

# BERNARD J. KOCH

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**ABOUT ME:** I am a computational sociologist (data scientist) interested in culture, the science of science, mixed methods, and the intersections of deep learning, causal inference, and network science. Before graduate school, I worked at NHGRI (the NIH genomics institute) doing bioinformatics/scientific programming, and at AAAS (publisher of *Science*) doing science education research and front-end development of science education tools.

## EDUCATION:

- Ph.D. in Sociology, University of California Los Angeles, ABD (2022 expected), advised by Jacob Foster
- M.A. in Sociology, University of California Los Angeles, 2018
- B.A. in Biology with a Cognitive Science minor, Swarthmore College, 2013

## GRANTS, FELLOWSHIPS, and HONORARIA:

- National Science Foundation Doctoral Dissertation Research Improvement Grant, 2021 (\$20,000)
- Templeton Foundation Education Development Grant, Primary Investigator, Jun 2019 (\$5,700)
- Templeton Foundation Diverse Intelligence Summer Institute, Travel/Housing Full Scholarship, 2019
- National Science Foundation Graduate Research Fellowship, 2018-2021 (\$138,000)
- University of California Graduate Research Mentorship Fellowship, 2017-2018 (\$38,000)
- University of California Graduate Summer Research Mentorship Fellowship, 2017 & 2018 (\$12,000)
- University of California Dean's Scholar Award, 2016-2021 (~14,000) (declined)
- University of California Dr. Ursula Mandel Scholarship, 2016 -2017 (\$15,000)
- Russell Sage Foundation Workshop for Social Science Genomics, Travel/Housing Full Scholarship, 2017

## AWARDS:

- 2021 UCLA Sociology Sifton Undergraduate Research Mentorship Award
- 2018 California Workshop on Evolutionary Social Sciences Poster Award, 2<sup>nd</sup> Place
- 2014 NHGRI Genome Recognition of Employee Accomplishment and Talents Award (as member of a team)

## PEER-REVIEWED PUBLICATIONS & PREPRINTS:

- Koch BJ, Silvestro D, Foster JG. [The evolutionary dynamics of cultural change \(as told through the birth and brutal, blackened death of Metal music\)](#). **Revise and Resubmit at the American Journal of Sociology.**
- Koch BJ, Sainburg T, Geraldo PE, Jiang S, Sun Y, Foster JG. [Deep Learning of Potential Outcomes](#). **Preprint.**
- Jiang S, Koch BJ, Sun Y. [HINTS: time series prediction via dynamic heterogeneous information network embedding](#). *WWW*, 2021.
- Brand JE, Xu J, Koch BJ, Geraldo PE. [Uncovering sociological effect heterogeneity using tree-based machine learning](#). *Sociological Methodology*, 2021..
- Gjesfjeld E, Silvestro D, Chang J, Koch BJ, Foster JG, Alfaro ME. [A quantitative workflow for modeling diversification in technological systems](#). *PLoS One*, 2020 February 6;15(2): e0227579.
- Brand JE, Koch BJ, Xu J. [Machine learning](#), in **SAGE Research Methods in the Social Sciences Foundation**. Paul Atkinson, Sara Delamont, Alexandru Cernat, Joseph W. Sakshaug, and Richard A. Williams. eds. 2020.

- Davidson PL, **Koch BJ**, Schnitzler CE, Henry JQ, Martindale MQ, Baxeavanis AD, Browne WE. [The maternal-zygotic transition and zygotic activation of the \*Mnemiopsis leidyi\* genome occurs within the first three cleavage cycles](#). *Mol Reprod Dev.*, 2017 Oct 25;84: 1218–1229.
- Moreland RT, Nguyen AD, Ryan JF, Schnitzler CE, **Koch BJ**, Siewert K, Wolfsberg TG, Baxeavanis AD. [A customized web portal for the genome of the ctenophore \*Mnemiopsis leidyi\*](#). *BMC Genomics*, 2014 Apr 15:316.
- Ryan JF, Pang K, Schnitzler CE, Nguyen A-D, Moreland RT, Simmons DK, **Koch BJ**, Havlak P, NISC Comparative Sequencing Program, Smith SA, Putnam N, Dunn CW, Wolfsberg TG, Mullikin JC, Martindale MQ, Baxeavanis AD. [The genome of the ctenophore \*Mnemiopsis leidyi\*](#). *Science*, 2013 Dec 13;342(6164).
- **Koch BJ**, Ryan JF, Baxeavanis AD. [The diversification of the LIM superclass at the base of the metazoa increased subcellular complexity and promoted multicellular specialization](#). *PLoS One*, 2012 March 15;7(3): e33261.

## WORKS IN PROGRESS:

- **Koch BJ**, Dasgupta K, Panofsky A. White supremacy in an academic forest: does anyone hear it?
- Koch BJ, Denton E, Hanna A, Foster JG. The genealogy of data and genesis of fields in machine learning research (*authorship order TBD*).

## INVITED TALKS:

- “*Modeling the Dynamics of Cultural Diversification*” Cultural Evolution Society/National Institute for Mathematical and Biological Synthesis, virtual, November 2020.

## CONFERENCE PRESENTATIONS:

- **Koch BJ**, Dasgupta K, Panofsky A. White supremacy in an academic forest: does anyone hear it? **American Sociological Association, Main Session on Science Knowledge and Technology**, virtual, August 2021.
- Koch BJ, Sainburg T, Jiang S, Foster JG, Sun Y. Deep Learning of Potential Outcomes. **American Sociological Association, Main Session on Methodology**, San Francisco CA (virtual), August 2020.
- Koch BJ, Silvestro D, and Foster JG. Evolutionary Dynamics of Cultural Change. **American Sociological Association, Main Session on Culture**, San Francisco CA (virtual), August 2020.
- Koch BJ, Silvestro D, and Foster JG. The Birth and Death of Cultural Things: Explaining Cultural Evolution Through Bayesian Analysis of Diversification Rates. **American Sociological Association, Main Session on Computational Sociology**, New York NY, August 2019.
- Koch BJ, Silvestro D, and Foster JG. The Birth and Death of Cultural Things: Explaining Cultural Evolution Through Bayesian Analysis of Diversification Rates. **International Conference for Computational Social Science**, Amsterdam NL, July 2019.
- Koch BJ, Silvestro D, and Foster JG. The birth and (brutal, blackened) death of cultural things: a macroevolutionary history of metal music 1968-2000. **Cultural Evolution Society**, Tempe AZ, October 2018.

## POSTERS:

- **Koch BJ**, Sainburg T, Geraldo PE, Jiang S, Sun Y, Foster JG. [Deep Learning of Potential Outcomes](#). **ICML Workshop on Causal Assumptions**, August 2021.
- Koch BJ, Dasgupta K, Panofsky A. White Supremacy in an Academic Forest: Does Anyone Hear It? **Pre-ASA Workshop on Computational Sociology**, Palo Alto CA (virtual), August 2020.
- Koch BJ, Silvestro D, Foster JG. The Evolution of Cultural “Things:” Diversity Dependence Among Metal Bands (1968-2000). **California Workshop for the Evolutionary Social Sciences**, Santa Barbara CA, May 2018.
- Koch BJ, Glassman SE, Roseman JE, DeBoer GE. A Case Study in the Evaluation of Alignment to the Next Generation Science Standards using the EQuIP Rubric. **The National Association For Research in Science Teaching Annual International Conference**, Chicago IL, April 2015.

- Koch BJ, Schnitzler CE, Gildea, DE, Henry JQ, Martindale MQ, Baxeavanis AD, Browne WE. Differential Gene Expression During Early Embryogenesis in the Ctenophore *Mnemiopsis leidyi*. **The Society for Integrative & Comparative Biology**, Austin TX, January 2014.

## SKILLS:

- **Programming:** Python/pandas, R (fluent), Javascript, SQL, Bash (intermediate)
- **Deep Learning:** Tensorflow2, Pytorch (intermediate)
- **Supervised Machine Learning:** Standard models (LR, NB, SVM, RF, XGBoost, etc...)
- **Unsupervised Machine Learning:** Standard models (PCA, t-SNE, UMAP, Struct. topic models, Word vecs)
- **Network Science:** GNNs, Community detection, ERGMs, Centrality analyses
- **Bayesian Statistics:** Simple MCMCs with Gibbs Sampling
- **Causal Inference:** DL models for CI, Causal Trees/Forests, interpreting DAGs, other methods for obs. data
- **Regression:** GLMs, Mixed effect models
- **Languages:** English (fluent), Spanish (intermediate)

## PREVIOUS EMPLOYMENT/RESEARCH EXPERIENCE:

**American Association for the Advancement of Science**, Washington DC Spring 2014-Spring 2016

**Position:** Research Assistant

- Designed and validated assessments to measure high school students' understanding of evolution
- Managed random controlled trial study of biochemistry curriculum over a cohort of ~1000 students
- Co-wrote & programmed instructional [web app](#) using 80+ years of NOAA weather data and Google Maps API
- Researched criteria for the evaluation of curricula in the context of national science education standards

**National Human Genome Research Institute/NIH**, Bethesda MD Summer 2013-Winter 2014

**Position:** Post-baccalaureate Fellow

- Quantified gene expression in embryos to find evolutionarily important developmental pathways
- Worked on assembly of animal genomes and algorithmic identification of genomic features

**Sars International Centre for Marine Molecular Biology**, Bergen, Norway Summer 2012

**Position:** Howard Hughes Medical Institute Undergraduate Summer Research Grantee

- Wrote user-friendly Python program for selection of statistical models of evolution for phylogenetics
- Studied the developmental genes of animals to understand how evolutionary innovations occurred

**National Human Genome Research Institute/NIH**, Bethesda MD Fall 2010-Fall 2011

**Position:** Student Fellow

- Worked with a team of scientists on algorithmic identification of features in a newly sequenced genome
- Co-taught and organized introductory "Python Programming for Biologists" course for NHGRI fellows
- Chronicled evolution of protein structures throughout animal history using Hidden Markov Models
- Provided scientific programming support to non-computational laboratories

**National Cancer Institute/NIH**, Bethesda MD Summer 2010

**Position:** NIH Summer Intern

- Worked on unpublished Bioconductor package to import biomedical publication metadata into R
- Developed techniques for detecting virus contamination in genomic sequencing data

**Wesleyan University**, Middletown CT Summer 2009

**Position:** Howard Hughes Medical Institute Undergraduate Summer Research Grantee

- Used information theory to identify alternative gene start sites in yeast genomes

**METHODS WORKSHOPS (lead/co-lead and organized):**

- Summer Institute in Computational Social Science (SICSS) at UCLA, 2 weeks, sponsored by California Center for Population Research (CCPR) and SICSS, Jun 2020.
- Summer Institute in Computational Social Science at UCLA, 2 weeks, sponsored by CCPR and SICSS, Jun 2019.
- UCLA Computational Social Science Bootcamp, 1 week, sponsored by UCLA Sociology, Sep 2018.
- Word Embeddings for Social Science, 4 hr, UCLA BRITE Center, retreat, Sep 2018.
- Introduction to Text Analysis, sponsored by UCLA Library, 2hr, 2018.
- Introductory Programming for Text Analysis, UCLA Sociology, 2hr, May 2018 & Oct 18.
- Python Programming for Biologists, National Human Genome Research Institute, weekly, Spring 2011.

**MENTORSHIP:**

- Brandon Grayson (Undergraduate Thesis in Sociology) 2020-2021
- Cheng Yi (Krystal) Xu (Undergraduate Research in Statistics) 2017-2018
- Jordan Jurczyk (Undergraduate Thesis in Sociology) 2018-2019
- Vinay Kumar (Undergraduate Research in Biology) 2018-2019
- Shawn Schwartz (Undergraduate Research in Biology) 2018-2019
- Brandon Grayson (Undergraduate Thesis in Sociology) 2020-2021

**SERVICE:**

- UCLA Graduate Student Association Social Sciences Council, VP of Communications 2017-2019
- UCLA Sociology Graduate Association Treasurer & Social Sciences Council Representative 2016-2019

**REVIEWER:**

- *American Sociological Review*
- *Poetics*

**INTERESTS:**

- Sound Design/Music Composition
- Cycling