

DANIEL R. KICK, PHD

I am a Postdoctoral researcher working at the USDA Agricultural Research Service (ARS). Professionally my goal is to support human food security by leveraging statistical and computational tools to improve crop resiliency and yield. My current research aims to use deep learning to more accurately predict crop yields using genetic, environmental, and management data. This work focuses on corn (*Zea mays*) while being extendable to other row crops. During my PhD, I applied machine learning to identify neuronal cell types from transcriptomic and ion channel mRNA abundance data. I also applied statistical modeling in conjunction with electrophysiological experiments to study activity dependent compensation in neurons and neural circuits.



Competencies

I have experience with statistical modeling, machine learning, deep learning, experimental design, and data visualization & communication.

[R]: R Programming (5.8 years) including experience with `tidyverse`, `lme4`, `caret`, `ggplot2`, `shiny`, & package creation.

[P]: Python Programming (1.4 years) including experience with `pandas`, `plotly`, `scikit-learn`, `keras`.

[H]: Experience high performance computing (`bash`, `slurm`), virtual environments (`conda`, `singularity`, `docker`), version control (`git`), literate programming (`Rmarkdown`, `Jupyter`).

RELEVANT RESEARCH EXPERIENCE

Present
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2021

Research Geneticist

Jacob Washburn Lab, USDA-ARS

- Improved yield prediction of maize in diverse environments by using deep learning to better capture gene by environment effects. Conducted research and wrote manuscript on results. Communicated results to stakeholders through local and national presentations. Supervised undergraduate high throughput phenotyping project and assisted with related coding needs.

2021
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2016

Graduate Student

David Schulz Lab, Missouri State University

- Assessed the efficacy of machine learning models to recapitulate neural cell identity from mRNA expression 1. Demonstrated that activity desynchronization induces degree dependent changes in conductance between neurons 2. Investigated the compensatory effects of elevated depolarization on neuronal excitability, conductances, and ion channel mRNA abundances in small neural networks 3.

SELECTED TEACHING EXPERIENCES

2022

Workshop Creator; Tools and Techniques for a Jupyter Based Scientific Workflow

Created and delivered a workshop on data visualization in Python for University of Missouri Bioinformatics in Plant Science

2022

Software Carpentries Certified Instructor

Received theoretical and practical instruction on leading computational workshops. Taught [R for Reproducible Scientific Analysis](#), assisted in teaching [Data Management with SQL](#).

2021
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2018

Lead Teaching Assistant, Animal Physiology Lab

Biological Sciences, University of Missouri

- While lead TA (2020-2021) I coordinated adaptation and expansion of lab material to be fully online due to Covid-19. Developed and deployed a statistics web application used by a minimum 705 students as of 2021 [source](#), [deployed](#). Includes capability for visualization, testing model assumptions, frequentist models, non-parametric tests, basic Bayesian models.

CONTACT INFO

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SELECTED PUBLICATIONS

2022

• **Yield Prediction Through Integration of Genetic, Environment, and Management Data Through Deep Learning**

Daniel R. Kick, Jason G. Wallace, James C. Schnable, Judith M. Kolkman, Baris Alaca, Timothy M. Beissinger, David Ertl, Sherry Flint-Garcia, Joseph L. Gage, Candice N. Hirsch, Joseph E. Knoll, Natalia de Leon, Dayane C. Lima, Danilo Moreta, Maninder P. Singh, Teclemariam Weldekidan, Jacob D. Washburn

 [bioRxiv \(Under-Review\)](#)

2022

• **Timing dependent potentiation and depression of electrical synapses contributes to network stability in the crustacean cardiac ganglion**

Daniel R. Kick and David J. Schulz

 [The Journal of Neuroscience](#)

2019

• **Molecular profiling of single neurons of known identity in two ganglia from the crab *Cancer borealis***

Adam J. Northcutt¹, Daniel R. Kick¹, Adriane G. Otopalik, Benjamin M. Goetz, Rayna M. Harris, Joseph M. Santin, Hans A. Hofmann, Eve Marder, and David J. Schulz (¹ denotes co-first authorship)

 [Proceedings of the National Academy of Sciences](#)

SELECTED PRESENTATIONS

2022

• **Yield Prediction Accuracy is Improved Through Incorporating Genetic, Environmental, and Management Interactions with Deep Learning,**

University of Missouri Interdisciplinary Plant Group Symposium, Columbia MO

- Daniel R Kick, Jacob D. Washburn (2022)
- Oral Presentation

2022

• **Yield Prediction Through Integration of Genetic, Environment, and Management Data by Deep Learning**

Columbia MO

 University of Missouri MU Plant Research Symposium

- Daniel R Kick*, Jacob D Washburn
- Ranked first in poster competition

PROFESSIONAL ACTIVITIES

2022

• **Panel Member, Next-Generation Omics, Biological Sciences Divisional Retreat**

Ruthie Angelovici, *David J Schulz*, Daniel R Kick, and Mannie Liscum, University of Missouri Division of Biological Sciences Retreat

HONORS AND AWARDS

2019

• **J. Perry Gustafson Award for Outstanding Graduate Research in the Life Sciences**

This award is granted in recognition of the quality of their independent research and academic achievements. Recipients receive a \$2,000 award.

2018

• **National Institutes of Health T32 Training Grant Recipient**

This fellowship provides a \$27,000 yearly stipend and two travel awards of \$750 to facilitate presenting research at scientific conferences.

| 2016

EDUCATION

2021

• **PhD. Biological Sciences**

University of Missouri, Columbia, MO

- Coursework included Machine Learning Methods for Biomedical Informatics, Quantitative Methods in the Life Sciences, and Grant Writing

2015

• **Bachelor of Science**

Truman State University, Kirksville, MO

- Coursework included Next Generation Sequence Data and Analysis, Bioinformatics, Analysis of Variance and Experimental Design, Non-Parametric Statistics, and Economic & Medicinal Botany

| 2011