Susan VanderPlas
Curriculum Vitae

801 Onyx Cir
Ames, IA 50010
515-509-6613
✉ srvander@iastate.edu
🖥 srvanderplas.com
srvanderplas

Education

2011–15   **Doctor of Philosophy in Statistics**, *Iowa State University*.
Dissertation: The Perception of Statistical Graphics

2009–2011   **Master of Science in Statistics**, *Iowa State University*.

2005–2009   **Bachelor of Science**, *Texas A&M University*.
Major: Psychology and Applied Mathematical Sciences (Statistics), Minor: Neuroscience

Professional Experience

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

2018   **Part-Time Statistical Analyst**, *Nebraska Public Power District*.
Provided individual mentoring and project leadership to continue the Business Intelligence Embedded Agent program and provide support for R-related projects.

2015 2018   **Statistical Analyst**, *Nebraska Public Power District*.
Conducted analyses to improve NPPD's data-driven decision making, including analysis of safety, profitability, and reliability data. Set up a program to train employees in data analysis, business intelligence, and basic statistical modeling.

2015   **Postdoc**, *Iowa State University Office of the Vice President for Research*, Ames, IA.

2014   **Consultant**.
Developed web applications, interactive data displays, and statistical analyses for clients including the Iowa Soybean Association and Iowa State USDA Extension office.
Nitrogen Deficiency in Corn, Crop Yield Forecast

Research Interests

STATISTICAL GRAPHICS & VISUALIZATION
- Visual Inference
- Human Perception
- Interactive Graphics
- Graphics for "Big" Data

DATA SCIENCE & COMPUTING
- Data Mining
- Pattern Recognition
- Computer Vision
- Image Analysis

Publications

2018 **Susan VanderPlas**, Ryan Goluch, and Heike Hofmann. Framed! reproducing 150 year old plots. *Journal of Computational and Graphical Statistics*, 2018.

Carson Sievert, J Cai, **Susan VanderPlas**, F Khan, K Ferris, and Toby Hocking. Extending ggplot2 for linked and dynamic web graphics. *Journal of Computational and Graphical Statistics*, 2018.

2017 **Susan VanderPlas** and Heike Hofmann. Clusters beat trend!? testing feature hierarchy in statistical graphics. *Journal of Computational and Graphical Statistics*, 26(2):231–242, 2017.

Lindsay Rutter, **Susan VanderPlas**, Dianne Cook, and Michelle Graham. ggeanealogy: An R package for visualizing genealogical data. *Journal of Statistical Software*, 2017.

Heike Hofmann and **Susan VanderPlas**. All of this has happened before. all of this will happen again: Data science. *Journal of Computational and Graphical Statistics*, 26(4):775–778, 2017.

2016 **Susan VanderPlas** and Heike Hofmann. Spatial reasoning and data displays. *IEEE Transactions on Visualization and Computer Graphics*, 2016.

2015 **Susan VanderPlas** and Heike Hofmann. Signs of the sine illusion - why we need to care. *Journal of Computational and Graphical Statistics*, 24(4):1170–1190, 2015.

2010 Fadi Towfic, **Susan VanderPlas**, Casey A Oliver, Oliver Couture, Christopher K Tuggle, M Heather West Greenlee, and Vasant Honavar. Detection of gene orthology from gene co-expression and protein interaction networks. *BMC bioinformatics*, 11(Suppl 3):S7, 2010.

2009 Rachel Hull, Heather Bortfeld, and **Susan Koons**. Near-infrared spectroscopy and cortical responses to speech production. *The open neuroimaging journal*, 3:26, 2009.

In Progress **Visual Inference for Bayesians** An examination of two-target statistical lineups as visual Bayes Factor analogs.

Context Mediated Graph Perception User Study of the influence of contextual information and expertise on the perception of polar plots used to display information in a compass-like setting.

Footwear Class Characteristic Recognition using Convolutional Neural Networks Using Convolutional Neural Networks to identify class characteristics in images of footwear outsoles. These characteristics form a feature set which can be used for automating identification of footwear.

Teaching Experience

2017

Business Intelligence Embedded Agent Program, *Nebraska Public Power District*, Columbus, NE.

Designed a program to mentor NPPD employees, providing instruction in data science and opportunities to apply new skills within the company. One-on-one and group mentoring sessions were used to create a sense of community and to reinforce skills learned through online courses.

2017

R Course Instructor, *Nebraska Public Power District*, Columbus, NE.

Taught a 3-day internal course on using R for data analysis, including use of ggplot2, dplyr, tidyr, knitr, and stringr.

2013
2014

R Course Instructor, *Iowa State University Stat Dept.*, Ames, IA.

Designed and conducted workshops to teach R skills to the members of the university and local business community. Workshop topics included an introduction to R, ggplot2, data management with plyr, reshape2, and stringr, package development, document creation with knitr, linear models, and creating web applets with Shiny.

Spring 2013

Statistical Methods for Research, *Iowa State University Stat Dept.*, Ames, IA.

Teaching Assistant - Held office hours and graded labs and tests for Stat 401, a class composed primarily of graduate engineering students.

2012
2013

Introduction to Business Statistics II, *Iowa State University Stat Dept.*, Ames, IA.

Teaching Assistant - Taught undergraduate business students statistical methods and use of JMP statistical software. Responsibilities included holding office hours and evening help sessions, developing lab materials, managing the course website on Blackboard, and grading labs, homework, and tests.

2011

Statistical Methods for Research, *Iowa State University Stat Dept.*, Ames, IA.

Teaching Assistant - Taught graduate social science students statistical methods and use of SAS statistical software. Responsibilities included teaching lab sessions, creating lab materials, holding office hours and grading homework and lab materials.

2011

Empirical Methods for Comp. Sci., *Iowa State University Stat Dept.*, Ames, IA.

Teaching Assistant - Held office hours and graded homework for Stat 430, a class composed of graduate bioinformatics and computer science students.

Mentoring and Advising

2018

Miranda Tilton, *Statistics*, MS Project.

Footwear Class Characteristics and Computer Vision

Service

2017

Graphics Section Representative to the Council of Sections, *ASA*.

Presentations

2018

Framed! Reproducing 150 year old charts, *JSM Contributed Session*.

2018

Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics, *SDSS Invited Session*.

2017	**A Bayesian Approach to Visual Inference**, *JSM Contributed Session*.
2016	**Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics**, *JSM Contributed Session*.
2015	**Visual Aptitude and Statistical Graphics**, *InfoVis*.
2015	**Animint: Interactive Web-Based Animations Using Ggplot2's Grammar of Graphics**, *JSM Invited Session*.
2015	**Animint: Interactive, Web-Ready Graphics with R**, *Great Plains R User Group*.
2014	**The curse of three dimensions: Why your brain is lying to you**, *JSM Student Paper Award Session*.
2014	**Do You See What I See? Using Shiny for User Testing**, *JSM Panel*.
2013	**Signs of the Sine Illusion – why we need to care**, *JSM Contributed Session*.

Theses

Dissertation

Title	*The Perception of Statistical Graphics*
Committee	Dr. Heike Hofmann (Chair), Dr. Dianne Cook, Dr. Sarah Nusser, Dr. Max Morris, Dr. Erin McDonald, Dr. Stephen Gilbert
Abstract	Research on statistical graphics and visualization generally focuses on new types of graphics, new software to create graphics, interactivity, and usability studies. Our ability to interpret and use statistical graphics hinges on the interface between the graph itself and the brain that perceives and interprets it, and there is substantially less research on the interplay between graph, eye, brain, and mind than is sufficient to understand the nature of these relationships. This dissertation further explores the interplay between a static graph, the translation of that graph from paper to mental representation (the journey from eye to brain), and the mental processes that operate on that graph once it is transferred into memory (mind). Understanding the perception of statistical graphics will allow researchers to create more effective graphs which produce fewer distortions and viewer errors while reducing the cognitive load necessary to understand the information presented in the graph.

MS Creative Component

Title	*Nonparametric statistical analysis of Atom Probe Tomography spectra*
Committee	Dr. Alyson Wilson (Chair), Dr. Alicia Carriquiry, Dr. Krishna Rajan

Research Projects

Perception of Statistical Graphics

2015

Independent Research, Auburn, NE.

Designed and analyzed experiments to understand human perception of statistical graphics and optimized graphics to clearly communicate statistical results.

- Hierarchy of Graphical Features: Which features of statistical graphics dominate the perceptual experience? Do colored points matter more than trend lines? (Paper)
- Reproducibility of Plots in the 1870 Statistical Atlas (Paper)
- Bayesian Analysis of Statistical Lineups (Working Project)

2012–2015

PhD Research, *Iowa State University*, Ames, IA.

Designed and analyzed experiments to understand human perception of statistical graphics and optimized graphics to clearly communicate statistical results.

- The Sine Illusion in Statistical Graphics: How does this common illusion effect the information we take in from graphs?
  - Won the ASA Student Paper Award (2014) for the Graphics Section (Paper)
  - Created Shiny applets to demonstrate the illusion and test it's effect.
- Statistical Graphics and Visual Aptitude: How are spatial reasoning abilities related to the ability to read statistical graphics? (Paper)
- Hierarchy of Graphical Features: Which features of statistical graphics dominate the perceptual experience? Do colored points matter more than trend lines? (Paper)

Visualization of Genetics Data

2013
2015

Research Assistant, USDA Soybean Genome Project, *Iowa State University*, Ames, IA.

- Analyzed large quantities of soybean genetics data to identify inheritance, important genes, single nucleotide polymorphisms, and copy number variation.
- Created interactive applets presenting the data and appropriate graphics designed to encourage exploration of the results by biologists.
- Assembled a database of known soybean parantage to facilitate further research, and created an interactive applet to display the lineage of any variety in the database.

Advisor: Dr. Dianne Cook, Dr. Michelle Graham

Software Development

2013
2014

Statistics Teaching Applets, *Iowa State University*, Ames, IA.

Created and redesigned web-based applets to teach statistical techniques interactively. Applets covered topics such as the method of least squares, ANOVA, k-means, regression diagnostics, and t-tests.

2013
2015

Animint Developer, *R Project*, Google Summer of Code.

Worked to develop the `animint` package for R to translate `ggplot2` into d3 interactive JavaScript graphics. Participated in the project in 2013, adding support for all ggplot2 geoms as well as most scales and axes. Returned to serve as a mentor for the project in 2014 and 2015.

Materials Informatics

2010
2011

M.S. Research, *Iowa State University*, Ames, IA.

Worked with materials scientists and engineers to develop and implement nonparametric methods for automatic peak detection in mass spectroscopy data. Fit systems of differential equations to spectroscopy data based on theoretical concepts from quantum physics to facilitate inference about the atomic structure of a material.