
BIOGRAPHICAL SKETCH

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NAME: Baker, Justin T.

eRA COMMONS USER NAME (credential, e.g., agency login): JUSTINTBAKER

POSITION TITLE:

Associate Psychiatrist, McLean Hospital; Assistant Professor in Psychiatry, Harvard Medical School

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Brown University, Providence, RI	B.S.	06/97	Neuroscience
Washington University, St Louis MO	M.D./Ph.D	05/07	Medicine / Neurobiology

A. Personal Statement:

I am an Assistant Professor of Psychiatry at Harvard Medical School, Scientific Director of the Institute for Technology in Psychiatry at McLean Hospital, and Director of the Laboratory for Functional Neuroimaging and Bioinformatics at McLean Hospital. I have over two decades of experience in cognitive neuroscience, computational systems, and functional neuroimaging. For the past 10+ years, I have focused on studying humans with a range of psychiatric disorders to glean what can be learned about the underlying systems biology through careful observation of dysfunctional systems. After graduating from Brown University, I obtained a medical degree and a PhD in neuroscience (Washington University), using single-unit neurophysiology and detailed psychophysics to study oculomotor and attentional control systems in the macaque monkey. During and following clinical training in psychiatry (MGH/McLean), I completed a postdoctoral fellowship with Randy Buckner and Dost Ongur, compiling large (>3000 cases) data sets of systematically acquired neuroimaging, genetic, and other phenotypic information from individuals with varying degrees of risk for psychotic illness. With a network of collaborators, staff, and students, my group has since extended large-scale phenotypic approaches to adjacent psychopathological domains, such as mood disorders, ritualizing disorders, and post-traumatic spectrum conditions. Our group has also more recently pivoted toward dense, computationally-rigorous, behavioral assessment to facilitate precise longitudinal assessment in complex, dynamic diseases, and enables the development of closed-loop systems to influence behavior over time at the level of the individual. To promote the adoption of these powerful approaches, our laboratory has developed open source software tools to enable others in the research community to acquire high quality, temporally dense, longitudinal behavioral data from individuals across the spectrum from mental health to disease. Our goal is to help capture an unbiased assessment of the rich, complex, and dynamically evolving human behavioral repertoire, in order to better understand and help our species thrive in complex changing environments. The following are a few recent papers from our group.

1. **Baker JT**, Holmes AJ, Masters GA, Krienen F, Yeo BTT, Buckner RL, Öngür D. Disruption of Cortical Association Networks in Schizophrenia and Psychotic Bipolar Disorder. *JAMA Psychiatry*. 2014 Feb;71(2):109-118.
2. Wang D, Li M, Wang M, Schoeppe F, Ren J, Chen H, Öngür D, **Baker JT***, Liu H*. Individual-specific functional connectivity markers track dimensional and categorical features of psychotic illness. *Molecular Psychiatry*. 2018 Nov 15. *equal contribution
3. Reinen JM, Chén OY, Hutchison RM, Yeo BTT, Anderson KM, Sabuncu MR, Öngür D, Roffman JL, Smoller JW, **Baker JT**, Holmes AJ. The human cortex possesses a reconfigurable dynamic network architecture that is disrupted in psychosis. *Nature Commun*. 2018 Mar 20;9(1):1157.
4. **Baker JT**, Dillon DG, Patrick LM, Roffman JL, Brady RO Jr, Pizzagalli DA, Öngür D, Holmes AJ. (2019) Functional connectomics of affective and psychotic pathology. *Proc Natl Acad Sci U S A*. 2019 Apr 15.

B. Positions and Honors:

Positions and Employment

2007 – 2011	Resident in Psychiatry, MGH/McLean Adult Psychiatry Residency Program, Boston, MA
2011 – 2016	Instructor in Psychiatry, Harvard Medical School, Department of Psychiatry, Boston, MA
2011 – 2016	Assistant Training Director, MGH / McLean Adult Psychiatry Residency Program
2011 – 2015	Associate Director, MGH / McLean Research Concentration Program
2015 – present	Co-Director, MGH / McLean Research Concentration Program
2011 – 2013	Director of Scientific Programs, MGH Center for Law, Brain & Behavior
2013 – 2016	Associate Director, MGH Center for Law, Brain & Behavior
2011 – present	Assistant Psychiatrist, Psychotic Disorders Division, McLean Hospital
2014 – present	Director of Functional Neuroimaging and Bioinformatics, Psychotic Disorders Division
2016 – present	Assistant Professor in Psychiatry, Harvard Medical School, Boston, MA
2016 – present	Founding Scientific Director, Institute for Technology in Psychiatry, McLean Hospital

Other Experience and Professional Memberships

1995-	Member, Society for Neuroscience
2007-	Member, American Psychiatric Association
2015-	Member, Society of Biological Psychiatry

Honors

2003	National Institute of Neurological Disorders and Stroke Ruth Klingenstein Individual National Research Service Award Fellowship
2007	APIRE / Janssen Pharmaceuticals, Resident Psychiatric Research Fellowship
2009	NIMH Outstanding Resident Award Program
2011	APA / Pfizer MD/PhD Psychiatric Research Fellowship
2011	Dupont-Warren Fellowship, Dept of Psychiatry, Harvard Medical School
2011	Distinguished Laughlin Fellow, Durkee Laughlin Foundation
2012, 2013	Maria Lorenz Pope Fellowship
2013	KL2 / Harvard Catalyst Medical Research Investigator Training Program
2015	Domestic Travel Award Fellowship, Society of Biological Psychiatry
2015	Early Career Travel Award, American College of Neuropsychopharmacology

C. Contribution to Science:

1. Cortical Control of Attention and Sensorimotor Transformations. My early publications and abstracts addressed the cortical neurophysiology underlying motor behavior in humans and non-human primates. This work included several neuroimaging studies, which used functional magnetic resonance imaging to explore the topography and state-dependence of motor representations in human cerebral cortex (with Jerome Sanes, PhD), a study using early “Utah” multichannel array recordings to explore how neuronal ensembles in monkey motor cortex dynamically code information during visually-guided arm movements (with John Donoghue, PhD), and a series of experiments in awake behaving monkeys designed to reveal how bottom-up attention and top-down contextual processing interact in frontoparietal circuits subserving memory-guided saccades (with Lawrence Snyder, MD, PhD).
 - a. **Baker JT**, Donoghue JD, Sanes JN. Gaze Direction Modulates Finger Movement Activation Patterns in Human Motor Cortex. *Journal of Neuroscience*. 1999 Nov 15;19(22):10044-52. PMID: PMC6782988
 - b. **Baker JT**, Fellows M, Donoghue JD. Directional Tuning Rotations In Motor Cortical Neurons During Radial Arm Movements. (1997) *Soc. Neurosci. Abstr.*, 607.2.
 - c. **Baker JT**, Harper T, Snyder LH. (2001) Representing Invisible Targets During Gaze Shifts in the Lateral Intraparietal Area Of Monkey Cerebral Cortex. *Cognitive Neuroscience Society Annual Meeting*.
 - d. **Baker JT**, Harper TM, Snyder LH. Spatial Memory Following Shifts of Gaze: Saccades to Memorized World-fixed and Gaze-fixed Targets. *Journal of Neurophysiol.* 2003 May;89(5):2564-2576. PMID: 12740406

2. Attention and Oculomotor Control in Non-Human Primate Brain Networks. The non-human primate is an essential model system for understanding the human brain, and yet much of the work in non-human primates uses single-unit electrophysiology, whereas much work in humans relies on brain imaging. During my graduate training, I developed and implemented imaging-based solutions to bridge our understanding of the human and non-human primate brain at a macroscopic scale. These methods have been adopted and used widely in other work. The *Nature* paper, on which I contributed foundational tools, data, and insights and which established a physiological and anatomical grounding for spontaneous or “resting state” functional brain networks, remains my most highly cited work, with nearly 1500 references in the literature.
- Baker JT**, Patel GH, Corbetta MC, Snyder LH. Distribution of Activity Across the Macaque Cerebral Cortical Surface, Thalamus, and Midbrain during Rapid, Visually-Guided Saccades. *Cerebral Cortex*. 2006 Apr;16(4):447-59. PMID: 15958778
 - Vincent JL, Patel GH, Fox MD, Snyder AZ, **Baker JT**, Van Essen DC, Zempel JM, Snyder LH, Corbetta M, Raichle ME. Intrinsic Functional Architecture in the Anaesthetized Monkey Brain. *Nature*. 2007 May 3;447(7140):83-6. PMID: 17476267
 - Patel GH, Shulman GL, **Baker JT**, Akbudak E, Snyder AZ, Snyder LH, Corbetta M. Topographic organization of macaque area LIP. *Proc Natl Acad Sci U S A*. 2010 Mar 9;107(10):4728-33. PMID: PMC2842044
3. Neuroimaging in Neuropsychiatric Disease. Since obtaining my PhD, my work has applied the tools and insights from my graduate and undergraduate training to the understanding of how brain systems go awry in mental illness and how we can leverage biological insights to develop more effective treatment strategies. My publications since this transition apply structural and functional MRI to understand brain changes that occur across the spectrum of psychotic illness and related conditions. We found that changes in the frontal executive network occur in both schizophrenia and psychotic bipolar disorder, supporting a dimensional model of psychotic illness, which is a foundation of the current proposal.
- Baker JT**, Holmes AJ, Masters GA, Yeo BTT, Krienen F, Buckner RL, Öngür D. Disruption of Cortical Association Networks in Schizophrenia and Psychotic Bipolar Disorder. *JAMA Psychiatry*. 2014 Feb;71(2):109-118. PMID: PMC4435541
 - Reinen JM, Chén OY, Hutchison RM, Yeo BTT, Anderson KM, Sabuncu MR, Öngür D, Roffman JL, Smoller JW, **Baker JT**, Holmes AJ. The human cortex possesses a reconfigurable dynamic network architecture that is disrupted in psychosis. *Nature Commun*. 2018 Mar 20;9(1):1157.
 - Wang D, Li M, Wang M, Schoeppe F, Ren J, Chen H, Öngür D, **Baker JT***, Liu H*. Individual-specific functional connectivity markers track dimensional and categorical features of psychotic illness. *Molecular Psychiatry*. 2018 Nov 15. *equal contribution
 - Baker JT**, Dillon DG, Patrick LM, Roffman JL, Brady RO Jr, Pizzagalli DA, Öngür D, Holmes AJ. (2019) Functional connectomics of affective and psychotic pathology. *Proc Natl Acad Sci U S A*. 2019 Apr 15.

Complete List of Published Work:

NCBI MyBibliography: <https://www.ncbi.nlm.nih.gov/labs/bibliography/1hwrBdiEz2dQk/bibliography/public/>
 Google Scholar: <https://scholar.google.com/citations?user=jqWZsC0AAAAJ&hl=en>

D. Research Support:

Ongoing Research Support:

U01MH116925	Baker/Rauch (PIs)	08/03/2018-05/31/2022
NIMH		
<i>Robust Predictors of Mania and Psychosis</i>		
The goal of this project is to identify biological, environmental, and social factors that trigger dangerous mental states, particularly mania and psychosis, in individuals known to be at risk for these conditions using intensive, longitudinal, assessments.		
Role: Principal Investigator		
U01MH116925 (Administrative Supplement)	Baker/Rauch (PIs)	08/09/2019-05/31/2022
NIMH		

Robust Predictors of Mania and Psychosis

The goal of the supplemental project is to address the pressing bioethics issues associated with computational phenotyping, and to help establish a comprehensive roadmap to provide the types of practical advice and resources that researchers and clinicians need.

Role: Principal Investigator

McLean Hospital Institutional Funds

Baker (PI)

07/1/2016-06/30/2022

Institute for Technology in Psychiatry

The goals of the Institute for Technology in Psychiatry are to provide technical and logistical support for technology-based projects in mental health to enhance research and clinical practice.

Role: Principal Investigator

R25MH094612

Greenfield/Fava (PIs)

06/01/2011-03/31/2022

NIMH

Fostering Research Mentorship and Training during Psychiatry Residency

The goal is to foster research careers of psychiatric residents through protected research time, mentorship, and curriculum.

Role: Co-Investigator

UH3NS100548

Dougherty/Eskander (PIs)

08/01/2017-12/29/2019

NIMH

Renewal Pending

Combined Cortical and Subcortical Recording and Stimulation as a Circuit-Oriented Treatment for Obsessive-Compulsive Disorder

The goal of this project is to enhance the temporal and spatial precision of behavioral recordings in a larger BRAIN initiative study (PI, Dougherty), which uses novel technology to record the brain's activity while delivering stimulation treatment for obsessive compulsive disorder, by recording continuous behavioral signals over long periods of time using temporally dense assessments tailored to individual study participants.

Role: Site Principal Investigator

AE Foundation Fund

Baker (PI)

01/01/2019-12/31/2020

AE Foundation

Intensive Real-time Computational Phenotyping in Patients with Borderline Personality Disorder

The goal of this project is to identify the latent behavioral state structure accompanying fluctuations in cognition and emotion in individuals aged 15-25 conditions with severe borderline personality features using intensive, longitudinal, assessments across both ambulatory and residential treatment settings.

Role: Principal Investigator

R01MH120400

Rosso (PI)

07/01/2019-04/30/2024

NIMH

Multimodal imaging of hippocampal-cortical networks and mechanisms of trauma-related intrusions

This study aims to identify brain processes that are associated with distinctive phenomenological characteristics of trauma memories that implicate sensory-perceptual brain networks, and that may be different than canonical brain networks of PTSD.

Role: Co-Investigator

R01MH120080

Holmes (PI)

08/15/2019-05/31/2024

NIMH

Functional genomics of the human connectome in psychiatric illness

The goal of this project is to identify genetic contributors to the functioning of large-scale brain networks and characterize their relationship to dimensional symptom profiles in patients with affective and psychotic illnesses.

Role: Site Principal Investigator

Completed Research Support:

K23MH104515

Baker (PI)

09/01/2014-09/30/2019

NIH

Frontoparietal Network Integrity and Risk for Psychosis

The major goal of this study is to probe the biology of the frontoparietal control network, a key brain network engaged in higher cognition and disrupted in chronic in psychosis by linking genetics, neuroimaging and clinical variables in individuals at clinical and genetic high risk for psychosis. My role as the PI on this study is to design and coordinate all activities in the study, including data acquisition, analysis, interpretation, and dissemination.

Role: Principal Investigator

NARSAD Young Investigator Grant

Holmes (PI)

07/01/2014-01/14/2017

Brain & Behavior Research Foundation

Identifying the Network-Level Fingerprints of Affective Illness and Associated Polygenic Vulnerability in the General Population

The major goals of this study are to probe the biology of depression by combining neuroimaging and genetic analysis in a cross-diagnostic sample of individuals with depression.

Role: Site Principal Investigator

Blavatnik Biomedical Accelerator

Datta (PI)

07/01/2016-12/30/2017

Harvard University

Automatic Characterization of Patterns of Human Behavior

The goal of this work is to determine whether individuals with different neuropsychiatric illnesses may deviate from healthy individuals in their movement patterns in ways that may reflect their illness severity, current treatments, and side effects.

Role: Site Principal Investigator

HBI Bipolar Disorder Seed Grant

Baker/Ongur (PIs)

02/01/2017-04/30/2018

Harvard Brain Science Initiative

Circuit dynamics underlying longitudinal fluctuations in mood and cognition in bipolar patients

The purpose of this project is to combine longitudinal neuroimaging with continuous real-time tracking using smartphones and wearable devices to study the brain changes that accompany fluctuations in bipolar disorder and related conditions.

Role: Principal Investigator

HHSN271201700776P

Germine (PI)

09/26/2017-09/25/2018

NIMH Contract

TestMyBrain Design Consulting for Research Domain Criteria Field Test Battery

The NIH contract is to provide consulting with the NIMH regarding how to measure constructs and domains defined in the NIMH Research Domain Criteria using web and mobile devices, for use in a field test battery that will be developed by the NIMH.

Role: Co-Investigator

R21MH112956

Ressler/Kaufman (PIs)

04/01/2017-01/31/2019

NIH

Evaluating the Neurobiological Basis of Traumatic Dissociation in a Cross-Diagnostic Sample of Women with Histories of Childhood Abuse and Neglect

The major goals of this study are to characterize any brain system abnormalities present in patients with dissociative symptoms and diagnoses of either post-traumatic stress disorder or dissociative identity disorder. My role is to coordinate the neuroimaging portion of the study, including acquisition and maintenance of hardware and software, as well as collecting, analyzing and interpreting the data.

Role: Co-Investigator