

DANIEL R. KICK, PHD

EDUCATION

2021
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2015

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
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2011

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

PROFESSIONAL AND 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.

2015

Graduate Student Rotation

Loren Milescu Lab, Missouri State University

- Developed a protocol for live imaging neurons in *Drosophila melanogaster* with a two-photon microscope.

2015

Graduate Student Rotation

Bing Zhang Lab, Missouri State University

- Designed a machine to assay *Drosophila* climbing (used in Willenbrink et al. 2016) and quantified sleep patterns of *Drosophila* tyrosine hydroxylase mutants

2014

Undergraduate Researcher

Diane Janick-Buckner, Brent Buckner Lab, Truman State University

- Designed and prototyped a hydroponic growth chamber for maize root phenotyping.

2014

NSF REU Student

Rahul Kanadia Lab, University of Connecticut

- Measured minor spliceosome upregulation using *in situ* hybridization supporting a role in postponing retinal cell death.

CONTACT INFO

-  hello@danielkick.com
 danielkick.com
 github.com/danielkick
 [daniel-kick-5a449b9a/](https://www.linkedin.com/in/daniel-kick-5a449b9a/)
 [Google Scholar](https://scholar.google.com/citations?user=5a449b9a)
 [0000-0002-9002-1862](https://orcid.org/0000-0002-9002-1862)

TECHNICAL SKILLS

 R Programming (8 years)
experience with `tidyverse`,
`lme4`, `caret`, `ggplot2`, `shiny`,
& package creation.

 Python Programming
(3 years) experience with
`pandas`, `numpy`, `plotly`,
`scikit-learn`, `keras`,
`pytorch`.

 Miscellaneous

Experience with high performance computing (`bash`, `slurm`), virtual environments (`conda`, `singularity`), version control (`git`, `GitHub`), literate programming (`Quarto`, `Rmarkdown`, `Jupyter`, `nbdev`), crop growth modeling (`APSIM`).

 Neuroscience Research

Experience with **multimodal datasets** (single cell mRNA expression, ionic conductances, and excitability), experimental design, electrophysiology techniques (dynamic, voltage, & current clamp), **creating custom data processing workflows**.

2013

NSF REU Student

Christian Lorson Lab, Missouri State University

- Assessed motor function in mouse model of spinal muscular atrophy with and without oligonucleotide treatment.

2012

Camp Counselor & Lifeguard

- Responsible for safety, development, and wellbeing of campers.

2011

Student Assistant

Laszlo Kovacs Laboratory, Missouri State University

- Tested teaching experiments for use in a genetics course.



HONORS AND AWARDS

2025

NIFA Fellowship (AFRI EWD)

\$225,000 awarded (Grant # 2023-67012-39485) over two years to create and environmentally aware deep learning genomic selection models and prepare the recipient to transition into industry.

2022

Poster Ranked first in MU Plant Research Symposium poster competition

2019

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

This \$2,000 award is granted for the quality of their research and academic achievements.

2018

NIH T32 Training Grant Recipient

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

2015

Cum Laude & President's Recognition, Truman State University



PROFESSIONAL ACTIVITIES

2024

Deep Learning Community of Practice (Coordinator)

Cross institution

2023

Maize Genetic Cooperation Member

2023

Workshop Creator; Preparing for Interviews: Behavioral, Technical, and Job Search Preparation, Internal professional development workshop

2023

Panel Member, Non-academic research careers, MU Summer Undergraduate Research Program: Professional Dev. Mini-Conference

2023

Panel Member, Working with your Mentor, MU Summer Undergraduate Research Program: Summer Intern Orientation

2022

Workshop Assistant; Data Management with SQL

University of Missouri, Columbia

- Data Management with SQL

2022

Workshop Instructor; R for Reproducible Scientific Analysis

University of Missouri, Columbia

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](#).

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

2019

Society for Neuroscience Member

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2016

Workshop Assistant; Computational Neuroscience: Models and Neurobiology (NIH BRAIN Initiative Short Course)

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2016

Scientific Poster Judge

Spring Undergraduate Research and Creative Achievements Forum



MENTORING

2024

Andrew Diaz

- Postdoc Pilot Mentorship Program

2024

Henry Bloch

- University of Missouri Student Researcher

2024

Madi Michell

- University of Missouri Student Researcher

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2021

Grace Sidberry

- University of Missouri Student Researcher

2019

Abby Beckerdite

- University of Missouri Student Researcher

2019

Ayla Ross

- NSF Research Experience for Undergraduates Student

2018

Katlyn Sullivan

- NSF Research Experience for Undergraduates Student

2017

Kelly Hiersche

- NSF Research Experience for Undergraduates Student

2016

Rody Kingston

- Postbaccalaureate Research Student

PROFESSIONAL DEVELOPMENT

2024

Postdoc Pilot Mentorship Program (mentor)

2024

Maize Genetics Mentoring Program (mentee)

2024

MaizeGDB: Pan-genome and AI resources, Maize Genetics Cooperation

2024

Gramene Workshop, Maize Genetics Cooperation

2023

Applications of AlphaFold2 for Studying Proteins, University of Missouri

2023

APSIM Training Course, Iowa State University

2022

MU-Bayer Mentoring Program (mentee)

2020

Software Carpentry: Python, University of Missouri

2017

Diversity & Inclusion Workshop, University of Missouri

2016

Big Data in Biology, University of Austin

PUBLICATIONS

2023

RootBot: High-throughput root stress phenotyping robot

Mia Ruppel, Sven K. Nelson, Grace Sidberry, Madison Mitchell, Daniel Kick, Shawn K. Thomas, Katherine E. Guill, Melvin J. Oliver, Jacob D. Washburn

📍 [Applications in Plant Sciences](#)

2023

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

📍 [G3](#)

2023

Ensemble of Best Linear Unbiased Predictor, Machine Learning, and Deep Learning Models Predict Maize Yield Better Than Each Model Alone

Daniel R. Kick, Jacob D. Washburn

📍 [in Silico Plants](#)

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. Northcutt, Daniel R. Kick, Adriane G. Otopalik, Benjamin M. Goetz, Rayna M. Harris, Joseph M. Santin, Hans A. Hofmann, Eve Marder, and David J. Schulz

Proceedings of the National Academy of Sciences

2019

Cell Communication: Studying gap junctions with PARIS

Daniel R Kick, David J Schulz

eLife

2018

Dopamine maintains network synchrony via direct modulation of gap junctions in the crustacean cardiac ganglion

Brian J Lane, Daniel R Kick, David K Wilson, Satish S Nair, David J Schulz

eLife

2018

Motor Systems: Variability in neural networks

Daniel R Kick, David J Schulz

eLife

2016

The Hillary Climber trumps manual testing: an automatic system for studying *Drosophila* climbing

Alex M. Willenbrink, Margo K. Gronauer, Leon F. Toebben, Daniel R. Kick, Madalyn Wells & Bing Zhang

The Journal of Neurogenetics



PUBLICATIONS IN PREPARATION

2024

comp paper

(In Review)

2024

madi paper

(In Prep)

2024

grace paper

(In Prep)

2024

Crustacean cardiac ganglion model reveals constraints on morphology and conductances

Dan Dopp, Pranit Samarth, Jing Wang, Daniel Kick, David J. Schulz, Satish S. Nair

In Prep, BioRxiv

2023

The Mustard Mayhem: Phylogenetically localizing and dating the mesohexaploidy of the tribe Brassiceae

Shawn K. Thomas, R. Shawn Abrahams, Nora Walden, Tatiana Arias, Daniel Robert Kick, Alex McAlvay, Alex Harkess, Michael R. McKain, Ihsan A. Al-Shehbaz, Frederic Lens, Kasper Hendriks, Marcus A. Koch, J. Chris Pires, Jacob Washburn

(In Prep)



NATIONAL PRESENTATIONS

Leveraging Biological Theory in Phenotypic Prediction

Models

National Association for Plant Breeding

2024

- Daniel R Kick, Jacob D. Washburn (2024)
- Poster

2024

Ensembles of deep learning, machine learning, and linear models outperform individual models for maize yield prediction in diverse environments

Maize Genetics Meeting

- Daniel R Kick, Jacob D. Washburn (2024)
- Poster

2023

Maize yield prediction accuracy increased by inclusion of genetics, environment, and management interactions with deep learning

Maize Genetics Meeting

- Daniel R Kick, Jacob D. Washburn (2023)
- Presentation

2023

Maize Yield Prediction Accuracy Increased By Inclusion of Genetics, Environment, and Management Interactions With Deep Learning

Plant and Animal Genetics (PAG), San Diego CA

- *Daniel R Kick, Jacob D. Washburn (2023)*
- Poster

2022

Improving Maize Yield Prediction through Genetic, Environmental, and Management Factor Interactions with Deep Learning

ASA, CSSA and SSSA International Annual Meetings, Baltimore MD

- *Daniel R Kick, Jacob D. Washburn (2022)*
- Poster

2022

Improving Maize Yield Prediction through Genetic, Environmental, and Management Factor Interactions with Deep Learning

ASA, CSSA and SSSA International Annual Meetings, Baltimore MD

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

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)*
- Presentation

2020

Effects of blockade of K⁺ currents on membrane conductance and channel expression at 1 hour and 24 hours in motor neurons of the cardiac ganglion.

Dynamic Neural Networks: The Stomatogastric Nervous System, Virtual

- *Daniel R Kick, Brian J. Lane, David J Schulz.*
- Presentation

2019

Loss of synchronous activity across gap junctions results in a phase-dependent change in coupling conductance magnitude.

Neuroscience, Chicago IL

- *Daniel R Kick, David J Schulz.*
- Poster

2019

Asynchronous voltage activity regulates electrical synapse plasticity.

Dynamic Neural Networks: The Stomatogastric Nervous System, Chicago IL

- *Daniel R Kick, David J Schulz.*
- Presentation

2017

Variability from mRNAs to network output in the *C. borealis* cardiac ganglion.

Dynamic Neural Networks: The Stomatogastric Nervous System, Washington D.C

- *Daniel R Kick, David J Schulz.*
- Presentation

2017

Variation across network output, excitatory post synaptic potentials, ionic conductances, and ion channel and receptor mRNAs within motor neurons of the crustacean cardiac ganglion.

Neuroscience, Washington D.C.

- *Daniel R Kick, Brian J Lane, Joseph L Ransdell, Satish S Nair, David J Schulz.*
- Poster

What crustaceans can teach us about the workings of the nervous system.

Animal Behavior Society, Columbia MO

- Virginia Garcia, *Daniel R Kick*, Cindy Kyi, Brian J Lane, Kwasi M Lett, Adam J Northcutt, Joseph L Ransdell, Simone Temporal, and David J Schulz.
- Poster

LOCAL PRESENTATIONS

2024

Using AI and ensembling methods to improve plant yield predictions across diverse environments

University of Georgia, AI in Plant Breeding Symposium, Athens GA

- *Daniel Kick*
- Presentation

2024

The Promises and Pitfalls of Deep Learning Methods for Plant Phenotype Prediction

Iowa State University Department of Agronomy Plant Breeding Seminar, Invited Seminar, Ames IA

- *Jacob Washburn* and *Daniel Kick*
- Presentation

2024

The Quick and Easy Way to Predict Phenotypes More Accurately

University of Missouri MU Plant Research Symposium, Columbia MO

- *Daniel R Kick*, Jacob D. Washburn (2023)
- Presentation

2024

Ensembles of deep learning, machine learning, and linear models outperform individual models for maize yield prediction in diverse environments

University of Missouri MU Plant Research Symposium, Columbia MO

- *Daniel R Kick*, Jacob D. Washburn (2023)
- Poster

2024

Greater than the Sum of Its Parts: Better Phenotypic Prediction across Environments by Combining Deep Learning and Statistical Models

Truman State University Biology Department Invited Seminar, Kirksville MO

- *Daniel R Kick* and Jacob D Washburn
- Presentation

2024

The Promises and Pitfalls of Deep Learning Methods for Plant Phenotype Prediction

Michigan State University Department of Epidemiology and Biostatistics Invited Seminar, East Lansing MI

- *Jacob Washburn* and *Daniel Kick*
- Presentation

2024

Environmentally Aware Deep Learning: Overcoming Gene by Environment Effects and Enhancing Biological Interpretability

University of Missouri DBL Group Meeting, Columbia MO

- *Daniel R Kick*, Jacob D Washburn
- Presentation

2023

Maize Yield Prediction Accuracy Increased By Inclusion of Genetics, Environment, and Management Interactions With Deep Learning

University of Missouri MU Plant Research Symposium, Columbia MO

- *Daniel R Kick*, Jacob D Washburn
- Poster

2022

Maize Yield Prediction is Improved by Modeling Interactions between Genetic, Environmental, and Management Factors with Deep Learning

Interdisciplinary Plant Group Seminar “Plant Talks”, Columbia MO

- *Daniel R Kick, Jacob D Washburn*
- Presentation

2022

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

University of Missouri MU Plant Research Symposium, Columbia MO

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

2019

Classifying neurons from molecular data

University of Missouri [DataPhiles](#), Columbia MO

- *Daniel R Kick, David J Schulz*
- Presentation

2018

Voltage Dependent Modification of Electrical Synapses and Ionic Conductances

University of Missouri-Columbia Life Sciences Week, Columbia MO

- *Daniel R Kick, David J Schulz*
- Poster

2017

The Cancer borealis Cardiac Ganglion: a Window into Variability and Activity Dependent Regulation

NIH-T32 progress seminar, Columbia MO

- *Daniel R Kick, David J Schulz*
- Presentation

2015

Upregulation of the Minor Spliceosome in Mouse Retinae due to Zaprinast Exposure

Truman State University Student Research Conference, Kirksville MO

- *Daniel R Kick, Marybeth Baumgartner, Christopher Lemoine, Devi Krishna Priya Karunakaran, Nikita Sturrock, Amye Black, Rahul Kanadia*
- Poster

2014

Upregulation of the Minor Spliceosome in Mouse Retinae due to Zaprinast Exposure

University of Connecticut Summer Undergraduate Research Conference, Storrs CT

- *Daniel R Kick, Marybeth Baumgartner, Christopher Lemoine, Devi Krishna Priya Karunakaran, Nikita Sturrock, Amye Black, Rahul Kanadia*
- Poster

2013

Effective Gene Therapy in Spinal Muscular Atrophy: Utilizing Antisense Oligonucleotides Targeting Intronic Repressor Elements

University of Missouri Summer Undergraduate Research Conference, Columbia MO

- *Daniel R Kick, Eric Osman, Christian Lorson*
- Poster



OUTREACH AND OTHER PRESENTATIONS

2023

Rootbot, Rover, Drones, and Deep Learning

University of Missouri Biology DataBlitz, Columbia MO

- *Daniel R Kick, Shawn Thomas*
- Presentation

2023

Maize Yield Prediction Accuracy Increased By Inclusion of Genetics, Environment, and Management Interactions With Deep Learning

University of Missouri Graduate Student Recruitment, Columbia MO

- *Daniel R Kick*, Jacob D. Washburn
- Poster

2022

Maize Yield Prediction is Improved by using Deep Learning to Incorporate Interactions between Genetic, Environmental, and Management Factors.

USDA-ARS AgriCulture Series, Virtual

- *Daniel R Kick*, Jacob D Washburn

2022

From Neurobiologist to Research Geneticist

Beyond the PhD (beyond-the-phd.com), Virtual

- *Daniel R Kick*
- Presentation

2019

Spare the synapse, spoil the circuit, Public presentation

Science on Tap, Columbia MO

- *Daniel R Kick*
- Presentation

2019

Can mRNA expression recapitulate neuron cell types

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation

2019

Voltage Dependent modification of Electrical Synapses

University of Missouri Biological Sciences Recruitment, Columbia MO

- *Daniel R Kick*
- Poster

2018

Gap Junction Conductance Modulation Via Voltage

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation

2017

Please mind the gap: Network homeostatic plasticity in the Cancer borealis cardiac ganglion

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation

2016

The Tell-Tale Heart: Applying crustacean neurogenic hearts to basic neurosciences questions

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation