BIOGRAPHICAL SKETCH

NAME: John P. Hegarty II, Ph.D.

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

POSITION TITLE: Research Instructor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YYYY	FIELD OF STUDY
Clemson University, Clemson, SC	B.S.	2002-2006	Psychology, Minor Biology
San Diego State University, San Diego, CA	M.A.	2007-2010	Psychology, Emphasis Neuroscience
University of Missouri, Columbia, MO	Ph.D.	2010-2015	Neuroscience
Stanford University, Stanford, CA		2015-Present	Neuroscience of Autism

A. Personal Statement

The overarching goal of my research program is to improve our understanding of the neurobiology underlying the development of different cognitive and behavioral processes and to use this knowledge to identify objective biomarkers for psychiatric disorders in order to improve biologically-based diagnosis and advance precision medicine for mental health. Biologically-based diagnosis and treatment are extremely limited for neuropsychiatric disorders but also critically-needed to increase early identification and improve treatment outcomes, especially for pervasive disorders such as autism spectrum disorder (ASD) in which early intervention is often the most efficacious. Thus far, my early career training has focused on developing the expertise to study the neurobiology and treatment of neurological and neuropsychiatric disorders and my research has focused on the application of non-invasive neuroimaging approaches to examine brain-behavior relationships and develop objective biomarkers of treatment response.

Thus far in my early research career, my primary contributions to science fall within four major categories: 1) identifying the neural correlates of different cognitive and behavioral deficits, 2) investigating the neurobiological substrates of treatment response, 3) examining the etiological factors that contribute to atypical brain development in children with ASD, and 4) summarizing and increasing accessibility to autism-related research. My earliest research investigated the neurobiology associated with the cognitive deficits of alexithymia, dyslexia, and stress to further develop theories of the underlying mechanisms that contribute to differences in cognitive and behavioral processing. My subsequent dissertation research, in which I began to focus on neurodevelopmental disorders, examined the neural correlates of treatment response to beta-blockers in adults with ASD and also assessed the contribution of cerebellar circuits to autism-related symptoms, which is well-supported from postmortem studies but understudied in clinical populations. During my postdoctoral training, I have been further developing skills for working with young children with and without neurodevelopmental disorders as well as utilizing advanced neuroimaging/neurophysiological approaches to examine the biological mechanisms that are related with different symptom presentations. My most recent research has focused on examining the neural correlates of response to behavioral interventions and examining the etiological factors that contribute to atypical brain development in twins with ASD. The line of research that I will continue to develop as an independent faculty member will aim to improve our understanding of typical and atypical brain development to aid in the advancement of precision medicine. Overall, my track record exemplifies that I am highly dedicated to improving biologically-based approaches for neuropsychiatric disorders and am uniquely-qualified to develop this line of research based on my neuroimaging expertise, incorporation of basic research findings into clinical studies, and extensive experience collaborating with clinicians and other researchers to conduct novel clinical research in pediatric, adolescent, adult, and geriatric populations.

B. Positions and Honors

Research Positions

2005-2006 Undergraduate Research Assistant, Comparative Neuropsychology Lab, Clemson University
2007-2009 Graduate Research Assistant, Lifespan Human Senses Lab, San Diego State University
2009-2010 Lab Manager, Attention and Perception Lab, University of Missouri
2010-2015 Graduate Research Assistant, Cognitive Neuroscience Lab, University of Missouri
2010-2012 Graduate Assistant, Dept. of Psychology Brain Imaging Center, University of Missouri
2015-2020 Postdoctoral Research Fellow, Autism Research Program, Stanford University
2020-Present Research Instructor, Autism Research Program, Stanford University

Teaching Positions

2007-2008 Teaching Assistant, Introduction to Psychology, San Diego State University
2008-2009 Teaching Assistant, Statistical Methods in Psychology, San Diego State University
2008-2009 Laboratory Instructor, Data Analysis in Psychology, San Diego State University
2012 Teaching Assistant, Research Methods, University of Missouri
2012 Laboratory Instructor, Research Methods, University of Missouri
2013 Course Instructor, Neurobiology of Autism, University of Missouri
2016-2017 Course Instructor, Physiological Psychology, California State University, East Bay

Other Relevant Administrative and Academic Positions

2008-2009 Psychological Sciences Master's Program Student Committee, San Diego State University
2011-2012 Graduate Professional Council Departmental Representative, University of Missouri
2011-2012 Graduate Professional Council Finance Committee Member, University of Missouri
2011-2015 Mizzou Adventures in Education Outreach Neuroscience Representative, University of Missouri
2012-2013 Society for Neuroscience Midwest Chapter Committee Member, University of Missouri
2016-Present Stanford University Postdoctoral Association (SURPAS), Council Member
2018-2019 Stanford University Postdoctoral Association (SURPAS), Leadership - Advocacy Coordinator
2019-2020 Stanford University Postdoctoral Association (SURPAS), Leadership - Co-chair
2019-2020 Stanford University Faculty Senate, Postdoctoral Representative
2019-Present International Society for Autism Research (INSAR) Website Committee Chair
2020-Present Clinical Human Subjects Research Committee, Stanford University

Extracurricular Training Programs

2011 FMRIB FSL and FreeSurfer Workshop
2012 Preparing Future Faculty Workshop, University of Missouri
2013 College Science Teaching Workshop, University of Missouri
2014 Technical Writing Workshop, University of Missouri
2015, 2020 Preparing for Faculty Careers Workshop, Stanford University
2016 Teaching STEM for Undergraduates Workshop, Stanford University
2016-2017 Grant Writing Academy Bootcamp, Stanford University
2017-2019 Teaching Certificate Program for Postdocs, Stanford University
2017, 2019 International Symposium on GABA and Advanced MRS
2018 Someone Like Me Mentoring Program, Stanford University
2020 Diversity and Inclusivity Forum, Stanford University
2020 Magnetic Resonance Spectroscopy Editing School, Johns Hopkins University

Professional Memberships *(conference presentation information available upon request)*

2003-2006 Alpha Lambda Delta Honors Society
2004-2006 National Society for Collegiate Scholars
2005-Present Society for Neuroscience Member
2010-2014 Cognitive Neuroscience Society Member
2011-Present International Society of Autism Research Member
2015-Present Bay Area Autism Consortium Member

Honors

2002-2006	Dean's List
2006	Clemson Honors College Departmental and General Honors
2010	Rebecca Bryson-Kissinger Master's Thesis Award for Outstanding Thesis in Psychology
2010,'12,'14	University of Missouri Graduate Professional Council Conference Travel Scholarship
2013	International Meeting for Autism Research Student Travel Award
2014	Mizzou Advantage Conference Travel Scholarship
2014	Advancing Neuroscience at MU Honorable Mention for Outstanding Graduate Student Poster
2014	University of Missouri Chancellor's Award for Community Outreach
2015-Present	Bass Society for Pediatric Scholars Postdoctoral Research Fellowship
2016	Bay Area Autism Consortium Best Poster Award and IMFAR Travel Grant
2020	NIH Loan Repayment Program Award from NICHD

Invited Peer Review

2012	Neuroinformatics
2016	Biological Psychiatry
2016-2019	Molecular Autism
2017-2018	Journal of Neurodevelopmental Disorders
2017-2020	Journal of Autism and Developmental Disorders
2018-2019	Molecular Psychiatry
2018-2020	Autism Research
2019	University of Ottawa Medical Research Fund
2019	Neuorimage: Clinical
2019	Research in Autism Spectrum Disorders
2020	Journal of Psychiatry and Neuroscience

C. Contribution to Science

1. Identifying the neural correlates of different cognitive and behavioral deficits: My earliest research examined the neural mechanisms that are associated with disorders affecting emotional awareness (alexithymia), reading abilities (dyslexia), and susceptibility to stress in order to provide some of the first objective tests of prominent theories regarding the pathophysiology of these disorders.

a. Hesse, C., Floyd, K., Rauscher, E., Frye-Cox, N., **Hegarty, J.P., II,** and Peng, H. (2013) Alexithymia and impairment of decoding of positive affect: An fMRI Study. ***Journal of Communication***, 63(4): pp. 786-806. DOI: https://doi.org/10.1111/jcom.12039.

b. Chica, M. G., **Hegarty, J. P., II,** and Schneider, K. A. (2015) Morphological differences in the lateral geniculate nucleus associated with dyslexia. ***Neuroimage: Clinical****,* 7: pp. 830-836. DOI: https://doi.org/10.1016/j.nicl.2015.03.011.

c. Nair, N., **Hegarty, J.P., II,** Ferguson, B.J., Hooshmand, S.J., Hecht, P.M., Tilley, M.R., Christ, S.E., and Beversdorf, D.Q. (2020) Effects of stress on functional connectivity during verbal processing. ***Brain Imaging and Behavior****,* 14: pp. 2708-2723. DOI: https://doi.org/10.1007/s11682-019-00221-5.

d. Nair, N., **Hegarty, J.P., II**, Ferguson, B.J., Hecht, P.M., Tilley, M., Christ, S.E., and Beversdorf, D.Q. (2020) Effects of stress on functional connectivity during problem solving. ***Neuroimage***, 208: pp. 116407. DOI: https://doi.org/10.1016/j.neuroimage.2019.116407.

2. Investigating the neurobiological substrates of treatment response: My doctoral and postdoctoral research has examined the clinical relevance of structural, functional, and neurochemical differences in the brain in individuals with ASD and assessed their ability to serve as treatment prediction markers for clinical research. These studies indicated the potential utility of non-invasive neuroimaging measures to explain some of the extreme variability in clinical presentation and treatment response across individuals as well as the mechanisms through which pharmacological and behavioral interventions may provide their clinical benefits.

a. **Hegarty, J.P., II,** Ferguson, B.J., Zamzow, R. M., Rohowetz, L.J., Johnson, J.D., Christ, S.E. and Beversdorf, D. Q. (2017) *Beta*-adrenergic antagonism modulates functional connectivity in the default mode network of individuals with and without autism spectrum disorder. ***Brain Imaging and Behavior****,* 11(5): pp. 1278-1289. DOI: https://doi.org/10.1007/s11682-016-9604-8.

b. **Hegarty, J.P.,II,** Weber, D.J., Cirstea, C.M. and Beversdorf, D.Q. (2018) Cerebro-cerebellar functional connectivity is associated with cerebellar excitation-inhibition balance in autism spectrum disorder. ***Journal of Autism and Developmental Disorders****,* 48(10): pp. 3460-3473, DOI: https://doi.org/10.1007/s10803-018-3613-y.

c. **Hegarty, J.P., II,** Zamzow, R. M., Ferguson, B.J., Christ, S.E., Porges, E.C., Johnson, J.D., and Beversdorf, D. Q. (2020) *Beta*-adrenergic antagonism alters functional connectivity during associative processing in a preliminary study of individuals with and without autism. ***Autism****,* 24(3): pp. 795-801. DOI: https://doi.org/10.1177/1362361319868633.

d. **Hegarty, J.P.,II,** Gengoux, G.W., Berquist, K.L., Millan, M.E., Tamura, S.M., Karve, S., Rosenthal, M.D., Phillips, J.M., and Hardan, A.Y. (2019) A Pilot Investigation of Neuroimaging Predictors for the Benefits from Pivotal Response Treatment for Children with Autism, ***Journal of Psychiatric Research****,* 111: pp. 140-144. DOI: https://doi.org/10.1016/j.jpsychires.2019.02.001.

3. Examining the etiological factors that contribute to atyipcal brain development in children with ASD: My postdoctoral research has also examined whether altered brain-behavior relationships in children with ASD are associated with genetic or environmental factors during development. This line of research indicated that subcortical development is primarily associated with genetic susceptibility for ASD but cortical/cerebellar development may be more impacted by environmental factors, suggesting that changes to the postnatal environment could potentially impact brain development to provide some clinical benefits for children with ASD.

a. **Hegarty, J.P.,II,** Gu, M., Spielman, D.M., Cleveland, S.C., Hallmayer, J.F., Lazzeroni, L.C., Raman, M.M., Frazier, T.W., Phillips, J.M., Reiss, A.L., and Hardan, A.Y. (2018) A proton MR spectroscopy study of the thalamus in twins with autism. ***Progress in Neuro-Psychopharmacology and Biological Psychiatry****,* 81: pp. 153-160, DOI: https://doi.org/10.1016/j.pnpbp.2017.09.016.

b. **Hegarty, J.P.,II,** Pegoraro, L. F. L., Lazzeroni, L. C., Raman, M.M., Hallmayer, J.F., Monterrey, J. C., Cleveland, S. C., Wolke, O. N., Phillips, J. M., Reiss, A.L., and Hardan, A.Y. (2019) Genetic and environmental influences on structural brain measures in twins with autism spectrum disorder. ***Molecular Psychiatry****,* 25: pp. 2556-2566, DOI: https://doi.org/10.1038/s41380-018-0330-z.

c. **Hegarty, J.P.,II**, Lazzeroni, L. C., Raman, M.M., Hallmayer, J. C., Cleveland, S. C., Wolke, O. N., Phillips, J. M., Reiss, A.L., and Hardan, A.Y. (2020) Genetic and environmental influences on cortico-striatal circuits in twins with autism. ***Journal of Psychiatry and Neuroscience****,* 45: pp. 188-197. DOI: https://doi.org/10.1503/jpn.190030.

d. **Hegarty, J.P.,II,** Lazzeroni, L. C., Raman, M.M., Pegoraro, L. F. L., Monterrey, J. C., Cleveland, S. C., Hallmayer, J.F., Wolke, O. N., Phillips, J. M., Reiss, A.L., and Hardan, A.Y. (2020) Genetic and environmental influences on lobar brain structures in twins with autism. ***Cerebral Cortex****,* 30(3): pp. 1946-1956. DOI: https://doi.org/10.1093/cercor/bhz215.

4. Summarizing and increasing accessibility to autism-related research: I have also received invitations to submit chapters for autism-related reference materials. These chapters provide comprehensive overviews regarding our current knowledge of the neurobiology of ASD. My contributions specifically focus on relevant findings and limitations regarding theories of abnormal structural and functional connectivity in ASD.

a. **Hegarty, J.P.,II,** Hardan, A.Y., and Frazier, T.W. (2018) Corpus callosum. In F.R. Volkmar (Ed.), ***Encyclopedia of Autism Spectrum Disorders****, 2nd Edition,* New York: Springer-Verlag. DOI: https://doi.org/10.1007/978-1-4614-6435-8_669-3.

b. **Hegarty, J.P.,II,** Hardan, A.Y., and Frazier, T.W. (2018) Agenesis of the corpus callosum. In F.R. Volkmar (Ed.), ***Encyclopedia of Autism Spectrum Disorders****, 2nd Edition,* New York: Springer-Verlag, DOI: https://doi.org/10.1007/978-1-4614-6435-8_657-3.

c. **Hegarty, J.P.,II,** Hardan, A.Y., and Frazier, T.W. (2018) Corpus callosum abnormalities in autism. In F.R. Volkmar (Ed.), ***Encyclopedia of Autism Spectrum Disorders****, 2nd Edition,* New York: Springer-Verlag, DOI: https://doi.org/10.1007/978-1-4614-6435-8_1913-3.

d. **Hegarty, J.P.,II,** Hardan, A.Y., and Müller, R.A. (2019) Brain connectivity theories of autism. In F.R. Volkmar (Ed.), ***Encyclopedia of Autism Spectrum Disorders****, 2nd Edition,* New York: Springer. DOI: https://doi.org/10.1007/978-1-4614-6435-8_102064-1.

e. **Hegarty, J.P.,II,** Fung, L.K., and Hardan, A.Y. (2020) N-acetylcysteine (NAC). In F. Hollander, R. Hagerman, and C. Ferretti (Ed.), ***Textbook of Autism Spectrum Disorders****, 2nd Edition,* Washington, DC: American Psychiatric Publishing, Inc. *in press.*

D. Research Support

Current Support

NIH Career Development Award (**Hegarty** & Hardan) 2020-2025
Eunice Kennedy Shriver National Institute of Child Health and Human Development (K99HD101702)
Targeting the neurobiology of restricted and repetitive behaviors in children with autism using N-acetylcysteine
The goal of this research is to use multi-modal MRI and EEG measures to examine the neurobiology of restricted and repetitive behaviors in children with autism spectrum disorder and examine the efficacy of N-acetylcysteine, a well-tolerated nutritional supplement and glutamatergic modulator, for targeting this neurobiology to reduce symptom severity.
Role: Principal Investigator

NIH Loan Repayment Program Award (**Hegarty**) 2020-2022
Eunice Kennedy Shriver National Institute of Child Health and Human Development
The NIH Loan Repayment Programs were established by Congress and designed to recruit and retain highly qualified health professionals into biomedical or biobehavioral research careers. This merit-based award will repay up to half of an awardees educational loan in exchange for a commitment to non-profit research endeavors.
Role: Award recipient

Stanford eWear Seed Grant (Miri, **Hegarty**, Hardan & Gross) 2020-2021
Stanford University Wearable Electronics Initiative
Facilitating Affect Regulation in Youth with Autism Spectrum Disorder
The goal of this research is to design, prototype, and evaluate a vibrotactile-based system that is tailored to assist youth diagnosed with ASD improve affect regulation in their everyday life.
Role: Co-investigator

NIH Developmental Research Grant Award (Hardan & Gengoux) 2018-2020
National Institute on Deafness and Other Communication Disorders (1R21DC016089-01A1)
Neuroimaging predictors of pivotal response treatment in young children with autism
The goal of this research is to use multi-modal MRI techniques in young children with ASD that are participating in a clinical trial of pivotal response treatment to target language and communication abilities to identify neuroimaging predictors of treatment response.
Role: Co-investigator

Completed Support

Postdoctoral Research Fellowship (**Hegarty**) 2015-2020
Stanford University Bass Society of Pediatric Scholars
The goals of my postdoctoral training and research were to develop expertise in the neurobiological assessment of young children with ASD in order to identify neurobiological abnormalities that are associated specific symptom profiles and develop objective treatment-prediction markers that can help identify which individuals will most likely benefit from certain forms of interventions.
Role: Award recipient/Postdoctoral trainee

Pediatric Imaging Research Grant (Spielman, Hardan & **Hegarty**) 2017-2019
Stanford University Department of Radiology
Multi-modal neuroimaging of the cerebellum in children with ASD
The goal of this research was to apply multi-modal MRI techniques, especially advanced proton spectroscopy to examine neurochemical levels, in children with ASD and aged-matched, typically-developing controls in order to provide the a comprehensive *in vivo* examination of cerebellar abnormalities in children with ASD.
Role: Co-investigator

Bio-X Interdisciplinary Initiatives Seed Grant (Kuhl & Hardan) 2015-2016
Stanford University School of Medicine
Understanding Gyrification Dynamics in the Human Brain
The goal of this project was to identify how mechanics, a quantitative, predictive discipline, can help to address the major challenges of understanding cortical folding in autism using longitudinal imaging data. This data is currently being analyzed by our collaborators. However, within this pilot study we were able to collect baseline data from young children with ASD before they participated in a trial of Pivotal Response Treatment, which was used as pilot data to support the NIH Developmental Research Grant listed above.
Role: Project Manager

Brain Imaging Center Pilot Grant (Beversdorf & **Hegarty**) 2014-2015
University of Missouri Department of Psychological Sciences
Cerebellar glutamatergic/GABAergic signaling and neocortical projections in autism spectrum disorders: a multi-modal study of resting state functional connectivity and spectroscopy MRI.
The goal of this research was to determine whether disturbances in the GABAergic system in the cerebellum are observable in individuals with autism spectrum disorder *in vivo* and assess how they are related with cerebro-cerebellar connectivity and autism-related symptom presentation.
Role: Co-Investigator

NIH Maternal and Child Health Research Program (Beversdorf) 2011-2013
Health Resources and Services Administration (1R40MC19926)
Effects of propranolol across a range of tasks on sympathetic reactivity and functional connectivity in autism.
The goal of this research was to assess how propranolol, a beta-adrenergic antagonist, affects cognition across different psychological and behavioral domains in indi with autism spectrum disorder and examine how these effects are modulated by the peripheral and central nervous system.
Role: Project Manager