

Abstract

This project assesses a new pedagogical approach to teaching graduate-level statistics to first year social science students. The approach emphasizes the intuitive understanding of statistical concepts and draws heavily on a new set of demonstrations and animations designed to illustrate underlying concepts.

Background

Social science graduate students take statistics courses to acquire data analysis skills. Statistics courses and textbooks tend to be “cookbooks” providing a set of recipes for students to follow in different analysis problems (see flowchart to the right).

The goal of most existing statistics courses is to teach how to select a proper statistical procedure, how to use a statistical package, how to interpret the output, and how to write the results section of a report.

The limitation of this approach is that students do not always understand material and cannot easily continue to learn new statistical tools throughout their careers as new procedures may not fit their cookbooks.

New Pedagogical Approach

1. Present statistics in a scholarly manner to students with limited statistical background and sometimes aversion to quantitative methods.
2. Present material in a scholarly way so that students can incorporate new statistical tools throughout their career.
3. New set of demonstrations and animations created to facilitate conceptual understanding rather than mere number crunching.

Example Demos and Animations

See laptop near poster

Progress and Next Steps

Progress so far

- Demos/animations were improved
- Developed pedagogy for incorporating demos/animations in lectures

Qualitative evidence suggests the approach is promising (post-semester survey and course evaluations)

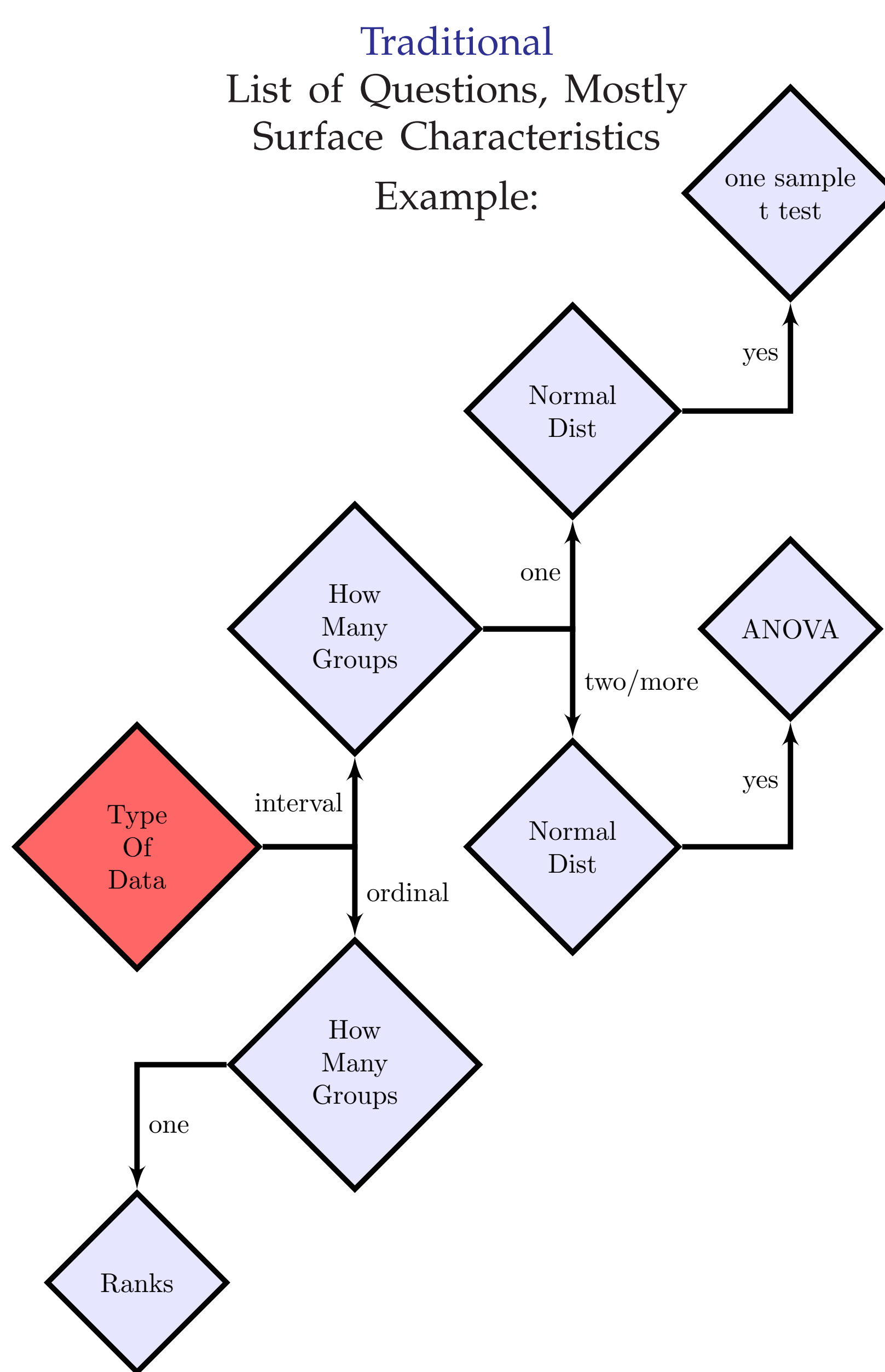
- *It was very helpful to have a conceptual understanding of the material before learning how to run analyses using SPSS.*
- *... makes the topic not only understandable but really, really interesting for just about anyone.*

The course ratings were higher than usual: 4.73, 4.92, and 4.78 for excellent course, excellent teacher, and learned a great deal, respectively.

Next Steps

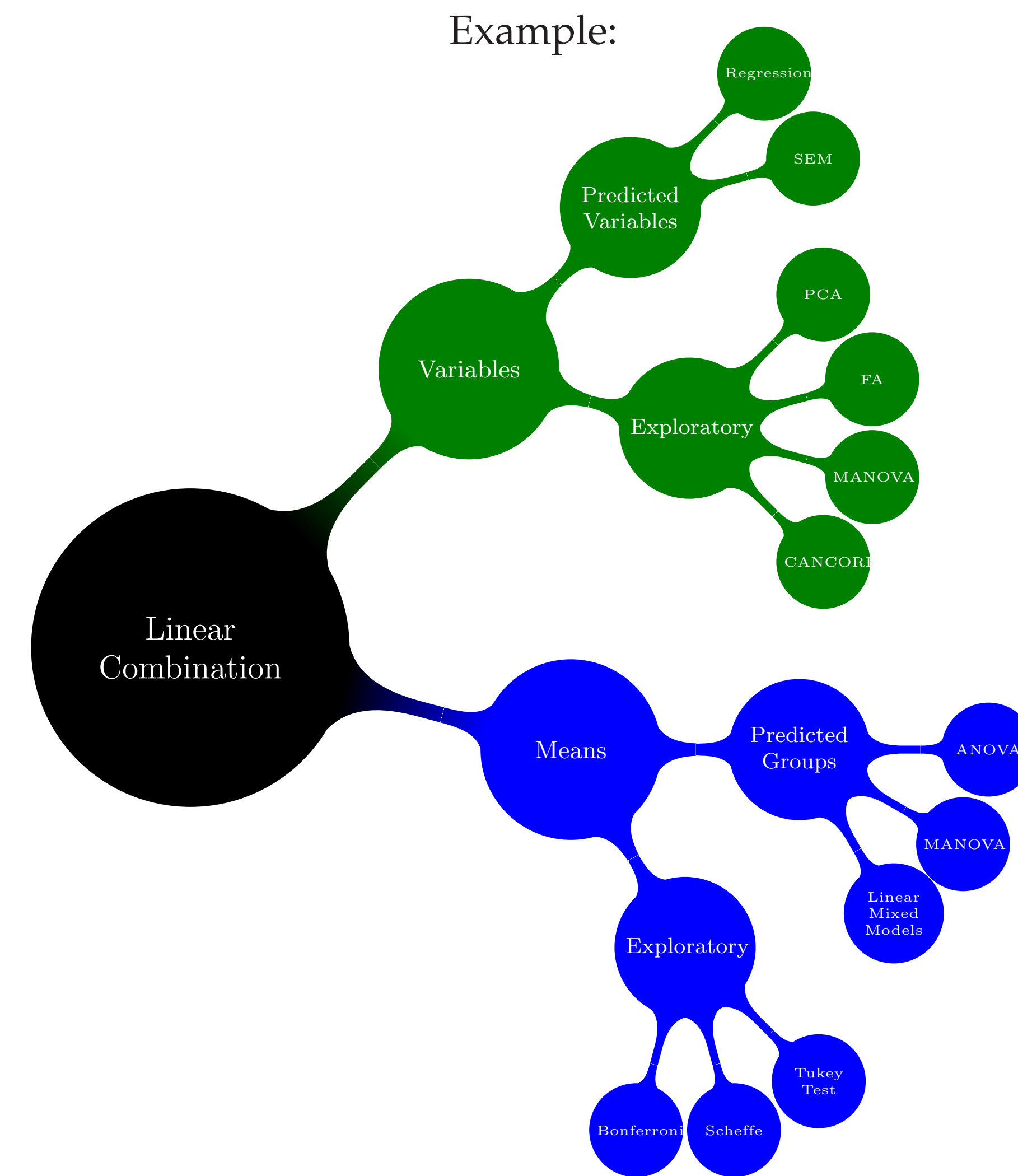
- Perform randomized trial
- Incorporate demos in class assignments
- Develop measures of statistical insight
- Examine long-term statistical understanding and learning one to two years post course

Traditional Versus New Method of Organizing Class Material



New Approach

Scaffold-based
Structured Approach to Research Questions



Sample Student Quotes

Benefits

The animations ...definitely helped me gain a better understanding of difficult topics.

I liked the ones that were controlled by the user...that way I could try different variations and understand the concepts better.

Having a visual to view after we talked about it in class was nice ... [it] helped me make sure I truly grasped the concept.

Really helped to demonstrate the material

They always helped enhance my learning experience because they provided a more concrete picture There were a number of times when I was confused until we saw the demo. Then things usually made more sense, as I was able to connect the words visual images. It was also helpful to have a visual image to recall when trying to understand or explain difficult concepts.

They relate to the lectures but provide a different perspective. Kind of in a learning by seeing/doing way.

The demos gave me a feel for how much a little change in one variable ... can impact the whole data pattern.

I found all of the ones I used helpful because I was able to watch them while listening to the lecture, then use them to re-teach myself (or show others) the main ideas.

Primary Drawback (only one mentioned and by several students)

That some of them were not interactive

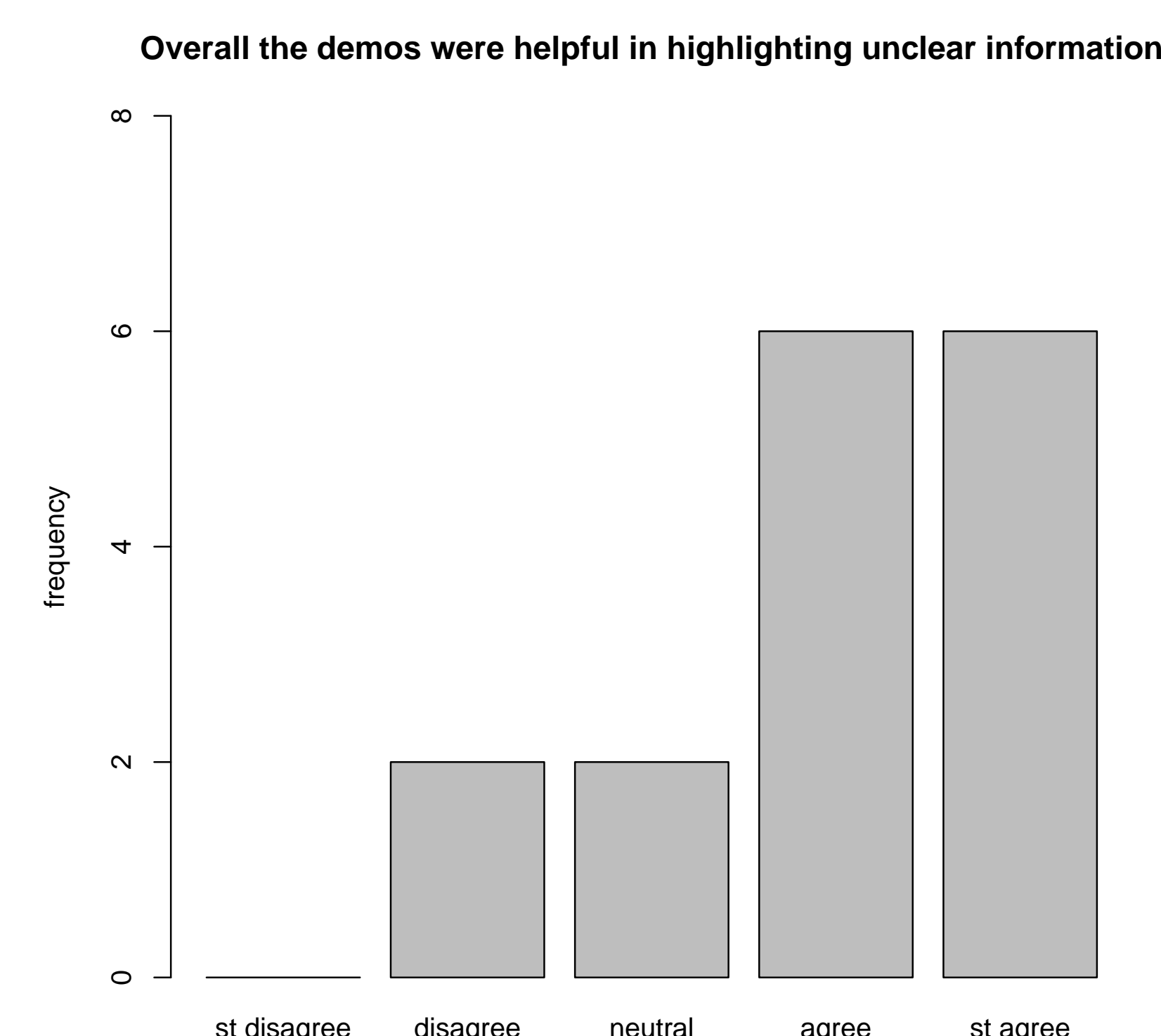
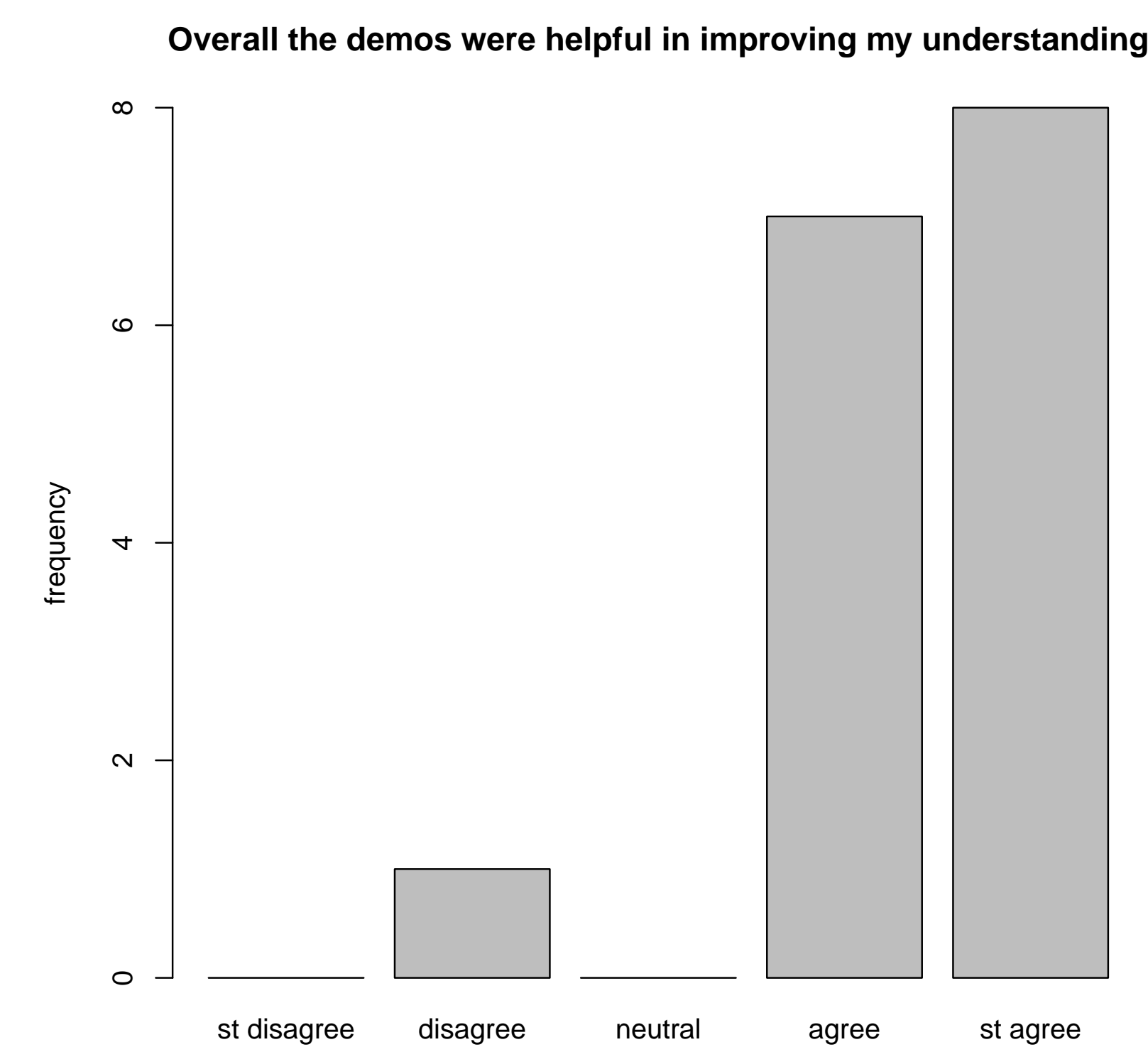
Conclusion

Students report learning from the demos/animations and they would like all of them to be interactive.

Basic Details

Post-semester Questionnaire

- All demos/animations presented in lecture
- All demos/animations on a website so students could explore on their own
- Out of 56 students 16 responded to survey so far (semester recently ended)
- 5 of the 16 reported never visiting the website; remaining used between 1 and 14 of the 20 demos/animations (median = 4).



Funding

Thanks to CRLT for seed money to develop the initial set of demos and to develop this research program to assess results.