

Chapter 13

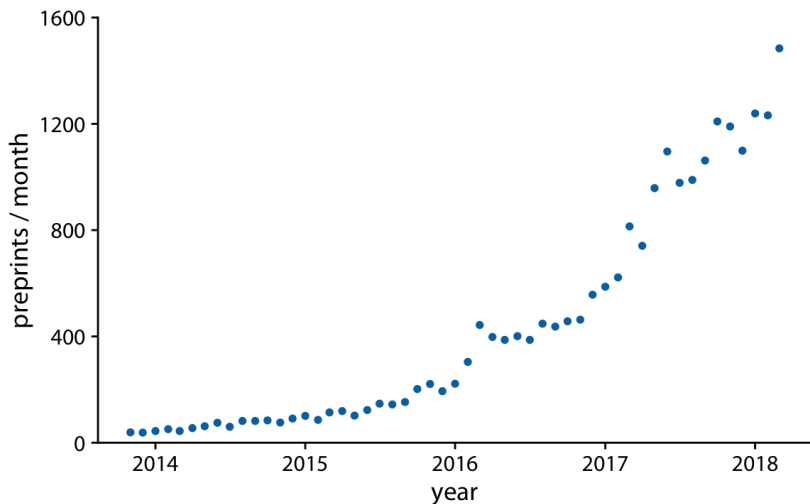
Fundamentals of Data Visualization

May 1, 2023

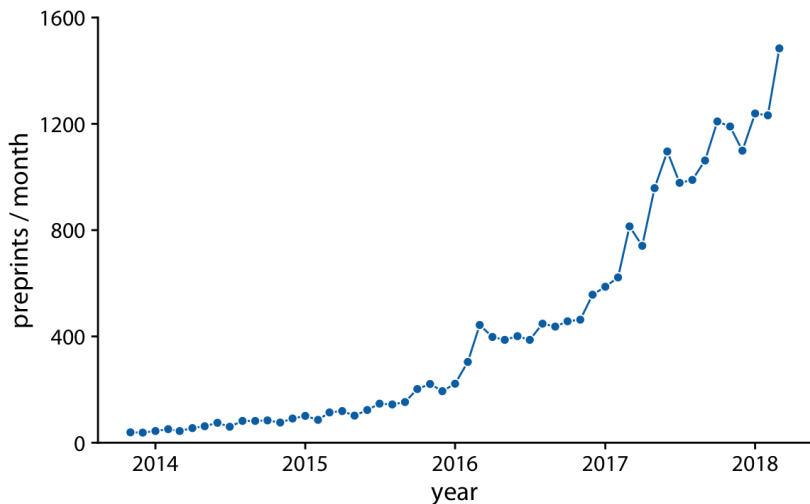
Time series

- Time (and a few other variables) imposes additional structure on the data
- The data points have an inherent order; we can arrange the points in order of increasing time and define a predecessor and successor for each data point.
- We use **line graphs** to connect point in order.
- Can be used whenever one variable imposes a total order.
- A treatment can be purposefully set to a range of values, e.g.

Monthly preprint submissions to bioRxiv, scatterplot



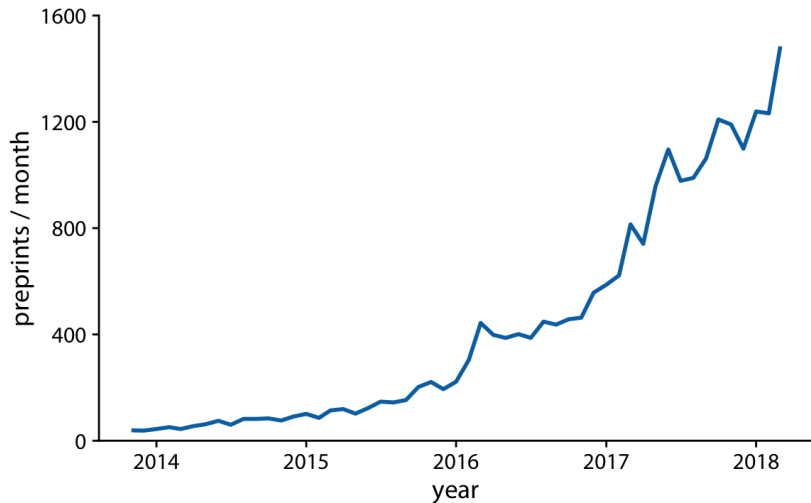
Monthly preprint submissions to bioRxiv, line graph



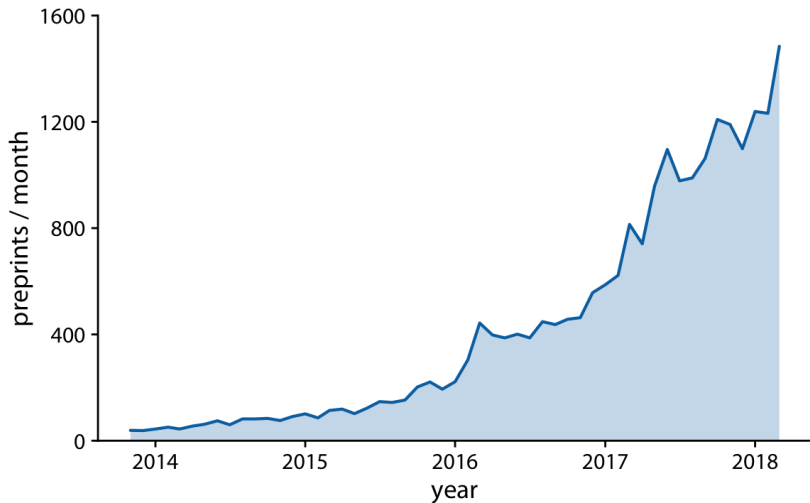
Line plots

- Since each point has unique left and right neighbors, lines can connect these.
- Some object to drawing lines between points because the lines do not represent observed data.
- Had observations been made at intermediate times they would probably not have fallen exactly onto the lines shown.
- The lines correspond to made-up data.
- Yet they may help with perception when the points are spaced far apart or are unevenly spaced.
- Using lines to represent time series is generally accepted practice

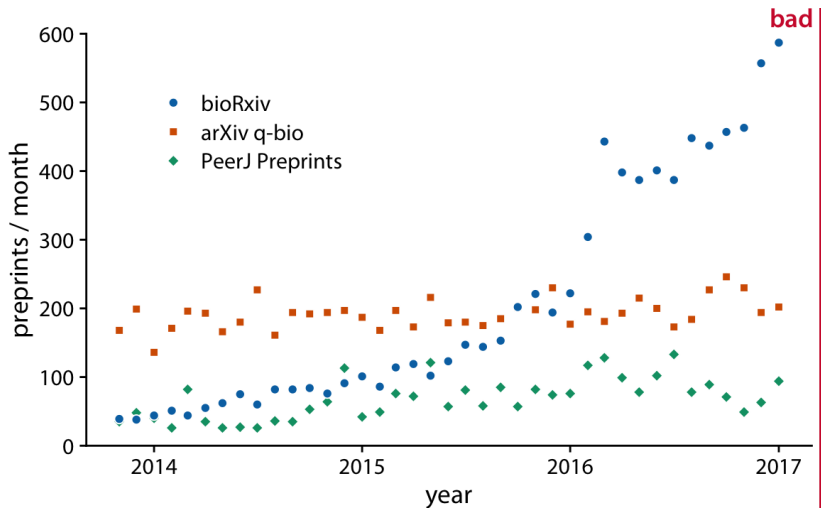
Omit the dots



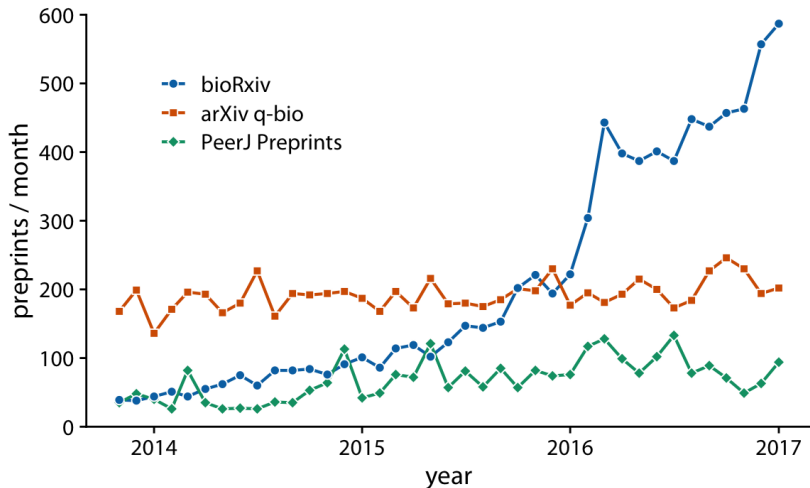
Fill with color



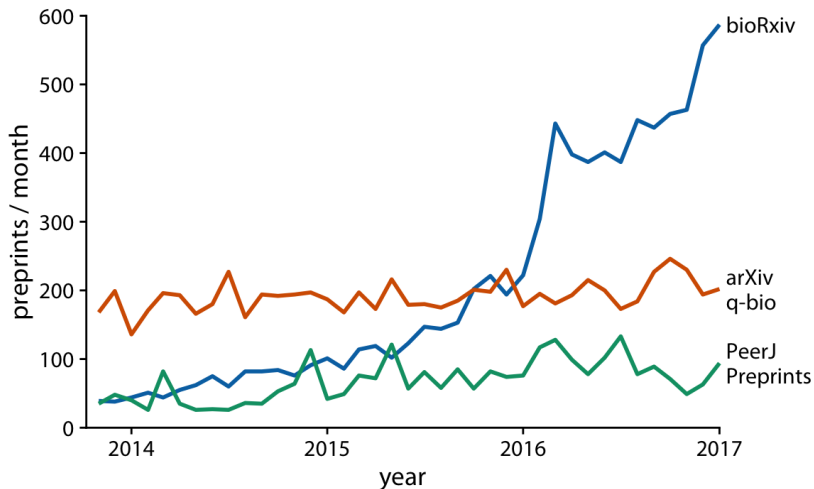
Multiple time series need connecting lines



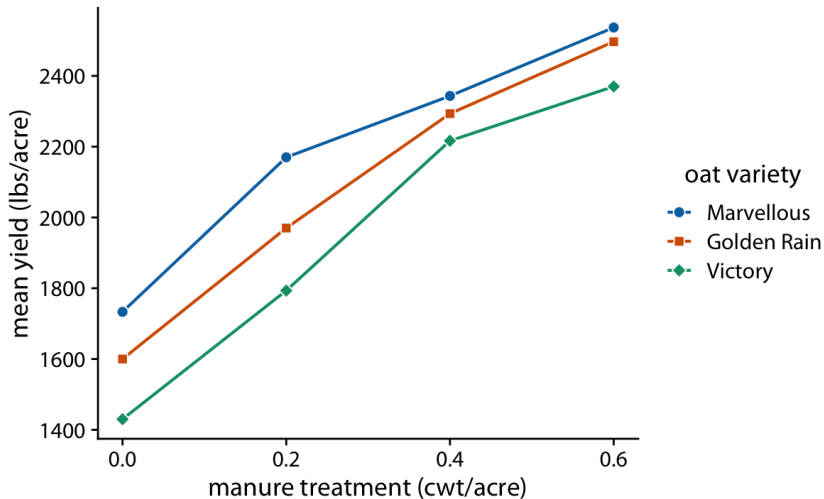
Multiple time series need connecting lines



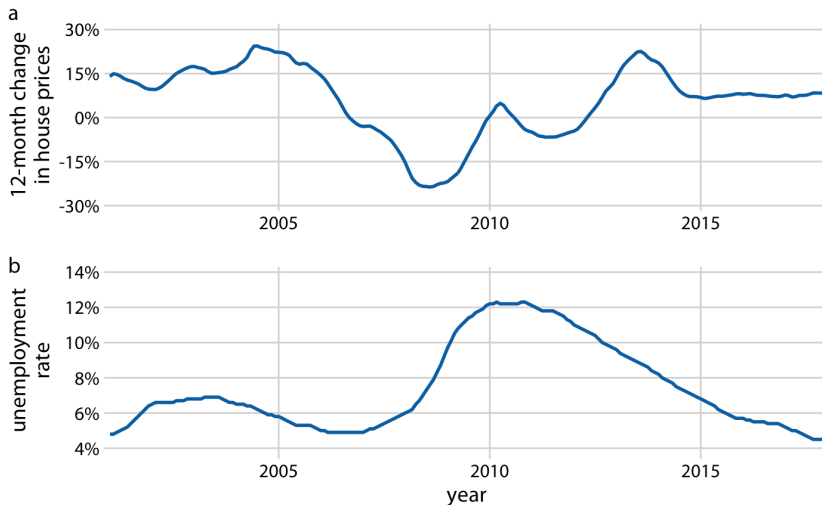
Omit dots and legends when you can



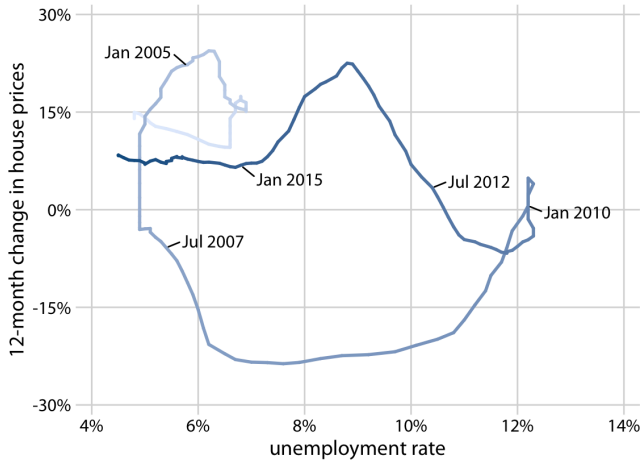
Dose-response curves



Two time series compared

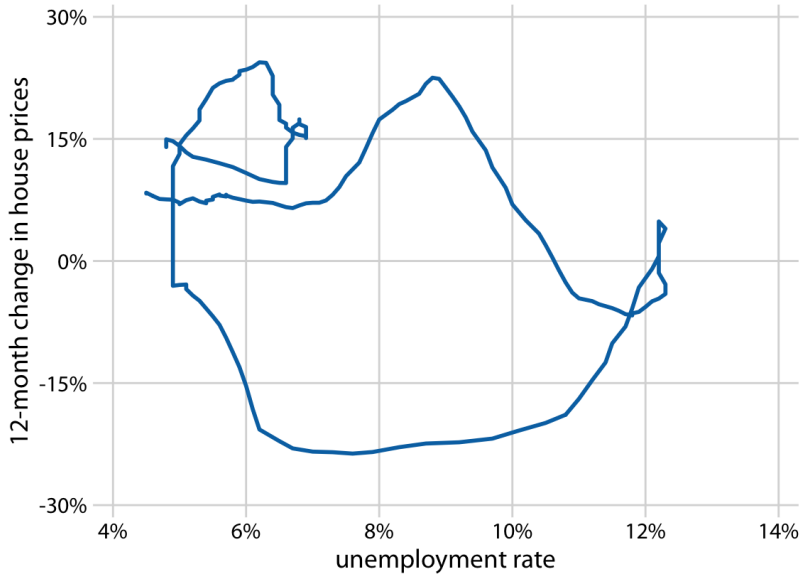


Connected scatter plot



- positive and negative correlations obvious

Need to show direction along path



Connected scatter plot or two line graphs?

- Separate line graphs tend to be easier to read.
- Once people are used to connected scatter plots they may be able to extract certain patterns (such as cyclical behavior) that can be difficult to spot in line graphs.
- Readers are more likely to confuse order and direction in a connected scatter plot than in line graphs and less likely to report correlation.
- Connected scatter plots seem to result in higher engagement, and thus such plots may be a effective tools to draw readers into a story.

CSP with PCA

Recession vs. recovery

