

# Rebecca Wood



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## EDUCATION

<b>Doctoral Student, Psychology   Brain, Behavior &amp; Quantitative Psychology</b> <i>Certificate in Clinical Health Psychology</i> The University of Kansas   Lawrence, KS	Aug. 2024 – Present
<b>Master of Arts, Clinical Psychology</b> <b>Master of Science, Quantitative Psychology</b> <i>Certificate in Institutional Research</i> Ball State University   Muncie, IN	Aug. 2022 – May 2024
<b>Bachelor of Arts, Psychology</b> <i>Concentration in Neuroscience</i> St. Olaf College   Northfield, MN	Sep. 2013 – May 2017

## SCHOLARLY WORK

### Peer-Reviewed Publications

1. Holtgraves, T., Sarin, R., **Wood, R.**, Cronk, E., & Nogueira Mourão, A. J. (2025). Interpreting Microaggressions: The Role of Discourse Context, Recipient Status, and Observers' Political Orientation. *Personality and Social Psychology Bulletin*, 01461672251377809.
2. Adjornor, B. Y., Han, B., Zahran, E. M., **Wood, R.**, (2024). Transport and deposition of microplastics at the water-sediment interface: A case study of the White River near Muncie, Indiana. *Hydrology* 11(9). <https://doi.org/10.3390/hydrology11090141>
3. Sanchez-Roige, S., Barnes, S., Mallari, J., **Wood, R.**, Polesskaya, O., & Palmer, A. (2022). A mutant allele of glycoprotein M6-B (Gpm6b) facilitates behavioral flexibility but increases delay discounting. *Genes, Brain, and Behavior*, 21(4). <https://doi.org/10.1111/gbb.12800>

### Research Presentations

1. Sarin, R., Wood, R., Cronk, E., Nogueira Mourão, A. J., & Holtgraves, T. (2026, February 26-28). *Interpreting Microaggressions: Effects of Discourse Context, Race, and Political Orientation* [Poster presentation]. Society for Personality and Social Psychology annual conference, Chicago, Illinois, United States.
2. McRobert, C., Cronk, E., **Wood, R.**, Sarin, R., Sederlund, A., & Holtgraves, T. (2025, April 10-12). *Frailty, thy name is woman: Gender representation in ChatGPT narratives* [Poster presentation]. Ninety-seventh annual Midwestern Psychological Association conference, Chicago, Illinois, United States.
3. McRobert, C., Cronk, E., Sederlund, A., **Wood, R.**, Sarin, R., & Holtgraves, T. (2025, April 10-12). *Words of fury: Linguistic analyses of prejudice-based internet posts* [Poster presentation]. Ninety-seventh annual Midwestern Psychological Association conference, Chicago, Illinois, United States.
4. **Wood, R.**, Jacobs, B., Duncan, W. (2025, April 25-26). *Community insights: Disaster concerns and resilience* [Flash Talk]. Kansas Data Science Conference 2025, Lawrence, Kansas, United States.
5. **Wood, R.**, Jacobs, B., Duncan, W. (2025, April 3-5). *Community insights: Disaster concerns and resilience* [Poster Presentation]. Two thousand and twenty five, ARISE annual symposium, Garden City, Kansas, United States.
6. Allen, B., & **Wood, R.** (2024, October 3-5). Using explainable artificial intelligence to understand cross-sectional obesity prevalence in rural and urban U.S. counties.

7. Nogueira Mourao, A. J., Sarin, R., Cronk, E., **Wood, R.**, Sahni, E., & Holtgraves, T. (2024, April 18-20). *Successful communication: Effects of face-threat and culture* [Poster presentation]. Ninety-sixth annual Midwestern Psychological Association conference, Chicago, Illinois, United States. (Abstract submitted).
8. Sarin, R., **Wood, R.**, Nogueira Mourao, A. J., Cronk, E., Brown, L., Kriegbaum, C., Hannegan, H., & Holtgraves, T. (2024, April 18-20). *Interpreting microaggressions: The role of context and individual differences* [Poster presentation]. Ninety-sixth annual Midwestern Psychological Association conference, Chicago, Illinois, United States. (Abstract submitted).
9. **Wood, R.**, Sarin, R., Brown, L., Nogueira Mourao, A. J., Sahni, E., Gick, A., & Holtgraves, T. (2024, April 18-20). *Processing diverse scalar expressions in conversational contexts*. [Poster presentation] Ninety-sixth annual Midwestern Psychological Association conference, Chicago, Illinois, United States. (Abstract submitted).
10. Ritchey, K. A., Hill, R., Gonzalez, G., Rieman, M.\*, Sarin, R.\*., & **Wood, R.**\*. (2023, May 25-28). *The Effect of Working Memory and Reading Goal on Inferring Themes from a Text* [Poster presentation]. Two thousand and twenty-three Association for Psychological Science convention, Washington, D.C., United States.  
\*Authorship is alphabetical
11. **Wood, R.** (2023, May 25-28). *Individuals who score positive for major depressive disorder consume less fruits and vegetables than individuals who score negative* [Poster presentation]. Two thousand and twenty-three Association for Psychological Science convention, Washington D.C., United States.
12. **Wood, R.** & Holtgraves, T. (April 11, 2023). *Diet and depression: An analysis of the relationship between phytochemicals found in fruits and vegetables and depression* [Poster presentation]. Twenty-eighth annual Ball State student symposium, Muncie, Indiana, United States.
13. McRobert, C., Sederlund, A., Griffin, Y., Cronk, E., Sarin, R., **Wood, R.**, Brooks, C., Sahni, E., & Holtgraves, T. (2023, April 21-23). *Sound and fury; Linguistic analysis of microaggression and aggression tweets* [Poster presentation]. Ninety-fifth annual Midwestern Psychological Association conference, Chicago, Illinois, United States.
14. Sederlund, A., Cronk, E., Griffin, Y., **Wood, R.**, Sarin, R., Brooks, C., McRobert, C., & Holtgraves, T. (2023, April 21-23). *Conversational repair in the digital realm* [Poster presentation]. Ninety-fifth annual Midwestern Psychological Association conference, Chicago, Illinois, United States.
15. **Wood, R.** & Gaither, G. (2023, April 21-23). *Food for Thought: The Impact of Nutrition on Mental Health* [Poster presentation]. Ninety-fifth annual Midwestern Psychological Association conference, Chicago, Illinois United States.
16. **Wood, R.** & Dickinson, S. (2017, May 1). *Ethanol-induced conditioned approach behavior in adolescent and adult Swiss Webster mice* [Poster presentation]. St. Olaf Honors Day conference, Northfield, Minnesota, United States.  
Note: This study was also presented at the 2017 Minnesota Undergraduate Psychology Conference, Northfield, Minnesota, United States.

## **RESEARCH EXPERIENCE**

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### **Research Analyst Intern**

- Peruvian Connection, Tonganoxie, KS** May 2025 – Present
- Led large-scale data cleaning and documentation across D365 and Shopify systems, supporting customer-level analysis across U.S., U.K., and German markets.
  - Built comprehensive data dictionaries and validation workflows for thousands of tables and variables to enable reproducible analytics.
  - Engineered robust ETL pipelines to process and standardize multi-gigabyte transactional datasets, resolving encoding, delimiter, and schema issues.
  - Translated raw transaction data into behavioral economic features (RFM, discount sensitivity, channel usage, product affinity).

- Designed probabilistic customer segmentation frameworks grounded in behavioral economics and consumer decision-making theory.

### **Independent Research | The University of Kansas**

**Advisor: Dr. Ben Allen**

Aug. 2024 – Sep. 2025

*First Year Research Project: Depression and Dietary Flavonoids*

- Conducted an independent first-year research project using NHANES data to examine the association between dietary flavonoid intake and depression prevalence
- Implemented multiple imputation to address missingness in complex survey data
- Fit and interpreted multivariable logistic regression models, incorporating survey design features
- Developed a formal research proposal and analytical plan as part of program milestone requirements

### **Research Analyst Internship | Ball State University**

**Advisors: Drs. James Jones & Kianre Eouanzoui**

Sep. 2023 – May 2024

*Office for Research and Academic Effectiveness*

- Development of Qualtrics surveys for research clients
- Statistical analysis for faculty and student research projects
- Assist with client research project questions

### **Graduate Assistantship | Ball State University**

**Supervisor: Mr. Steve Reed**

Jun. 2023 – Jun. 2024

*Office of the Vice Provost for Academic Affairs*

- Collaborate with task force to adapt and develop a new University Core Curriculum that accounts for Indiana Common Core
- Collaborates in meetings to develop research questions and subsequent methodology
- Determines procedures for data coding/editing, and statistical analysis
- Analyze student enrollment, grade, and transfer credit data to support strategic planning using SPSS
- Present research findings for Provost's UCC Task Force to support institutional effectiveness activities
- Develop integrated dashboards in Tableau for High Impact Practices, Undergraduate Core Curriculum, and transfer student metrics
- Write easy to understand and effective data analysis summaries for supervisor and task force
- Develop procedure guides for statistical analysis in SPSS
- Develop how-to guides for faculty and staff data entry into the Promotion & Tenure database
- Work one-on-one with faculty to troubleshoot issues in the Promotion & Tenure database
- Designed and implemented a sophisticated Qualtrics survey that utilized embedded university data and piping to streamline information entry and become more individualized
- Engage in continuous self-improvement activities (e.g., learning: statistical analyses, SQL, Tableau, effective communication strategies) through collaboration with faculty or UDEMY courses

### **Independent Research | Ball State University**

**Advisor: Dr. Jocelyn Bolin**

Sep. 2023 – May 2024

*Dietary Fiber, Found in Fruits and Vegetables, and Depression Prevalence*

- Establish a proposal evaluating the consumption of dietary fiber and fiber found in fruits and vegetables and prevalence of depression, using complex sample, multiple regression
- Write literature review, method, results, and discussion for final manuscript

**Advisors: Drs. Katie Lawson, Thomas Holtgraves, and James Jones**

Sep. 2022 – May 2024

*Diet and Mental Health*

- Developed testable research questions and corresponding hypotheses to evaluate dietary categories (e.g., protein, omega 3s, fruit and vegetable, phytochemicals) and the prevalence of major depressive disorder or generalized anxiety disorder
- Conducted survey sample, logistic regression analysis using tertials in SPSS and STATA
- Submitted to and created visually striking posters for a national conference
- Preparation of manuscript for publication

**Advisor: Dr. George Gaither**

Sep. 2022 – Jan. 2023

*Food for thought: Examination of nutrition and mental health*

- Developed testable research questions and corresponding hypotheses to evaluate consumption of fruit and vegetables and the prevalence of major depressive disorder or generalized anxiety disorder
- Conducted appropriate statistical analyses of data using SPSS
- Submitted to and created visually striking posters for a regional conference

### **Volunteer Research Assistant | Ball State University**

**Advisor: Dr. Thomas Holtgraves**

Aug. 2022 – Dec. 2025

*Chat GTP and gender bias*

- Contribute to and provide constructive feedback for protocol design and data collection
- Harvest relevant data for analysis
- Collaborate and provide feedback for abstracts and posters submitted to regional conferences

*Conversational repair in the digital realm*

- Contribute to and provide constructive feedback for protocol design and data collection
- Recruit SONA (an undergraduate subject pool) participants
- Collect conversational repair data in Chat Plat (an online conversation platform) using a standardized protocol
- Code data for inter-rater reliability analysis on critical trials and memory retention
- Collaborate and provided feedback for abstracts and posters submitted to national conferences

*Conversation Repair with Emoji in the Digital Realm* 🌟

- Contribute to and provide constructive feedback for protocol design and data collection
- Code data for inter-rater reliability analysis on critical trials and memory retention
- Provide mentorship for data analyses
- Collaborate and provided feedback for abstracts and posters submitted to national conferences

*Interpreting Microaggressions: The Role of Context and Individual Differences*

- Contribute to and provide constructive feedback for protocol design and data collection
- Contribute to Qualtrics design for effective measurement of dependent variables
- Provide mentorship for and perform data analyses (e.g., log linear, MANOVA, multiple regression) using SPSS
- Collaborate and provided feedback for abstracts and posters submitted to national conferences

*Linguistic analysis of microaggression and aggression tweets*

- Adapt R syntax for harvesting Twitter Tweets
- Collaborate and provided feedback for abstracts and posters submitted to national conferences

*Scalar implications in conversational contexts*

- Recruit and monitor participants using SONA (an undergraduate subject pool)
- Administer standardized lab protocol to collect data using E-Prime
- Lead collaborative construction of qualitative scale categories for interrater reliability
- Code over 10,000 qualitative responses in two domains
- Perform data analyses (log linear, MANOVA, multiple regression) in SPSS
- Collaborate and provide feedback for abstracts and posters submitted to regional conferences

**Advisor: Dr. Kristen Ritchey**

Aug. 2022 – Jan. 2023

*Generalization inferences and working memory*

- Contribute protocol and project ideas during lab meetings
- Administer standardized lab protocol

### **Laboratory Assistant | University California, San Diego**

**Supervisor: Dr. Samuel Barnes**

Aug. 2017 – Apr. 2020

*Neuroimaging and neuropathologic substrates of cognitive deficits in mouse models of HIV, methamphetamine and aging*

- Collaboration with the Translational Methamphetamine AIDS Research Center to conduct research on a NIH P50 grant
- Managed food restricted diet and care for multiple cohorts of gp120 transgenic mice
- Performed programmable mini-pump surgery
- Trained cohorts of mice in a probabilistic reversal learning (PRL) instrumental conditioning
- Implemented testing and data collection for cohort during a nicotine binge paradigm in PRL
- Implemented testing and data collection for cohort during a methamphetamine binge paradigm that required four daily subcutaneous injections over two weeks

*Substance use disorder genetics*

- Collaboration with Dr. Sandra Sanchez-Roige in Dr. Abraham Palmer's research lab
- Managed food restricted diet and care for multiple cohorts of gpm6b transgenic mice
- Implemented testing and data collection for delay discounting, effort based decision making, and break-point instrumental conditioning paradigms

*Effort based decision making in a schizophrenia rat model*

- Implemented PRL, effort-based decision-making, T-maze, and two-choice reversal learning in multiple cohorts of a schizophrenia rat model
- Intraperitoneally dosed two cohorts of rats once a day for four weeks
- Executed optogenetic manipulation of a T-maze, effort-based decision-making, and PRL
- Oversaw fiber photometry research on rats performing PRL
- Prepared and sectioned tissue samples for immunohistochemistry
- Performed microscopy using an inverted confocal microscope
- Instructed undergraduate and high school interns on use of cryostat histochemistry and immunohistochemistry staining techniques
- Managed: data sets, dosing schedules, testing schedules, personnel schedules, lab inventory, rat and mouse colonies
- Maintained lab product orders
- Maintained lab personal IACUC and Environment, Health and Safety training

**Research Assistant | St. Olaf College**

*Supervisor: Dr. Shelly Dickinson*

Aug. 2016 – May 2017

- Installed ANY-maze lab software and equipment for lab
- Retrofitted place conditioning chambers for video recording and behavior tracking
- Established ANY-maze protocol for lab
- Maintain mouse care for Dr. Shelly Dickinson's lab and Dr. James Demas' lab
- Maintained rat care and colonies for Dr. Gary Muir's lab

**Volunteer Research Assistant | University of Otago, New Zealand**

*Advisor: Dr. Martin Sellbom*

Spring 2016

*Externalizing disorders in the behavioral activation system using EEG*

- Established a literature review on externalizing personality disorders and the use of an electroencephalogram
- Established Qualtrics for the Minnesota Multifaceted Personality Inventory-II

**Independent & Student Research | St. Olaf College**

*Advisor: Dr. James Demas*

Jan. 2017 – May 2017

*Melanopsin and Retinal Ganglion Cell Overlap*

- Established and managed a breeding program of triple transgenic C57/BL mice
- Wrote protocols to genotype mice, bred in-house, for CRE, OPSIN4, Gamma2, and Rosa26; used quick start PCR and gel electrophoresis for genotyping protocol
- Developed immunohistochemistry protocol for melanopsin in intrinsically photosensitive retinal ganglion cells in dissected mouse retinas
- Retrofitted the lab organizational system for ease of access

**Advisor: Dr. Shelly Dickinson***Ethanol-induced conditioned approach in adolescent & adult mice*

- Establish independent research proposal, protocol, and IACUC submission
- Executed 100 intraperitoneal injections of an ethanol solution and saline solution

*Efficacy of Jell-O cubes in the Sand Maze*

- Investigated use of Sand Maze as a possible replacement for Morris Water Maze
- Established Sand Maze protocol utilizing video tracking software
- Investigated effects of spatial learning in Sand Maze

**Advisor: Dr. Kevin Crisp***Investigation of eugenol on leach neuron firing rate*

- Investigated effects of eugenol on earthworms and leeches as a natural pesticide
- Observation of eugenol on leach neurobiology and neuron firing rate

**Advisor: Dr. Charles Huff***Choices involving academic success*

- Lead small group of students to investigate Honor Code choices and academic success
- Developed questionnaire for faculty and students
- Led student focus groups
- Independently interviewed faculty members

Aug. 2016 – May 2017

Sep. 2015 – Dec. 2015

Jan. 2015 – May 2015

Sep. 2014 – Dec. 2014

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**TEACHING & TUTORING EXPERIENCE**

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**Instructor of Record | The University of Kansas****PSYC 210: Statistics for Psychological Research**

Aug. 2025 – Present

- Serve as instructor of record for two sections (~ 50 students per semester), with full responsibility for course delivery and assessment, and shared responsibility of grading
- Designed and delivered original lectures and lesson plans grounded in active learning, gamified learning theory, and evidence-based pedagogy
- Iteratively adapted course content for relevance and accessibility, incorporating real-world examples aligned with student interests and disciplinary applications
- Revised and scaffolding course project materials to improve clarity, alignment with learning objectives, and student comprehension, informed by ongoing student feedback.
- Supervised and coordinated grading workflows for a graduate teaching assistant, ensuring consistency, fairness, and timely feedback.

**Teaching Assistant | The University of Kansas****PSYC 210: Statistics for Psychological Research**

May 2025 – August 2025

- Grade student work and provide timely feedback and guidance

**PSYC 104: General Psychology**

Aug. 2024 – May 2025

- Grade student work and provide timely feedback and guidance

**Academic Tutor | Lane Community College****Anatomy and Physiology**

Sep. 2021 – Aug. 2022

- Established study schedules for students to follow
- Developed interactive learning material for anatomy material
- Curated flashcard sets and study guides
- Mentored students about the undergraduate college application process

**Academic Tutor | St. Olaf College****Developmental Psychology**

Sep. 2016 – May 2017

- Invited by the Department of Psychology to serve as a one-on-one tutor for students
- Created assignments from lectures and assigned reading
- Assisted students with the construction of study guides

- Led review sessions before exams

**Introduction to Psychology**

Sep. 2015 – May 2017

- Invited by the Department of Psychology to serve as a one-on-one tutor for students
- Created assignments from lectures and assigned reading
- Assisted students with the construction of study guides
- Led review sessions before exams

**Teaching Assistant | St. Olaf College**

**Conditioning and Learning**

Sep. 2016 – May 2017

- Invited by the professor to serve as a teaching assistant
- Assisted with teaching animal handling skills and proper laboratory techniques

**Introduction to Psychology**

Sep. 2015 – Dec. 2015

- Administered exams
- Organized and managed groups for a semester-long project
- Evaluated and scored the final paper
- Lead study groups and provided one-on-one tutoring
- Delivered lecture on sleep

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**SERVICE AND LEADERSHIP**

**Graduate Student Committee, Psychological Science | Ball State University**

Aug. 2023 – May 2024

*Clinical Psychology Student Representative*

- Serve as voice for student requests or concerns regarding courses, department policies, facilities, equipment, or other aspects of their graduate program
- Provide student perspective as voting member
- Relay information from the Graduate Committee to the students

**Graduate Student Orientation Panel | St. Olaf College**

Mar. 1, 2023

*Volunteer*

- Discussed program experience, recommendations, and opportunities in graduate school with prospective graduate students

**Graduate Student Orientation Panel | Ball State University**

Feb. 1, 2023

*Volunteer*

- Discussed program experience, recommendations, and opportunities in graduate school with prospective graduate students

**Neuroscience Club | St. Olaf College**

Sep. 2016 – May 2017

*President*

- Organized and managed weekly club events
- Organized and led events, activities, and speakers for Brain Awareness Week
- Designed departmental logo for club and brain awareness week

**IMPULSE: The Premier Undergraduate Neuroscience Journal | St. Olaf College**

May 2016 – May 2017

*Associate Editor*

- Organized bi-monthly paper review sessions involving a review of the manuscript and discussion of revision recommendations
- Mentored and trained students on manuscript review and APA format
- Prepared review submission
- Served as primary contact for IMPULSE at St. Olaf College

**Faculty and Student Life Committee | St. Olaf College**

Jan. 2014 – May 2015

*Student Representative*

- Served as the student voice on the committee dealing with the cohesion of faculty and student engagement
- Invited to investigate and present research on the perception of the Honor Code at St. Olaf College from faculty and student perspectives (2014)

- Invited to investigate and present research on the perception of the Week One program at St. Olaf College from faculty and student perspectives (2015)

## Information Technology | St. Olaf College

### *Office Assistant*

May 2014 – Sep. 2015

- Facilitated migration of updates to the campus-wide network platform
- Served as a troubleshooting resource for professors and students
- Digitized field purchase orders and invoices for computer and office supply orders
- Organized, archived, cleaned, and updated 35 years of hard-copy files
- Invoiced campus-wide computers and computer devices

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## GRANTS & FUNDING

NSF Graduate Research Fellowship Program

Submitted Oct. 2023

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## ACADEMIC HONORS & AWARDS

Graduate Student Fellowship | *KU Center of Teaching Excellence*

Aug. 2025 – Present

Graduate Teaching Assistantship | *University of Kansas*

Aug. 2024 – Present

Graduate Assistantship | *Ball State University*

June 2023 – July 2024

Blue Key Honor Society, Nominee

Nov. 2015

St. Olaf College Leadership Award

Sep. 2015

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## SCHOLASTIC MEMBERSHIP

Midwestern Psychological Association

2022 – 2024

Association for Psychological Science

2022 – 2023

Society for Neuroscience

2017

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## CERTIFICATIONS

### Collaborative Institutional Training Initiative

Human Subjects Research, CITI Biomedical Researchers |

Aug. 2025 – Aug. 2028

*University of Kansas Medical Center*

Meaningful Community Engagement in Research |

Feb. 2025

*University of Kansas*

Social & Behavioral Research | *University of Kansas*

Jan. 2025 – Jan 2028

Conflicts of Interest | *Ball State University*

Aug. 2022 – Aug. 2026

Social & Behavioral Research | *Ball State University*

Aug. 2022 – Aug. 2025

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## PROFESSIONAL DEVELOPMENT

### Working Groups

Gamification of Teaching

Sep. 2025 – Present

Kansas Data Science Consortium

Jan. 2025 – Present

### Teaching Workshops

2025 KU Teaching Summit

Aug. 2025

Center for Teaching Excellence, Preparing for the Teaching Market

Apr. 2025

Center for Teaching Excellence, Building Your Teaching Portfolio

Apr. 2025

Center for Teaching Excellence, Crafting Your Teaching Statement

Mar. 2025

### Quantitative Workshops

Machine Learning in R (SMaRT Workshops)

Nov. 2025

Software Carpentry Workshop (KU Library)

Sep. 2025

Transitioning to R for Statistics (SMaRT Workshops)

Jan. 2025

Intro to R for Researchers (SMaRT Workshops)	Jan. 2025
Tableau Desktop Specialist (Udemy)	Nov. 2023
Practical SQL for Data Analysts & Data Scientists (Udemy)	Nov. 2023
Tables and Formulas with Excel (Udemy)	Sep. 2023
Mastering Data Visualization (Udemy)	July 2023

## TECHNICAL SKILLS

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<b>Data Management &amp; Engineering</b>	Relational database management   SQL   ETL pipeline development   Data migration and schema reconciliation   Data validation and auditing   Cloud data workflows (Google Cloud Platform, Google Cloud Storage)   Tableau Prep
<b>Data Visualization</b>	Exploratory and explanatory data visualization   Interactive dashboards   R (ggplot2, Shiny)   Tableau
<b>Preclinical</b>	Colony Management   Immunohistochemistry   Intraperitoneal Injections   Tissue Dissection   Tissue Fixation   Tissue Embedding   Cryosectioning   Slide mounting and Preparation
<b>Software</b>	Adobe (Illustrator, Photoshop)   ANY-maze   ChatPlat   MED-PC   Microsoft (Access, Excel, PowerPoint, Word)   Prolific   Qualtrics   SolidWorks
<b>Statistical &amp; Quantitative Methods</b>	R   SPSS   STATA   Generalized linear models   Analysis of variance (ANOVA / factorial designs)   Regularization (LASSO, elastic net)   Survey-weighted analysis   Hierarchical data structures   Model evaluation and validation