

## Teaching Statement

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I have developed a diverse teaching record. Currently, I am teaching “Introduction to Statistical Analysis” - a requirement for undergraduate psychology majors. In this course, I emphasize statistical literacy and a basic understanding of R programming. I have taught two similar courses (“Introduction to Applied Statistics”; “Lying with Statistics”) to gifted college-bound adolescents, through the Vanderbilt Summer Academy. In those courses, students used R to test their own hypotheses using archival data. In addition, I have led weekly discussion sections in larger undergraduate courses, provided disability-related support, and given guest lectures.

I prioritize inclusivity and relevancy in my teaching. I believe that students from all backgrounds – particularly those traditionally underrepresented in STEM – can harness the concepts learned in quantitative methods courses and develop relevant skills beyond my classroom. At all levels, I vary my approaches to facilitate learning according to the needs and interests of the student. In the following sections, I illustrate my teaching philosophy.

### **Stereotype Threat**

In the school of education, “Introduction to Statistical Analysis” is a requirement for nearly every major. I’ve noticed that students often delay taking this course as long as possible. Once enrolled, many of them seem reluctant to engage with the more technical aspects of the material. Conversations with students and personal experiences led me to believe that this reluctance stems from the misplaced belief that they “just don’t have a mind for numbers.” This belief isn’t gender specific, but the majority of my students are female. Regardless, I like to address this misconception on the first day of class with a brief discussion on stereotype threat.

To facilitate the discussion, I ask students to write down their specific concerns of the course, their major, and what their kindergarten-aged selves’ wanted to be. I collect the responses, and share an experience of my own; “During my Freshman year, I wasn’t sure if I wanted to be an historian or an economist. I actively avoided math classes because I was worried they would be

really difficult.” I continue to discuss how these worries was based on stereotypes about my gender, and not actual experience.

The next class I present anonymous summaries of these written concerns to reiterate findings from the stereotype threat literature. The two most frequent concerns: this material will be hard and that the student is “just bad at math”. Frank discussions early in a course about stereotype threat’s impact on math performance are effective interventions that short-circuit much of the effect (Johns, Schmader, & Martens, 2005). To ensure that this intervention inoculates all my students – not just the women – I emphasize that these stereotypes threats affect anyone and include non-gendered examples.

## **Graphical Approaches**

When I designed my Vanderbilt Summer Academy (VSA) courses, I focused on non-technical methods of conveying statistical concepts. I wanted to test whether teaching graphically and focusing on the geometric representations of statistical concepts could be an additional means of short-circuiting stereotype threat. I found that easing students into the math behind statistics reduced students’ early reluctance to engage with the material. Moreover, this method required a very limited mathematical background – students only need to understand what a slope is. Thus, students with a diverse range of mathematical backgrounds and interests are able to learn from this approach. Those students with the mathematical background appreciated the alternative representation, while those without it the mathematical background were not left behind and could appreciate the underlying concepts.

I had two learning goals for my gifted students – (1) understand correlations and (2) improve their statistical literacy. I achieved these goals by reading selections from Huff’s (1954) “How to Lie with Statistics,” discussing articles from the American Statistical Association’s CHANCE Magazine, looking at media uses (and misuses) of statistics, and finally by having students develop their own research project, where they applied the statistical concepts they learned. Over the week-long course, students developed research questions about topics ranging from the influence of gender on surviving the Titanic to the timing of geysers in Yellowstone park. Throughout the week, tested their hypotheses and developing graphic illustrations using R.

Students presented their findings to their peers. Due to class constraints, I limited students to preselected data sets, curated on my website <https://smasongarrison.github.io/Data.html>. If the class had been longer or my students more senior, I would have allowed them to identify their own data sets and test more interesting hypotheses.

### **Inclusive Practices**

These alternative approaches are effective for most students – even those not at risk for stereotype threat. However, they are not universal solutions to teaching statistics. For example, I provided disability support in my advisor’s Introductory to Statistical Analysis course to a blind student, whose name is not “Arya.” Graphical illustrations were ineffective for Arya.

Rather than describing the illustrations used in class or translating the graphics into equations, I converted many of them into tactile alternatives. To demonstrate how variance influenced the normal distribution, I cut multiple normal distributions (with low variance, high variance, skewness, etc) out of paper plates. For correlations, I created a 3D scatter plot out of cardboard, push pins, and wire. By moving the pins, Arya was able to gain a sense of how an outlier could influence a correlation as well as how the magnitude and direction of a correlation was influenced by individual data points. During tests, I would convert the handful of questions requiring visuals into non-visual alternatives. These conversions would keep the spirit of the question, but provide an alternative method of testing Arya’s knowledge.

### **Conclusion**

Experiences with Arya as well as my own personal experiences encourage me to think about alternative methods of teaching and assessment. I accommodate whenever possible. I treat students as adults. If they ask for accommodations or assignment extensions, I grant them in good faith. I assume that students only request them when they need it. I share my own experiences with students to let them know that they are not alone. In sum, all of my pedagogical methods aim to encourage engagement with statistics that is relevant to the individual student.