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Susan Vanderplas

Curriculum Vitae

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*

Publications

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

Peer Reviewed Publications

15. 2022 Zemmels, Joseph*, **Vanderplas**, **Susan**, and Hofmann, Heike (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 A.*, Howard, Reka, and **Vanderplas**, **Susan** (2022). "Eye Fitting Straight Lines in the Modern Era". In: *Journal of Computational and Graphical Statistics* 0.ja, pp. 1–19. DOI: https://doi.org/10.1080/10618600.2022.2140668.
Contribution: Programming and analysis (10%), Writing (10%), Advising (60%).

13. 2021 Hofmann, Heike, **Carriquiry**, **Alicia**, and Vanderplas, Susan (May 5, 2021). "Treatment of inconclusives in the AFTE range of conclusions". In: *Law, Probability and Risk* 19.3-4, pp. 317–364. ISSN: 1470-8396. DOI: https://doi.org/10.1093/lpr/mgab002.
Contribution: Writing (50%).

12. 2021 **Vanderplas**, **Susan**, Röttger, Christian, Cook, Dianne, and Hofmann, Heike (Dec. 1, 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, Carriquiry, Alicia, Hofmann, Heike, Hamby, James, and Tai, Xiao Hui (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: https://doi.org/10.1201/9780367527709.
Contribution: Writing (50%).

10. 2020 — Vanderplas, Susan, Nally, Melissa, Klep, Tylor, Cadevall, Cristina, and Hofmann, Heike (Mar. 1, 2020). "Comparison of three similarity scores for bullet LEA matching". In: *Forensic Science International* 308, p. 110167. ISSN: 0379-0738. DOI: https://doi.org/10.1016/j.forsciint.2020.110167. URL: https://www.sciencedirect.com/science/article/pii/S0379073820300293.
Contribution: Programming and analysis (20%), Writing (55%).

9. 2020 — **Vanderplas**, **Susan**, Cook, Dianne, and Hofmann, Heike (Mar. 1, 2020). "Testing Statistical Charts: What Makes a Good Graph?" In: *Annual Review of Statistics and Its Application* 7.1, pp. 61–88. DOI: https://doi.org/10.1146/annurev-statistics-031219-041252.
Contribution: Writing (85%).

8. 2019 — Rutter, Lindsay, **Vanderplas**, **Susan**, Cook, Dianne, and Graham, Michelle (May 29, 2019). "ggenealogy: An R Package for Visualizing Genealogical Data". In: *Journal of Statistical Software* 89.13, pp. 1–31. DOI: https://doi.org/10.18637/jss.v089.i13.

7. 2019 — **Vanderplas**, **Susan**, Goluch, Ryan C, and Hofmann, Heike (Apr. 1, 2019). "Framed! Reproducing and Revisiting 150-Year-Old Charts". In: *Journal of Computational and Graphical Statistics* 28.3, pp. 620–634. DOI: https://doi.org/10.1080/10618600.2018.1562937.
Contribution: Programming and analysis (60%), writing (50%).

6. 2018 — Sievert, Carson, **Vanderplas**, **Susan**, Cai, Jun, Ferris, Kevin, Khan, Faizan Uddin Fahad, and Hocking, Toby Dylan (Nov. 14, 2018). "Extending ggplot2 for Linked and Animated Web Graphics". In: *Journal of Computational and Graphical Statistics* 28.2, pp. 299–308. DOI: https://doi.org/10.1080/10618600.2018.1513367.

5. 2017 — **Vanderplas**, **Susan** and Hofmann, Heike (Apr. 24, 2017). "Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics". In: *Journal of Computational and Graphical Statistics* 26.2, pp. 231–242. DOI: https://doi.org/10.1080/10618600.2016.1209116.
Contribution: Programming and analysis (90%), writing (50%).

4. 2016 — **VanderPlas**, **Susan** and Hofmann, Heike (Dec. 31, 2016). "Spatial Reasoning and Data Displays". In: *IEEE Transactions on Visualization and Computer Graphics* 22.1, pp. 459–468. DOI: https://doi.org/10.1109/TVCG.2015.2469125.
Contribution: Programming and analysis (90%), writing (75%).

3. 2015 — **Vanderplas**, **Susan** and Hofmann, Heike (Dec. 10, 2015). "Signs of the Sine Illusion - why we need to care". In: *Journal of Computational and Graphical Statistics* 24.4, pp. 1170–1190. DOI: https://doi.org/10.1080/10618600.2014.951547.
Contribution: Programming and analysis (50%), writing (60%).

2. 2010 — Towfic, Fadi, **Vanderplas**, **Susan**, Oliver, Casey A, Couture, Oliver, Tuggle, Christopher K, Greenlee, M Heather West, and Honavar, Vasant (2010). "Detection of gene orthology from gene co-expression and protein interaction networks". In: *BMC bioinformatics* 11.Suppl 3, S7. DOI: https://doi.org/10.1186/1471-2105-11-S3-S7.

1. 2009 — Hull, Rachel, Bortfeld, Heather, and **Koons**, **Susan** (2009). "Near-infrared spectroscopy and cortical responses to speech production". In: *The open neuroimaging journal* 3, p. 26. DOI: https://doi.org/10.2174/1874440000903010026.

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: https://doi.org/10.1162/99608f92.7d099fd0.

3. 2019 Carriquiry, Alicia, Hofmann, Heike, Tai, Xiao Hui, and **Vanderplas**, **Susan** (Apr. 1, 2019). "Machine learning in forensic applications". In: *Significance* 16.2, pp. 29–35. DOI: https://doi.org/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 **Vanderplas**, **Susan** (Dec. 19, 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: https://doi.org/10.1080/10618600.2017.1385474.
Contribution: Writing (75%).

1. 2013 Budrus, Sarah, **Plas**, **Susan Vander**, and Cook, Dianne (2013). "In tennis, do smashes win matches?" In: *Significance* 10.3, pp. 35–38. DOI: https://doi.org/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.

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.

Perception of Log Scales Assessment of perception and use of log scales to display exponential growth. Several manuscripts in preparation.

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

Under Review

2022 **NIJ: R&D In Forensic Science**, *Physical Simulation of Lower Body Biomechanics for Artificial Shoe Wear and Forensics Analysis*, Co-PI, Total: $299,859, Sub: $73,693

Funded

2021–2023 **NIJ: R&D In Forensic Science**, *Automatic Acquisition and Identification of Footwear Class Characteristics*, PI, Total: $380,650

2021–2022 **USDA-NIFA: Agriculture and Food Research Initiative**, *Corn Residue Adaptive Grazing Strategies*, Collaborator, Total: $300,000

2020–2025 **NIST: Center for Statistics and Applications in Forensic Evidence**, *Footwear Class Characteristics and Human Factors*, PI, Total: $20,000,000, Sub: $456,930

2021–2023 **USDA-NRCS: Conservation Innovation Grant On-Farm Trials**, *Improving the Economic and Ecological Sustainability of US Crop Production through On-Farm Precision Experimentation*, PI, Total: $4,000,000, Sub: $400,000 (Split between 3 UNL co-PIs)

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

2019–2020 **NIJ: R&D In Forensic Science**, *Statistical Infrastructure for the Use of Error Rate Studies in the Interpretation of Forensic Evidence*, Collaborator, Total: $197,699, Sub: $57,596

Not Funded

2020 **USDA-NIFA: Agriculture and Food Research Initiative**, *Practical Framework to Facilitate Adoption of In-Season N Management Technology in Commercial Fields*, Collaborator, Total: $300,000

2020 **NSF: National Artificial Intelligence Research Institutes**, *AI Institute: AgroAI: The Institute for Advancing Agriculture and Food in a Changing World Using AI*, Collaborator, Total: $20,000,000

2019 **USDA-AFRI: Sustainable Agricultural Systems**, *A Cyber-Physical System for Data-Intensive Farm Management*, PI, Total: $3,000,000

2018 **NIJ: R&D In Forensic Science**, *Evaluating Photogrammetry for 3D Footwear Impression Recovery*, PI, Total: $281,755

Talks

Invited

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*, 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*, Section on Statistical Graphics, Seattle, WA

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

Contributed

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

2022 **From Scans to Scores**, *IAI*, Omaha, NE

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

2018 **Framed Charts in the 1870 Statistical Atlas**, *JSM*, Section on Statistical Graphics, Vancouver, BC, CA

2017 **A Bayesian Approach to Visual Inference**, *JSM*, Section on Statistical Graphics, Baltimore, MD

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

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

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

2014 **Animint: Interactive, Web-Ready Graphics with R**, *Great Plains R User Group*, Sioux Center, IA

2013 **Signs of the Sine Illusion – why we need to care**, *JSM*, Section on Statistical Graphics, Montreal, ON, CA

Seminars

2022 **Reproducible Science: Statistics, Forensics, and the Law**, *Statistics*, University of Nebraska, Lincoln, Lincoln, NE

2022 **How to make good charts**, *Complex Biosystems*, University of Nebraska Lincoln, Lincoln, NE

2022 **Pandemics, Graphics, and Perception of Log Scales**, *Math*, University of Nebraska Omaha, Omaha, NE

2022 **Automatic Acquisition of Footwear Class Characteristics**, *Center for Statistical Applications in Forensic Evidence*, Online

2021 **Pandemics, Graphics, and Perception of Log Scales**, *NUMBATS*, Monash University, Melbourne, Vic, AUS

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

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

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

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

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

Software

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

2021 `ggpcp`, *Generalized parallel coordinate plots*, Repository

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

2019–2021 `groovefinder`, *Identification of grooves in scans of bullet land engraved areas*, Repository

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

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

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

2018 `bulletsamplr`, *Resampling of bullet signatures*, Repository

2018–2020 `ShoeScrapeR`, *Acquisition of shoe images and metadata from online retailers*, Repository

2018–2021 `ImageAlignR`, *Image registration algorithms for forensics*, Repository

2013–2015 `animint`, *Animated, interactive web graphics for R using ggplot2 and d3.js*, Repository

Teaching

2022 **STAT 151**, *Introduction to Statistical Computing*, University of Nebraska Lincoln, Flipped synchronous. Evals: 4.95 (mean), 5 (median)

2022 **STAT 218**, *Introduction to Statistics*, University of Nebraska Lincoln, Online asynchronous. Evals: 3.72 (mean), 4 (median)

2022 **STAT 850**, *Computing Tools for Statisticians*, University of Nebraska Lincoln, Flipped synchronous

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

2022 **STAT 982**, *Advanced Inference*, University of Nebraska Lincoln, Co-taught with Bertrand Clarke

2021 **STAT 218**, *Introduction to Statistics*, University of Nebraska Lincoln, Online asynchronous.. Evals: 4.01 (mean), 4 (median)

2021 **STAT 850**, *Computing Tools for Statisticians*, University of Nebraska Lincoln, Hybrid, flipped, synchronous. Evals: 4.79 (mean), 5 (median)

2020 **STAT 218**, *Introduction to Statistics*, University of Nebraska Lincoln, Initially in person synchronous, then online asynchronous. Evals: 4.20 (mean), 4 (median)

2020 **STAT 850**, *Computing Tools for Statisticians*, University of Nebraska Lincoln, Hybrid, flipped, synchronous. Evals: 4.76 (mean), 5 (median)

2019 **STAT 585**, *Data Technologies for Statistical Analysis*, Iowa State, Co-taught with Heike Hofmann. Evals: 4.92 (mean), 5 (median)

Mentoring and Advising

Ph.D.

2022 **Weihao (Patrick) Li**, *Monash University*, Advances in Artificial Intelligence for Data Visualization: Developing Computer Vision Models to Automate Reading of Data Plots, with Application to Predictive Model Diagnostics, co-advised with Dianne Cook and Emi Tanaka

2021 **Rachel Rogers**, *University of Nebraska Lincoln*, Explainable Machine Learning for Forensics in Courtooms

2020 **Alison Kleffner**, *University of Nebraska Lincoln*, Spatial Statistics and Visualization in Ecology and Agriculture, co-advised with Yawen Guan

2020 **Joseph Zemmels**, *Iowa State University*, Analysis and Matching of Cartridge Cases, co-advised with Heike Hofmann

2020 **Emily Robinson**, *University of Nebraska Lincoln*, Perception of Log Scales, co-advised with Reka Howard

MS

2022 **Tyler Wiederich**, *University of Nebraska Lincoln*, Perception of Three Dimensional Graphics

2022 **Muxin Ha**, *University of Nebraska Lincoln*, Automatic Recognition of Shoe Class Characteristics

2021 **Jayden Stack**, *University of Nebraska Lincoln*, Automatic Recognition of Shoe Class Characteristics

2020 **Ved Piyush**, *University of Nebraska Lincoln*, Machine Learning and Computer Vision

2020

2019 **Joseph Zemmels**, *Iowa State University*, Analysis and Matching of Cartridge Cases, co-advised with Heike Hofmann

2019 **Eryn Blagg**, *Iowa State University*, Analysis of Wear Development in Three-Dimensional Shoe Scans, co-advised with Heike Hofmann

2018 **Miranda Tilton**, *Iowa State University*, Footwear Class Characteristics and Computer Vision

Undergraduate

2021 – 2021 **Xinyu Liu**, *University of Nebraska Lincoln*, Machine Learning for Shoe Sole Images, UNL FYRE Program

2019 – 2019 **Jason Seo**, *Iowa State University*, R package for visualization of neural networks using the python library keras-vis

2018 **Talen Fisher**, *Iowa State University*, Database engineering and tools for working with x3p files

Summer

2019 – 2019 **Molly McDermott and Andrew Maloney**, *Iowa State University*, Bullet Scan Quality and Machine Learning

2019 – 2019 **Syema Ailia, Emmanuelle Hernandez Morales, Tiger Ji**, *Iowa State University*, Rapid quality control tools for confocal microscopy scans

2018 – 2018 **Ben Wonderlin, Jenny Kim**, *Iowa State University*, Footwear Class Characteristics and Computer Vision, Young Engineers and Scientists Program

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