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

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.

Generalized Parallel Coordinate Plots: ggpcp An R package for creation of generalized parallel coordinate plots

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.

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

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 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

2021–2022 **Jayden Stack**, *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 **Emily Robinson**, *Statistics*, Ph.D, Perception and Visual Inference
Co-advised with Reka Howard

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

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

Co-advised with Heike Hofmann

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

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

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

Forensic Practitioners

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

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

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

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

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 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