# Katelyn L. Arnemann

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## Education

**2012-2018**  **University of California, Berkeley**
Ph.D. in Neuroscience
"Insights on Alzheimer's disease etiology from network approaches in healthy aging"
Advisor: William Jagust
Dissertation Committee: Mark D'Esposito, Jack Gallant, & Lexin Li

**2007-2010**  **Case Western Reserve University**
B.A. in Cognitive Science; Philosophy

## Experience

**2021-present**  **Unlearn.AI**, San Francisco, CA, USA
Data Scientist
- Led data processing team comprised of data scientists and engineers to spearhead new disease progression models
- Collaborated to develop software in **python** to generalize and streamline data processing and EDA

**2019-2021**  **Datacubed Health**, Brooklyn, NY, USA
Research Scientist
- Conducted **statistical validation** of Linkt mobile app features, including surveys, cognitive tasks, and geofencing
- Performed **data wrangling** and **QA** for data transfers to clients conducting **clinical trials**
- Conducted ML analyses (e.g., **survival analysis**, **classification**) to predict behavior of participants in clinical trials
- Contributed to scientific requirements and data specifications of Datacubed products

**2019**  **Insight Data Science**, New York City, NY, USA
Data Science Fellow

*Points of Interest web application*
- Built a web-app recommender system for little-known travel destinations using NLP (LDA topic analysis) and categorical features (MCA dimensionality reduction and k-means clustering)
- Scraped, cleaned, and feature-engineered text data from wikipedia.org and stateparks.com

**2018-2019**  **Rutgers University, Newark**, NJ, USA
Center for Molecular and Behavioral Neuroscience
Postdoctoral Associate
Principal Investigator: Michael Cole

*Latent functional connectivity project*
- Implemented exploratory factor analysis to estimate latent functional connectivity across many cognitive states using fMRI data from the Human Connectome Project
- Demonstrated that latent functional connectivity improves prediction of evoked brain activity and behavior

- Contributed to open-source software Brain Activity Flow Toolbox for predictive models of brain activation patterns

2013-2018   **University of California, Berkeley**, CA, USA
Helen Wills Neuroscience Institute
Graduate Student Researcher in Neuroscience
Principal Investigator: William Jagust

*General*
- Implemented and piloted multiband rs-fMRI sequences
- Used Python to wrangle longitudinal multimodality neuroimaging data (rs-fMRI, MRI, FDGPET, PIB-PET, AV1451-PET) for hundreds of sessions
- Developed a flexible rs-fMRI preprocessing stream using nipype in Python https://github.com/klarnemann/jagust_rsfmri
- Mentored three undergraduate students and a visiting graduate student

*Predictors of spatial pattern of amyloid and tau pathology project*
- Used linear regression to dissociate properties of the connectivity (rs-fMRI) from metabolism (FDG-PET) in young adults
- Compared explanatory power of metabolism, connectivity, and a novel metric of metabolic inefficiency in predicting the spatial pattern of amyloid-β (PIB-PET) and tau (AV1451-PET)

*Metabolic networks in preclinical Alzheimer's disease project*
- Identified differences in group metabolic brain networks (FDG-PET) for young, healthy old, and Alzheimer's disease patients
- Found significant widespread elevated metabolic correlation strength and metabolic brain network desegregation in healthy older adults, with departure in subgroup with two Alzheimer's risk factors (ApoE ε4 genotype and amyloid-β)

*Cross-sectional model of amyloid-β spread via directed progression networks*
- Modeled accumulation of amyloid-β using cross-sectional PIB-PET
- Built directed progression networks to model the spread of amyloid-β across successive stages of amyloid-β accumulation in normal aging
- Detected multiple sources of amyloid-β accumulation in PIB- older adults

*Community detection methods*
https://github.com/nipy/brainx
- Extended cluster-stabilization approaches to address degeneracy of network community detection by partitioning a consistency matrix generated through iterative sub-sampling
- Contributed to BrainX in Python by overhauling weighted community detection to allow flexible functionality for networks with negative weights

2010-2012   **U.S. Department of Veteran's Affairs**, Martinez, CA, USA
Neurology Division
Research Assistant in Rehabilitation Neuroscience
Principal Investigators: Mark D'Esposito & Anthony Chen

*General*
- Trained brain injured patients with executive dysfunction on a selective attention task and administered MRI scans and neuropsychological tests
- Helped edit manuscripts and book chapters

*Network modularity predicts rehabilitation project*
- Computed modularity using community detection in intrinsic brain networks from baseline rsfMRI, used this metric to predict improvement in executive function after a rehabilitative intervention

*Neural codes for task condition, stimulus, and relevance project*
- Used a linear multilayer perceptron classifier to perform multivariate pattern analysis during selective attention to faces and/or scenes during a working memory task in young adults
- Classification of condition, stimulus category, and stimulus relevance were compared for the middle frontal gyrus and visual associate cortex

2008-2010     **Case Western Reserve University**, Cleveland, OH, USA
Department of Cognitive Science
Undergraduate Research Assistant in Cognitive Neuroscience
Principal Investigator: Anthony Jack

*General*
- Managed and trained other undergraduate research assistants
- Used E-Prime to create and administer a wide variety of neuropsychological and cognitive tests and questionnaires

*Opposing domains hypothesis of brain function project*
- Implemented and pilot tested a novel 2x2 factorial design crossing cognitive domain
- (social/mechanical) and stimulus modality (text/video)
- Conducted a pilot analysis using a general linear model to contrast brain activity during social and mechanical reasoning tasks, which respectively invoked activity characteristic of the so-called "default-mode" and "task-positive" networks
- Conducted a meta-analysis extracting coordinates associated with social/emotional and numerical/logical reasoning

## Publications

**Arnemann KL**, McCormick EM, Ito T, Hanson SJ, Cole M, Estimating latent functional connectivity underlying multiple brain states (in review).

**Arnemann KL**, , Maass A, Harrison T, Baker S, de Flores R, Chetelat G, Jagust WJ, Early life metabolic inefficiency predicts the spatial patterns of Alzheimer's pathology in late life (in preparation).

**Arnemann KL**, Stoeber F, *Narayan S, Rabinovici GD, Jagust WJ. Metabolic brain networks in aging and preclinical Alzheimer's disease. Neuroimage: Clinical (2018): 17 987-999.

**Arnemann KL**, Chen AJ, Novakovic-Agopian, Gratton C, Nomura EM, D'Esposito. Functional brain network modularity predicts response to cognitive training after brain injury. Neurology (2015): 84 1568-1574.

Jack AI, *Dawson AJ, **Begany KL**, Leckie RL, Barry KP, Ciccia AH, Snyder AZ. fMRI reveals reciprocal inhibition between social and physical cognitive domains. NeuroImage (2013): 66 385-401.

## Presentations

**Talks**

2017     Society for Neuroscience Annual Meeting
Washington, DC, USA

*Metabolic inefficiency in early life predicts the spatial pattern of amyloid-β in late life*

2016        Human Amyloid Imaging Conference
            Miami, FL, USA
            *Metabolic efficiency predicts the spatial pattern of Alzheimer's pathology in late life*

2012        Henry H. Wheeler Jr. BIC Research Day
            University of California, Berkeley, CA, USA
            *Brain modularity predicts responsiveness of brain injury patients to cognitive rehabilitation*

2010        Midwestern Undergraduate Cognitive Science Conference
            University of Indiana, Bloomington, IN, USA
            *Two domains of human higher cognition: distinct brain networks underlie social and mechanical reasoning*

## Posters

2019        Organization for Human Brain Mapping Annual Meeting
            Rome, Italy
            *Estimating latent functional connectivity underlying multiple brain states*

            Cognitive Neuroscience Society Annual Meeting
            San Francisco, CA, USA
            *Estimating latent functional connectivity underlying multiple brain states*

2018        Society for Neuroscience Annual Meeting
            San Diego, CA, USA
            *Amyloid-beta spreads from multiple sources in healthy aging*

2016        Alzheimer's Association International Conference
            Toronto, ON, Canada
            *Beta-amyloid spreads from multiple epicenters in preclinical Alzheimer's disease*

2012        Society for Neuroscience Annual Meeting
            New Orleans, LA, USA
            *Individual differences in response of brain injury patients to cognitive rehabilitation: evidence from analyses of functional brain networks*

            Cognitive Neuroscience Society Annual Meeting
            Chicago, IL, USA
            *Predicting the response of patients with brain injury to cognitive rehabilitation: evidence from analyses of functional brain networks*

2011        Center for Integrated Brain Health and Wellness Grand Opening
            U.S. Department of Veterans Affairs, Martinez, CA, USA
            *Functional brain imaging for understanding the neuroscience of rehabilitation*

2010        SOURCE Intersections Competition Case Western Reserve University
            Cleveland, OH, USA
            *Two domains of human higher cognition: distinct brain networks underlie social and mechanical reasoning*

2009        Society for Neuroscience Annual Meeting
            Chicago, IL, USA
            *Two domains of human higher cognition: distinct brain networks underlie social and mechanical reasoning*

## Teaching Experience

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| 2017 | **University of California, Berkeley**, CA, USA<br>Redwood Center for Theoretical Neuroscience<br>Teaching Assistant<br>Berkeley Summer Course in Mining and Modeling of Neuroscience Data |
| 2015 | **University of California, Berkeley**, CA, USA<br>Helen Wills Neuroscience Institute<br>Graduate Student Instructor<br>Applied Statistics for Neuroscience (graduate level) |
| 2013 | **University of California, Berkeley**, CA, USA<br>Department of Public Health<br>Graduate Student Instructor<br>The Aging Brain (undergraduate level) |
| 2012-2015 | **Level Playing Field Institute**, Oakland, CA, USA<br>Summer Math and Science Honors Academy<br>Summer Project Leader<br>Topics in Current Science Research (high school level) |
| 2009 | **Case Western Reserve University**, Cleveland, OH, USA<br>Department of Cognitive Science<br>Undergraduate Student Supplemental Instructor<br>Introduction to Cognitive Science II (undergraduate level) |

## Leadership & Community Engagement

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| 2017 | Data Science Workshop<br>Career Development in Physical Sciences<br>University of California, Berkeley, CA, USA<br>Participant |
| 2017 | Human Brain Imaging Faculty Search Committee<br>Joint Department of Psychology & Helen Wills Neuroscience Institute<br>University of California, Berkeley, CA, USA<br>Graduate Student Representative on Committee |
| 2016 | Helen Wills Neuroscience Institute Work Climate Committee<br>University of California, Berkeley, CA, USA<br>Member |
| 2015-2016 | Graduate Student Assembly<br>University of California, Berkeley, CA, USA<br>Neuroscience Graduate Program Representative |
| 2014-2016 | Neuroscience Data Mining Group<br>University of California, Berkeley, CA, USA<br>Founding Member and Leader<br>https://sites.google.com/site/neurodatamininggroup/ |
| 2014 | Women in Tech Workshop |

Facebook & NumFocus
Mentor

2013-2015 Berkeley Science Review
University of California, Berkeley, CA, USA
Contributing Author & Editor

## Honors and Awards

2013  Graduate Research Fellowship Program
National Science Foundation

2010  Cognitive Science Award
Department of Cognitive Science
Case Western Reserve University, Cleveland, OH, USA

2010  Truman P. Handy Philosophical Prize
Department of Philosophy
Case Western Reserve University, Cleveland, OH, USA