learn about potential applications for resting state dynamics.

Neural Basis of Dynamic Network Activity

Shella Keilholz, *Wallace H. Coulter Department of Biomedical Engineering, Georgia Tech and Emory University, Atlanta, GA, USA*

EEG Correlates of Functional Connectivity States

Elena Allen, *K.G. Jebsen Center for Research on Neuropsychiatric Disorders and the Department of Biological and Medical Psychology at the University of Bergen, Norway; Mind Research Network, Albuquerque, New Mexico, USA*

When Does a Task Disturb Rest?

Javier Gonzalez-Castillo, *Section on Functional Imaging Methods, NIMH, NIH, Bethesda, MD, USA*

Directly Testing the Roles of Resting-State Networks with Real-Time fMRI

Stephen LaConte, *Virginia Tech, Carilion School of Medicine, Roanoke, VA, USA*

Morning Workshop

Shaping-up Nicely: Advances in Developmental and Translational Neuroimaging of the Subcortex

8:30 – 9:45
605-607, Level 6
Text Code: 343607

Organizer

M. Mallar Chakravarty, *The Centre for Addiction and Mental Health, Toronto, Canada*
Armin Raznahan, *Child Psychiatry Branch, National Institute of Mental Health, Bethesda, MS, USA*

Sub-cortical systems sometimes take a backseat to the cerebral cortex as a focus for basic and clinical neuroimaging studies. However, structures such as the striatum and thalamus are evolutionarily ancient components of the brain that not only play a fundamental role in sensorimotor processing, but also diverse domains of higher mental function. Despite the clear importance of sub-cortical systems for developmentally dynamic, sexually differentiated and disease-sensitive aspects of brain function, sub-cortical maturation and sexual dimorphism in humans remain relatively uncharted, and clinical studies rooted in these normative models are scarcer still. This symposium will bring together some of the latest work from labs in Europe and North American that have been developing and applying new tools for sub-cortical analysis in order to (i) unlock the wealth of shape-related information hidden within classical measures of sub-cortical volume, (ii) create four-dimensional maps of sub-cortical maturation using longitudinal data in healthy youth, (iii) dissect-out patterns of structural and functional connectedness between sub-cortical structures and the rest of the brain, and (iv) leverage these newly-built normative models to arrive at mechanistically informative and clinically useful sub-cortical signatures of neuropsychiatric disorders across the lifespan.

Learning Objectives:

1. The unique challenges faced in MRI-based analysis of sub-cortical systems, and the latest strategies being adopted to address these;
2. How the volume and shape of sub-cortical systems change between childhood and adolescence in healthy males and females, the way in which age and sex-biased illnesses impact typical sub-cortical development, and the structural and functional connections that tie developmental dynamic and disease-sensitive sub-cortical "hot-spots" into other brain systems to underpin behavior; and
3. The power of high-resolution, high-field image acquisition techniques in fine-mapping sub-cortical connectivity in humans as a parallel to animal research and strategies for wielding sub-cortical analyses in order to generate clinical useful predictions in disease states.

Developmental Deformations of the Subcortex in Healthy: Localizing "Hotspots" of Dynamic Change and Sexual Dimorphism in Childhood and Adolescence
Armin Raznahan, *Child Psychiatry Branch, National Institute of Mental Health, Bethesda, MD, USA*

Compromised Neuroanatomical Developmental Trajectories and the Translational Utility of Subcortical Anatomy
M. Mallar Chakravarty, *The Centre for Addiction and Mental Health, Toronto, ON, Canada*

Ultra-High 7T MRI of Structural Age-Related Changes of the Subthalamic Nucleus
Birte U. Forstmann, *Cognitive Science Center Amsterdam, University of Amsterdam, Amsterdam, The Netherlands*

Structural and Functional Cortical-Subcortical Interactions and Their Relationship to Typical and Atypical Development
Damien Fair, *Oregon Health and Science University, Portland, OR, USA*

Break

9:45 – 10:00

LOC Symposium

Neural – Device Interfaces and Cortical Circuitry: Excitement in Both Directions

10:00 – 11:30
6ABC, Level 6
Text Code: 341605

Organizer

Tom Grabowski, *University of Washington, Seattle, WA, USA*

The LOC will showcase Seattle as a center of neuroscientific innovation with a symposium that brings together leading local efforts to fathom the circuitry of the cortex, and to develop novel brain-machine interface technology. Advances in machine learning, sensor technology, and optogenetics have made brain-computer interfaces increasingly feasible, but an understanding of brain systems architecture and its cortical basis is critical for advancing useful BCI and this is in turn informs systems neuroscience.

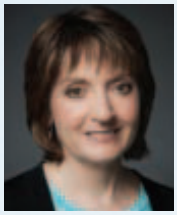
Mapping the Neocortex at the Cellular Level in a Large-Scale and High Throughput Manner
Christof Koch, *Allen Institute for Brain Science, Seattle, WA, USA*

Bidirectional Interactions Between the Brain and Implantable Computers
Eberhard Fetz, *Departments of Physiology & Biophysics and Bioengineering, University of Washington, Seattle, WA, USA*

Dynamic Learning Networks Support Brain-Machine Interface Adaptation
Jeffrey Ojemann, *Department of Neurological Surgery, University of Washington, Seattle, WA, USA*

Break

11:30 – 11:45



Keynote Lecture

The Role of Multimodal Imaging in the Development and Refinement of Deep Brain Stimulation for Depression

11:45 – 12:30
6ABC, Level 6
Text Code: 341001

Helen Mayberg, Emory University, Atlanta, GA, USA

Deep Brain Stimulation is an emerging treatment strategy for patients with intractable depression with imaging playing a crucial role in the development, testing and refinement of the procedure. Combined with real-time behavioral and physiological metrics, these studies offer a unique perspective on critical pathways and mechanisms mediating antidepressant effects of DBS, and on the pathophysiology of treatment resistant depression more generally.

Lunch

12:30 – 13:30

Interactive Poster Presentations

13:30 – 14:15
608-610, Level 6
Text Code: 614743

I-Poster presentations highlight top ranked submitted abstracts. Authors will present their abstracts in a short, "datablitz" format. The objective of the I-Poster session is to arrive at a hybrid of posters and oral sessions.

Moderator: Marco Catani, *Natbrainlab, King's College London, London, UK*

13:30 – 13:35
3511: Combining ZOOPPA and blipped CAIPIRINHA for highly accelerated Diffusion Weighted Imaging at 7T & 3T
Cornelius Eichner, *Athinoula A. Martinos Center for Biomedical Imaging, Charlestown, MA, USA*

13:35 – 13:40
3741: The Human Cerebral Cortex Flattens During Adolescence
Yasser Alemán-Gómez, *Instituto de Investigación Sanitaria*
Gregorio Marañón, IiSGM, HGUGM, *CIBERSAM, Madrid, Spain*

13:40 – 13:45
3880: Attentional base response in human superior colliculus measured using high-resolution fMRI
Sucharit Katyal, *University of Texas at Austin, Austin, TX, USA*

13:45 – 13:50
3958: Reciprocal anti-correlation underlies multi-functionality of the temporo-parietal junction
Danilo Bzdok, *Research Center Jülich, Germany*

13:50 – 13:55
4027: Electrocorticography of the Face and Place Network Connectivity
Mehmet Kadipasaoglu, *University of Texas Medical School at Houston, Houston, TX, USA*

13:55 – 14:00
4030: Functional cross-subject mapping reveals common dimensions of visually evoked brain activity
Natalia Bilenko, *University of California, Berkeley, CA, USA*

14:00 – 14:15
Questions and Answers

Poster Session

13:30 – 15:30
Exhibit and Poster Hall – 4AB, Level 4

Poster Numbers #1000-2119: Even Numbered Posters Stand-By

Brain Stimulation Methods: Deep Brain Stimulation, Direct Electrical/Optogenetic Stimulation, TDCS, TMS

Disorders of the Nervous System: Autism, Developmental Disorders, Other Disorders, Stroke, Obsessive-Compulsive Disorder and Tourette Syndrome, Parkinson's Disease and Movement Disorders, Sleep Disorders

Genetics: Genetic Association Studies, Genetic Modeling and Analysis Methods, Neurogenetic Syndromes

Higher Cognitive Functions: Decision Making, Executive Function, Imagery, Music, Reasoning and Problem Solving, Space, Time and Number Coding

Informatics: Atlases, Databasing and Data Sharing, Pipelines

Language: Language Acquisition, Language Comprehension and Semantics, Reading and Writing, Speech Perception, Speech Production

Learning and Memory: Implicit Memory, Long-Term Memory (Episodic and Semantic), Neural Plasticity and Recovery of Function, Skill Learning, Working Memory

Modeling and Analysis Methods: Bayesian Modeling, Classification and Predictive Modeling, Diffusion MRI Modeling and Analysis, EEG/MEG Modeling and Analysis, Exploratory Modeling and Artifact Removal, fMRI Connectivity and Network Modeling, Image Registration and Computational Anatomy, Motion Correction and Preprocessing, Multivariate modeling, Other Methods, PET Modeling and Analysis, Segmentation and Parcellation, Task-Independent and Resting-State Analysis, Univariate Modeling

Motor Behavior: Brain Machine Interface, Mirror System, Motor Planning and Execution, Visuo-Motor Functions

Physiology, Metabolism and Neurotransmission: Cerebral Metabolism and Hemodynamics, Neurophysiology of Imaging Signals, Pharmacology and Neurotransmission

Break

15:30 – 15:45

Symposium
Brain Stimulation

15:45 – 17:00
6ABC, Level 6
Text Code: 341493

Organizer
Vincent Clark, *University of New Mexico, Albuquerque, NM, USA*

Every few years, a new set of technologies come along that energizes the human brain mapping and cognitive neuroscience communities, such as PET and fMRI have done in previous decades. Brain stimulation may be the next of these. It offers the possibility to test theories of brain organization directly, to treat clinical disorders and to enhance cognition, among other applications. The number of published studies using brain stimulation has increased dramatically in recent years, and this trend is likely to continue as these methods are refined and new, more effective and precise methods are developed. This symposium will discuss the development and applications of technologies that are available today, such as transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS), as well as recently developed technologies that are likely to become commonplace. New methods currently in development will also be discussed, such as thermal, acoustic/mechanical, optical and combinations of these and other methods, and examples of combining brain mapping with brain stimulation will be given. A few individuals who have helped to spearhead the development of brain stimulation for research and clinical applications will share their experiences and their impressions of how the field developing. Learning outcomes will include a basic understanding of the history, present technology and possible future directions of brain stimulation, and how these technologies may impact human brain mapping and cognitive neuroscience.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Learn the most commonly used methods of brain stimulation;
2. Understand how brain stimulation can be used to test hypotheses about brain organization, treat clinical disorders, and be used for neuroenhancement; and
3. Learn about what future developments are in store for brain stimulation.

Transcranial Direct Current Stimulation (tDCS): Current State and Perspectives
Michael A. Nitsche, *University Medicine Göttingen, Dept. Clinical Neurophysiology, Göttingen, Germany*

The History of Developing Daily Left Prefrontal TMS for Treating Depression – Lessons From Brain Imaging Regarding Optimum Location and Biological Effects
Mark S. George, *Brain Stimulation Laboratory, Medical University of South Carolina, Charleston, SC, USA*

Imaging the Effects of Brain Stimulation: Relevance to Learning and Recovery
Heidi Johansen-Berg, *University of Oxford, Oxford, UK*

Technological Perspectives on Neurostimulation: From the Historical Beginnings to Future Directions
Timothy Wagner, *MIT, Boston, MA, USA*

Break
17:00 –17:15

Keynote Lecture
Structure and Dynamics of the Human Connectome

17:15 – 18:00
6ABC, Level 6
Text Code: 341153

Olaf Sporns, *Indiana University, Bloomington, IN, USA*

Efforts are under way to comprehensively map the connections of the human brain (the human connectome) with a variety of imaging methods. Network analysis and modeling have begun to reveal some of the principles underlying brain network organization and its relation to patterns of neural dynamics. Recent studies have suggested that highly connected hub nodes may play a central role in global brain communication and integration of information. I will discuss how network analyses of hubs and their interconnections in conjunction with computational studies of communication processes can inform our understanding of integrative brain function.

Break
18:00 – 18:15

Oral Sessions

18:15 – 19:45

Oral session presentations are chosen by the Program Committee from submitted abstracts using criteria of quality and timeliness; a wide spectrum of investigation is represented.

O – M1: Brain Stimulation Methods and Motor Behavior

602-604, Level 6
Text Code: 341201
Chair: Christian Ruff, *University of Zurich, Zurich, Switzerland*

18:15 – 18:30
1047: Topological correlates of motor improvements after repetitive transcranial magnetic stimulation
Chang-hyun Park, *UCL Institute of Neurology, London, UK*

18:30 – 18:45
2057: The role of the anterior midcingulate cortex in neurofeedback training
Tibor Auer, *Biomedizinische NMR GmbH am Max Planck Institute for Biophysical Chemistry, Goettingen, Germany*

18:45 – 19:00
2061: Exploring the Neural Basis of Observational Motor Learning using Resting-state fMRI
Heather McGregor, *Western University, London, Canada*

19:00 – 19:15
1018: Establishing a causal link between oscillatory coupling of brain activity and cognitive performance
Rafael Polania, *Laboratory for Social and Neural Systems Research, Department of Economics, University of Zurich, Zurich, Switzerland*

19:15 – 19:30
1037: Impact of 5Hz rTMS is related to volume of white matter in the sensory cortex after stroke
Sonia Brodie, *University of British Columbia, Vancouver, Canada*

19:30 – 19:45
1003: Fornix Deep Brain Stimulation Induces Functional Activation in Hippocampal Circuitry
Erika Ross, *Mayo Clinic, Rochester, MN, USA*

O – M2: Disorders of the Nervous System 1: Pediatric and Developmental Disorders

608-610, Level 6
Text Code: 341222
Chair: Damien Fair, *Oregon Health & Science University, Portland, OR, USA*

18:15 – 18:30
3252: Modules of synchronized cortical maturation in typical development and childhood-onset schizophrenia
Aaron F. Alexander-Bloch, *Brain Mapping Unit, Department of Psychiatry, University of Cambridge, Cambridge, UK*

18:30 – 18:45
1064: Diagnostic classification of autism using particle swarm optimization for fMRI feature selection
Colleen Chen, *San Diego State University, San Diego, CA, USA*

18:45 – 19:00
3147: Assaulted Adolescents Fail to Recruit Domain-Specific Neural Networks during Conflict Processing
James Steele, *University of Arkansas for Medical Sciences, Little Rock, AR, USA*

19:00 – 19:15
3155: Childhood Maltreatment Contributes to Altered Resting State Connectivity in Young Combat Veterans
Remi Patriat, University of Wisconsin Madison, Madison, USA

19:15 – 19:30
1081: Robust antero-posterior default mode hypoconnectivity in ASDs despite motion scrubbing
Tuomo Starck, *Oulu University, Oulu, Finland*

19:30 – 19:45
3002: Abnormal Patterns of Gyrification in Fetal Alcohol Spectrum Disorder
Shantanu Joshi, *UCLA, Los Angeles, CA, USA*

O – M3: Modeling and Analysis Methods 1: Resting – State

6 ABC, Level 6
Text Code: 341226
Chair: Elena Allen, *Mind Research Network, Albuquerque, NM, USA*

18:15 – 18:30
1775: Boundaries on Functional Connectivity Boundaries
Fenna Krienen, *Harvard University, Cambridge, MA, USA*

18:30 – 18:45
1796: Detection of Spontaneous Co-activation Patterns by Selectively Grouping Resting-State fMRI Volumes
Xiao Liu, *NIH, Bethesda, MD, USA*

18:45 – 19:00
2019: Inferring Transiently Synchronising Networks using a Hidden Markov Model
Adam Baker, *University of Oxford, Oxford, UK*

19:00 – 19:15
2011: Frequency characteristics of large scale resting state networks using 7T Spin Echo EPI
Erik van Oort, *MIRA Institute, University of Twente, Donders Institute, Radboud University Nijmegen, Nijmegen, Netherlands*

19:15 – 19:30
1996: Characterizing Intrinsic Connectivity Microstates Within The Posteromedial Cortex
Zhen Yang, *Center for the Developing Brain, Child Mind Institute, New York, NY, USA*

19:30 – 19:45
1974: Convergent functional organization of Broca's area across multi-sites rs-fMRI datasets
Yu Zhang, *Institute of Automation, Chinese Academy of Sciences, Beijing, China*

O – M4: High Resolution Imaging

605-607, Level 6
Text Code: 341264
Chair: Natalia Petridou, *UMC Utrecht, Utrecht, Netherlands*

18:15 – 18:30
3384: Fine details of brain anatomy revealed in-vivo by ultra-high resolution quantitative T1 mapping
Pierre-Louis Bazin, *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

18:30 – 18:45
3815: Detailed laminar characteristics of the human neocortex revealed by NODDI and histology
Michiel Kleinnijenhuis, *University Medical Centre St. Radboud, Nijmegen, Netherlands*

18:45 – 19:00
2115: Variable Couplings between Neural Activity and Flow-metabolism across Cortical Lamina
Fahmeed Hyder, *Yale University, New Haven, CT, USA*

19:00 – 19:15
2090: A hemodynamic model for layered BOLD signals
Jakob Heinzle, *Translational Neuromodelling Unit, University Zurich & ETH Zurich, Zurich, Switzerland*

19:15 – 19:30
2104: Correspondence of Spontaneous and Evoked Inter-Laminar Functional Connectivity of Current Sources
Shmuel Naaman, *MNI, McGill University, Montreal, Canada*

19:30 – 19:45
1920: Decoding cell-type specific spatial representations in human entorhinal layers
Tobias Navarro Schroeder, *Donders Institute for Brain, Cognition and Behaviour; Radboud University Nijmegen; The Netherlands, Nijmegen, Netherlands*

ASK QUESTIONS ELECTRONICALLY DURING SESSIONS

Text questions to moderators while attending sessions by dialing #22333. In the message field, type in the unique code for the session you are attending followed by your question and then hit send! All session codes can be found at www.humanbrainmapping.org/questions and also next to each session description throughout this program.

Morning Workshop

Resting State Connectivity: Views From Nonhuman Primates

8:30 – 9:45
6 ABC, Level 6
Text Code: 343605

Organizer

Anna W. Roe, *Dept of Psychology, Vanderbilt University, Nashville, TN, USA*

Correlated spontaneous activity in the resting brain (or resting state activity, RSA) is increasingly recognized as a useful index for inferring underlying functional-anatomic architecture. However, fundamental questions remain regarding the interpretation of RSA; such questions can be informed by studies of RSA in the nonhuman primate. The first two speakers will first address the fundamental issue of whether RSA can be equated with underlying anatomical connectivity and whether the size of the network scale under consideration (local or global) affects this relationship. Dr. Anna Roe will show at a very local mm-based scale within area 3b and 1 in squirrel monkey somatosensory cortex, that local digit connectivity revealed by anatomical tracers and neuronal cross correlation strongly parallels BOLD RSA. Dr. Yasushi Miyashita brings this analysis to a larger scale and will show in anesthetized macaques that RSA may be predicted by interareal short connection patterns but, with larger global networks, it deviates from direct underlying anatomy and is substantially influenced by network-level cortical architecture. The second two speakers will address RSA-inspired studies of homologies between monkey and man. Dr. Sebastian Neggers presents new data suggesting commonalities between monkey and human fronto-striatal systems underlying eye movement behavior; surprisingly, this data calls for a revision of previous models of oculomotor circuitry in the monkey. Using both resting state and natural-vision fMRI data, Dr. Wim Vanduffel examines homologies between monkey and human and identifies signatures for conserved brain circuits as well as distinct networks which may have been adapted for new functions over evolution.

Learning Objectives:

1. What is the anatomical and neurophysiological basis of resting state connectivity? Does this basis differ between the size (local vs global) of network examined?
2. Are there evolutionarily conserved networks?
3. What novel networks have emerged over evolution?
4. How do resting state networks relate to behavioral networks?

The Anatomical and Functional Basis of Resting State Connectivity in Primate Somatosensory Cortex
Anna W. Roe, *Dept of Psychology, Vanderbilt University, Nashville, TN, USA*

Differences in Anatomical Basis of Local vs Global Resting State Networks
Yusuke Adachi, *Dept of Physiology, University of Tokyo, Tokyo, Japan*

Comparison of Human and Monkey Networks Reveal Conserved and Evolutionarily Novel Networks
Wim Vanduffel, *Massachusetts General Hospital, Charlestown, MA, USA*

Comparing the Human and Macaque Fronto-Striatal Oculomotor Network
Bas Neggers, *University Medical Center Utrecht, Utrecht, The Netherlands*

Morning Workshop

Functional Data-Driven Atlases of the Brain

8:30 – 9:45
608-610, Level 6
Text Code: 342778

Organizer

Bertrand Thirion, *Parietal team, INRIA Saclay, Gif sur Yvette, France*

The exploration of brain structure and function through various functional and anatomical neuroimaging modalities includes its segmentation into areas that are characterized by different cytoarchitecture, connectivity and functional organization. In this respect, mounting evidence suggests that region-specific features are, to some extent, reflected in the measurements provided by various neuroimaging modalities. Conversely, emerging neuroimaging and modeling approaches allow the in-vivo parcellation of the brain volume (or cortical surface) as a set of multiple pieces or modules. Parcellations are a concise way to map information conveyed by various modalities, as they relate these observations with a certain ontology of brain structures and organization. They play a key role in the understanding of structure-function relationships, i.e. in the identification of the neural implementation of various cognitive functions. The practical value of brain parcellations is that intersubject anatomical variability as well as the additional spatial variability of functional regions cannot be completely overcome by current spatial normalization methods. However, the impact of such residual variability can be mitigated by the use of extended regions instead of voxels when brain image analysis procedures are performed at the group level. An additional benefit of parcellations is that they make it possible to run complex analysis procedures (e.g. the estimation of graphical models in connectivity studies) in an informed fashion rather than arbitrarily dividing the brain into small units. They also make it easier to run multivariate pattern analyses and to provide benefits in sensitivity by limiting the multiple comparison problem. This particular aspect might gain importance with the advent of high-resolution data on the one hand, and of under-powered neuroimaging-genetic studies on the other hand. In spite of the emerging success of the data-driven definition of brain regions, this approach also carries some ambiguities: subdivision of some structures into sub-structures is debatable and sharp borders are not necessarily observed with a high confidence due to limited resolution and signal-to-noise ratio of current neuroimaging data. Current challenges from group models to individual models: to make parcellations usable, a major issue is to adapt a model (atlas) to a given subject under study. Data-driven procedures are particularly useful because they can take into account the characteristics of new subjects. Yet, it is still unclear how to model properly this between-subject variability. Link data-driven models with an ontology of brain regions: the neuroimaging community deals with many different ontologies of the brain territories, that provide more or less consistent labellings of the image data. As a community, we need to find rules to decide on the evolution of the ontology; on the other hand, data-driven parcellations need to take into account prior knowledge associated with current ontologies. Improve the data-driven definition of brain regions: parcellation models need to be inferred from and compared across different modalities, protocols and methods. They can take various priors or constraints into account. The procedures used to infer them have to be made available to the community.

Model selection: Given a certain amount of data, the model that represents the best bias-variance compromise can be considered as the "best" model. In the case of brain parcellations, the problem consists typically in estimating the right number of regions. However defining this best model this is intrinsically an ill-posed problem, and rather indirect approaches and surrogate criteria have to be used instead.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Understand the neuroscientific underpinnings of brain parcellation models and the limitations as well as open issues in current parcellation schemes and models;
2. Know what combinations of imaging modalities and computational tools are currently used to perform brain parcellation, as well as the best practices;
3. Refer to adequate tools and packages to find the necessary resource; and
4. Understand the impact of choosing adapted spatial models for connectivity inference, multivariate pattern analysis or group studies (e.g. neuroimaging-genetics).

Data Driven Methods for Neuroimaging Phenotypes: Progress and Pitfalls

Jessica A. Turner, *Director of Operations, 3T MRI Center, Mind Research Network, Albuquerque, NM, USA*

Areas and Clusters: What Are We Mapping?

Simon B. Eickhoff, *Heinrich-Heine University Düsseldorf, Düsseldorf, Germany*

Brain Parcellations for the Modeling of Brain Functional Connectivity

Steve Petersen, *Director, McDonnell Center for Systems Neuroscience Depts. of Neurology and Psychology Washington University Medical School, Saint Louis, MO, USA*

A Statistical Perspective on Brain Parcellations

Bertrand Thirion, *Parietal team, INRIA Saclay, Gif sur Yvette, France*

Morning Workshop

On the Use of Brain Network Measures to Characterize Major Mental Disorders

8:30 – 9:45
605-607, Level 6
Text Code: 343577

Organizer

Vince D. Calhoun, *The Mind Research Network & The University of New Mexico, Albuquerque, NM, USA*

There has been a considerable amount of work recently on the characterization of brain structure and function in the context of "networks". This includes identifying correlated changes, defining various network properties (such as small worldness, rich club behavior, or more general information theoretic measures) and evaluating changes in these properties in various patient groups. We propose to bring together experts in the use of network-based approaches to characterize neuropsychiatry illness. Dr. Bullmore will present an overview of how network approaches can inform a study of schizophrenia, from characterizing resting and task networks, pharmacological interventions, and even generative models. Dr. Calhoun will discuss some exciting findings showing state versus trait aspects are captured in different intrinsic network properties in schizophrenia and bipolar disorder. He will also discuss the issue of overlapping symptoms in the patient groups. Dr. Hendler utilizes a new approach for portraying individual emotional experience via dynamics in network cohesion to characterize the interaction between emotional and cognitive aspects of mental processing in schizophrenia patients and their healthy siblings. And Dr. Jiang will discuss a multi-level framework for characterizing mental illness from whole-brain networks to genes.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Realize the superiority of using network-based approach for translating brain imaging finding to mental illness practice;
2. Understand the differences between the neural correlates of state and trait aspect of mental illness as well as the importance of these concepts for effective personalized psychairty; and
3. Identify several types of network measures in brain imaging and understand their differential advantages and disadvantages for the diagnosis and/or treatment of mental disorders.

Brain Network Disorganization in Schizophrenia
Ed Bullmore, *University of Cambridge, Cambridge, UK*

Intrinsic Functional Networks are Sensitive Markers of State versus Trait Changes in Bipolar Disorder and Schizophrenia
Vince D. Calhoun, *The Mind Research Network & The University of New Mexico, Albuquerque, NM, USA*

Network Probing of Emotional Dynamics in Schizophrenia Patients and Their Healthy Siblings
Talma Hendler, *Tel Aviv Medical Center and Tel Aviv University, Tel Aviv, Israel*

Brainnetome-Wide Association Studies in Schizophrenia
Tianzi Jiang, *The Chinese Academy of Sciences, Beijing, China*

Break

9:45 – 10:00

Keynote Lecture

Linking Mental and Neural Function Using Representational fMRI

10:00 – 10:45
6ABC, Level 6
Text Code: 340739

Russell Poldrack, *University of Texas at Austin, TX, USA*

A continuing debate has centered around the question of whether neuroimaging can inform questions about psychological function. I will show how representational similarity analysis with fMRI data provides the ability to test the claims of psychological models regarding the similarity of mental representations, and discuss how these methods allow the establishment of powerful isomorphisms between psychological and neural representations.

Break

10:45 – 11:00

Oral Sessions

11:00 – 12:30

Oral session presentations are chosen by the Program Committee from submitted abstracts using criteria of quality and timeliness; a wide spectrum of investigation is represented.

O – T1: Higher Cognitive Functions

602-604, Level 6
Text Code: 341278
Chair: Simon Eickhoff, *Heinrich-Heine University Düsseldorf, Düsseldorf, Germany*

11:00 – 11:15
1297: A within-attribute comparison strategy in multi-attribute choice
Laurence Hunt, *University College London, London, UK*

11:15 – 11:30
1417: Analogue coding of nonsymbolic numbers and digital coding of symbolic numbers in the human brain
Ian Lyons, *University of Chicago, Chicago, IL, USA*

11:30 – 11:45
1317: Informatic Parcellation of the Network Involved in the Neural Computation of Value
John Clithero, *California Institute of Technology, Pasadena, CA, USA*

11:45 – 12:00
1367: Post-error adjustments are modulated by acetylcholine
Markus Ullsperger, *Radboud University, Nijmegen, Netherlands*

12:00 – 12:15
1352: Functional Maturation of the Executive System in Adolescence
Theodore Satterthwaite, *UPenn, Philadelphia, PA, USA*

12:15 – 12:30
1400: Interactions between nucleus accumbens and sensory cortices predict music reward value
Valorie N. Salimpoor, *McGill University, Montreal, Canada*

O – T2: Modeling and Analysis Methods 2: Functional Modeling

6 ABC, Level 6
Text Code: 341353
Chair: Stephen LaConte, *Virginia Tech, Carilion School of Medicine, Roanoke, VA, USA*

11:00 – 11:15
1708: EEG modeling of the sleep wake transition using physiologically based neural field theory
Romesh Abeysuriya, *University of Sydney, Sydney, Australia*

11:15 – 11:30
1752: Spatiotemporal neural dynamics from fMRI: Deconvolution with a spatiotemporal HRF
Kevin Aquino, *University of Sydney, Sydney, Australia*

11:30 – 11:45
1786: Connectivity-based neurofeedback: dynamic causal modeling for real-time fMRI.
Yury Koush, *EPFL Lausanne, Lausanne, Switzerland*

11:45 – 12:00
1662: Sparse network-based discriminative models for depression using fMRI
Maria Joao Rosa, *UCL, London, UK*

12:00 – 12:15
1823: Granger causality analysis of fMRI is invariant to hemodynamic convolution but not downsampling
Anil Seth, *University of Sussex, Brighton, UK*

12:15 – 12:30
1800: Dynamic causal modeling for arterial spin labeling data
Martin Havlicek, *Maastricht University, Maastricht, Netherlands*

O – T3: Neuroimaging Genetics and Informatics

608-610, Level 6
Text Code: 341377
Chair: Jason Stein, *UCLA, Los Angeles, CA, USA*

11:00 – 11:15
4110: Model-based neurogenetic characterization of social information processing in an interactive game
Andreea Oliviana Diaconescu, *Translational Neuromodeling Unit (TNU), University & ETH Zürich, Zurich, Switzerland*

11:15 – 11:30
1285: SOLAR-Eclipse computational tools for imaging genetic and mega-genetic analysis
Peter Kochunov, *Maryland Psychiatric Research Center, Baltimore, MD, USA*

11:30 – 11:45
1284: Multi-Site Genetic Analysis of 1151 Diffusion MRI Scans from the ENIGMA–DTI Working Group
Neda Jahanshad, *UCLA, Los Angeles, CA, USA*

11:45 – 12:00
1288: VGWAS revisited: A novel and powerful approach to voxelwise genome-wide association studies
Jonathan Rosenblatt, *Tel Aviv University, Tel Aviv, Israel*

12:00 – 12:15
1289: Voxel-wise and Cluster-based Heritability Inferences of fMRI Data
Xu Chen, *University of Warwick, Coventry, UK*

12:15 – 12:30
1282: Genetic control of resting state default mode network derived from task fMRI using a TWINs dataset
Mayuresh Korgaonkar, *University of Sydney, Sydney, Australia*

O – T4: Language, Learning and Memory

605-607, Level 6
Text Code: 341227
Chair: Svenja Caspers, *Institute for Neuroscience and Medicine, Research Center Jülich, Jülich, Germany*

11:00 – 11:15
1556: Layer-specific encoding processes in the human medial temporal lobe
Anne Maass, *Institute of Cognitive Neurology and Dementia Research, Otto-von-Guericke-University Magdeburg, Magdeburg, Germany*

11:15 – 11:30
1598: A longitudinal study of fronto-parietal and fronto-striatal networks and working memory development
Fahimeh Darki, *Neuroscience Department, Stockholm, Sweden*

11:30 – 11:45
1608: Feedback associated with reward normalizes responses in ADHD children during working memory tasks
Rubi Hammer, *Northwestern University, Evanston, IL, USA*

11:45 – 12:00
1472: The neural segregation of syntax from semantics in the developing brain
Michael Skeide, *MPI CBS, Leipzig, Germany*

12:00 – 12:15
1542: Sensory-Motor Integration in Speech Production, a Voxel-Based Lesion-Symptom Mapping Study
Tasha Poppa, *University of California, Irvine, Irvine, CA, USA*

12:15 – 12:30
3951: Electrocorticography of visual cortex responses to multisensory speech
Inga Schepers, *University of Texas Health Science Center at Houston, Houston, TX, USA*

Lunch

12:30 – 13:30

Interactive Poster Presentations

13:30 – 14:15
608-610, Level 6
Text Code: 675686

Moderator: Peter Bandettini, *National Institutes of Health, Bethesda, MD, USA*

I-Poster presentations highlight top ranked submitted abstracts. Authors will present their abstracts in a short, "datablitz" format. The objective of the I-Poster session is to arrive at a hybrid of posters and oral sessions.

13:30 – 13:35
3376: Background-Suppressed Myelin Water Imaging
Jongho Lee, *University of Pennsylvania, Philadelphia, PA, USA*

13:35 – 13:40
3465: Physiological Noise Reduction in 7 T fMRI using Concurrent Magnetic Field Monitoring
Jakob Heinzle, *University of Zurich/ETH Zurich, Zurich, Switzerland*

13:40 – 13:45
3416: BOLD mapping of finger movement compares with electrophysiology; a combined 7T fMRI and ECoG study
Jeroen Siero, *UMC Utrecht, Utrecht, Netherlands*

13:45 – 13:50
3549: Colocalizing EEG and fMRI in Space
Pamela Douglas, *UCLA, Los Angeles, CA, USA*

13:50 – 13:55
3552: EEG dynamic source imaging based on general linear modeling and non-parametric statistical testing
Anna Custo, *University of Geneva, Switzerland*

13:55 – 14:00
3593: A combined portable multimodal imaging system for electric and hemodynamic activity of the brain
Javad Safaie, *UPJV, Amiens, France*

14:00 - 14:15
Questions and Answers

Poster Session

13:30 – 15:30
Exhibit and Poster Hall – 4AB, Level 4

Poster Numbers #1000-2119: Odd Numbered Posters Stand-By

Brain Stimulation Methods: Deep Brain Stimulation, Direct Electrical/Optogenetic Stimulation, TDCS, TMS

Disorders of the Nervous System: Autism, Developmental Disorders, Other Disorders, Stroke, Obsessive-Compulsive Disorder and Tourette Syndrome, Parkinson's Disease and Movement Disorders, Sleep Disorders

Genetics: Genetic Association Studies, Genetic Modeling and Analysis Methods, Neurogenetic Syndromes

Higher Cognitive Functions: Decision Making, Executive Function, Imagery, Music, Reasoning and Problem Solving, Space, Time and Number Coding

Informatics: Atlases, Databasing and Data Sharing, Pipelines

Language: Language Acquisition, Language Comprehension and Semantics, Reading and Writing, Speech Perception, Speech Production

Learning and Memory: Implicit Memory, Long-Term Memory (Episodic and Semantic), Neural Plasticity and Recovery of Function, Skill Learning, Working Memory

Modeling and Analysis Methods: Bayesian Modeling, Classification and Predictive Modeling, Diffusion MRI Modeling and Analysis, EEG/MEG Modeling and Analysis, Exploratory Modeling and Artifact Removal, fMRI Connectivity and Network Modeling, Image Registration and Computational Anatomy, Motion Correction and Preprocessing, Multivariate modeling, Other Methods, PET Modeling and Analysis, Segmentation and Parcellation, Task-Independent and Resting-State Analysis, Univariate Modeling

Motor Behavior: Brain Machine Interface, Mirror System, Motor Planning and Execution, Visuo-Motor Functions

Physiology, Metabolism and Neurotransmission: Cerebral Metabolism and Hemodynamics, Neurophysiology of Imaging Signals, Pharmacology and Neurotransmission

Break

15:30 – 15:45

Symposium
Bridging Brain Imaging and Gene Expression

15:45 – 17:00
6ABC, Level 6
Text Code: 341496

Organizer
Michael Hawrylycz, *Allen Institute for Brain Science, Seattle, WA, USA*
Marcus Raichle, *Washington University School of Medicine, St. Louis, MO, USA*

Imaging genetics studies have focused on exploring or discovering genes involved in imaging endophenotypes for function or disease states in genome-wide association studies or correlating the specific genotypes for a candidate gene or set of candidate genes with imaging-based measures. Methods and resources for large-scale gene expression or transcriptomics studies have recently become more widely available and more sophisticated in terms of quantitative readouts and ability to correlate gene expression with underlying genetic architecture. These advances open the possibilities for further connections among imaging, imaging genetics and gene expression datasets to formulate and validate hypotheses regarding biological mechanisms in both normal functioning and disease states. We will present studies from diverse areas of research to demonstrate how researchers are currently integrating gene expression and imaging research to understand: structural and functional brain networks in adult and developing brain, continuities and discontinuities of genetic effects during development in light of changes in control networks and environmental influences, validation of imaging and other biomarkers for major neuropsychiatric disorders, and relationships of gene expression with structural and cellular architecture of the human brain.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Understand cutting-edge approaches for integrating gene expression and imaging datasets; and
2. Understand how assessing gene expression can advance the study of brain structure and function in normal and disease states.

Aerobic Glycolysis Identifies Neotenous Regions of the Human Brain
Manu Goyal, *Washington University School of Medicine, St. Louis, MO, USA*

Genes and Developing Brain Networks
Michael I. Posner, *Department of Psychology, University of Oregon, Eugene, OR, USA*

Validating MRI Imaging Data with Serum Biomarkers and the Whole Genome Gene Expression Data Base of the Allen Human Brain Atlas
Matthias Schroeter, *Max Planck Institute for Human Cognitive and Brain Sciences & Clinic of Cognitive Neurology, University of Leipzig, Leipzig, Germany*

An Anatomically Comprehensive Atlas of Gene Expression in Adult Human Brain
Ed Lein, *Allen Institute for Brain Science, Seattle, WA, USA*

Break
17:00 – 17:15

Keynote Lecture
Connecting fMRI to Lesion Studies

17:15 – 18:00
6ABC, Level 6
Text Code: 340890

Cathy Price, *Wellcome Trust Centre for Neuroimaging, University College London, UK*

For identifying brain structures associated with cognitive functions, the contribution of fMRI belittles that of the old lesion-deficit approach. However, the tables are turned when it comes to the more clinically important business of identifying cognitive ability from brain structure. I will discuss new ways to integrate these old approaches.

Poster Reception
18:00 – 19:30
Exhibit and Poster Hall – 4AB, Level 4

There is a reception being held in the poster hall from 18:00 – 19:30. If you have a poster that was presented on Monday or Tuesday, you are welcome to stand by your poster and present.

ASK QUESTIONS ELECTRONICALLY DURING SESSIONS

Text questions to moderators while attending sessions by dialing #22333. In the message field, type in the unique code for the session you are attending followed by your question and then hit send! All session codes can be found at www.humanbrainmapping.org/questions and also next to each session description throughout this program.

Morning Workshop

Current Directions in Neuroimaging of Language and Language-Related Disorders

8:30 – 9:45
605-607, Level 6
Text Code: 342534

Organizer

William W. Graves, *Rutgers University, Newark, NJ, USA*

The neural bases of typical and disordered language were among the first applications of functional neuroimaging, and discoveries have continued apace ever since. The goal of this workshop is to give a snapshot of the current state of the art in the functional brain imaging of language and language-related disorders. Although much is now known about the neural regions that support typical language and areas of damage that lead to language deficits, less is known about how such regions work together as a network to support language functions. Connectivity among regions can also change over time, whether in terms of developmental trajectory over years, as a result of an advancing neurodegenerative disease process, or even with different information processing demands within a single experiment. Language networks reported at the group level can also vary among individuals, whether pathological or within the typical performance range. In some cases these differences may be more clearly elucidated using recent network-level and/or dynamic time course analyses than with traditional static mapping approaches. This workshop will present experiments aimed at these issues and more using a range of brain imaging techniques including fMRI, VBM, DTI, EEG, and MEG.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Learn about the role of individual differences in neuroimaging studies of language, including how measuring such differences can be informative beyond exclusively reporting group means;
2. Learn about the dynamic arrangement of language-related brain regions into networks and how such networks may change over various time scales; and
3. Become acquainted with contemporary approaches to analyzing neuroimaging data that are used to understand language function and dysfunction. These include analyses of fMRI data with multiple continuous regressors, as well as analyses of functional, effective, and structural connectivity. Approaches integrating fMRI with EEG and MEG will also be discussed.

Automatic and Predictive Contextual Facilitation in Comprehension: Evidence from Multimodal Neuroimaging
Ellen Lau, *Department of Linguistics, University of Maryland, College Park, MD, USA*

Mapping the Language Network: Multimodal Neuroimaging in Primary Progressive Aphasia
Stephen M. Wilson, *Department of Speech, Language, and Hearing Sciences and Department of Neurology, University of Arizona, Tucson, AZ, USA*

Identifying Static and Dynamic Neural Indices of Individual Differences in Comprehension Abilities
Chantel S. Prat, *Department of Psychology and Institute for Learning & Brain Sciences, University of Washington, Seattle, WA, USA*

Influences of Individual Differences and Performance on the Neural Reading Network
William W. Graves, *Department of Psychology, Rutgers University, Newark, NJ, USA*

Morning Workshop

The Functional Implications of Brain Signal Variability

8:30 – 9:45
608-610, Level 6
Text Code: 343659

Organizers:

Biyu Jade He, *National Institute of Neurological Disorders and Stroke, NIH, Bethesda, MD, USA*
Douglas Garrett, *Center for Lifespan Psychology, Max Planck Institute for Human Development, Berlin, Germany*

Brain signal variability has been traditionally considered noise. While the field of resting-state networks has revealed an impressive and rich hierarchical-organization within spontaneous brain activity via studying connectivity patterns among brain regions, much remains unknown regarding the exact mechanisms and functional roles of variability per se. The four speakers in this proposal have studied signal variability from different angles and with a variety of techniques and methodology, including functional magnetic resonance imaging (fMRI), electroencephalography (EEG), magnetoencephalography (MEG), electrocorticography (ECoG), neuronal spiking, and neural network modeling. A particular emphasis will be placed on the functional implications of signal variability, including its relation to cognition and behavioral performance, as well as changes of brain variability during development, aging and certain clinical conditions. Neural network models will further shed light upon the mechanisms of signal variability. Converging results from these diverse methods suggest that signal variability represents a complemenary, if not orthogonal dimension of information processing in the brain. More practically, we suggest that as an alternative to mean-signal-based brain mapping that has brought tremendous successes over the past two decades, brain signal variability provides a promising new approach to mapping the brain in the context of resting-state or cognitive experiments.

Learning Objectives: Having completed this workshop, participants will be able to:

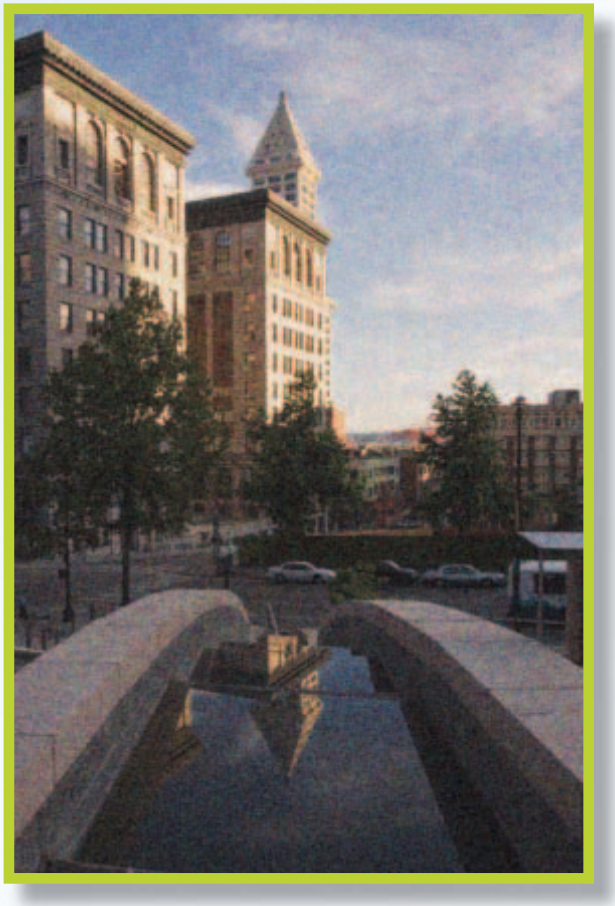
1. Understand the various emerging approaches in the study of brain signal variability;
2. Understand the relationship between brain signal variability and traditional signal-mean-based measurements; and
3. Recognize the functional implications of brain signal variability across task types, cognitive domains, as well as developmental and clinical groups.

Brain Signal Variability is a Robust Marker of Aging and Cognition
Douglas Garrett, *Center for Lifespan Psychology, Max Planck Institute for Human Development, Berlin, Germany*

The Development of a Noisy Brain
A. Randy McIntosh, *Department of Psychology, University of Toronto, Toronto, ON, Canada*

Brain Variability and Task Performance
Biyu Jade He, *National Institute of Neurological Disorders and Stroke, NIH, Bethesda, MD, USA*

The Dynamical Structure of Brain Fluctuations At Rest
Gustavo Deco, *Center for Brain and Cognition, University Pompeu Fabra, Barcelona, Spain*



Morning Workshop

The Human Connectome Project: What's in the Data and How Can I Begin Data Mining?

8:30 – 9:45
6 ABC, Level 6
Text Code: 343660

Organizer

David Van Essen, *Washington University, St. Louis, MO, USA*

The Human Connectome Project (HCP) recently began a three-year period of systematically acquiring high-resolution MRI scans from a large number of healthy adults, along with extensive behavioral data. This effort, led by Washington University, University of Minnesota, and Oxford University (the 'WU-Minn HCP Consortium'), follows a two-year period of intensive improvements in data acquisition and analysis that will take advantage of advanced pulse sequences and a customized Siemens 3T Skyra. The MRI modalities include diffusion imaging, resting-state fMRI (R-fMRI) and task fMRI (T-fMRI), along with T1w and T2w structural images. By the time of the OHBM meeting, there will have been two quarterly data releases (winter and spring of 2013), and the data will be available at multiple levels of analysis: (i) primary (unprocessed) datasets from each modality; (ii) minimally preprocessed datasets that have been processed systematically to take advantage of the intrinsically high data quality; and (iii) extensively processed datasets that can be used for visualizing brain connectivity, structure, and function in group averages and in individual subjects.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Acquaint the audience with the exceptionally high quality of the neuroimaging data that have been acquired and made available to the neuroscience community;
2. Illustrate how the data from different imaging modalities have been analyzed and can be visualized; and
3. Provide examples of how the HCP data can be mined in order to relate brain connectivity and function to behavior in individual healthy adults.

Data Acquisition on the WU-Minn 3T Connectome Skyra
Junqian (Gordon) Xu, *Mount Sinai School of Medicine, New York, NY, USA*

Analysis and Interpretation of Diffusion Imaging Data Acquired by the WU-Minn HCP Consortium
Tim Behrens, *Oxford University, Oxford, UK*

Analysis and Interpretation of Resting-State fMRI and Task-fMRI Data Acquired by the WU-Minn HCP Consortium
Michael Harms, *Washington University, St. Louis, MO, USA*

Visualization and Mining of HCP Data in Individuals and Across Groups
David Van Essen, *Washington University, St. Louis, MO, USA*

Break

9:45 – 10:00

Keynote Lecture

It's Maps All the Way Up

10:00 – 10:45
6ABC, Level 6
Text Code: 341003

Martin Sereno,
University College London, London, UK

Topological maps of receptor sheets are well known from early sensory processing stages. But two-dimensional topological maps are also common at higher levels of processing. Moving hills of activity within predominantly locally-interconnected areas, each then interconnected with a handful of other similar areas, is argued to be the primary mode of neural representation in the brain.

Break

10:45 – 11:00

Oral Sessions

11:00 – 12:30

Oral session presentations are chosen by the Program Committee from submitted abstracts using criteria of quality and timeliness; a wide spectrum of investigation is represented.

O – W1: Perception and Attention

605-607, Level 6
Text Code: 341500
Chair: Geoff Boynton, *University of Washington, Seattle, WA, USA*

11:00 – 11:15
3960: Reorganization of auditory motion direction encoding in early blind humans
Fang Jiang, *University of Washington, Seattle, WA, USA*

11:15 – 11:30
4015: Broadly Tuned Face and Hand Representations in Human Ventral Temporal Cortex
Nicolas Davidenko, *UC Santa Cruz, Santa Cruz, CA, USA*

11:30 – 11:45
3953: Is this really an orange? Effects of crossmodal semantic congruency on olfactory perception
Janina Seubert, *Monell Chemical Senses Center, Philadelphia, PA, USA*

11:45 – 12:00
3861: Predicting Response Time Variations from Anticipatory Modulation of Large-scale Brain Networks
Matthias Ekman, *Donders Institute for Brain, Cognition and Behaviour, Nijmegen, Netherlands*

12:00 – 12:15
3896: White matter damage in healthy aging disrupts neural oscillations underlying top-down attention
David Ziegler, *UCSF, San Francisco, CA, USA*

12:15 – 12:30
3936: Measurement of auditory frequency selectivity in the depth of human inferior colliculus
David Ress, *The University of Texas at Austin, Austin, TX, USA*

O – W2: Modeling and Analysis Methods 3: Structural and Diffusion

6 ABC, Level 6
Text Code: 341507
Chair: Ged Ridgway, *UCL Institute of Neurology, London, UK*

11:00 – 11:15
1623: Analysis of Multiple Sclerosis Lesions via Spatially Varying Coefficients
Tian Ge, *University of Warwick, Coventry, UK*

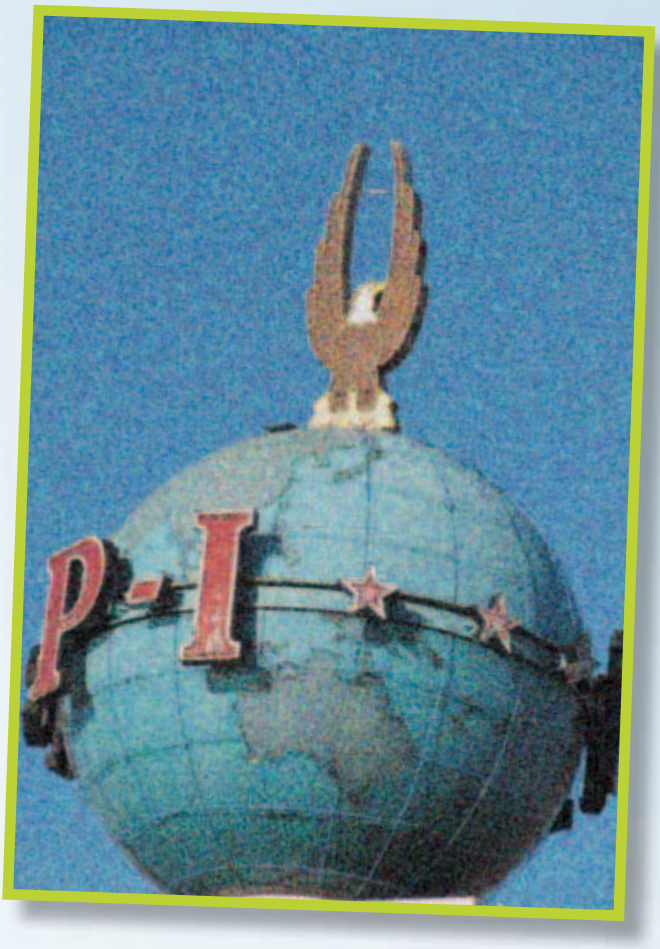
11:15 – 11:30
1657: Predicting favorable vs non-favorable surgery outcome in patients with mesial temporal lobe epilepsy
Delia-Lisa Feis, *Max Planck Institute for Neurological Research, Cologne, Germany*

11:30 – 11:45
1883: Automated Analysis of the Shape of Sulcal Curves using the Anisotropic Helmholtz Equation
Anand Joshi, *University of Southern California, Los Angeles, CA, USA*

11:45 – 12:00
1885: Brain Image and Fiber Log-demons Registration with Currents
Viviana Siless, *Parietal Team, INRIA, Saclay, Paris, France*

12:00 – 12:15
1676: DoubleAx: In-vivo Axon Measurement in the Human Corpus Callosum Using Angular Double-PFG MRI
Wenjin Zhou, *Oakland University, Rochester Hills, MI, USA*

12:15 – 12:30
1898: Towards joint morphometry of white matter tracts and gray matter surfaces
Pietro Gori, *Inria – ICM, Paris, France*



O – W3: Neuroanatomy

608-610, Level 6
Text Code: 341547
Chair: Gaolang Gong, *Montreal Neurological Institute and Hospital, McGill University, Montreal ,Canada*

11:00 – 11:15
3851: MR diffusion-based histology and micro-tractography reveal mesoscale details of the human cerebellum
Flavio Dell'Acqua, *King's College London – Institute of Psychiatry, London, UK*

11:15 – 11:30
3844: Estimation of fiber orientation distribution functions in 3D-polarized light imaging
Melanie Dohmen, *Institute for Neuroscience and Medicine, Research Center Juelich, Juelich, Germany*

11:30 – 11:45
3759: Learning to read improves the structure of the arcuate fasciculus
Michel Thiebaut de Schotten, *Institute of Psychiatry, London, UK*

11:45 – 12:00
3816: Identifying Heavily Myelinated Areas of the Cortex using subject-specific Cortical Profiles of T1
Miriam Waehnert, *Max-Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

12:00 – 12:15
3765: Pupil diameter indexes locus coeruleus activity in humans
Joshua Balsters, *ETH Zurich, Zurich, Switzerland*

12:15 – 12:30
3840: Connectome based classification of brain-derived neurotrophic factor Met allele carriers
Christophe Phillips, *Cyclotron Research Centre, University of Liege, Sart Tilman, Liege, Belgium*

O – W4: Disorders of the Nervous System 2: Psychiatric Illness

602-604, Level 6
Text Code: 341593
Chair: Vaibhav Diwadkar, *Wayne State University, Detroit, MI, USA*

11:00 – 11:15
3755: Gray matter volume analysis in major depression based on cytoarchitectonic maps of the frontal pole
Sebastian Bludau, *Institute of Neuroscience and Medicine, INM-1, Juelich, Germany*

11:15 – 11:30
3250: Mapping thalamo-cortical function in psychiatric disease: focus on schizophrenia and bipolar illness
Alan Anticevic, *Yale University School of Medicine, New Haven, CT, USA*

11:30 – 11:45
3217: An fMRI study of impaired sensory prediction in schizophrenia
Thomas White, *Institute of Psychiatry, King's College London, London, UK*

11:45 – 12:00
3197: Real-time fMRI Neurofeedback Training of Amygdala Modulates Frontal EEG Asymmetry in MDD Patients
Vadim Zotev, *Laureate Institute for Brain Research, Tulsa, OK, USA*

12:00 – 12:15
3165: Disrupted effective connectivity between amygdala and OFC in social anxiety disorder revealed by DCM
Ronald Sladky, *MR Centre Of Excellence, Medical University of Vienna, Austria*

12:15 – 12:30
3009: Altered Brain Network Interactions Are Associated With Nicotine Withdrawal
Elliot Stein, *NIH, Baltimore, MD, USA*

Lunch

12:30 – 13:30

Interactive Poster Presentations

13:30 – 14:15
608-610, Level 6
Text Code: 36265

I-Poster presentations highlight top ranked submitted abstracts. Authors will present their abstracts in a short, "datablitz" format. The objective of the I-Poster session is to arrive at a hybrid of posters and oral sessions.

Moderator: Ziad Saad, *National Institute of Health, Bethesda, MD, USA*

13:30 – 13:35
1628: Using Bayesian priors to improve power of whole brain voxel- and connexelwise inferences
Krzysztof Gorgolewski, *Max Planck Institute for Human Brain and Cognitive Sciences, Leipzig, Germany*

13:35 – 13:40
1622: A Bayesian Random Shape model for fMRI and MRI Brain Activity Analysis
Lijun Zhang, *Emory University, Atlanta, GA, USA*

13:40 – 13:45
1710: Frequency Specific Interactions of MEG activity within and across resting state networks as revealed
Laura Marzetti, *Department of Neuroscience and Imaging, University 'G. d'Annunzio' Chieti Pescara, Chieti, Italy*

13:45 – 13:50
1834: Inferring Ontologies of Mind-Brain Relations from Neuroimaging Data
BT Thomas Yeo, *Duke-NUS, Singapore*

13:50 – 13:55
1790: Contradictory Conclusions in Analysis of Brain Functional Networks: the Role of Image Registration
Maxime Taquet, *Harvard Medical School, Boston, MA, USA*

13:55 – 14:00
1811: Frequency-Dependent Resting-State Network Modules Revealed in MR-Encephalography
Hsu-Lei Lee, *University Medical Center Freiburg, Freiburg, Germany*

14:00 – 14:15
Questions and Answers

Poster Session

13:30 – 15:30
Exhibit and Poster Hall – 4AB, Level 4

Poster Numbers #3000-4119: Even Numbered Posters Stand-By

Disorders of the Nervous System: Addictions, Alzheimer's Disease and Other Dementias, Epilepsy, Mood and Anxiety Disorders, Schizophrenia and Psychotic Disorders, Traumatic Brain Injury

Emotion and Motivation: Emotional Learning, Emotional Perception, Reward and Punishment, Sexual Behavior

Imaging Methods: Anatomical MRI, BOLD fMRI, Diffusion MRI, EEG, MEG, MR Spectroscopy, Multi-Modal Imaging, Non-BOLD fMRI, Optical Imaging/NIRS, PET

Lifespan Development: Aging, Normal Brain Development: Fetus to Adolescence

Neuroanatomy: Anatomy and Function, Brain Networks, Cortical Anatomy and Segregation, Subcortical Structures, White Matter Anatomy, Fiber Pathways and Connectivity

Perception and Attention: Attention: Auditory/Tactile/Motor, Attention: Visual, Chemical Senses: Olfaction, Taste, Consciousness and Awareness, Perception: Auditory/ Vestibular, Perception: Multisensory and Crossmodal, Perception: Pain and Visceral, Perception: Tactile/Somatosensory, Perception: Visual, Sleep and Wakefulness

Social Neuroscience: Self Processes, Social Cognition, Social Interaction

Break

15:30 – 15:45

Symposium

The Challenge of Imaging Brain Connections in Animal and Man

15:45 – 17:00
6ABC, Level 6
Text Code: 341686

Organizer

Marco Catani, *Natbrainlab, King's College London, London, UK*

Current approaches to brain function rest on the empirical evidence that the pattern of connectivity defines the functional specialization of individual cerebral regions. Despite the increasingly number of methods available to visualize connections the analysis of structural connectivity remains a difficult task. In this symposium we will try to define connections at different levels from single neuronal morphology to large scale networks. Current methods based on electron microscopy are providing unprecedented access to local connectivity of animal models and relatively simple human structures (e.g. retina). The main limitation of these approaches is the relatively low volume of data that can be acquired in a reasonable amount of time, which makes the connectome of the Drosophila an ambitious goal. Axonal tracing methods have been extensively used to define short and long axonal connections in the animal brain. These approaches provide an opportunity for the connectome of the monkey brain. There is however a risk of translating these findings blindly to humans without further verification. Tractography methods based on diffusion imaging could help to identify pathways that are unique to humans and help to correlate interindividual variability with cognitive performance and behaviour. Nevertheless tractography remains an indirect quantitative method prone to many biases, which raise some doubts on whether this method will ever be able to reproduce the real anatomy of human connections. Our symposium will provide a balanced overview of this timely topic with ample time for discussion and reflection.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Learn about imaging structural connectivity at different scales;
2. Recognise the importance of developing reliable methods to provide solid foundations to different connectome projects; and
3. Identify emerging approaches to obtain high resolution anatomical connectivity for the human brain.

Defining Networks

Olaf Sporns, *Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN, USA*

Imaging Neuronal Microcircuits

Kevin Briggman, *Circuit Dynamics and Connectivity Unit, NIH, Bethesda, MD, USA*

Tracing Connections in the Monkey Brain

Jeremy Schmahmann, *Laboratory for Neuroanatomy and Cerebellar Neurobiology, Boston, MA, USA*

Tracking Pathways in the Human Brain

Marco Catani, *Natbrainlab, King's College London, London, UK*

Break

17:00 – 17:15

Keynote Lecture

The Three Dimensional Structure of the Brain Pathways

17:15 – 18:00
6ABC, Level 6
Text Code: 341158

Van Wedeen, *Massachusetts General Hospital, Martinos Imaging Center, Charlestown, MA, USA*

We present the thesis that the brain pathways conform to the three axes of a curved approximately orthogonal coordinate system related or identical to the natural coordinates of the body-plan. The evidence, implications for brain organization and particularly for the imaging of connectivity will be discussed.

Break

18:00 – 18:15

Town Hall Meeting

18:15 – 19:15
6ABC, Level 6

All OHBM meeting attendees are encouraged to participate in this open forum; where you will have an opportunity to ask questions and give the OHBM leadership feedback. Updates on future meeting sites and Council elections will be presented.

18:15 – 18:35
OHBM Town Hall Business

18:35 – 18:55
NIH BRAIN Project
Thomas R. Insel, M.D., *Director of the National Institute of Mental Health (NIMH), National Institutes of Health (NIH), Bethesda, MD*

On April 2, 2013, President Obama announced a new brain research initiative as one of his Grand Challenges for the 21st century. The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) project involving NIH, DARPA, and NSF builds on recent successes mapping brain structure and function in humans and experimental animals. NIH BRAIN will begin as a planning process to identify opportunities for new tools that can be used to decipher the language of the brain. This presentation will provide an overview of the origins and aspirations of the NIH BRAIN project.

18:55 - 19:15
Discussion

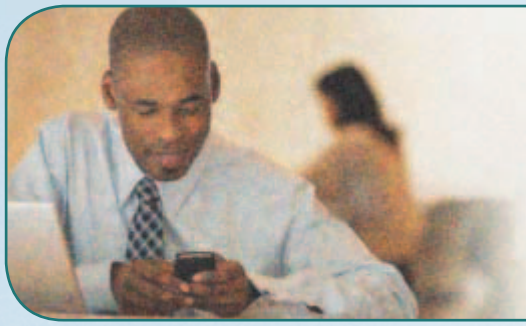
19:15
Adjourn

20:00 – 2:00

Club Night @ the EMP Museum

The EMP Museum is located at 325 5th Avenue N at Seattle Center. We encourage you to use the historic Seattle Monorail to and from the event. The monorail is most economical and will provide direct service until 2:00 am. EMP is a leading-edge, nonprofit museum, dedicated to the ideas and risk-taking that fuel contemporary popular culture. With its roots in rock 'n' roll, EMP serves as a gateway museum, reaching multigenerational audiences through our collections, exhibitions, and educational programs, using interactive technologies to engage and empower our visitors. At EMP, artists, audiences and ideas converge, bringing understanding, interpretation, and scholarship to the popular culture of our time.

There will be a band and a DJ that will play dance music throughout the evening. The party is complimentary to registrants. Please make sure to bring your ticket to the EMP. Additional guest tickets are $50.00 and must be purchased at the conference registration desk.



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Morning Workshop

Big Data in Neuroimaging: Big Opportunities or Just a Big Hassle – The Skeptical Neuroimagers View

8:30 – 9:45
6 ABC, Level 6
Text Code: 342506

Organizers

Martin Lindquist, *Johns Hopkins University, Baltimore, MD, USA*
Tom Nichols, *University of Warwick, Coventry, UK*

The term 'big data' has recently become a buzz-word in both scientific and governmental settings and the development of the necessary tools and techniques to access, organize, and make discoveries from huge volumes of data has been identified as a central research problem for the future. As large-sample neuroimaging data become increasingly available, it has become imperative to evaluate their potential benefits against costs in computational demands and increased complexity. Recently the long running concern of what constitutes an appropriate neuroimaging study size has generated some spirited discussion in the literature. While a small sample size is perfectly capable of differentiating certain characteristics of the brain, thousands of participants may be necessary to detect subtle longitudinal trends associated with human brain activation patterns in disease. Hence, sample size discussions should depend on a number of contextual factors and especially specifics of the hypotheses under question.

In this workshop we focus on several concrete examples of what you can learn from big data (i.e. data sets consisting of more than 100 subjects), that could not have been discovered using smaller samples. We also discuss a variety of statistical techniques for analyzing these high-dimensional data sets and illustrate a number of potential challenges and pitfalls that may arise along the way, drawing particularly on the fast growing literature dealing with this in statistics, machine learning and signal processing.

Learning Objectives: Having completed this workshop, participants will be able to learn that:

1. Sample size discussions should depend on a number of contextual factors and especially specifics of the hypotheses under question;
2. Certain important, but subtle, effects can only be detected using large (> 100 subjects) data sets; and
3. There exists a growing body of sophisticated statistical methods for dealing with high-dimensional data, each with their own promises and pitfalls.

Using Big Neuroimaging Datasets for Prediction and Classification

DuBois Bowman, *Emory University, Atlanta, GA, USA*

Big Data: A Requirement for Inferring Models of Brain Structure and Function Based on Neuroimaging

Bertrand Thirion, *NeuroSpin, Saclay, France*

What Large-Scale Meta-Analyses Can and Can't Do for Reverse Inference

Tal Yarkoni, *University of Colorado, Boulder, CO, USA*

Finding Patterns of Population Variation from Large Multimodal Datasets

Christian Beckmann, *NL Donders Institute for Brain, Cognition & Behaviour, Radboud University Nijmegen, Nijmegen, Netherlands*

Morning Workshop

Microstructure Meets Function in the Same Brain in Vivo – High-Field MRI Sets the Stage

8:30 – 9:45
608-610, Level 6
Text Code: 342788

Organizer

Stefan Geyer, *Max Planck Institute for Human Cognitive and Brain Sciences, Department of Neurophysics, Leipzig, Germany*

Unraveling the functional properties of structural brain elements in an individual-specific way is one of the fundamental goals of neuroscientific research. In the cerebral cortex this is not so easy to accomplish, since cortical areas are classically defined by their microstructure in post-mortem brains (cf. the famous map of Brodmann) but functionally in living brains with electrophysiological or neuroimaging techniques – and cortical areas vary in their topography considerably across individual brains.

One attempt to overcome this problem in the past has been to generate probabilistic cytoarchitectonic maps from post-mortem brains (ex vivo) in standard anatomical (e.g., MNI) space where they can be matched with co-registered functional imaging data (in vivo). However, due to interindividual variability, the population maps of adjacent areas overlap considerably and only after extensive thresholding – and thus discarding structural information – is it possible to unequivocally assign a given voxel in standard space to a particular population map (or cortical area).

It would be a huge leap forward if it were possible to remove this guesswork and generate an individual-specific map of cortical microstructure (areas) in vivo and correlate it with cortical function in vivo in the same brain.

In recent years, two advances have brought us closer to this ambitious goal. The first is the dramatic improvement in the quality of in vivo MRI scans. With 7 Tesla magnets and high sensitivity radiofrequency receive coils, the current state of the art allows structural images of entire brains to be obtained with 0.4 mm isotropic resolution (or even less) and BOLD contrast changes of blood oxygenation with an isotropic resolution much better than 1 mm. The second advancement is based on the observation that maps of the longitudinal relaxation time T1 effectively indicate the presence of myelin and closely resemble myelin-stained histological sections, whereas differences in cytoarchitecture are detectable with MRI only in rare instances. Research by Cécile and Oskar Vogt, two pioneers in the field of myeloarchitecture in the first half of the 20th century has shown that there is a great degree of concordance between structural parcellations of the cortex based on differences in myelin (myeloarchitecture) and maps based on differences in cell bodies (cytoarchitecture – the basis of Brodmann's map). Myelo- and cytoarchitecture are not two parallel universes but two different views of the same universe.

This sets the stage for an important new impulse for "The future of fMRI" – inspired by the seminal NeuroImage Special Issue "Twenty years of functional MRI" published in August 2012. We would like to share our enthusiasm with the neuroimaging community in this workshop entitled "Microstructure Meets Function in the Same Brain in Vivo – High-Field MRI Sets the Stage".

The first talk by Stefan Geyer introduces a "triple jump" approach that validates the myelin-based in vivo cortical maps with "classical" histology data ex vivo. Matt Glasser combines in vivo microstructure with resting state and task-related data from the Human Connectome Project. Rosa Sanchez-Panchuelo and Frederic Dick focus on more specific visual, somatomotor, and auditory regions where they link structure to function in single individuals.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Understand that cortical areas and their boundaries are "classically" defined by their myelo- and cytoarchitectonic pattern ex vivo, i.e., in post-mortem brains;
2. Learn that T1-based maps obtained with high-field MRI represent individual-specific in vivo maps of cortical microstructure, based on differential grey matter myelination between areas; and
3. Appreciate that the ultimate goal is direct structure-function correlation in the same subjects, which can now be achieved by matching microstructural and functional maps in the same living brains.

The "Triple Jump" Myeloarchitectural Approach for In Vivo Cortical Parcellation

Stefan Geyer, *Max Planck Institute for Human Cognitive and Brain Sciences, Department of Neurophysics, Leipzig, Germany*

Identifying Cortical Areas with In Vivo Architectonic and Functional Data from the Human Connectome Project

Matthew F. Glasser, *Washington University Medical School, Department of Anatomy and Neurobiology, St. Louis, MO, USA*

Linking Structure to Function In Vivo in Primary Visual and Somatosensory Cortex

Rosa Sanchez-Panchuelo, *University of Nottingham, Sir Peter Mansfield Magnetic Resonance Centre, Nottingham, UK*

Myeloarchitectural and Functional Mapping of Visual, Auditory, and Somatomotor Areas in Single Individuals

Frederic Dick, *Birkbeck/UCL Centre for NeuroImaging, Birkbeck College, London, UK*

Morning Workshop

Neurotransmitter Function and Intrinsic Brain Functional Connectivity: Studies of GABAergic Inhibitory Neurotransmitter Actions

8:30 – 9:45
605-607, Level 6
Text Code: 342801

Organizer

Lisa Nickerson, *McLean Hospital and Harvard Medical School, Belmont, MA, USA*

Functional magnetic resonance imaging (fMRI) using blood oxygenation level dependent (BOLD) contrast of brain functional connectivity (FC) is a powerful tool for studying the function of large-scale brain networks that are engaged during task performance and that are also active while a person is simply resting. The resting state FC approach assesses the extent to which endogenous fMRI signals measured from multiple brain regions are synchronized, indicating a functional connection, or formation of a network, between them. However, the neurobiological mechanisms giving rise to synchronous resting state fMRI signal oscillations are not known and this is an active area of research. Challenging neurotransmitter receptor systems pharmacologically with concurrent measurements of fMRI FC may shed some insight into the neural substrates of resting state FC. We will discuss the effects of challenging the GABAergic system on measurements of brain FC as well as the convergence of findings across GABAergic drugs and additional evidence from other imaging modalities to present a case for the link between GABA concentration and BOLD signals and the neurobiological importance of measuring FC-fMRI combined with drug challenges in assessments of intrinsic brain function.

Learning Objectives: Having completed this workshop, participants will be able to:

1. Discuss the use and limitations of measurements of resting state FC using fMRI in conjunction with pharmacological challenges to elucidate the contribution of neurotransmitter function to brain functional connectivity;
2. Discuss the utility of using multi-modal MRI to better interpret fMRI measurements, especially in the context of drug administration; and
3. Discuss the effects of GABAergic drug actions on brain functional connectivity and the interpretation of these drug actions and baseline GABA concentration toward understanding the neurobiological underpinnings of fMRI measurements.

Functional Magnetic Resonance Imaging of Drug Actions in the Brain
Bruce Jenkins, *Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA*

GABA and the Transition from Resting State to Stimulus-Induced Activity
Georg Northoff, *University of Ottawa Institute of Mental Health Research, Ottawa, ON, Canada*

Alterations in the Power and Synchrony of BOLD fMRI Signals Associated with GABA-A Receptor Modulation by Midazolam
Vesa Kiviniemi, *University of Oulu, Oulu, Finland*

The GABA-A Receptor Modulator Zolpidem Induces Increases in the Synchrony of BOLD Signal Fluctuations in Widespread Brain Networks
Lisa Nickerson, *McLean Hospital and Harvard Medical School, Belmont, MA, USA*

Break

9:45 – 10:00

Keynote Lecture

The Language Network: Structure and Function

10:00 – 10:45
6ABC, Level 6
Text Code: 341182

Angela Friederici, *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

Language, in particular the processing of syntax, is an ability specific to humans. The functional and structural neural network underlying this ability will be expounded, in the mature and developing brain. Brain regions in the frontal and temporal cortices involved in language, will be described with respect to their specific contributions language processing, as will the fiber tracts which guarantee information flow between them.

Break

10:45 – 11:00

Interactive Poster Presentations

10:45 – 11:30
608-610, Level 6
Text Code: 675633

I-Poster presentations highlight top ranked submitted abstracts. Authors will present their abstracts in a short, "datablitz" format. The objective of the I-Poster session is to arrive at a hybrid of posters and oral sessions.

Moderator: Nathalie Tzourio-Mazoyer, *CEA – CNRS – Université Bordeaux Ségalen, Bordeaux, France*

10:45 – 10:50
1279: Estimating heritability of the fMRI response to faces using Whole-Genome Complex-Trait Analysis
Erin Dickie, *Rotman Research Institute at Baycrest, Toronto, Canada*

10:50 – 10:55
1336: A Fundamental Causal Mechanism in Cognitive Control within the Fronto-Cingulo-Parietal Network
Weidong Cai, *Stanford University School of Medicine, Palo Alto, CA, USA*

10:55 – 11:00
1394: A cross-sectional and longitudinal analysis of functional asymmetries mediated by musical training
Robert Ellis, *Beth Israel Deaconess Medical Center / Harvard Medical School, Boston, MA, USA*

11:00 – 11:05
1435: The Second Generation of Dense Individualized and Common Connectivity-based Cortical Landmarks
Xi Jiang, *The University of Georgia, Athens, GA, USA*

11:05 – 11:10
1554: Hippocampal-neocortical reorganization and maturation of fact retrieval: a longitudinal fMRI study
Shaozheng Qin, *Stanford University, Stanford, CA, USA*

11:10 – 11:15
3776: The role of fronto-parietal networks in mental imagery
Henrietta Howells, *Institute of Psychiatry, London, United Kingdom*

11:15 – 11:30
Questions and Answers

Poster Session

10:45 – 12:45
Exhibit and Poster Hall – 4AB, Level 4

Poster Numbers #3000-4119: Odd Numbered Posters Stand-By

Disorders of the Nervous System: Addictions, Alzheimer's Disease and Other Dementias, Epilepsy, Mood and Anxiety Disorders, Schizophrenia and Psychotic Disorders, Traumatic Brain Injury

Emotion and Motivation: Emotional Learning, Emotional Perception, Reward and Punishment, Sexual Behavior

Imaging Methods: Anatomical MRI, BOLD fMRI, Diffusion MRI, EEG, MEG, MR Spectroscopy, Multi-Modal Imaging, Non-BOLD fMRI, Optical Imaging/NIRS, PET

Lifespan Development: Aging, Normal Brain Development: Fetus to Adolescence

Neuroanatomy: Anatomy and Function, Brain Networks, Cortical Anatomy and Segregation, Subcortical Structures, White Matter Anatomy, Fiber Pathways and Connectivity

Perception and Attention: Attention: Auditory/Tactile/Motor, Attention: Visual, Chemical Senses: Olfaction, Taste, Consciousness and Awareness, Perception: Auditory/ Vestibular, Perception: Multisensory and Crossmodal, Perception: Pain and Visceral, Perception: Tactile/Somatosensory, Perception: Visual, Sleep and Wakefulness

Social Neuroscience: Self Processes, Social Cognition, Social Interaction

Lunch

12:45 – 14:00

Oral Sessions

14:00 – 15:30

Oral session presentations are chosen by the Program Committee from submitted abstracts using criteria of quality and timeliness; a wide spectrum of investigation is represented.

O – Th1: Lifespan Development

605-607, Level 6
Text Code: 341229
Chair: Brad Schlaggar, *Washington University School of Medicine, St. Louis, MO, USA*

14:00 – 14:15
3723: Dynamic changes in heritability of brain morphology: a longitudinal pediatric twin study
Eric Schmitt, *University of Pennsylvania, Philadelphia, PA, USA*

14:15 – 14:30
3738: Spatial-temporal atlas of fetal brain development during the early second trimester
Shuwei Liu, *Research Center for Sectional and Imaging Anatomy, Shandong University School of Medicine, Jinan, China*

14:30 – 14:45
3681: Effect of chronic smoking on brain atrophy: assessment in a cohort of 1,184 healthy elderly
Quentin Duriez, *Bordeaux University, Bordeaux, France*

14:45 – 15:00
3737: Quantitative biological measurements of white matter development
Jason Yeatman, *Stanford University, Stanford, CA, USA*

15:00 – 15:15
3709: A reference curve of neuroanatomical development: Identifying normal and abnormal brain maturation
Katja Franke, *Structural Brain Mapping Group, Jena University Hospital, Jena, Germany*

15:15 – 15:30
3705: White matter lesion burden and cognitive function: a voxel-wise analysis in late middle age
Alex Birdsill, *University of Wisconsin-Madison, Madison, WI, USA*

O – Th2: Modeling and Analysis Methods 4: Multi-Modal

6 ABC, Level 6
Text Code: 341441
Chair: *Sepideh Sadaghiani, University of California, Berkeley, CA, USA*

14:00 – 14:15
3572: A multi-variate method for assessment of dynamic functional connectivity in MEG
Matthew Brookes, *University of Nottingham, Nottingham, UK*

14:15 – 14:30
3615: Neuroelectrical Decomposition of Resting State fMRI
Zhongming Liu, *National Institutes of Health, Bethesda, MD, USA*

14:30 – 14:45
3657: Using Optical Coherence Tomography to Validate Diffusion MRI
Caroline Magnain, Athinoula A. Martinos Center for Biomedical Imaging, MGH, Charlestown, MA, USA

14:45 – 15:00
2096: Quantification of baseline oxygen metabolism at 7T using QUO2
Claudine Gauthier, *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

15:00 – 15:15
3645: Mapping higher order resting-state networks with high-density diffuse optical tomography
Adam Eggebrecht, *Washington University School of Medicine, St Louis, MO, USA*

15:15 – 15:30
2110: The Amplitude of the Resting State fMRI Global Signal Is Related to EEG Vigilance Measures
Thomas Liu, *University of California San Diego, San Diego, CA, USA*

O – Th3: Disorders of the Nervous System 3: Neurological Disease

602-604, Level 6
Text Code: 341442
Chair: Stephen Wilson, *University of Arizona, Tucson, AZ, USA*

14:00 – 14:15
1162: Motor rehabilitation impacts white matter microstructure in patients with Multiple Sclerosis
Laura Bonzano, *University of Genoa, Genoa, Italy*

14:15 – 14:30
1255: Support vector machine classification of motor impairment after stroke based on resting-state fMRI
Anne Rehme, *Max-Planck-Institute for Neurological Research, Cologne, Germany*

14:30 – 14:45
1189: Atomoxetine and citalopram enhance action inhibition systems in Parkinson's disease
Zheng Ye, *University of Cambridge, Cambridge, UK*

14:45 – 15:00
3837: Chronic neglect and disconnection of white matter pathways: A longitudinal study
Marine Lunven, *Hôpital Pitié Salpétrière U975, Paris, France*

15:00 – 15:15
3050: Carriers of TREM2 Alzheimer risk gene show accelerated temporal lobe atrophy and cognitive decline
Priya Rajagopalan, *Laboratory of Neuro Imaging, Department of Neurology, UCLA School of Medicine, Los Angeles, CA, USA*

15:15 – 15:30
3055: Conceptualizing frontotemporal dementia with data-driven multimodal imaging meta-analyses
Matthias Schroeter, *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

O – Th4: Social Neuroscience, Emotion and Motivation

608-610, Level 6
Text Code: 341467
Chair: Michael Treadway, *McLean Hospital/Harvard Medical School, Belmont, MA, USA*

14:00 – 14:15
4060: A penny for your thoughts – Revealing the valence of spontaneous self-generated thoughts during rest
Anita Tusche, *Bernstein Center for Computational Neuroscience Charité – Universitätsmedizin, Berlin, Germany*

14:15 – 14:30
3306: Neural pattern similarity predicts long-term fear memory
Renée Visser, *University of Amsterdam, AMSTERDAM, Netherlands*

14:30 – 14:45
4108: Increasing honesty by stimulation of the right DLPFC
Giuseppe Ugazio, *University of Zurich, Zurich, Switzerland*

14:45 – 15:00
4098: Using social immersion to induce embarrassment in real-life person-group interactions
Laura Müller-Pinzler, *University of Marburg, Marburg, Germany*

15:00 – 15:15
4083: Neuronal coding of assessing another person's knowledge based on nonverbal cues
Carsten Bogler, *Bernstein Center for Computational Neuroscience, Berlin, Germany*

15:15 – 15:30
4071: Brain Activity during Empathy Tasks Predicts Prosocial Behavior in the Dictator Game
Leonardo Christov-Moore, *UCLA, Los Angeles, CA, USA*

Break

15:30 – 15:45

Closing Comments and Meeting Highlights

15:45 – 16:45
6ABC, Level 6

Maurizio Corbetta, *Washington University, St. Louis, MO, USA*

Farewell Poster Reception

16:45 – 18:15
Exhibit and Poster Hall – 4AB, Level 4

There is a reception being held in the poster hall from 16:45 – 18:15. If you have a poster that was presented on Wednesday or Thursday, you are welcome to stand by your poster and present.

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The Human Connectome Project (HCP) is comprehensively mapping region-to-region brain connections and variability in 1,200 healthy adults using cutting-edge neuroimaging and extensive behavioral and heritability measures. All data and tools for analysis, data mining, and visualization are being made freely available by HCP to advance discovery of brain circuitry in humans.

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Email: info@incf.org
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The National Database for Autism Research is an NIH-funded research data repository that aims to accelerate progress in autism spectrum disorders (ASD) research through data sharing, data harmonization, and the reporting of research results. NDAR also serves as a scientific community platform and portal to multiple other research repositories, allowing for aggregation and secondary analysis of data.

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Acknowledgments: neuGRID4 you has received funding from the European Commission's Seventh Framework Programme (FP7/2007-2013) under grant agreement n°283562

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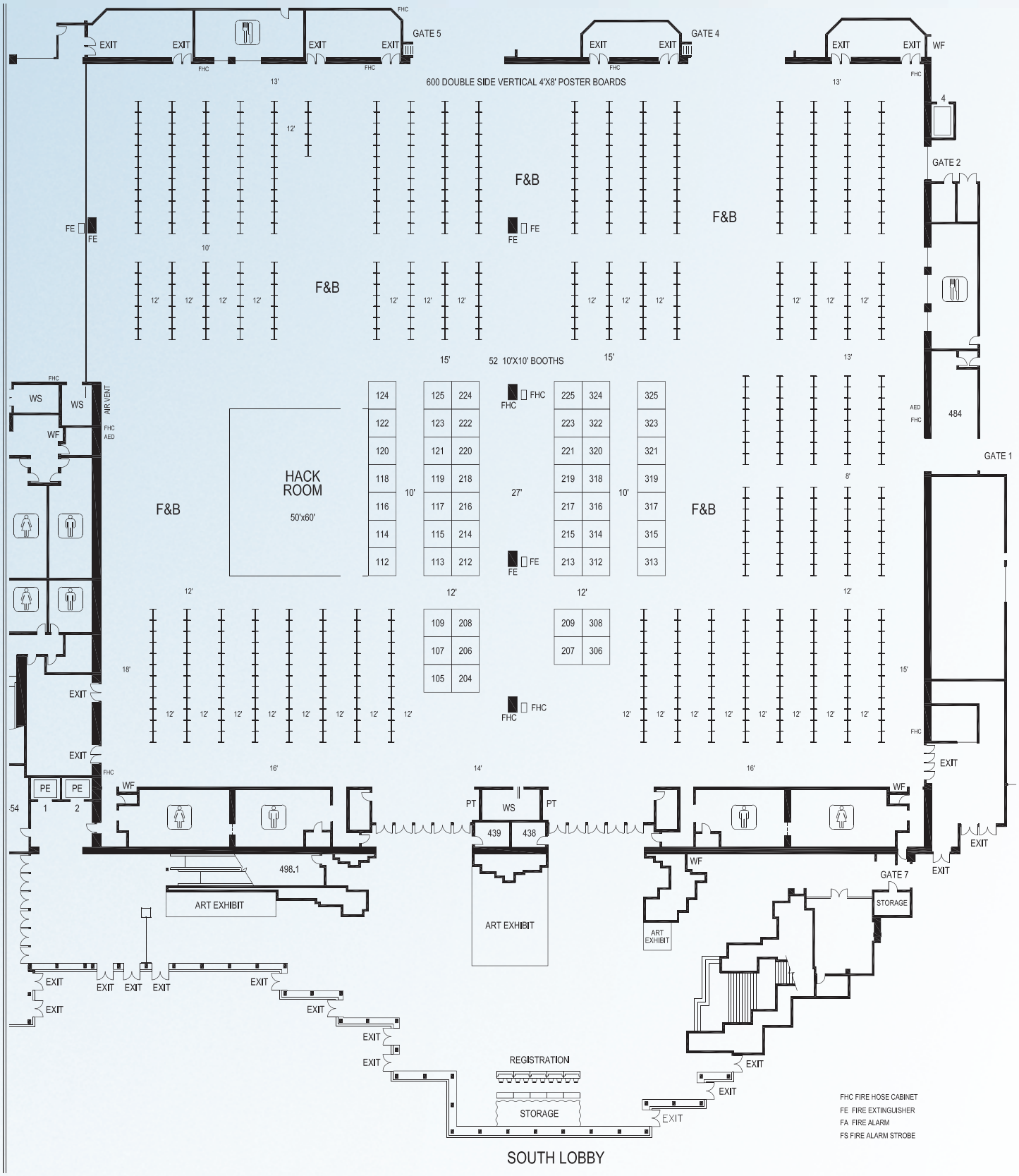

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