

Opportunities for Statistical Modeling and Computation at the National Institute of Mental Health (NIMH), NIH

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with

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Joint Statistical Meeting, Baltimore MD July 30, 2017



NIMH Research Priorities



Four Strategic Objectives

1. Define the mechanisms of complex behaviors

2. Chart mental illness trajectories to determine when, where, and how to intervene

- 3. Strive for prevention and cures
- 4. Strengthen the public health impact of NIMH-supported research



The BRAIN Initiative[™]

BRAIN 2025 A SCIENTIFIC VISION

<u>Brain Research through Advancing Innovative</u> <u>Neurotechnologies (BRAIN) Working Group</u> Report to the Advisory Committee to the Director, NIH

June 5, 2014



- Provides the roadmap for the NIH initiative
- A focus on tool development (devices and analysis techniques) to understand circuits and networks
- "statistic" appears 57 times in this document.



The BRAIN Initiative



The BRAIN Initiative

RFA-EB-15-006

BRAIN Initiative: Theories, Models and Methods for Analysis of Complex Data from the Brain (R01)

- Understand brain function from complex neuroscience data
- Theories to organize/unify data and infer general principles
- Mathematical/statistical models to drive testable hypothesis
- Methods for complex data analysis and feature detection
- Tools that can be used by the larger neuroscience community



The BRAIN Initiative

ACTIVE FUNDING OPPORTUNITIES

Please visit our Scientific Resources page for extra information related to select funding opportunities

Research Career Enhancement Award for Investigators to Build Skills in a Cross- Disciplinary Area	Visit
Contact Email: ghimm@mail.nih.gov	Due Date April 14, 2017
Standards to Define Experiments Related to the BRAIN Initiative	Visit
Contact Email: farberg@mail.nih.gov	Due Date October 11, 2017
Non-Invasive Neuromodulation - Mechanisms and Dose/Response Relationships for	Visit
Targeted CNS Effects	VISIC
Contact Email: ffriedma@mail.nih.gov	Due Date October 13, 2017
	With the Service of the N

National Institute of Mental Health

Collaborative Research in Computational Neuroscience (CRCNS)



National Institute of Neurological Disorders and Stroke

National Center for Complementary and Integrative Health

National Institute on Alcohol Abuse and Alcoholism

Eunice Kennedy Shriver National Institute Of Child Health and Human Development

National Institute on Drug Abuse

National Institute of Mental Health

National Institute on Deafness and other Communication Disorders

National Eye Institute

National Institute of Biomedical Imaging and Bioengineering





Bundesministerium für Bildung und Forschung



BSF

United States – Israel Binational Science Foundation



Theoretical and Computational Neuroscience Program

Division of Neuroscience and Basic Behavioral Science, NIMH

This Program supports empirical and theoretical studies of self-organizing behavior in neuronal systems, mathematical approaches to modeling non-stationary neuronal processes, functional imaging of dynamical systems, and the modeling of all levels of neuronal processing, from single cell activity to complex behaviors. Projects typically combine mathematical and computational tools with neurophysiological, neuroanatomical, or neurochemical techniques in order to decipher the mechanisms underlying specific neuronal and behavioral systems.

Computational Psychiatry Program Division of Translational Research, NIMH



This program fosters biologically-based computational frameworks to identify and validate biomarkers and novel treatment targets relevant to the prevention, treatment, and recovery of psychiatric disorders. The program supports translational research using analytical approaches for the prediction of risk and treatment response and the understanding of the pathophysiology underlying mental disorders.

Contact: michele.ferrante@nih.gov



Informatics – Data Archive

- NIMH has made significant investments in the area of informatics.
- The largest investment is in the NIMH Data Archive (NDA). This is a single Oracle database that holds all clinical research funded by NIMH and welcomes research from others. The Stanley Foundation and others are taking advantage of our willingness to hold data related to mental health by also requiring their awardees to deposit data.
- There are currently 4 websites that allow the community to access the NDA
 - Nat'l Database for Autism Research <u>https://ndar.nih.gov/</u>
 - Nat'l Database for Clinical Trials <u>http://ndct.nimh.nih.gov/</u>
 - RDoC Database <u>http://rdocdb.nimh.nih.gov/</u>
 - Pediatric MRI <u>http://pediatricmri.nih.gov/nihpd/info/index.html</u>



National Database for Autism Research – Overview

- Joint initiative supported by NIMH, NICHD, NINDS, and NIEHS
 - Federal data repository
 - Contains data from human subjects related to autism (and control subjects). Subjects have consented to broad data sharing.
 - Data are available to the research community through a not too difficult application process
 - Summary data are available to everyone with a browser (<u>http://ndar.nih.gov</u>)
- Begun in late 2006, and first data was received in 2008
- The data types include demographic data, clinical assessments, imaging data, and –omic data
- Currently has data available from over 85,000 subjects
- ~500TB of imaging and –omic data is securely stored in the cloud
- NDAR is the oldest of the NDA websites and has the functionality that will ultimately be available via all of them.



Data Dictionary – The First Building Block

- The NDAR data dictionary is one of the key building blocks for this repository. It provides a flexible and extensible framework for data definition by the research community.
- 1200+ instruments, freely available to anyone
 - 120,000+ unique data elements and growing
 - A research community platform for defining the complex language characterizing autism research
 - Clinical
 - Genomics/Proteomics
 - Imaging Modalities
- Curated by NDAR
- Allows investigators to quickly perform quality control tests of their data without submitting data anywhere.
- We expect 2000+ data instruments in the next few years, so we are searching for partners to help devise strategies to aid with queries across the data elements.



NIH Supported Data Repositories

The NIMH Data Archives are not the only game in town.



- This listing contains 65 repositories, and there are undoubtedly others.
- NIH sometime announces R03s for data re-analysis.



Directory of Federal Neuroscience Research Funding

https://www.nimh.nih.gov/funding/neuroscience-research-funding-contacts-in-the-federal-government-2017.shtml



NIMH Funding Initiatives

NIMH-Sponsored Program Announcements

- ▶ Parent Announcements I for Unsolicited or Investigator-Initiated Applications
- ▶ NIH Guide 🗷

Funding and Policy Announcements (Complete List):	NIMH-Sponsored NIMH-Participating Both
Program Announcements:	NIMH-Sponsored NIMH-Participating Both
Requests for Applications:	NIMH-Sponsored NIMH-Participating Both
Policy Announcements:	NIMH-Sponsored NIMH-Participating Both

Announcement Number	Title	Release Date	Expiration Date
PAR-17-309	Cellular and Molecular Biology of Complex Brain Disorders (R01)	2017- 06-12	2020-09- 08
PAR-17-310	Cellular and Molecular Biology of Complex Brain Disorders (R21)	2017- 06-12	2020-09- 08
PAR-17-272	Effectiveness Trials for Post-Acute Interventions and Services to Optimize Longer-term Outcomes (R01)	2017- 05-04	2018-01- 24
PAR-17-271	Pilot Effectivness Trials for Post-Acute Interventions and Services to Optimize Longer-term Outcomes (R34) Z	2017- 05-04	2018-01- 24
PAR-17-265	Initiation of a Mental Health Family Navigator Model to Promote Early Access, Engagement and Coordination of Needed Mental Health Services for Children and Adolescents (R01)	2017- 05-02	2018-01- 08
PAR-17-266	Pilot Studies to Test the Initiation of a Mental Health Family Navigator to Promote Early Access, Engagement and Coordination of Needed Mental Health Services for Children and Adolescents (R34) 🗷	2017- 05-02	2018-01- 08



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Rigor, Reproducibility and Statistical Power in Mental Health Research: Request for Information

- Notice Number: NOT-MH-17-036
- Released Date: July 14, 2017
- **Purpose:** Seeking input on statistical issues with the goal of improving the rigor and reproducibility of mental health research

Possible comments:

- Innovative study designs
- Optimizing sample size while maintaining feasibility
- What are the barriers to submitting adequately powered studies
- Developing guidance to applicants to improve rigor in applications
- Developing guidance to the peer-review process regarding statistical rigor
- Facilitating clinical results that can be reproducible and advance mental health
- Contact: Abera Wouhib, Math. Statistician (NIMH/NIH)

email: abera.Wouhib@nih.gov



How to Navigate the NIH Grants System

