Susan Vanderplas

Curriculum Vitae

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Education

2015 **PhD**, *Statistics*, Iowa State University
Dissertation: The Perception of Statistical Graphics

2011 **MS**, *Statistics*, Iowa State University

2009 **BS**, *Psychology & Applied Mathematical Sciences*, Texas A&M University

Professional Experience

2020 **Assistant Professor**, *Statistics Department*, University of Nebraska, Lincoln

2018–2019 **Research Assistant Professor**, *Center for Statistics and Applications in Forensic Evidence*, Iowa State University

2015–2019 **Statistical Analyst/Consultant**, *Nebraska Public Power District*

2015–2015 **Postdoc**, *Iowa State University Office of the Vice President for Research*

Scholarship

Contribution percentages estimated from git contributions using `git fame` where possible. Not all projects have github repositories for which this is meaningful.

Journal Publications

15. 2022 Zemmels, Joseph, **Susan Vanderplas**, and Heike Hofmann (2022). "A Study in Reproducibility: The Congruent Matching Cells Algorithm and cmcR package". In: *R Journal*. Accepted October 2022.
Contribution: Programming and analysis (10%), Writing (20%), Advising (40%).

14. 2022 Robinson, Emily, Reka Howard, and **Susan Vanderplas** (2022). "Eye Fitting Straight Lines in the Modern Era". In: *JCGS*. Accepted September 2022.
Contribution: Programming and analysis (10%), Writing (10%), Advising (60%).

13. 2021 Hofmann, Heike, **Susan Vanderplas**, and Alicia Carriquiry (June 2021). "Treatment of inconclusives in the AFTE range of conclusions". en. In: *Law, Probability and Risk* 19.3-4, pp. 317–364. DOI: 10.1093/lpr/mgab002. URL: https://academic.oup.com/lpr/article/19/3-4/317/6308611 (visited on 12/20/2021).
Contribution: Writing (50%).

12. 2021 **Vanderplas**, **Susan**, Christian Röttger, Dianne Cook, and Heike Hofmann (2021). "Statistical significance calculations for scenarios in visual inference". In: *Stat* 10.1, e337. DOI: https://doi.org/10.1002/sta4.337.
Contribution: Programming and analysis (30%), Writing (65%).

11. 2020 **Vanderplas**, **Susan**, Alicia Carriquiry, Heike Hofmann, James Hamby, and Xiao Hui Tai (2020). "An introduction to firearms examination for researchers in statistics". In: *Handbook of Forensic Statistics*. Ed. by Banks, D., Kafadar, K., Kaye, D., and Tackett, M. New York: Chapman and

Hall/CRC 2020. DOI: 10.1201/9780367527709.

Contribution: Writing (50%).

10. 2020 **Vanderplas**, **Susan**, Melissa Nally, Tylor Klep, Cristina Cadevall, and Heike Hofmann (Jan. 2020). "Comparison of three similarity scores for bullet LEA matching". In: *Forensic Science International*. DOI: 10.1016/j.forsciint.2020.110167.

Contribution: Programming and analysis (20%), Writing (55%).

9. 2020 **Vanderplas**, **Susan**, Dianne Cook, and Heike Hofmann (Mar. 2020). "Testing Statistical Charts: What Makes a Good Graph?" In: *Annual Review of Statistics and Its Application* 7.1, pp. 13.1–13.28. DOI: 10.1146/annurev-statistics-031219-041252.

Contribution: Writing (85%).

8. 2019 Rutter, Lindsay, **Susan Vanderplas**, Dianne Cook, and Michelle Graham (2019). "ggenealogy: An R Package for Visualizing Genealogical Data". In: *Journal of Statistical Software* 89.13, pp. 1–31. ISSN: 1548-7660. DOI: 10.18637/jss.v089.i13.

7. 2019 **Vanderplas**, **Susan**, Ryan Goluch, and Heike Hofmann (2019). "Framed! Reproducing and Revisiting 150 year old charts". In: *Journal of Computational and Graphical Statistics*. DOI: 10.1080/10618600.2018.1562937.

Contribution: Programming and analysis (60%), writing (50%).

6. 2019 Sievert, Carson, **Susan Vanderplas**, Jun Cai, Kevin Ferris, Faizan Uddin Fahad Khan, and Toby Dylan Hocking (2019). "Extending ggplot2 for linked and animated web graphics". In: *Journal of Computational and Graphical Statistics* 28.2, pp. 299–308. DOI: 10.1080/10618600.2018.1513367.

5. 2017 **Vanderplas**, **Susan** and Heike Hofmann (2017). "Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics". In: *Journal of Computational and Graphical Statistics* 26.2, pp. 231–242. DOI: 10.1080/10618600.2016.1209116.

Contribution: Programming and analysis (90%), writing (50%).

4. 2016 — (2016). "Spatial Reasoning and Data Displays". In: *IEEE Transactions on Visualization and Computer Graphics*. DOI: 10.1109/TVCG.2015.2469125.

Contribution: Programming and analysis (90%), writing (75%).

3. 2015 — (2015). "Signs of the Sine Illusion - why we need to care". In: *Journal of Computational and Graphical Statistics* 24.4, pp. 1170–1190. DOI: 10.1080/10618600.2014.951547.

Contribution: Programming and analysis (50%), writing (60%).

2. 2010 Towfic, Fadi, **Susan Vanderplas**, Casey A Oliver, Oliver Couture, Christopher K Tuggle, M Heather West Greenlee, and Vasant Honavar (2010). "Detection of gene orthology from gene co-expression and protein interaction networks". In: *BMC bioinformatics* 11.Suppl 3, S7. DOI: 10.1186%2F1471-2105-11-S3-S7.

1. 2009 Hull, Rachel, Heather Bortfeld, and **Susan Koons** (2009). "Near-infrared spectroscopy and cortical responses to speech production". In: *The open neuroimaging journal* 3, p. 26. DOI: 10.2174%2F1874440000903010026.

Other Publications

4. 2021 *Submitted as an invited response to Hullman & Gelman's "Designing for Interactive Exploratory Data Analysis Requires Theories of Graphical Inference"*.
Vanderplas, **Susan** (July 30, 2021). "Designing Graphics Requires Useful Experimental Testing Frameworks and Graphics Derived From Empirical Results". In: *Harvard Data Science Review* 3.3. DOI: 10.1162/99608f92.7d099fd0.

3. 2019 Carriquiry, Alicia, Heike Hofmann, Xiao Hui Tai, and **Susan Vanderplas** (2019). "Machine learning in forensic applications". In: *Significance* 16.2, pp. 29–35. DOI: 10.1111/j.1740-9713.2019.01252.x.

Contribution: Writing (50%).

2. 2017 *Submitted as an invited response to Donoho's "50 years of Data Science"*.
Hofmann, Heike and **Susan Vanderplas** (2017). "All of This Has Happened Before. All of This Will Happen Again: Data Science". In: *Journal of Computational and Graphical Statistics* 26.4, pp. 775–778. DOI: 10.1080/10618600.2017.1385474.
Contribution: Writing (75%).

1. 2013 Budrus, Sarah, Susan Vanderplas, and Dianne Cook (2013). "In tennis, do smashes win matches?" In: *Significance* 10.3, pp. 35–38. DOI: 10.1111/j.1740-9713.2013.00665.x.

In Progress **Visual narratives of the COVID-19 pandemic** A discussion of how graphics were used during the first two years of COVID-19. In press at JDSSV.

A Study in Reproducibility: The CMC Algorithm and cmcR package Development of the cmcR package for open-source cartridge case comparisons and what it says about reproducibility. Revision under review at the R Journal.

Perception of Log Scales Assessment of perception and use of log scales to display exponential growth. Several manuscripts in preparation; one under review at JCGS.

Exploring Rural Shrink Smart Through Guided Discovery Dashboards with Denise Bradford. Revision submitted to Journal of Data Science, Sept 2022.

'You Draw It': Implementation of visually fitted trends with `r2d3` with Emily Robinson and Reka Howard. Revision submitted to Journal of Data Science, Sept 2022.

Generalized Parallel Coordinate Plots: ggpcp with Heike Hofmann and Antony Unwin. An R package for creation of generalized parallel coordinate plots. Paper in preparation for submission to JCGS.

Bullet Signature Resampling Method for resampling bullet signatures used to calculate match and non-match score distributions.

Grants

2022 **NIJ R&D in Forensic Science**, *Physical Simulation of Lower Body Biomechanics for Artificial Shoe Wear and Forensics Analysis*, Co-PI, Under Review, $73,693 UNL budget, $299,859 total

2021–2022 **NIJ R&D in Forensic Science**, *Automatic Acquisition and Identification of Footwear Class Characteristics*, PI, Funded, $380,650 total

2020–2025 **NIST**, *Center for Statistics and Applications in Forensic Evidence*, PI, Funded ($20 million total, $456,930 sub-award)

2020–2023 **USDA CIGOFF**, *Improving the Economic and Ecological Sustainability of US Crop Production through On-Farm Precision Experimentation*, PI, Funded ($4,000,000 total, $400,000 UNL subcontract split between 3 UNL PIs)

2021–2022 **USDA NIFA AFRI**, *Corn Residue Adaptive Grazing Strategies*, Collaborator, Funded, $300,000

2020 **USDA NIFA AFRI**, *Practical Framework to Facilitate Adoption of In-Season N Management Technology in Commercial Fields*, Collaborator, Not funded, $300,000

2020 **NSF**, *AI Institute: AgroAI: The Institute for Advancing Agriculture and Food in a Changing World Using AI*, Collaborator, Not Funded, Total grant $20 million, UNL subcontract request $3,555,327

2020–2023 **NSF**, *Overcoming the Rural Data Deficit to Improve Quality of Life and Community Services in Smart & Connected Small Communities*, PI, Funded ($1,500,000 total, $123,445 subcontract)

2019 **USDA AFRI-SAS**, *A Cyber-Physical System for Data-Intensive Farm Management*, PI, Not funded, $3,000,000 total

2019 **NIJ R&D in Forensic Science**, *Statistical Infrastructure for the Use of Error Rate Studies in the Interpretation of Forensic Evidence*, Collaborator, Funded for FY 2019, $197,699 total, $57,596 ISU sub-award

2018 **NIJ R&D in Forensic Science**, *Passive Acquisition of Footwear Class Characteristics in Local Populations*, PI, Not funded, $383,104

2018 **NIJ R&D in Forensic Science**, *Evaluating Photogrammetry for 3D Footwear Impression Recovery*, PI, Not funded, $281,755

Invited Talks

2021 **How do you define a circle? Perception and Computer Vision Diagnostics**, *JSM*, Section on Statistical Graphics, Seattle, WA

2021 **Pandemics, Graphics, and Perception of Log Scales**, *R-Ladies DC*, Washington, DC

2020 **Perception and Visual Communication in a Global Pandemic**, *Data Science, Statistics, and Visualization Conference*, SAMSI, Online

2020 **One of these things is not like the others: Visual Statistics and Testing in Statistical Graphics**, *Data Science Symposium*, South Dakota State University, Brookings, SD

2020 **Big Data, Big Experiments, and Big Problems**, Plant and Animal Genome, San Diego, CA

2019 **Statistical Lineups for Bayesians**, *JSM*, Section on Statistical Graphics, Denver, CO

2018 **Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics**, *SDSS*, Reston, VA

2015 **Animint: Interactive Web-Based Animations Using Ggplot2's Grammar of Graphics**, *JSM*, Seattle, WA

2014 **The curse of three dimensions: Why your brain is lying to you**, *JSM*, Section on Statistical Graphics Student Paper Session, Boston, MA

Contributed Talks

2022 **An Introduction to the Automatic and Objective Firearm Evidence Identification**, *International Association for Identification*, Omaha, NE

2022 **Local Population Footwear Class Characteristics - An End-to-End Pipeline for Automatic Data Acquisition and Analysis**, *International Association for Identification*, Omaha, NE

2021 **Welcome to Forensic Statistics**, *Data Mishaps Night*, Online

2018 **Framed! Reproducing 150 year old charts**, *JSM*, Vancouver, BC

2017 **A Bayesian Approach to Visual Inference**, *JSM*, Baltimore, MD

2016 **Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics**, *JSM*, Chicago, IL

2015 **Visual Aptitude and Statistical Graphics**, *InfoVis*, Chicago, IL

2015 **Animint: Interactive, Web-Ready Graphics with R**, *Great Plains R User Group*, Sioux Center, IA

2014 **Do You See What I See? Using Shiny for User Testing**, *JSM*, Boston, MA

2013 **Signs of the Sine Illusion – why we need to care**, *JSM*, Montreal, ON

Seminar Talks

2022 **How to Make Good Charts**, *CBIO Seminar*, University of Nebraska, Lincoln

2021 **Pandemics, Graphics, and Perception of Log Scales**, *NUMBATS Seminar*, Monash University, Melbourne, Australia

2021 **Exploring Rural Quality of Life Using Data Science and Public Data**, *QQPM Seminar*, University of Nebraska, Lincoln

2021 **Inconclusive Conclusions: Biases and Consequences**, *Law and Psychology Brown Bag Seminar*, University of Nebraska, Lincoln

2021 **Visual Statistics: Communication and Graphical Testing**, *Animal Science Seminar*, University of Nebraska, Lincoln

2021 **How to Make Good Charts**, *Biological and Systems Engineering GSA*, University of Nebraska, Lincoln

2020 **Statistical Evaluation of Firearms and Toolmark Evidence**, *Statistics Department Seminar*, University of Nebraska, Lincoln

Software

Dates show initial involvement; only packages which are no longer maintained have end dates.

2021 `ggpcp`, *Generalized parallel coordinate plots*

2020 `vinference`, *Analysis of visual inference experiments*

2019 `groovefinder`, *Identification of grooves in scans of bullet land engraved areas*

2019 `cmcR`, *Automated matching of 3d cartridge case scans using the congruent matching cells algorithm*

2018 `bulletxtrctr`, *Automated matching of 3d bullet scans*

2018 `x3ptools`, *Reading, manipulating, and visualizing x3p files*

2018 `bulletsamplr`, *Resampling of bullet signatures*

2018–2020 `ShoeScrapeR`, *Acquisition of Shoe Images and Metadata from Online Retailers*

2018–2020 `ImageAlignR`, *Image registration algorithms for forensics*

2013–2015 `animint`, *animated, interactive web graphics for R using d3.js*

Teaching

2022 **Stat 892 - Writing in Statistics/TA Prep**, *University of Nebraska, Lincoln*, In person, synchronous

2022 **Stat 850 - Computing Tools for Statisticians**, *University of Nebraska, Lincoln*, Hybrid, flipped classroom, synchronous, Course materials: https://srvanderplas.github.io/unl-stat850/

2022 **Stat 982 - Advanced Inference**, *University of Nebraska, Lincoln*, In person, synchronous, reading course
Co-taught

2022 **Stat 151 - Introduction to Statistical Computing**, *University of Nebraska, Lincoln*, Hybrid, flipped classroom, synchronous, Statistical programming in R and python. Course materials: https://srvanderplas.github.io/Stat151/

2021 **Stat 850 - Computing Tools for Statisticians**, *University of Nebraska, Lincoln*, Hybrid, flipped classroom, synchronous, Course materials: https://srvanderplas.github.io/unl-stat850/
Mean evaluation: 4.76, Median: 5.0

2021 **Stat 218 - Introduction to Statistics**, *University of Nebraska, Lincoln*, Online, asynchronous
Mean evaluation: 4.0, Median: 4.0

2020 **Stat 850 - Computing Tools for Statisticians**, *University of Nebraska, Lincoln*, Hybrid, flipped classroom, synchronous, Course materials: https://srvanderplas.github.io/unl-stat850/
Mean evaluation: 4.76, Median: 5.0

2020 **Stat 218 - Introduction to Statistics**, *University of Nebraska, Lincoln*, In person synchronous
Mean evaluation: 4.2, Median: 4.0

2019 **Stat 585 - Data Technologies for Statistical Analysis**, *Iowa State University*, In person synchronous
Co-taught, assisted with curriculum development. Mean evaluation: 4.92, Median: 5.0

2017–2018 **Business Intelligence Embedded Agent Program**, *Nebraska Public Power District*, Hybrid
Design and implement a program to mentor employees, providing instruction in data science and opportunities to apply new skills within the company. Lead one-on-one and group mentoring sessions to create a sense of community and reinforce skills learned through online courses. 16 students.

2013–2014 **R Workshops**, *Iowa State*, In person synchronous
Introduction to R, ggplot2, data management and cleaning, package development, literate programming, and Shiny.

Mentoring and Advising

Graduate Students

2022 **Tyler Wiederich**, *Statistics*, MS, Perception of Three-Dimensional Graphics

2022 **Muxin Ha**, *Statistics*, MS, Automatic Recognition of Shoe Class Characteristics

2021 **Rachel Rogers**, *Statistics*, Ph.D., Explainable Machine Learning for Forensics in Courtrooms

2021 **Alison Kleffner**, *Statistics*, Ph.D., Spatial Statistics and Visualization in Ecology and Agriculture
Co-advised with Yawen Guan

2020 **Denise Bradford**, *Statistics*, Ph.D, Data Science and Interactive Graphics

2021–2022 **Jayden Stack**, *Statistics*, MS, Automatic Recognition of Shoe Class Characteristics

2020–2022 **Emily Robinson**, *Statistics*, Ph.D, Perception and Visual Inference
Co-advised with Reka Howard

2020 **Ved Piyush**, *Statistics*, MS, Machine Learning and Computer Vision

2019 **Joseph Zemmels**, *Statistics*, MS, Ph.D, Analysis and Matching of Cartridge Cases
Completed MS (Spring 2020). Co-advised with Heike Hofmann.

2019–2020 **Eryn Blagg**, *Statistics*, MS, Ph.D, Analysis of Wear Development in Three-Dimensional Shoe Scans.

Co-advised with Heike Hofmann

2018–2019 **Miranda Tilton**, *Statistics*, MS, Footwear Class Characteristics and Computer Vision.

Undergraduate Students

2021 **Xinyu Liu**, *Actuarial Science and Computer Science*, UNL FYRE Program, Machine learning for shoe sole images

2019 **Jason Seo**, *Computer Science and Statistics*, Undergraduate Research, R package for visualization of neural networks using the python library keras-vis.

2018–2019 **Talen Fisher**, *Computer Engineering*, Undergraduate Research, Tools for working with x3p files, database design for storing bullet scans and intermediate analysis products.

Summer Research Programs

2019 **Molly McDermott and Andrew Maloney**, *Research Experience for Undergraduates*, Summer 2019, Bullet Scan Quality and Machine Learning

2019 **Syema Ailia, Emmanuelle Hernandez Morales, Tiger Ji**, *Research Experience for Undergraduates*, Summer 2019, Rapid Quality Control Tools for Confocal Microscopy Scans

2018 **Ben Wonderlin and Jenny Kim**, *Young Engineers and Scientists*, Summer 2018, Footwear Class Characteristics and Computer Vision

Outreach

Legal Briefs and Testimony

2022 **Amicus Curiae Brief**, *Supreme Court of New Jersey*, A-56-18 State v. Michael Olenowski (082253)

2022 **Amicus Curiae Brief**, *Supreme Court of Maryland*, In Support of Appellant Kobina Ebo Abruquah

2022 **Written Testimony**, *Cook County Circuit Court*, Reply to Response by FBI Laboratory filed in Illinois v. Winfield and Affidavit by Biederman et al. (2022) filed in US v. Kaevon Sutton (2018 CF1 009709)

2021 **Written Testimony**, *Cook County Circuit Court*, Assessment of the Reliability of Studies of Firearms Examination in Forensics

Forensic Practitioners

2021 **Blog Post**, *CSAFE*, Q&A - Treatment of Inconclusive Results in Error Rates of Firearm Studies (Link)

2021 **Webinar**, *CSAFE*, Treatment of Inconclusive Results in Error Rates of Firearm Studies

2020 **CSAFE Firearms Workshop**, Invited Talk: Open Source Software in Forensics

Service

Service to the Discipline

2023–2025 **Advisory Committee on Forensic Science**, *ASA*

2023–2024 **Graphics Section Chair**, *ASA*

2022–2023 **Graphics Section Chair-Elect**, *ASA*

2021–2024 **Associate Editor**, *Journal of Computational and Graphical Statistics*

2020–2023 **Associate Editor**, *R Journal*

2020–2022 **Graphics Section Program Chair (2021)**, *ASA*, Official duties include planning JSM sessions in 2020 and running the Data Expo in 2022

2020 **Program Committee (Graphics)**, *Symposium on Data Science and Statistics 2020*, Visualization Track co-chair

2019–2021 **Gertrude Cox Scholarship Committee Member**, *ASA*
Assisted with selection of the Gertrude Cox Scholarship recipients and honorable mentions

2019 **Uncoast Unconference Organizing Committee**, Des Moines, IA
Organized the first R Uncoast Unconference to bring R developers in flyover country together for a 3-day event. Over 50% of the participants at the conference were women or minorities, and participants included students, academics, and industry R programmers with a variety of experience levels in R programming.

2017–2019 **Graphics Section Representative to the Council of Sections**, *ASA*

Department and Institutional Service

2021

R Workshop Coordinator

Develop and coordinate a week of R workshops taught in January, May, and August each year

2021–2022

Faculty Senate, *Statistics Department Representative*

2021–2022

Faculty Advisory Council, *Vice-Chair*

2021–2022

MS Comp Exam Committee

Committee to evaluate the current MS Stat Day presentation component and consider other options for the MS program

2021

Digital Ag Minor Committee

Committee to develop a digital ag minor.

2021

Data Science Joint Committee

Committee of Math, Computer Science, and Statistics departments to develop a comprehensive undergraduate data science program.

2020–2021

Seminar Organizer

Arrange speakers for the department seminar.

2020

SCIL 101 Poster Judge, *Fall Semester*

2019–2020

Undergraduate Program Committee

Design an undergraduate statistics major and submit the proposal to the university.

Training & Professional Development

2022–2023

Nebraska Governance and Technology Center, *Faculty Fellow*

2021–2022

Peer Review of Teaching Program

Create a course portfolio for Stat 850 in order to assess course design and analyze student engagement and learning

2020

New Faculty Development Program

2020

Summer Institute for Online Teaching

Online course structure and backwards design principles