Cognitive Science
UC San Diego

Amy Fox's Defense

Tales of Graphical Discovery:
A Case Study at the Intersection of Graph Comprehension and Visualization Design

Tuesday, September 13th
2:00pm – 4:00pm
Cognitive Science Building, Room 003

Abstract

"A picture is worth 1000 words," the adage goes, but only—I argue—if you know how to read it. The same is true of graphs, charts, and diagrams. As powerful as these visuospatial tools may be in their communicative efficiency, they needn't be immediately easy to understand. In fact, there are often trade-offs between a graph's discoverability and efficiency. Even for informationally equivalent forms, the computational efficiency of a less conventional representation may outweigh concerns over ease of use for the untrained reader. It is this fact that underlies much innovation in Information Visualization, and the development of sophisticated interfaces for highly skilled workers performing specialized tasks. Sometimes this work results in novel, unconventional representations that are computationally suited to particular complex tasks, but that would present a substantial challenge to the lay reader. Meanwhile, most work in remediating errors in graph comprehension has focused on "second order" readings: characterizing the trends or relationships between data represented in a graph. The ability to make these readings allows us to use graphs as vehicles for learning concepts—especially in science. We tend to accept *a priori* that well-designed graphs readily afford first-order readings: operations for extracting data from a graph. Accordingly, we know more about learning *with* representations, than we do about the learning *of* representations.

In this dissertation, I use simple graphs with an unconventional coordinate system to explore how readers extract information from a graph when they lack knowledge of its graphical formalism. I address what the systematic errors readers make can tell us about our graphical intuitions, and the interaction of perceptual and conceptual processing that underlies graph comprehension.

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