STEP RIGHT UP!

A randomized trial in a MOOC shows that people don't know what a statistically significant relationship looks like, but they can learn...

...DO YOU?

Aaron Fisher,[1] G. Brooke Anderson,[2] Roger Peng,[1] Jeff Leek[1]

1 - Dept of Biostatistics, Johns Hopkins Bloomberg School of Public Health
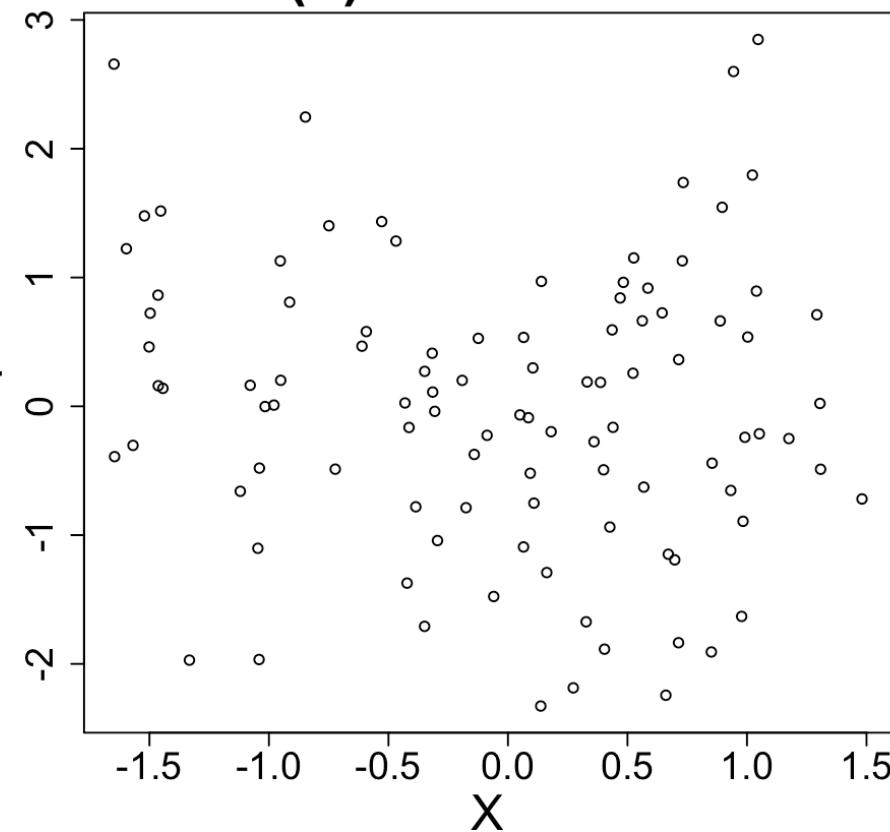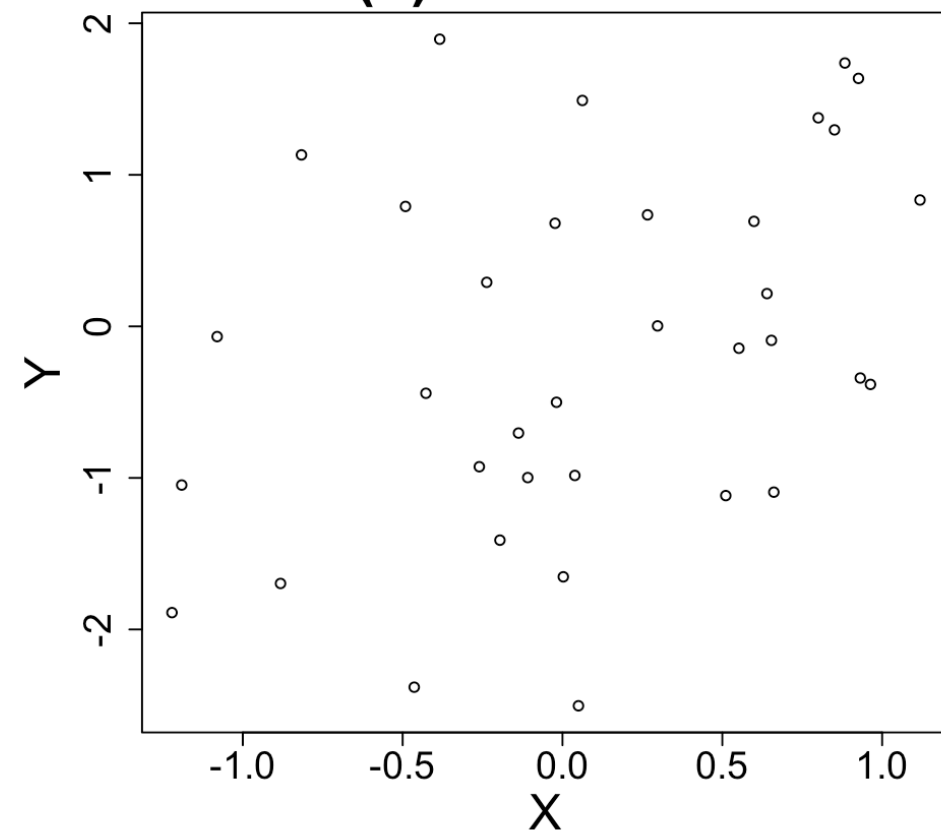*2 - Dept of Environmental & Radiological Health Sciences, Colorado State University*

Sample Quiz Questions:

For each of these figures, is the linear relationship between the plotted variables statistically significant ($p < 0.05$)?
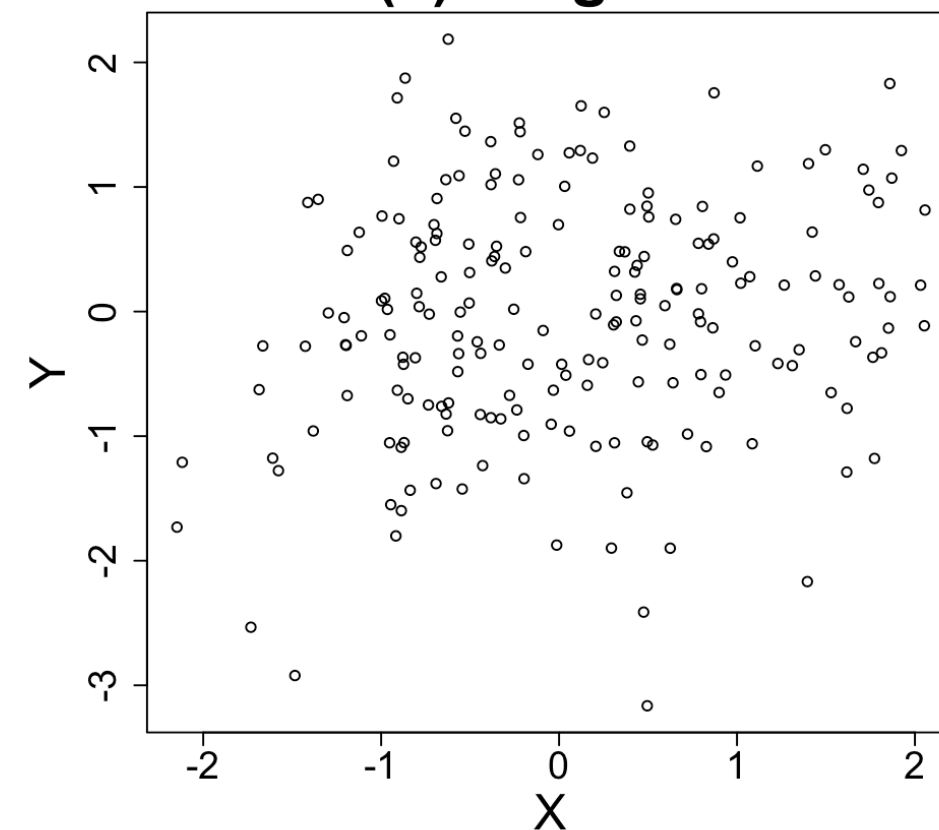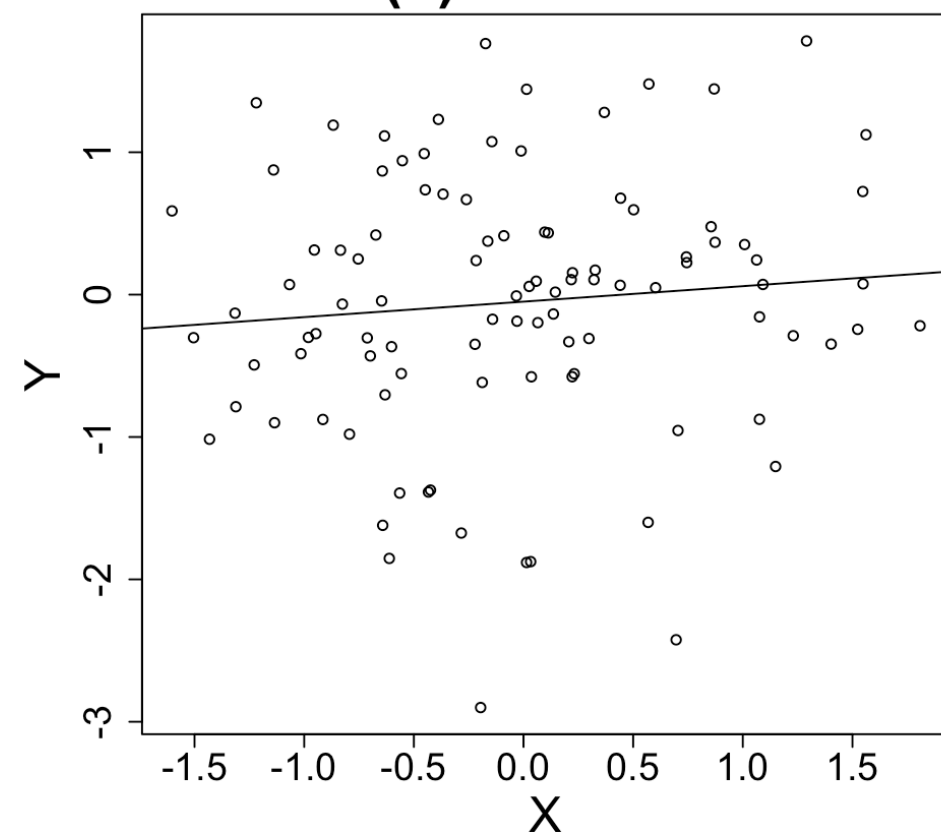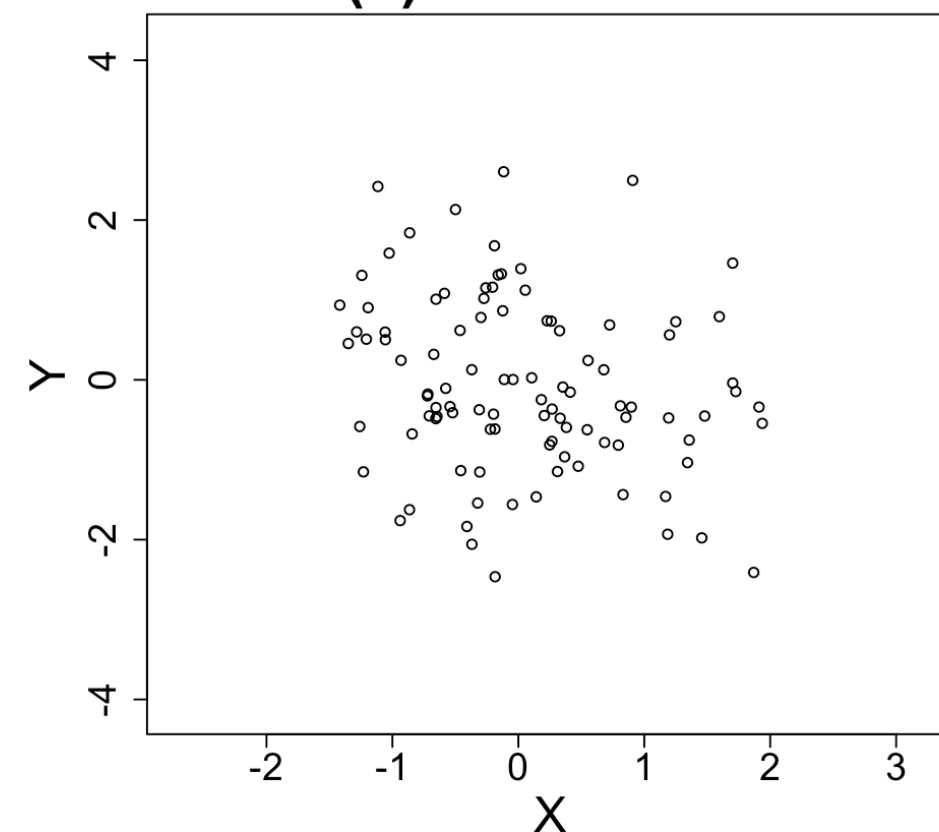

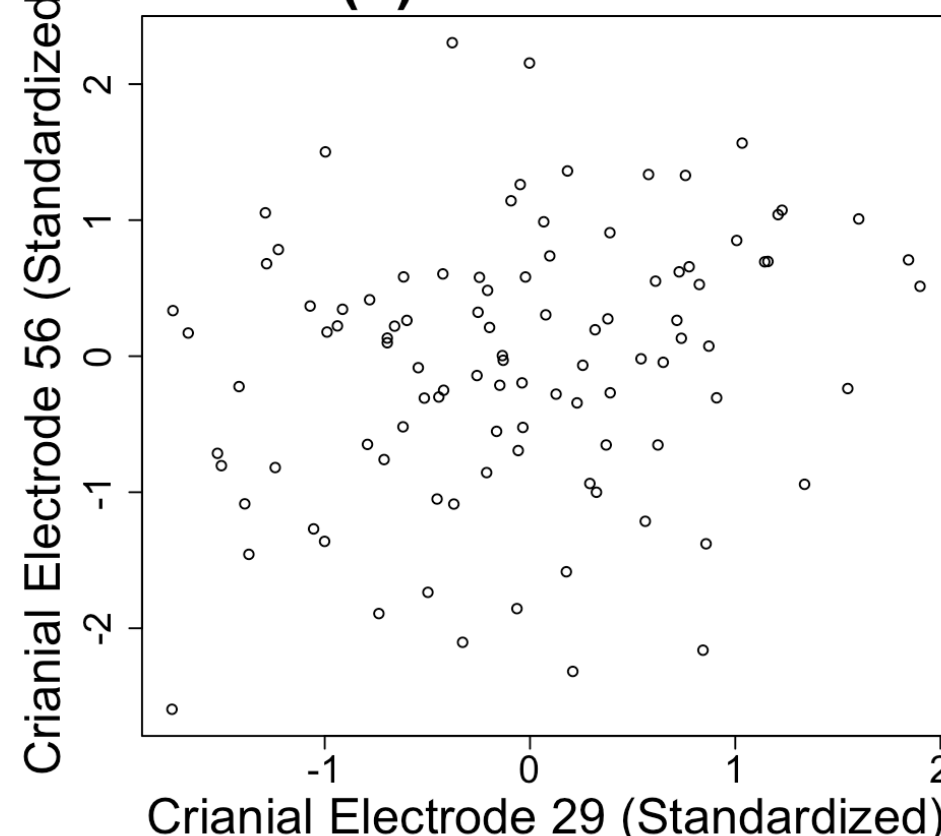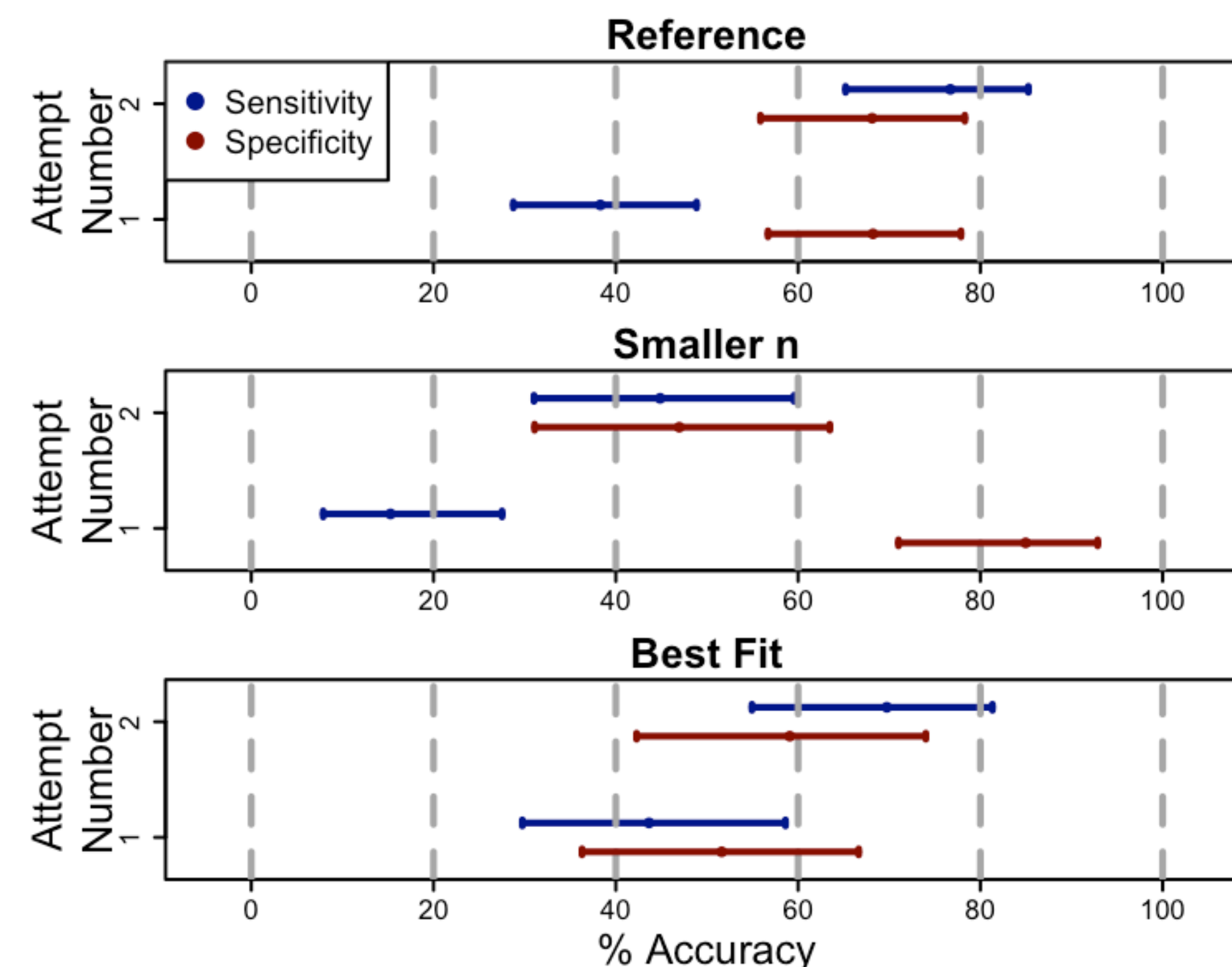(1) Reference

(2) Smaller n

(3) Larger n

(4) Best Fit

(5) Axis Scale

(6) Axis Label

(7) Lowess

Summary:

Background - Exploratory data analysis is a common, ad-hoc feature selection tool for identifying relationships between variables.

Aims - We study the accuracy with which human raters can visually detect statistically significant relationships from scatterplots.

Results - We find that accuracy is poor at baseline, but improves with practice (Figure 2). We also find that adding best fit lines can increase the probability that a plotted relationship is rated as significant (Figure 1). Further evidence-based analysis could highlight weaknesses of theoretically valid statistical procedures when they are implemented by non-expert users.
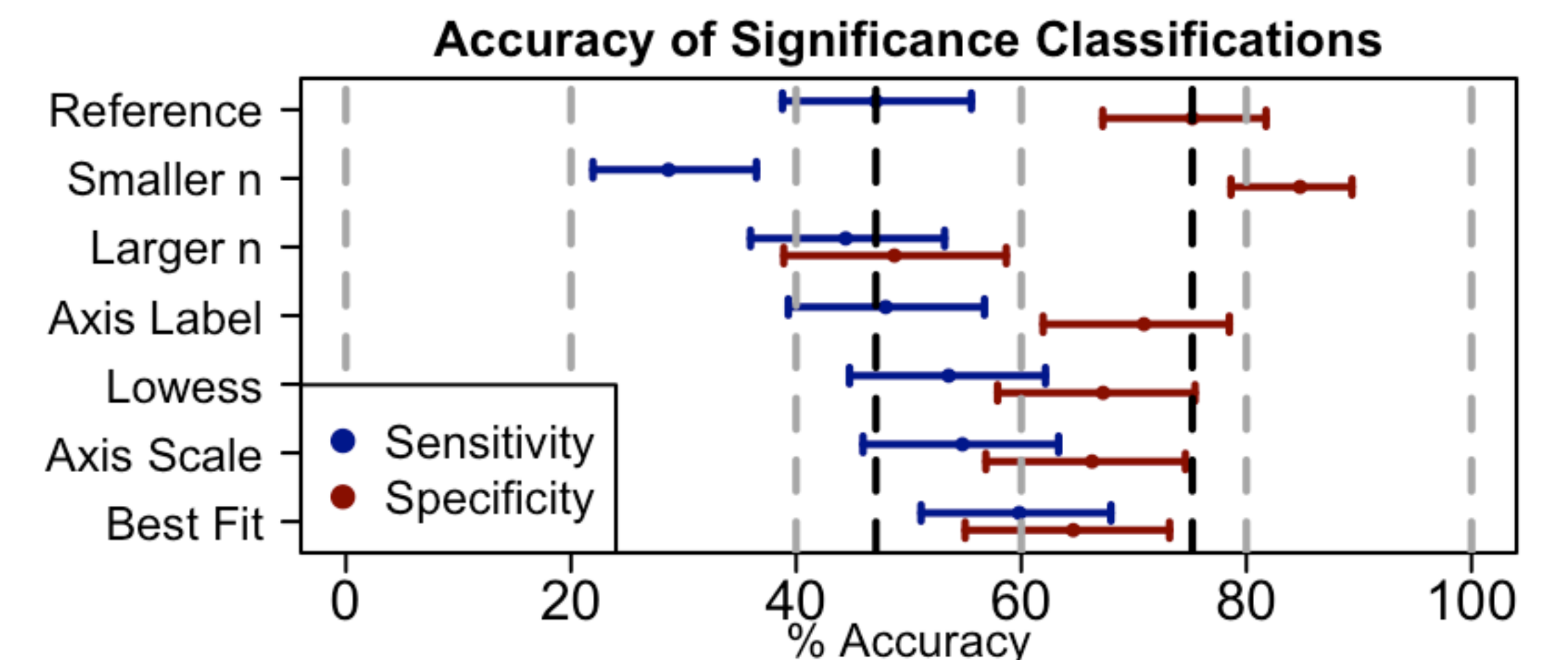
Methods:

- Sample size = 2039 students in a data analysis Coursera class
- Each student was shown plots from several categories (see sample quiz questions)

Two separate logistic regression models were created to estimate:

1. **Sensitivity** of human raters to truly significant relationships
2. **Specificity** of human raters to non-significant relationships

Result 2: For three categories, rater sensitivity improved on the second attempt of survey

Result 1: Adding best fit lines increased the probability that a plot was rated as significant

More Information:

Paper link: peerj.com/articles/589/
Interactive App: peerjeda.shinyapps.io/pvalueviz
Background based on: bit.ly/1VYeb5w

Author Information:
aaronjfisher.com
fisher@jhu.edu
@ajfishr on twitter

Sample quiz answers (significant Y/N): 1-N, 2-Y, 3-Y, 4-N, 5-Y, 6-Y, 7-Y