

# John C. Flournoy, PhD

Quantitative Research Scientist & Methodological Consultant

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## Professional Summary

Quantitative methodologist and research scientist with 12+ years translating complex statistical problems into practical guidance for multidisciplinary teams. I combine deep technical expertise with substantive research experience in developmental science, education, and learning—and I build the tools, workflows, and capacity that help teams do rigorous work independently.

## Why This Role: Fit Summary

- ✓ Deep expertise in causal inference, Bayesian methods, longitudinal analysis, measurement theory, and study design—the quantitative methods central to rigorous education research and impact evaluation
- ✓ Proven mentoring and capacity building: 12+ years building quantitative skills within multidisciplinary teams through workshops, one-on-one consultation, and reusable tools and templates; demonstrated ability to teach rigorous methods to collaborators across varying statistical backgrounds
- ✓ Youth-centered research background: Extensive experience designing and conducting research with adolescents, including vulnerable populations (foster-care-involved youth) requiring enhanced ethical protections; deep knowledge of measurement validity and implementation considerations specific to youth
- ✓ Direct education and learning research: Designed and evaluated pedagogical interventions at a learning technology company—testing whether framing assessment as learning improved engagement, and whether communities of practice supported persistence
- ✓ Substantive breadth rooted in cognitive and developmental science: Core expertise in cognition, development, and psychometrics extends naturally into mental health, education technology, and learning research—enabling methodological support across foundry10's diverse labs and interest areas
- ✓ Committed advocate and practitioner of open science: Published on improving scientific practices in developmental research; proponent of multiverse analysis, pre-registration, and transparent reporting; build and share reusable research tools (R packages, Docker environments, survey scoring pipelines) and apply test-driven development to analytic workflows

## Core Technical Expertise

### Advanced Statistical & Causal Methods

Multilevel/hierarchical linear modeling · Longitudinal data analysis (mixed effects, latent growth curves, intensive designs) · Bayesian inference & modeling (Stan, brms, hierarchical models, prior specification, posterior diagnostics) · Causal inference (DAGs, confounding adjustment, sensitivity analysis, instrumental variables) · Structural equation modeling · Network modeling · Measurement theory & psychometrics (IRT, factor analysis, measurement invariance, reliability)

### Study Design & Methodology

Experimental design & power analysis · Observational study design (matching, weighting, stratification) · Survey sampling & weighted data analysis · Mixed-methods integration · Research protocols & pre-registration · Human subjects research with youth and vulnerable populations · Missing data methods (maximum likelihood, multiple imputation)

### Computational & Reproducibility Skills

R (data.table, ggplot2, brms, Stan) · Python · SQL · Git/GitHub · R Markdown & Quarto · Open science practices (OSF, pre-registration, transparent reporting, multiverse analysis)

# Professional Experience

## Research and Data Science Consultant, Independent

2018–Present

- Provide expert statistical consultation to academic research teams and organizations on study design, causal inference approaches, measurement validation, and Bayesian modeling
- Clients include Harvard neuroimaging labs, digital mental health platforms (Meru Health), and academic teams across psychology and education
- Design observational longitudinal studies with attention to data collection strategies, missing data approaches, and hierarchical model specification
- Validate and develop measurement instruments through item analysis, internal consistency evaluation, and structural validity testing (SEM, IRT)
- Maintain active self-directed learning and experimental projects (i.e., play) across statistical, computational, and visualization domains: Bayesian modeling, ML pipelines, visualization tools, and generative AI experiments (see [johnflournoy.science/projects](https://johnflournoy.science/projects))

## Principal Research Scientist, Developer Success Lab, Pluralsight

2024–2025

- Led research spanning learning science and developer productivity at a company with two products: Skills (a learning platform) and Flow (productivity analytics)
- Designed and analyzed microstudies evaluating pedagogical interventions: whether framing testing as learning (vs. evaluation) improved learner engagement, and whether communities of practice supported persistence in learning
- Led statistical analysis of longitudinal productivity data from 11,000+ developers across 216 organizations (55,000+ observations); specified multilevel Bayesian models separating individual from organizational variation
- Published peer-reviewed evaluation demonstrating that individual-focused interventions have limited system-level impact, informing strategic shift toward organizational approaches

## Research Associate & Postdoctoral Fellow, Harvard University

2018–2024

- **Longitudinal Neuroimaging & Reliability:** Lead analyst on intensive longitudinal fMRI study (50+ adolescents, 200+ sessions) examining stress and psychopathology mechanisms; developed and evaluated multilevel models of neural activation reliability
- **Intensive Longitudinal Data & Measurement Development:** Designed digital phenotyping protocol (stress, sleep, digital communication, physical activity over 3+ years); validated new self-report and behavioral task measures for adolescent populations, leading to 3 publications (NIMH R37-MH119194, \$9M)
- **Multi-Site Longitudinal Analyses:** Analyzed fMRI and extensive survey data from 500+ adolescents across 4 sites on cognitive control and reward (NIMH U01-MH109589, \$17.1M); conducted systematic, pre-registered measurement invariance testing
- **Methodological Mentoring:** Provided research design consultation and statistical guidance to 8 graduate students, 15 postbaccalaureate RAs, and 9 postdoctoral fellows across 2 lab groups

## Graduate Research Fellow, University of Oregon

2012–2018

- Developed hierarchical Bayesian reinforcement learning model examining adolescent social motives as causes of health-risking behavior
- Collected and analyzed data from 300+ participants, including foster-care-involved adolescents requiring enhanced IRB protections, parental consent/youth assent procedures, and mandated reporting protocols
- Conducted multilevel modeling and SEM of longitudinal personality and fMRI task data
- Validated new behavioral task and self-report measures

## Research Coordinator, Stanford University

2009–2012

- Coordinated Simons Foundation-funded study examining sleep problems and autism spectrum disorder symptoms
- Site coordinator for registered clinical trial evaluating novel PET biomarker of cerebral amyloid in dementia patients

## Publications & Scientific Dissemination

See [Google Scholar](#) for full list of 25+ peer-reviewed articles

### First/Lead Author

Flournoy, J. C., Lee, C. S., Wu, M., & Hicks, C. M. (2025). No Silver Bullets: Why Understanding Software Cycle Time is Messy, Not Magic. *Empirical Software Engineering*, 30, 103. doi:10.1007/s10664-025-10735-w

Flournoy, J. C., Bryce, N. V., Dennison, M. J., et al. (2024). A precision neuroscience approach to estimating reliability of neural responses during emotion processing: Implications for task-fMRI. *NeuroImage*, 285, 120503.

Flournoy, J. C., Vijayakumar, N., Cheng, T. W., et al. (2020). Improving practices and inferences in developmental cognitive neuroscience. *Developmental Cognitive Neuroscience*, 100807.

### Collaborative Publications

Bryce, N., Flournoy, J. C., Moreira, J. F. G., et al. (2021). Brain parcellation selection: An overlooked decision point with meaningful effects on individual differences in resting-state functional connectivity. *NeuroImage*, 118487.

Ludwig, R. M., Flournoy, J. C., & Berkman, E. T. (2019). Inequality in personality and temporal discounting across socioeconomic status? Assessing the evidence. *Journal of Research in Personality*, 81, 79–87.

Matta, T. H., Flournoy, J. C., & Byrne, M. L. (2018). Making an unknown unknown a known unknown: Missing data in longitudinal neuroimaging studies. *Developmental Cognitive Neuroscience*, 33, 83–98.

## Teaching, Mentoring & Capacity Building

### Workshops & Training

- ABDC Workshop Instructor (2021): *Modeling Developmental Change*—Data science tools, SEM theory and hands-on tutorial
- UC Adolescence Consortium Presenter (2021): *Why and How to Care About Covariates in Longitudinal Data*
- Lifespan Informatics & Neuroimaging Center, UPenn Seminar (2021): *Scientific Practice in Developmental Cognitive Neuroscience*
- Institute for Technology in Psychiatry, McLean Hospital (2019): *Machine Learning as a Tool for Diagnosis and Theory Testing*
- Graduate Statistics Teaching Assistant, University of Oregon Department of Psychology (2014–2015)
- Co-lead, UO R Club: Led tutorials and consultations on R programming, data manipulation, simulation, and multilevel modeling (2014–2016)
- Contributor, UO Bayes Club: Bayesian inference workshops using R and JAGS (2014–2016)

### Mentorship & Multi-Project Management

- Provided methodological consultation, study design guidance, and statistical training to 32+ researchers (graduate students, postbac RAs, postdocs) across 2 major research groups
- Managed concurrent analytic workflows across multiple funded projects (NIMH R37 and U01 grants at Harvard; multiple consulting clients simultaneously)
- Mentored development of research proposals, analysis plans, and manuscript preparation
- Trained research staff in human subjects ethics, IRB protocols, data quality assurance, and open science practices

## Dissemination for Technical & Non-Technical Audiences

- Guest, The Stack Overflow Podcast (2025): Communicated statistical methodology concepts for a broad developer audience
- Synthesized research findings into accessible reports and presentations for stakeholders across varying levels of quantitative training
- Production Assistant, American Masters (PBS, 2005)

## Open Science & Methodological Infrastructure

### Reusable Tools & Templates for Research Teams (R Packages, CRAN & GitHub)

- **rielpmr**: Generate syntax for random intercept cross-lagged panel models—enables collaborators to implement complex longitudinal designs without writing model code from scratch
- **curvish** (alpha): Bayesian analysis and visualization of GAM smooths using 1st and 2nd derivatives—supports flexible nonparametric estimation with Bayesian uncertainty quantification
- **scorequaltrics**: Retrieve and score survey data from Qualtrics using CSV templates—standardizes survey data processing workflows across research teams
- **verse-cmdstan**: Docker container providing reproducible Bayesian computing environments (R + Stan)—eliminates setup barriers for collaborators and ensures identical environments across laptops, CI, and HPC clusters

### Open Data, Reproducibility & Quality Assurance

- Apply test-driven development (TDD) to all research workflows: writing tests for data processing pipelines, model specifications, and analytic code before implementation—ensuring analytic quality assurance and verification
- Contributor to Open Science Framework; publicly shared data and analysis code for multiple studies
- Active practitioner of pre-registration, open science practices, and transparent statistical reporting

## Education & Professional Training

Ph.D., Psychology, University of Oregon, 2018

Focus: Computational methods, Bayesian hierarchical modeling, developmental neuroscience

M.S., Psychology, University of Oregon, 2014

B.A., Cognitive Science, University of California, Berkeley, 2005

### Specialized Training

- Advanced Bayesian Models for the Social Sciences | ICPSR Summer Program in Quantitative Methods, 2015
- Causal Inference for the Social Sciences | ICPSR Summer Program in Quantitative Methods, 2015
- Python Programming and Neuroinformatics | Neurohackweek, 2016

## Academic Appointments

Associate of the Department of Psychology (Courtesy Appointment) | Harvard University, 2024–Present

## **Awards & Recognition**

- The Sackler Scholar Programme in Psychobiology Research Grant, 2019
- Gary E. Smith Summer Professional Development Award, 2015
- Clarence and Lucille Dunbar Scholarship, 2014