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**Eric Smith, Ph.D.**
*CMDA Program Leader*
*Statistics Department*
*Virginia Tech*
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Dear Dr. Smith,

I am writing to apply for the Computational Modeling and Data Analytics faculty position at Virginia Tech University. I am a PhD candidate in the statistics departmant at Iowa State university, and am defending my dissertation in February 2015. I am applying for this position in part because the CMDA program elegantly provides the skill set for modern data analytics, balancing mathematical and statistical training with programming and applied courses, mirroring my own academic journey from mathematics (and cognitive psychology) to bioinformatics to statistics.

My doctoral research is a study of human perception of statistical graphics, with the ultimate goal of designing graphics to effectively communicate statistical results. The research on graphical perception is scattered across many different fields, including psychology, statistics, human-computer interaction, and communication, but is ultimately somewhat sparse, focusing either on extremely low-level effects, or very specific problems that are not applicable to most statistical graphics. Integrating an understanding of human perception and methodology from cognitive psychology and human-computer interaction, I have explored several facets of human perception that meaningfully impact the way we interact with statistical graphics: perceptual distortions that impact variance estimation along nonlinear trend lines (the “sine illusion"), the influence of visual ability on graphical inference, and which features of a graph are most visually compelling. Two of these experiments have been presented at JSM, and one article has been accepted for publication in JCGS. Two other manuscripts are nearly ready for publication; I expect that the final chapter of my dissertation should be completed by mid-January 2015 and prepared for publication by March.

In addition to my own research on graphical perception, I collaborate with researchers in bioinformatics, genetics, and engineering, assisting with statistical analyses as well as data visualization. My masters’ research was a result of a collaboration between bioinformatics and materials engineering; I designed a nonparametric algorithm to mimic human perception of peaks in spectroscopy data that had significantly higher resolution than manual peak identification. I am currently working with soybean geneticists at the USDA to explore, analyze, and visualize populations of soybean sequence data; the massive amounts of data are particularly challenging for visualization, as even utilizing interactivity and heavily summarized data, it is fairly easy to overload the visual system.

Looking forward, I intend to expand my research, exploring the perception of interactive graphics. Visualizations which respond to user attention dynamically and incorporate motion through animation or other transitions have the potential to more intuitively communicate experimental results, but the additional complexity may reduce the amount of information that can be successfully conveyed due to the increased demands on working memory and attention. As web-based interactive visualizations become more common, it is important that statisticians design graphics that are not only visually attractive, but also clearly communicate the overarching message in perceptually appropriate ways (preventing the rise of the animated, interactive three-dimensional pie chart and other equally horrifying graphs).

Although my primary area of research is in statistical graphics and data visualization, I have taught both computational and introductory statistics classes. For several years, I have co-taught workshops on R programming as a resource for the Iowa State community, introducing the language and presenting advanced topics including data visualization, formatting and arranging data for analysis, linear models; I also designed and helped to teach more targeted courses on the use of `knitr` for reproducible research and Rstudio's `Shiny` package for creating interactive web applets. In addition to the R workshops, I have also taught and assisted with a number of introductory statistical lab courses for engineering, bioinformatics, social science, and business undergraduate and graduate students. In both settings, I utilized frequent examples which allowed students to independently apply the course material in a guided setting, reinforcing students' understanding of the material and providing opportunities for self-assessment and feedback.

The interdisciplinary nature of the CMDA program is likely to attract a group of students who are technically skilled but often need to communicate technical results to non-technical audiences. I would be interested in developing or teaching a class which focuses on strategies for communication of technical results in a non-technical setting, including the use of graphics and charts to effectively convey information.

My interdisciplinary training, research, and teaching experience fit well with the CMDA program's interdisciplinary focus on data analytics. I am also familiar with Blacksburg and Virginia Tech's culture: I was born a Hokie while my father was working on his dissertation in time series analysis (he graduated when I was about two). Please let me know if I can provide additional material, and feel free to look through my work on github; nearly all of my current research and other projects are publically available there.

Yours,

**Susan VanderPlas**