What is graph comprehension and how do you measure it?

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Abstract

Data visualizations are indispensable to modern scientific communication. As such, improving graph comprehension is a crucial target for STEM education. Unfortunately, there is no strong agreement on the components of graph comprehension nor how to measure it reliably, partly because no studies have compared the different measures directly. Here we administered two common graph comprehension assessments to the same individuals (N = 1,140) and analyzed their performance and error patterns. Our results suggest that these assessments measure a suite of abilities rather than a single construct. However, these abilities do not correspond to the categories that guided the design of either test. We find convergence between results obtained in a U.S. university and a U.S. demographically-representative sample, including an association between test performance and formal mathematics training. These findings raise fundamental questions concerning the mental representations that account for detailed patterns in how people answer questions using graphs.

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