

# Time Series: Overview and Best Practices

John F. Tripp

# Time Series

- Definition
  - A series of values of quantity obtained at successive points in time, usually with equal interval durations between them.
- Key terms
  - Change
  - Rise
  - Increase
  - Fluctuation
  - Growth
  - Decline/Decrease
  - Trend

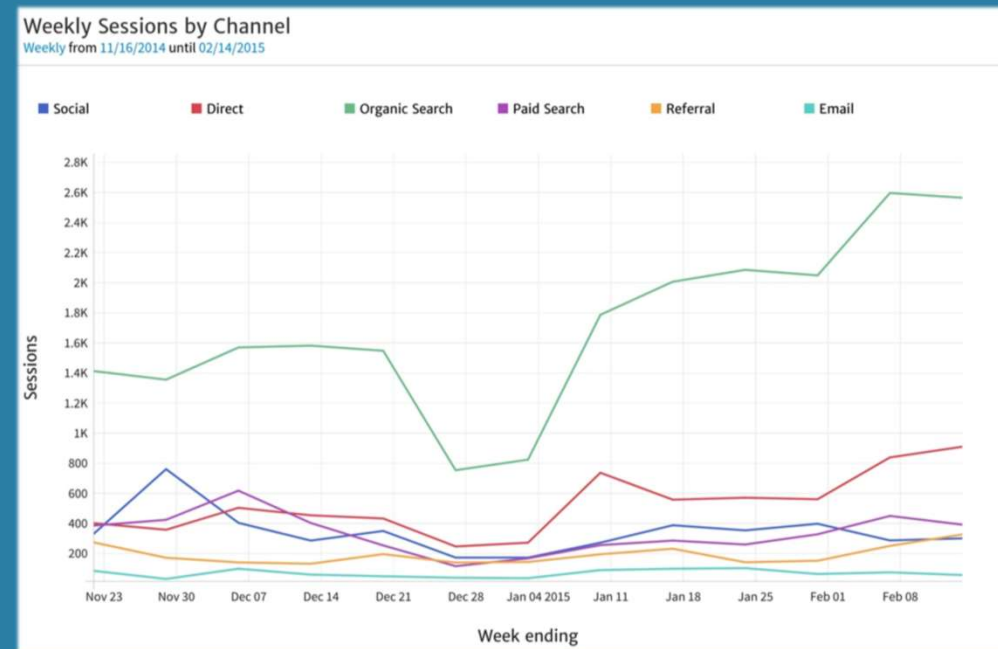
# “Not Wrong” Graphs – Line Graph

- Line graph is the “bread and butter” of time series.
- Best for mapping continuous data.
- Best when only one or two lines.



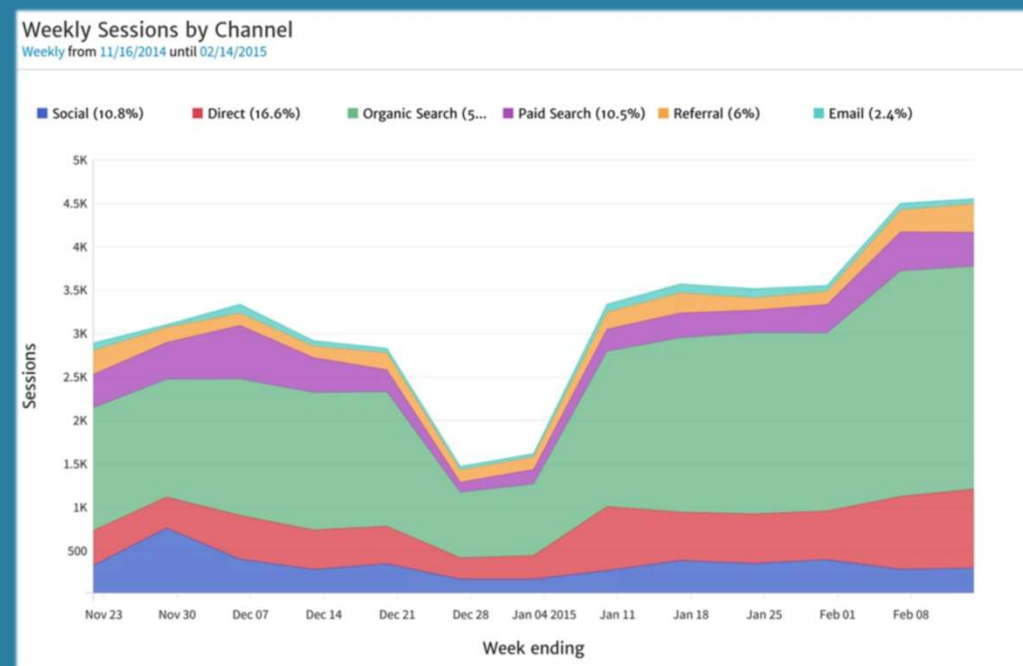
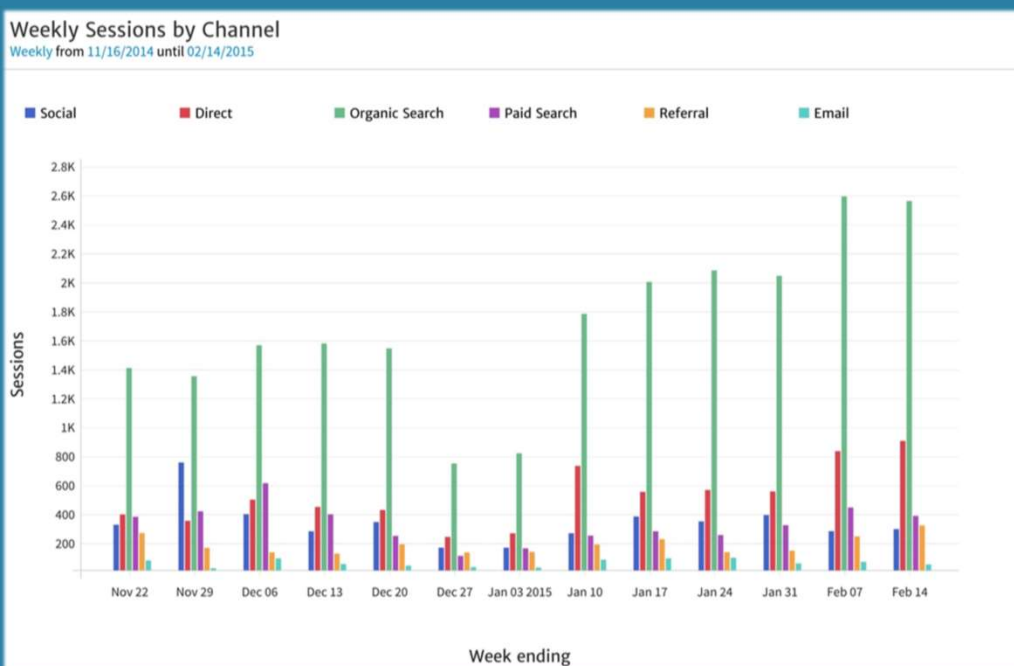
# “Not Wrong” Graphs – Area Chart

- When you get beyond two or three lines, line graphs get messy.
- Two options when you want to visualize more than three series.
  - (Stacked) Area Chart
  - Time Series Bar Chart



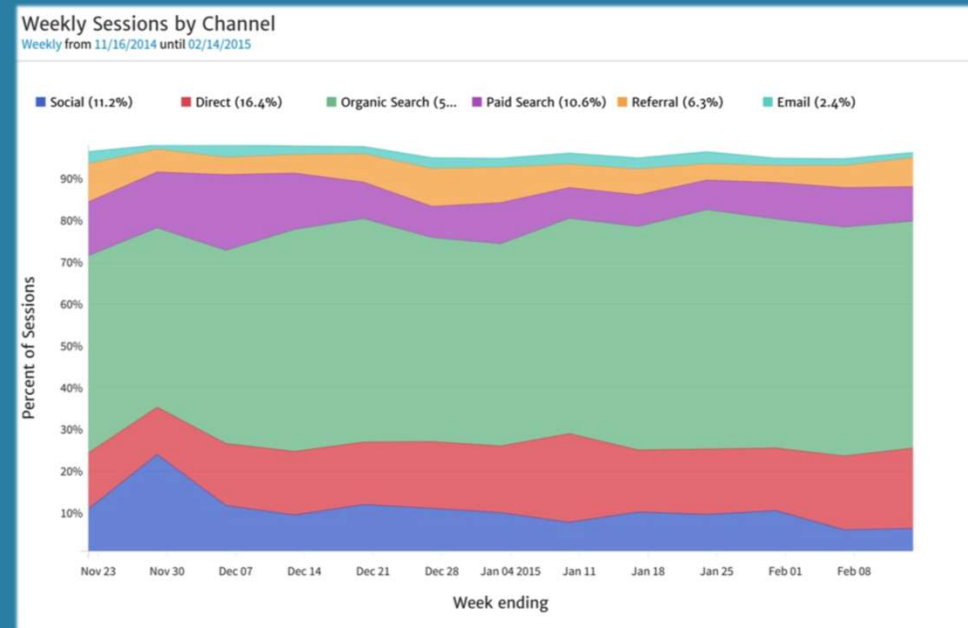
# “Not Wrong” Graphs – Area Chart

- Compare the Bar Chart with the Area Chart:



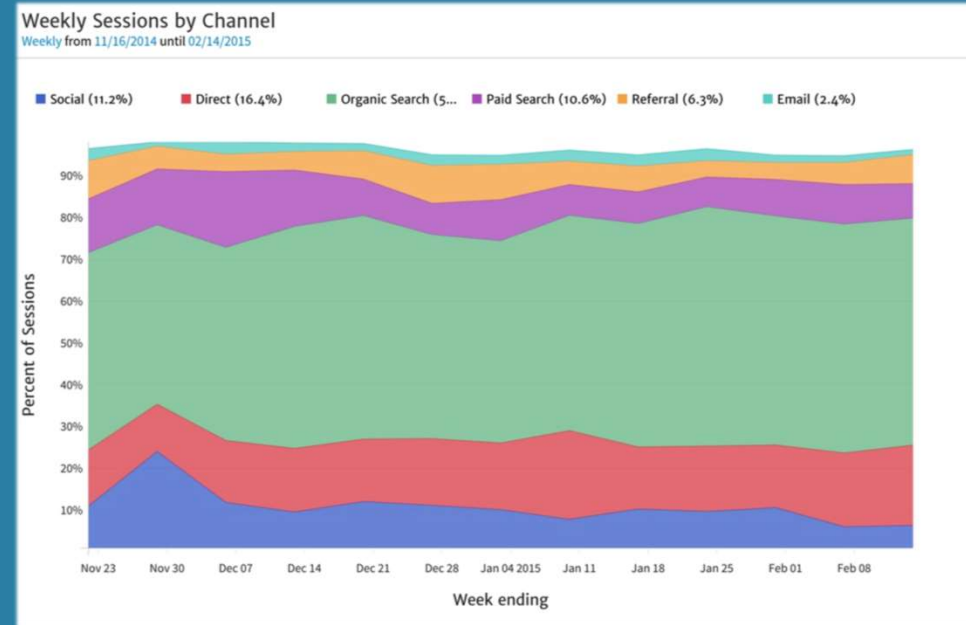
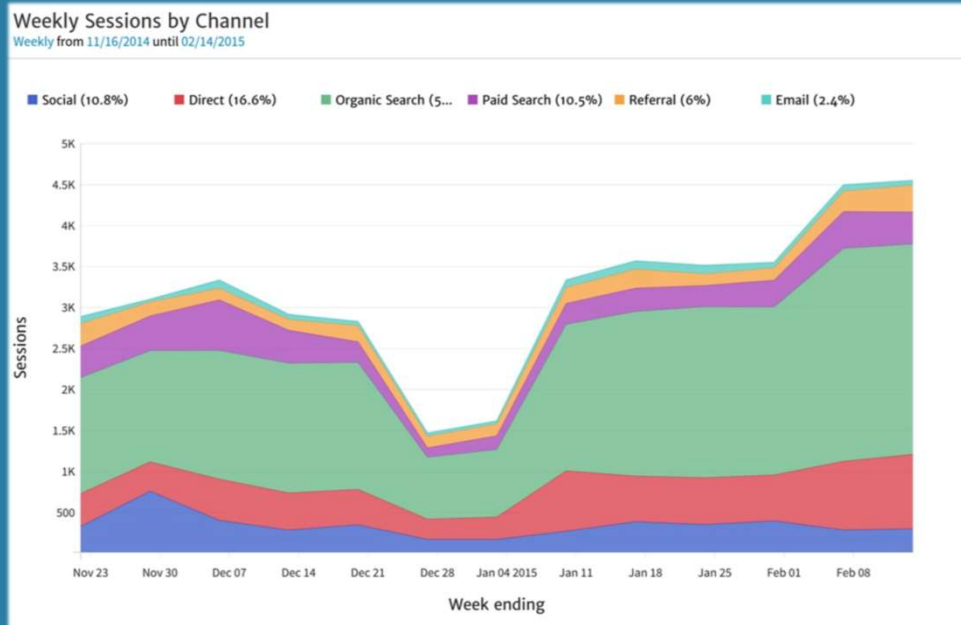
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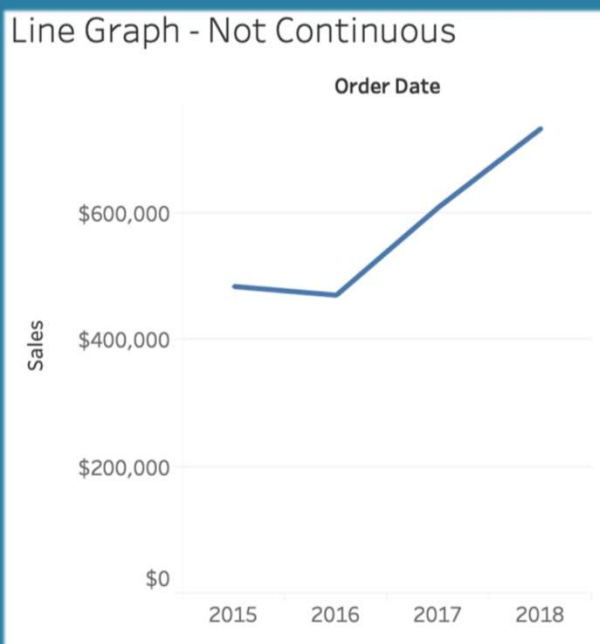
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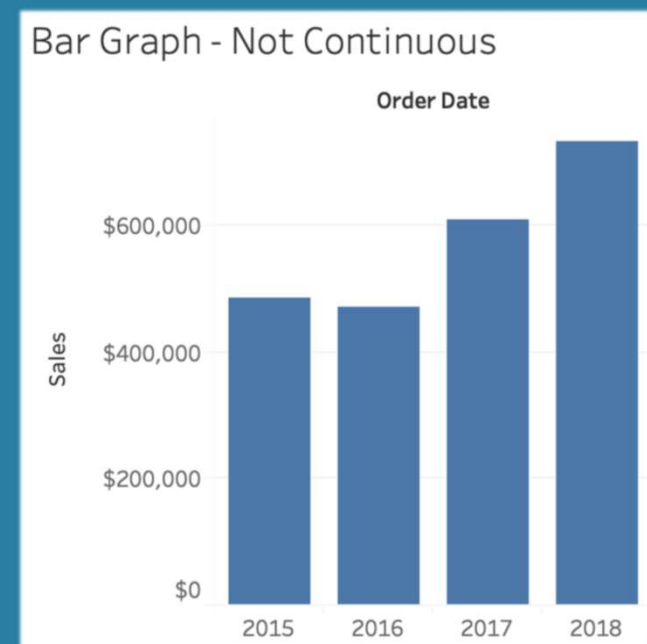
# “Not Wrong” Graphs – Line or Bar Chart?

- Use when the data you are presenting is not continuous (e.g., yearly rather than daily)



<- Implies smooth trend

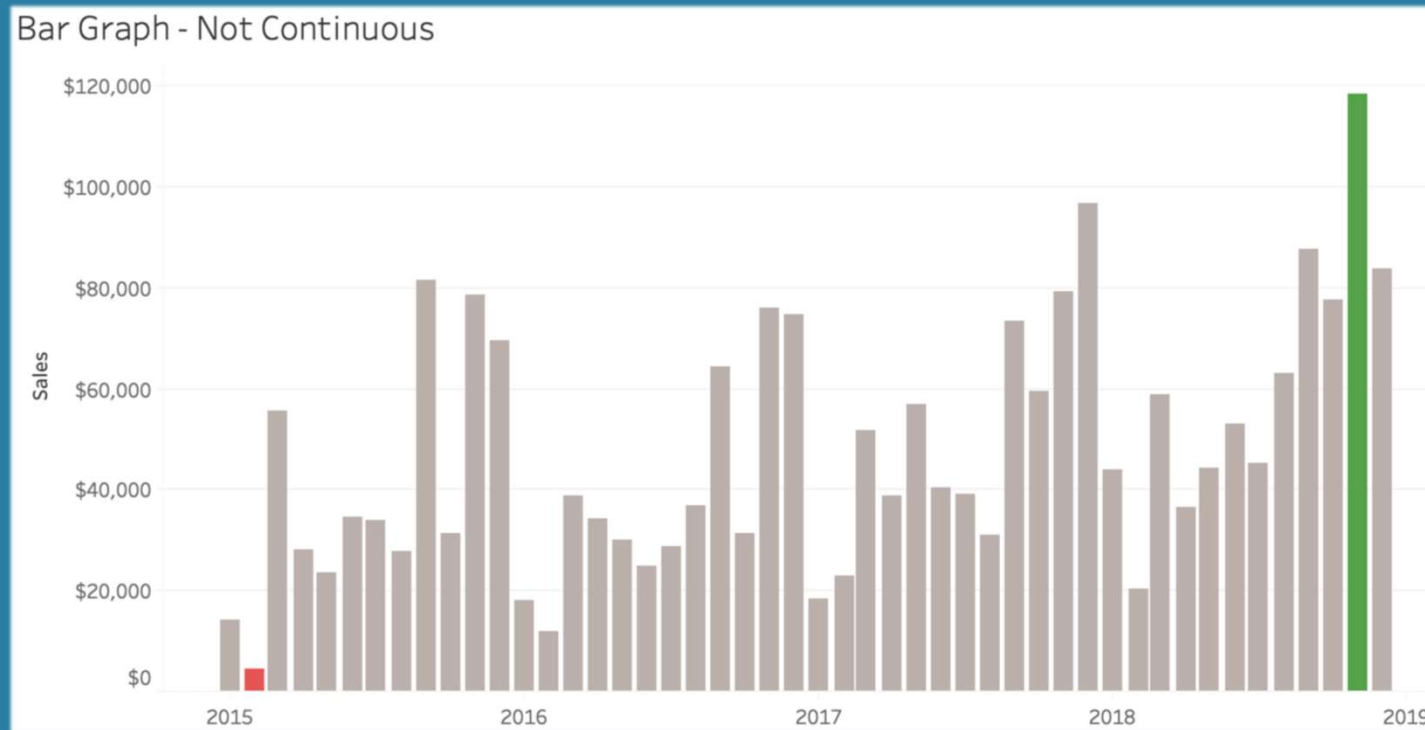
Shows that data has been categorized ->  
Does not imply smooth trend





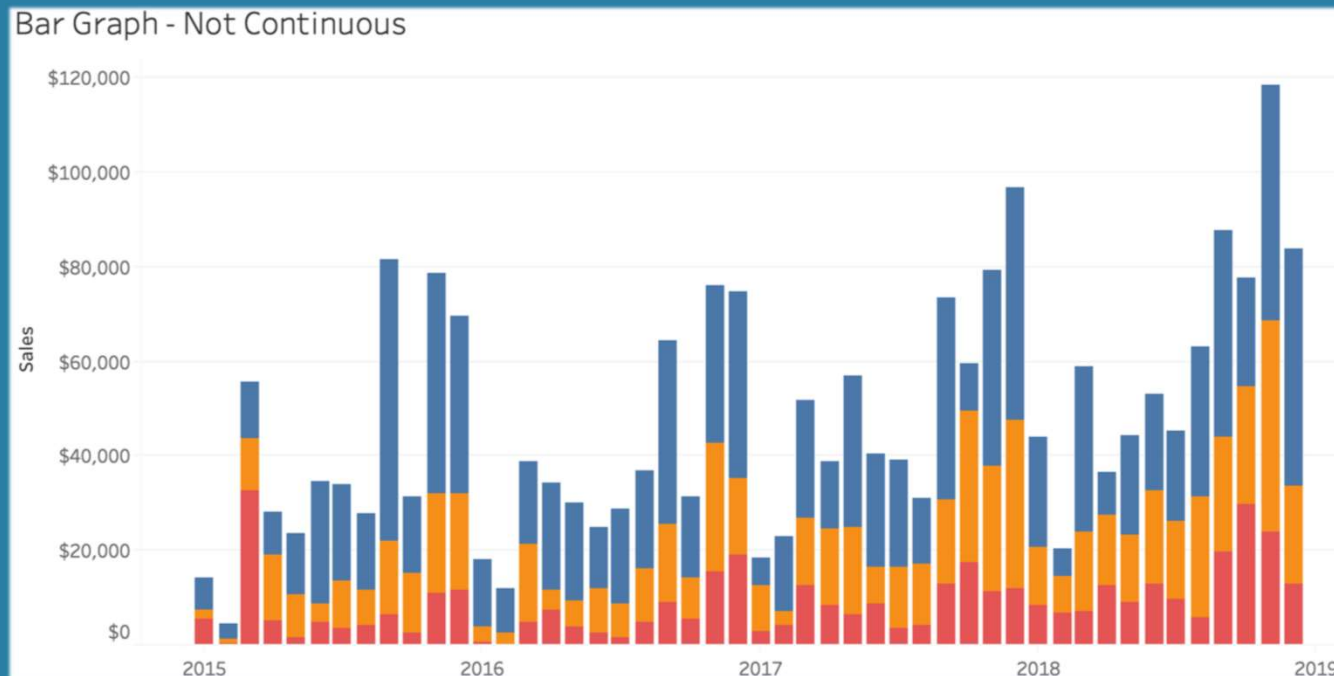
# “Not Wrong” Graphs – Bar Chart

- Use when the data you are presenting is not continuous (e.g., yearly rather than daily)



# “Not Wrong” Graphs – Stacked Bar Chart

- Use when the data you are presenting is not continuous (e.g., yearly rather than daily)

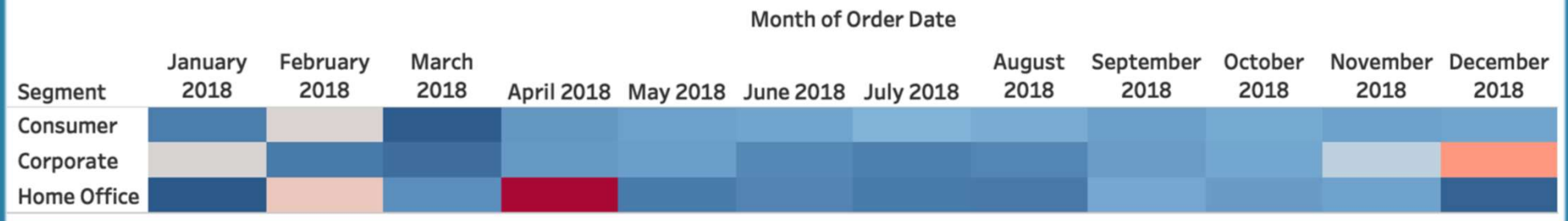


Cannot Accurately Show Ranking for Each Column

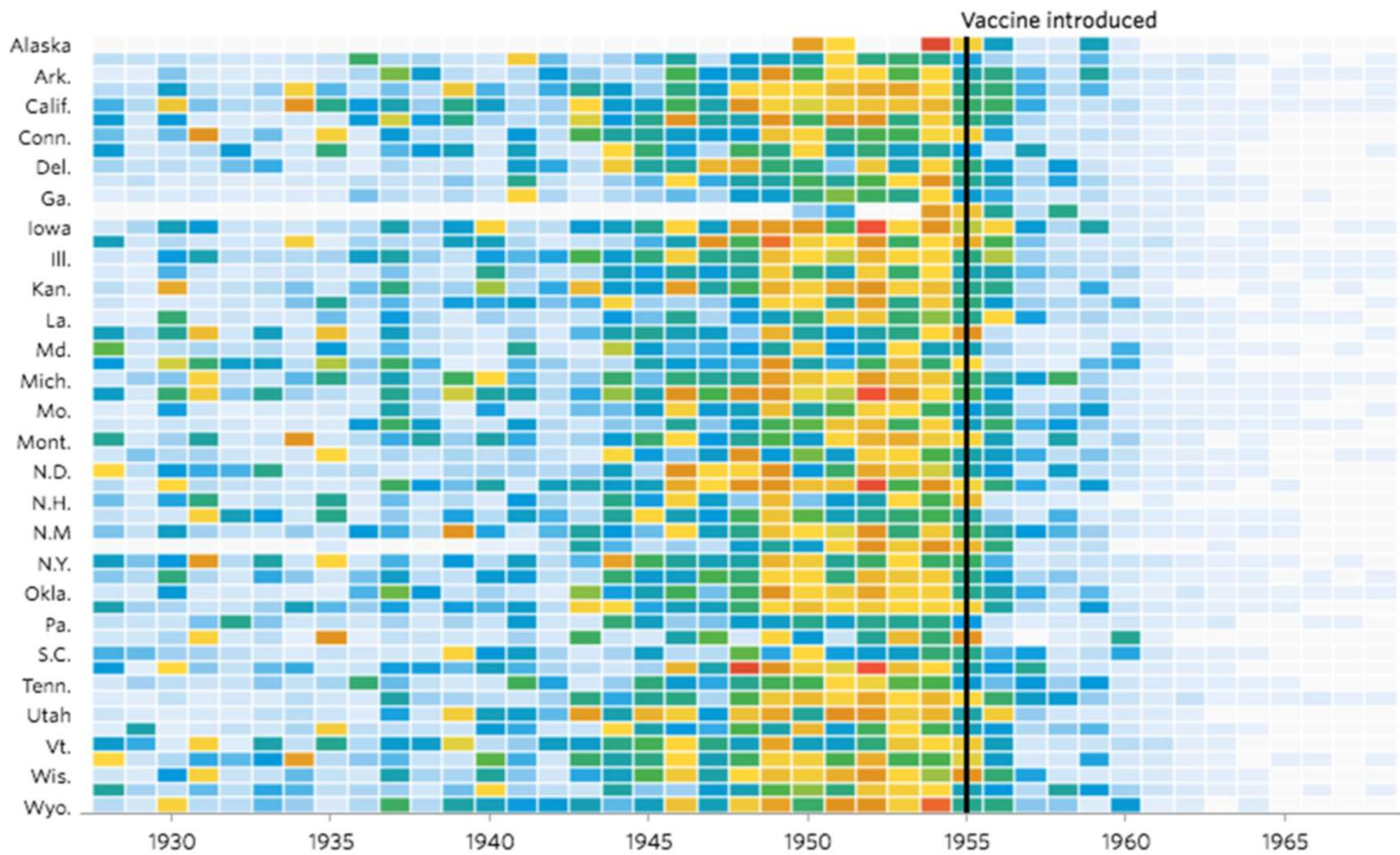
# “Not Wrong” Graphs – Heat Map

- Use when the data you are presenting is not continuous (e.g., yearly rather than daily)
- Use when you want to give an *overview* of multiple categories.

## Heat Map - Time Series By Category

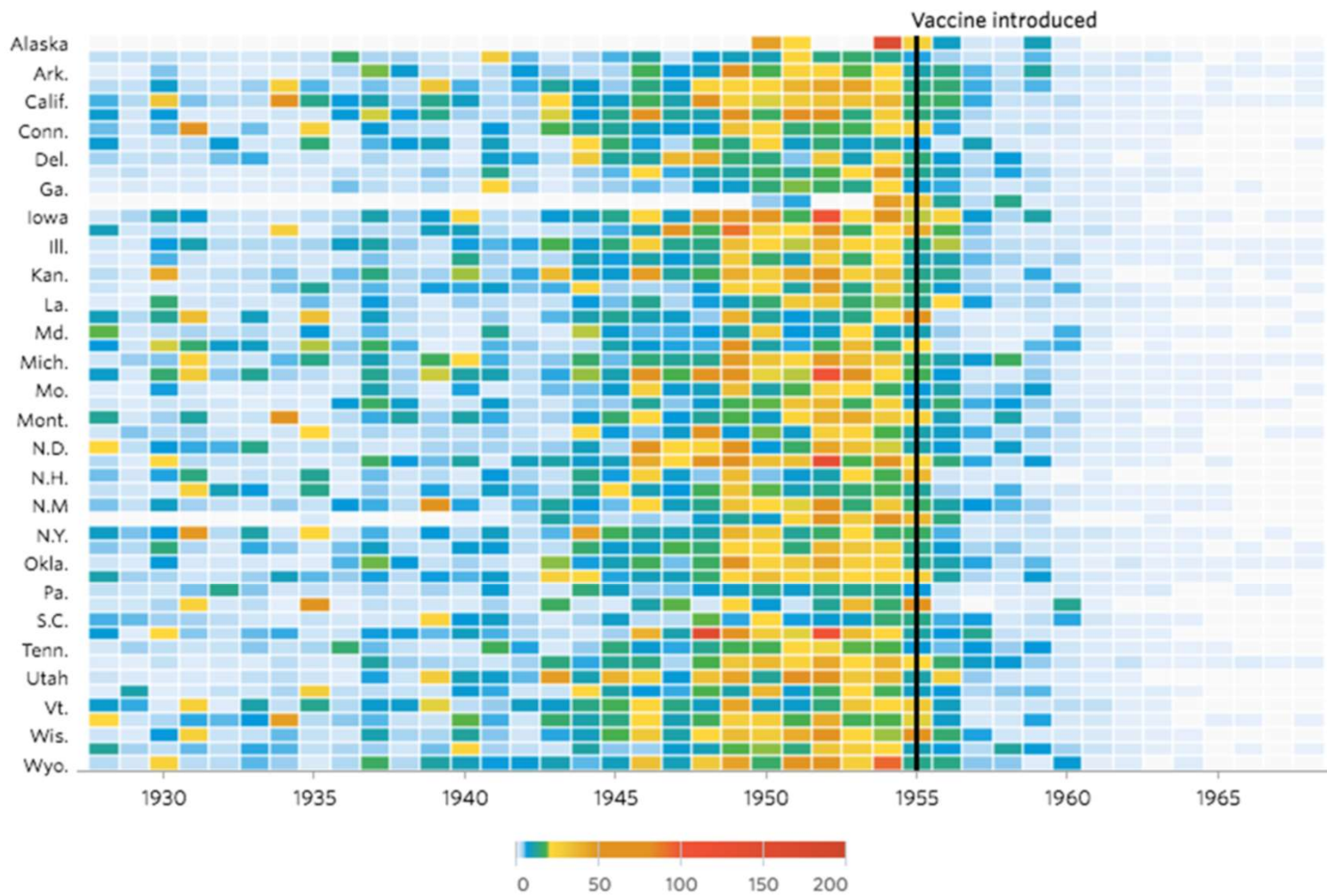


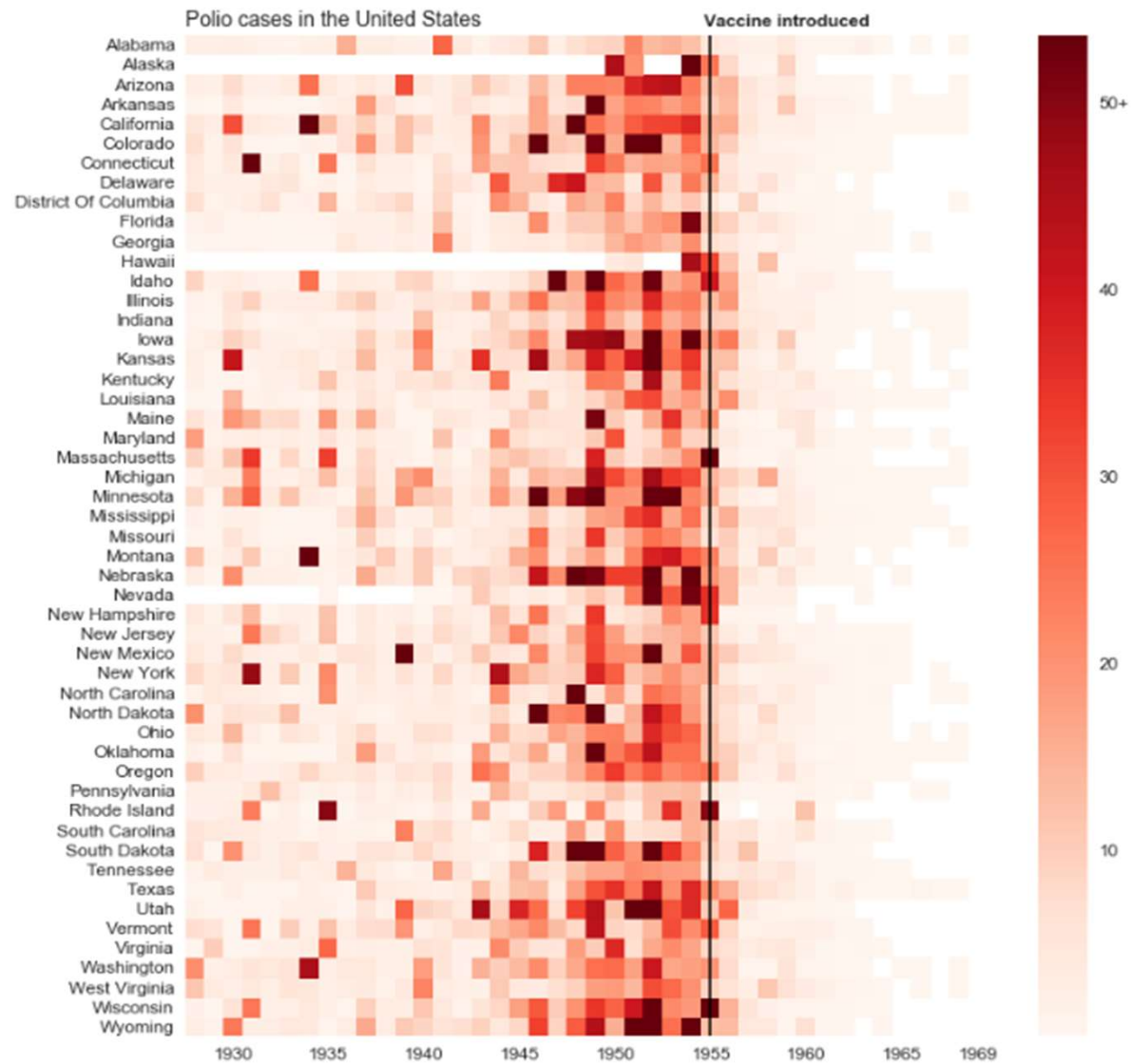
## Polio

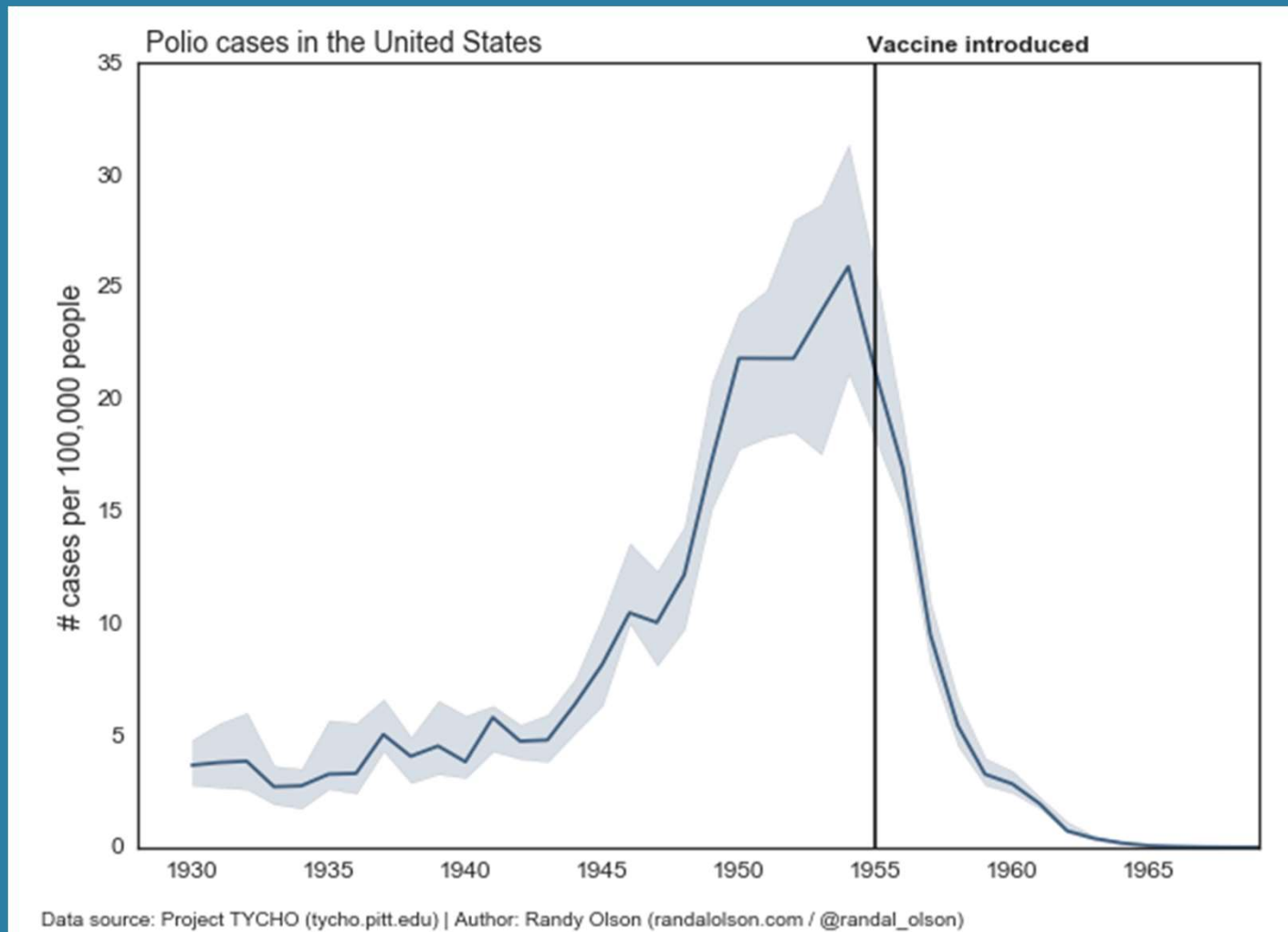


<http://graphics.wsj.com/infectious-diseases-and-vaccines/>

# Polio

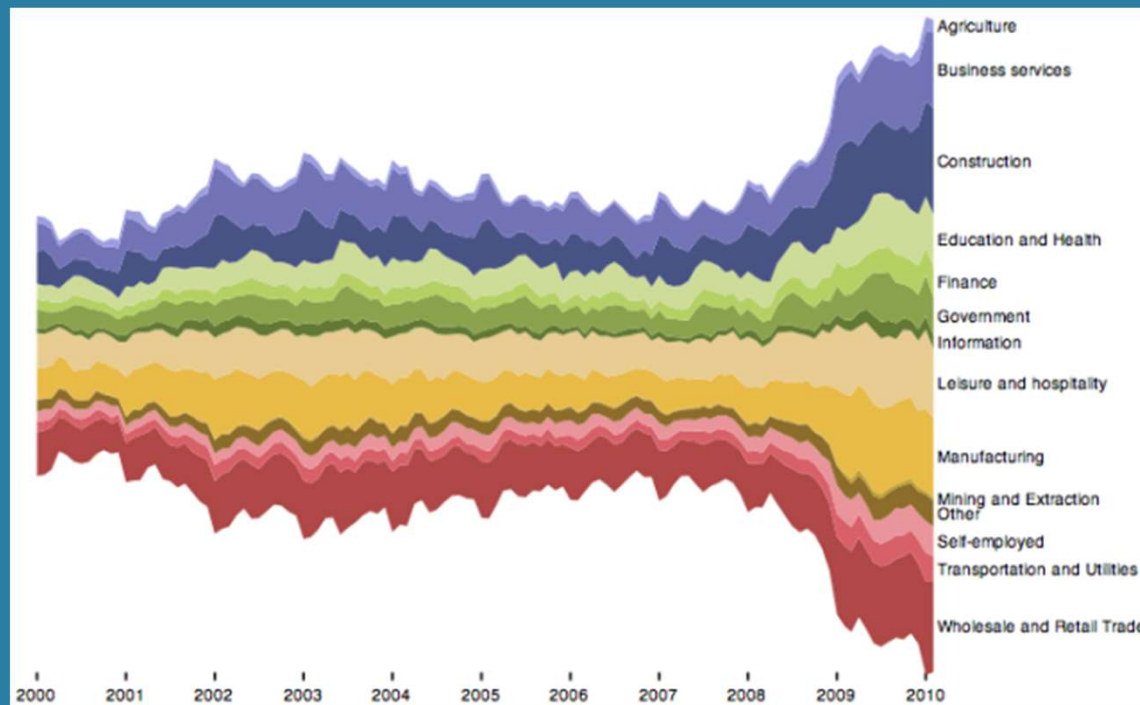








## Other “Not Wrong” Graphs – Stream Chart

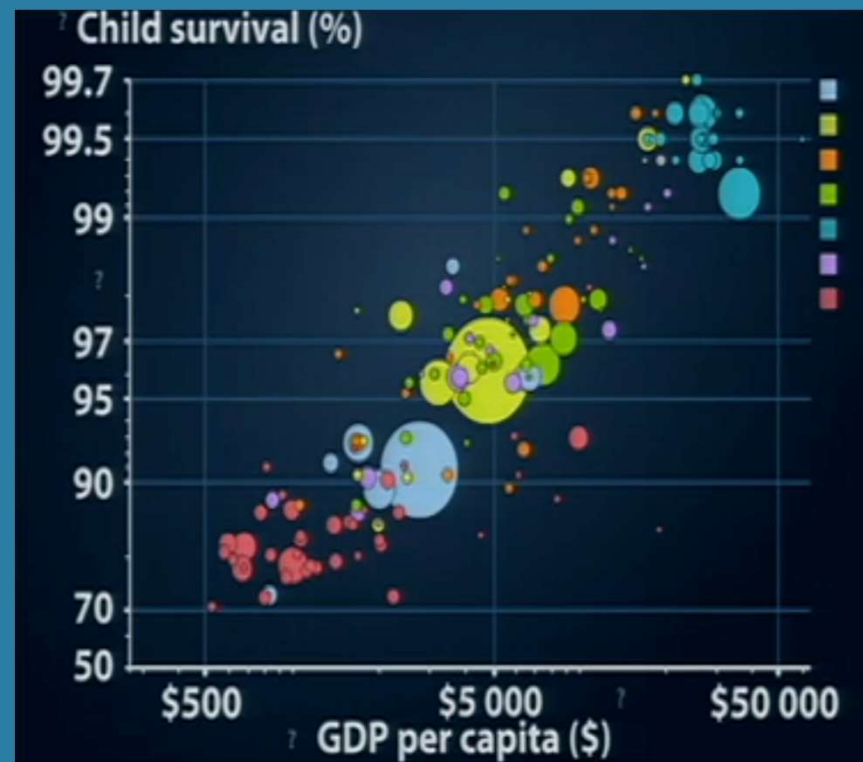




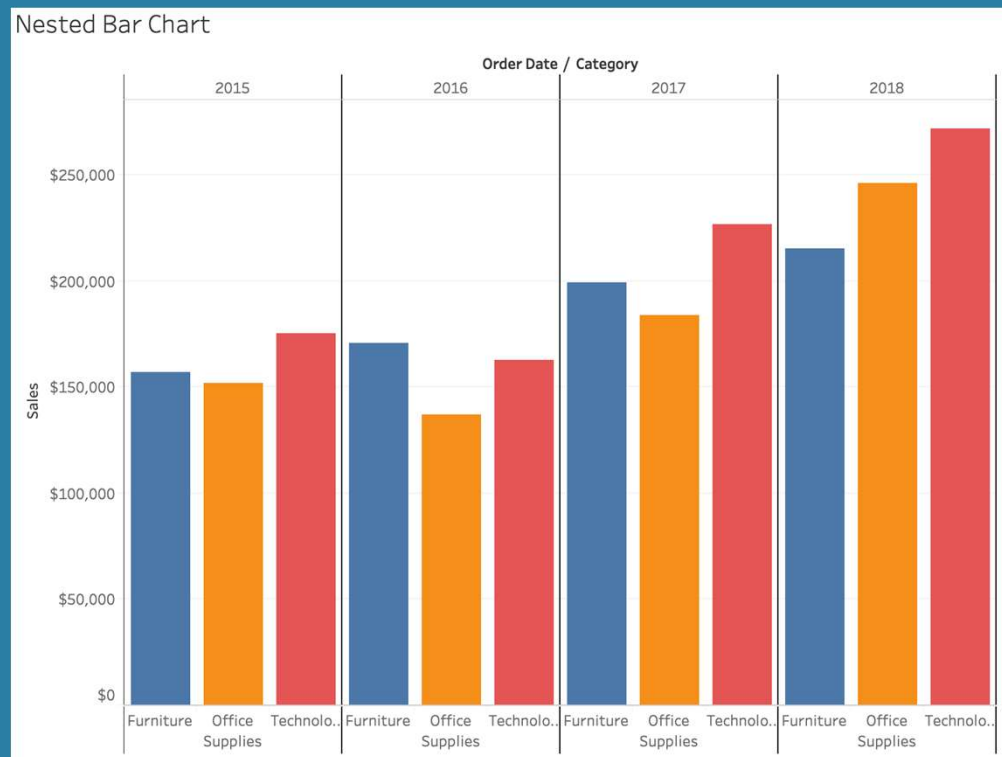
# Other “Not Wrong” Graphs – Scatterplots



## Other “Not Wrong” Graphs – Scatterplots



# Other “Not Wrong” Graphs – Nested Bar Chart



# “Rules” For Timeseries

- Plot time series horizontally – time is on the x-axis.
- Maintain consistent scales for duration of x-axis of graph.
- If you wish to illustrate causality (i.e., why the graph “bent”), show enough time points *before* the cause to convince the viewer that the values are different after the “cause”
- Lines that cross are difficult to interpret – try to avoid them if you have more than two lines.
- ALWAYS standardize values as appropriate.

# Animation Caveats

- Do not rely on viewer's memory when using animation.
- Use animation with “history”.
  - Leave trails on scatterplots



[https://www.ted.com/talks/hans\\_rosling\\_the\\_best\\_stats\\_you\\_ve\\_ever\\_seen](https://www.ted.com/talks/hans_rosling_the_best_stats_you_ve_ever_seen)

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