BIOGRAPHICAL SKETCH

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NAME: Keator, David

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

POSITION TITLE: Associate Professional Researcher

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
University of California, Irvine	B.S.	1994	Biological Sciences
California State University, Long Beach	M.S.	2001	Computer Science – Software Engineering
University of California, Irvine	Ph.D.	2015	Computer Science – Machine Learning

A. Personal Statement

Dr. Keator has been an active researcher in the fields of neuroimaging and neuroinformatics applied to psychiatric and neurological disorders for over twenty years. Dr. Keator's research has been focused in three principal domains: (1) The development of advanced machine learning models for problems in neuroimaging and medicine; (2) Developing biomedical informatics tools and techniques for the field of neuroimaging and applying them to problems in medicine. (3) Identifying brain-based biomarkers of dementia in Down's Syndrome, traumatic brain injury (TBI), Schizophrenia, and Alzheimer's disease; In each of these domains Dr. Keator has made significant research contributions, many of which have gained international exposure. Since 2011, Dr. Keator has chaired and co-developed the Neuroimaging Data Model (NIDM) working group consisting of representatives form 12 institutions across Europe and the United States. Dr. Keator is an active member of the International NeuroInformatics Coordinating Facility (INCF) Neuroimaging Task Force. Previously, Dr. Keator was the chair of the Neuroinformatics Working Group of the Function Biomedical Informatics Research Network (FBIRN; Steven Potkin PI) for approximately 10 years, managing technical staff from 10 sites, resulting in many high-impact publications and software. Dr. Keator is the informatics and data management and sharing director for the UCI Conte Center (Tallie Z. Baram PI), developing informatics tools to support translational research. Dr. Keator served on the Neuroimaging Technology Initiative's data format working group responsible for the development of the NIfTI-1 standard. Over the past seventeen years Dr. Keator has been the technical and operations director of the UCI Neuroscience Imaging Center, responsible for PET and MRI research performed at the center, quality control, reconstruction, and statistical analysis

B. Positions and Honors

Professional Experience/Previous Positions

1992 – 1994 EEG Technician, Dept. of Psychiatry and Human Behavior, Univ. of CA, Irvine
1994 – 1996 Staff Research Assistant I, Dept. of Psychiatry and Human Behavior, Univ. of CA, Irvine

1996 – 2001 Programmer/Analyst II, Dept. of Psychiatry and Human Behavior, Univ. of CA, Irvine
2001 – 2016 Specialist, Department of Psychiatry and Human Behavior, Univ. of CA, Irvine
2016 – present Associate Professional Researcher, Department of Psychiatry and Human Behavior, Operations Director – Neuroscience Imaging Center, Univ. of CA, Irvine

C. Contributions to Science

1. **Neuroimaging and Genetics Analysis of Complex Disorders:** Throughout my scientific career I have been contributing to analysis of complex disorders using neuroimaging and genetics. I am a co-patent holder on methods for analyzing imaging and genetics and have applied advanced machine learning and analysis techniques to the study of psychiatric and neurological disorders across a variety of imaging paradigms.

    a. Doran E, **Keator D.B**., Head E., Phelan M.J., Kim R., Totoiu M., Barrio J., Small G., Potkin S.G., Lott I. Down Syndrome, Partial Trisomy 21, and Absence of Alzheimer's Disease: The role of APP. Journal of Alzheimer's Disease. 56.2 (2017): 459-470. PMC5662115

    b. Rafii M.S., Baumann T.L., Bakay R.A.E, Ostrove J.M., Siffert J., Fleisher A.S., Herzog C.D., Barba D., Pay M., Tuszynski M.H., Salmon D., Kordower J.H., Bishop K., **Keator D.B**., Potkin S.G., Bartus R.T. A phase 1 study of sterotactic gene delivery of AAV2-NGF for Alzheimer's disease. Alzheimer's Disease & Dementia. 2014; 10:571-81 PMID:24411134

    c. Lakatos A., Derbeneva O., Younes D., **Keator D.B**., Bakken T., Lvova M., Brandon M., Guffanti G., Reglodi D., Saykin A., Weiner M., Macciardi F., Schork N., Wallace D., Potkin S., ADNI. Association between mitochondrial DNA variations and Alzheimer's Disease in the ADNI cohort. Neurobiology of Aging. 2010; 31:1355-63. PMC2918801

    d. **Keator D.B**., Fallon J.H., Lakatos A., Fowlkes C., Potkin S.G., Ihler A. Feed-Forward Hierarchical Model of the Ventral Visual Stream Applied to Functional Brain Image Classification. Journal of Human Brain Mapping. 2012; 35:38-52. PMC4745890

    e. Potkin, S.G., Turner, J.A., Guffanti, G., Lakatos, A., Torri, F., **Keator D.B**., Macciardi F. Genome-wide strategies for discovering genetic influences on cognition and cognitive disorders: methodological considerations. Cognitive Neuropsychiatry. 2009; 14:391-418. PMC3037334

2. **Multi-Site Data sharing:** Data sharing has become increasingly important in the study of complex disorders due to difficulties in recruiting large cohorts at single sites and for facilitating reproducibility of scientific results. I have been contributing to multi-site data sharing efforts such as BIRN project, SchizConnect federated database, and the International Neuroinformatics Coordinating Facility (INCF) Data Sharing Task Force, with the goal of promoting the sharing of neuroimaging data internationally to further scientific progress on a global scale.

    a. **Keator D.B**., Van Erp T.G, Glover G.H., Mueller B.A., Turner J.A., Liu T., Greve D., Voyvodic J., Rasmussen J., Brown G., Calhoun V.D., Lee H., Ford J., Mathalon D., Diaz M., O'Leary D., Gadde S., Preda A., Lim K., Wible C., Stern H., Belger A., McCarthy G., Ozyurt B., Potkin S.G., FBIRN. Function Biomedical Informatics Research Network Brain Imaging Data Resources. Neuroimage Special Issue on Brain Imaging Repositories. 2015; 124(Pt B):1074-9. PMC4651841

    b. Glover G.H., Mueller B.A., Turner J.A., Van Erp T.G, Liu T., Greve D., Voyvodic J., Rasmussen J., Brown G., **Keator D.B**., Calhoun V.D., Lee H., Ford J., Mathalon D., Diaz M., O'Leary D., Gadde S., Preda A., Lim K., Wible C., Stern H., Belger A., McCarthy G., Ozyurt B., Potkin S.G., FBIRN. Function Biomedical Informatics Research Network Recommendations for Prospective Multi-Center Functional Magnetic Resonance Imaging Studies. Journal of Magnetic Resonance Imaging. 2012; 36:39-54. PMC3349791

c. **Keator, D.B**. Information Management in Distributed Biomedical Collaboratories. Methods Mol Biol: Biomedical Informatics. 2009;569:1-23. PMID:19623483

d. **Keator, D.B**.; Grethe, J.S.; Marcus, D.; Ozyurt, B.; Gadde, S.; Murphy, S.; Pieper, S.; Greve, D.; Notestine, R.; Bockholt, H.J; Papadopoulos, P.; Function BIRN; Morphometry BIRN; BIRNCoordinating Center. A National Human Neuroimaging Collaboratory Enabled By The Biomedical Informatics Research Network (BIRN). IEEE Transactions on Information Technology in Biomedicine Special Bio-Grid edition. 2008;12:162-72. PMC2763494

3. **Software Development:** Software tools to support the data lifecycle are quickly becoming critical components for data reuse and reproducibility. Developing robust software for neuroscience requires community-based engagement and a close connection with domain scientists. For more than a decade I have been contributing to scientific software development and engaging communities of international developers and scientists to work together on open-source development projects.

a. **Keator D.B**., Chen J., Nichols N., Fana F., Stern H., Baram T.Z., Small S.L. A Semantic Cross-Species Derived Data Management Application. Data Science Journal. 2017 16, p.45.

b. Maumet C., Auer T., Bowring A., Chen G., Das S., Flandin G., Ghosh S., Glatard T., Gorgolewski K., Helmer K., Jenkinson M., **Keator D.B**., Nichols N, Poline J.B., Reynolds R., Sochat V., Turner J., Nichols T. Sharing brain mapping statistical results with the neuroimaging data model. Scientific Data. 2016; 3:160102. PMC5139675

c. **Keator D.B**., Helmer K., Steffener J., Turner J.A., Van Erp T.G.M., Gadde S., Ashish N., Burns G.A., Nichols B.N. Towards structured sharing of raw and derived neuroimaging data across existing resources. Neuroimage. 2013: 15;82:647-61. PMC4028152

d. Ozyurt I.B., **Keator D.B**., Wei D., Fennema-Notestine C., Pease K., Bockholt B., Grethe J. Federated Web-accessible Clinical Data Management within an Extensible NeuroImaging Database. Neuroinformatics. 2010: 8:231-49. PMC2974931

e. **Keator, D.B**., Wei, D., Gadde, S., Bockholt, H., Grethe, J.S., Marcus, D., Aucoin, N., Ozyurt, B. Derived Data Storage and Exchange Workflow for Large-Scale Neuroimaging Analyses on the BIRN Grid. Front Neuroinformatics. 2009; 3:30. PMC2759340

Complete List of Published Work in My Bibliography:
https://www.ncbi.nlm.nih.gov/sites/myncbi/david.keator.2/bibliography/51265747/public/?sort=date&direction=ascending

D. Research Support

ACTIVE

1P50MH096889 (PI: TZ Baram) 06/17/2013-06/14/2019 2.40 Cal months
NIH/NIMH $5,047,939
Contracting Officer: Julia Zehr
Fragmented Early Life Environmental and Emotional / Cognitive Vulnerabilities
Goals: The major goals of this project are to probe the effects of fragmented early life experience on neuronal network structure and function using magnetic resonance brain imaging (MRI) of rats and humans.
Specific Aims: 1) Characterize patterns of pre- and postnatal maternal signals that influence adolescent vulnerabilities across species, using conventional and innovative methods, and generate trajectories of altered behaviors in infancy, childhood and adolescence. 2) Address the potential underlying mechanisms using common platforms in human and rodents, including structural and functional imaging, and mechanistic studies in rodents. 3) Through a strong Statistics / Computational approach, combine behavioral and imaging outcomes

along time to generate potentially predictive models for adolescent behaviors that may indicate pathology
Project Role: Informatics Core (Director)

1P41EB019936-01A1(PI: Kennedy) 04/15/16-01/31/2021 1.80 Cal months
University of Massachusetts Medical School
UCI Sub-Award (PI: Keator): $268,003
Prime: NIH
Center for Reproducible Neuroimaging Computation (CRNC)
Goals: The major goals of this project are: 1) To develop the necessary technology to deliver an end-to-end reproducible analysis framework that 'bundles' the complete study data, processing workflow, execution environment, statistical analysis and interpretations that arise from an analysis; 2) Training of research investigators at all levels is necessary, as is the development of an active and vibrant social community; 3) Aim 1 technologies will be tested on large existing datasets, with a finite number of initial workflows, and will work through our national and international collaborators with tasks that will probe the actual utility and extendibility of these developments in basic science and clinical applications.
Project Role: Sub-Award PI

1U01AGO51412-01 (PI: Lott) 09/30/2015-04/30/2020 3.00 Cal months
Columbia Univ/NIH
Biomarkers of Alzheimer's Disease in Down Syndrome
Goals: The overall aim of this project is to identify biomarkers associated with the progression of Alzheimer's disease (AD) from its prodromal stages to frank dementia in adults with Down syndrome (DS), responding to RFA-AG-15-011. Adults with DS are at high risk for AD. However there is a wide range of age at onset and a substantial proportion of adults with DS maintain their abilities even at older ages associated with extensive neuropathology. The objective of this project is to identify the factors contributing to these individual differences through a longitudinal analysis of biomarkers of dementia status.
Project Role: Data Analysis
OVERLAP: NONE

Completed Research Support (last three years)

1U01NS087825-01 (PI: Potkin) 09/01/2014-08/31/2016 1.50 Cal months
NIH/NINDS $250,000
CSF-enhanced-aggregation Biomarker for Huntington's Disease
Huntington's disease is a progressive and fatal illness with no known treatment. This proposal refines a CSF biomarker measure to diagnose and monitor the progression of HD. The availability of such a biomarker is crucial to the efficient development of novel treatments for HD.
Project Role: Image Analysis

1U01MH097435-01A1 03/19/2013-01/31/2016 1.50 Cal months
UCI Award : 60033871 (PI: Potkin) $335,942
Northwestern University (Prime NIH)
SchizConnect: Large-Scale Schizophrenia Neuroimaging Data Mediation and Federation
The major goals are to develop SchizConnect Mediator, an algorithmic approach to querying and integrating information from disparate, heterogeneous databases, to enable data retrieval easily and precisely. To establish and validate a web-based portal, SchizConnect, which will provide a uniform, structured, and user-friendly interface to query and download data provided by the Mediator.
Project Role: Director of Computing