Week 7 - Still further into Data Viz

Alex Lishinski

September 28, 2021

Welcome!

Welcome to *week 7*!

Record the meeting

Discussion!

One question:

- What is one interesting or exciting thing you did or found out about when using R this past week?

One reflection/discussion:

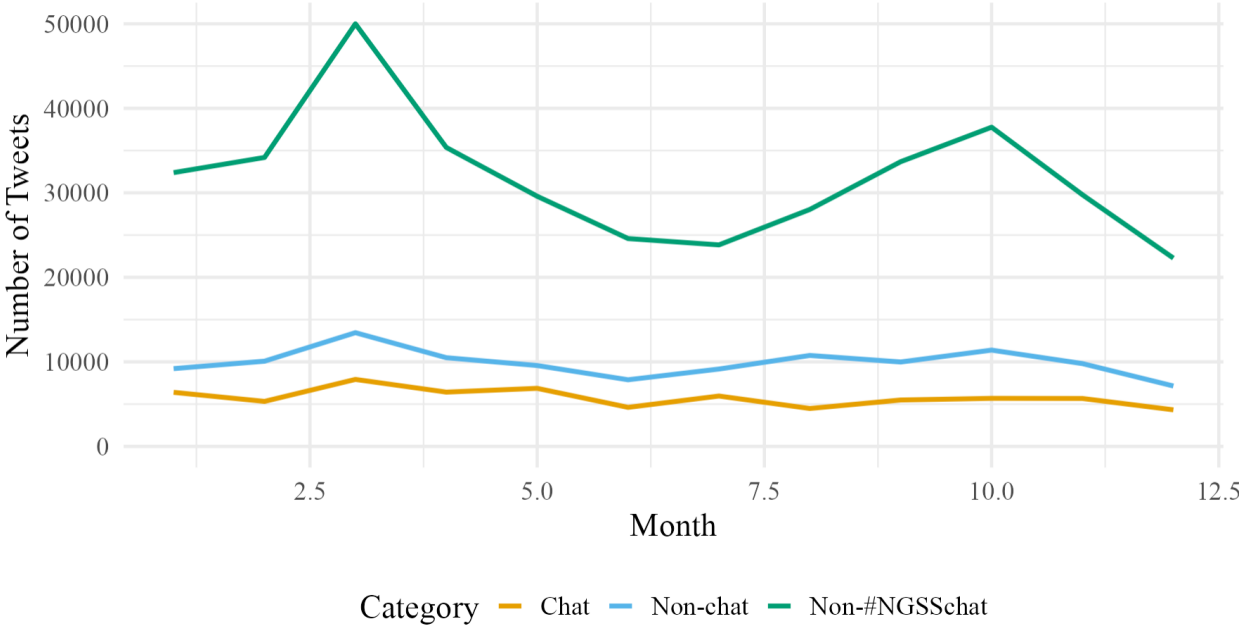
- What is one take-away (large or small) that you can use in your own visualizations from the two readings from last week?

- 1: https://clauswilke.com/dataviz/histograms-density-plots.html
- 2: https://clauswilke.com/dataviz/visualizing-proportions.html

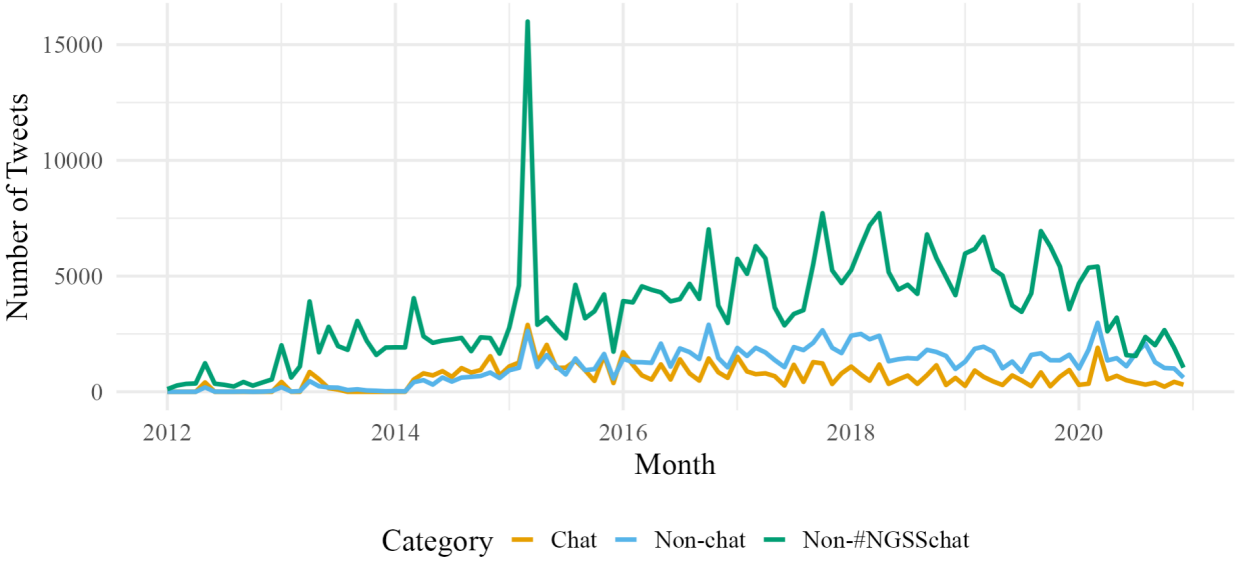
Review of last week's class

- Review of the grammar of graphics
- Understanding visualizations by layers
- Understanding mapping of data to geoms
- Homework: counting, grouping and summarizing, recoding using a factor, and telling a story with data

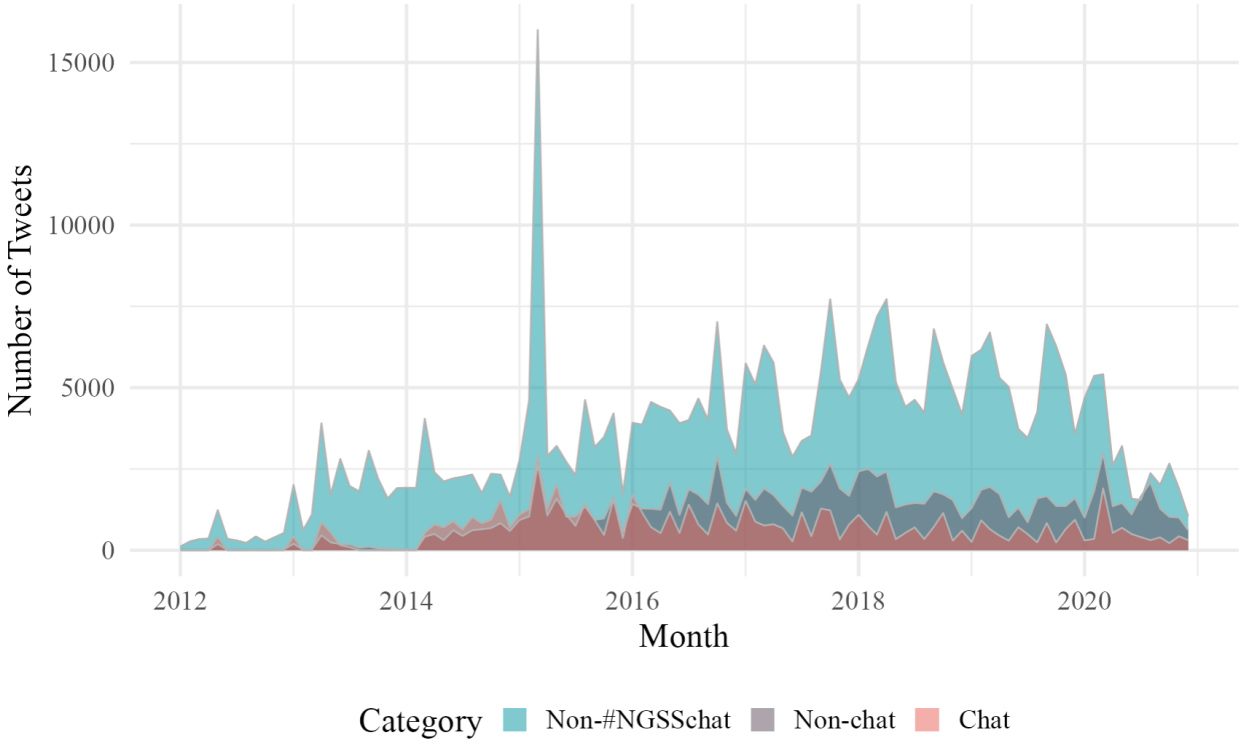
But first: an example



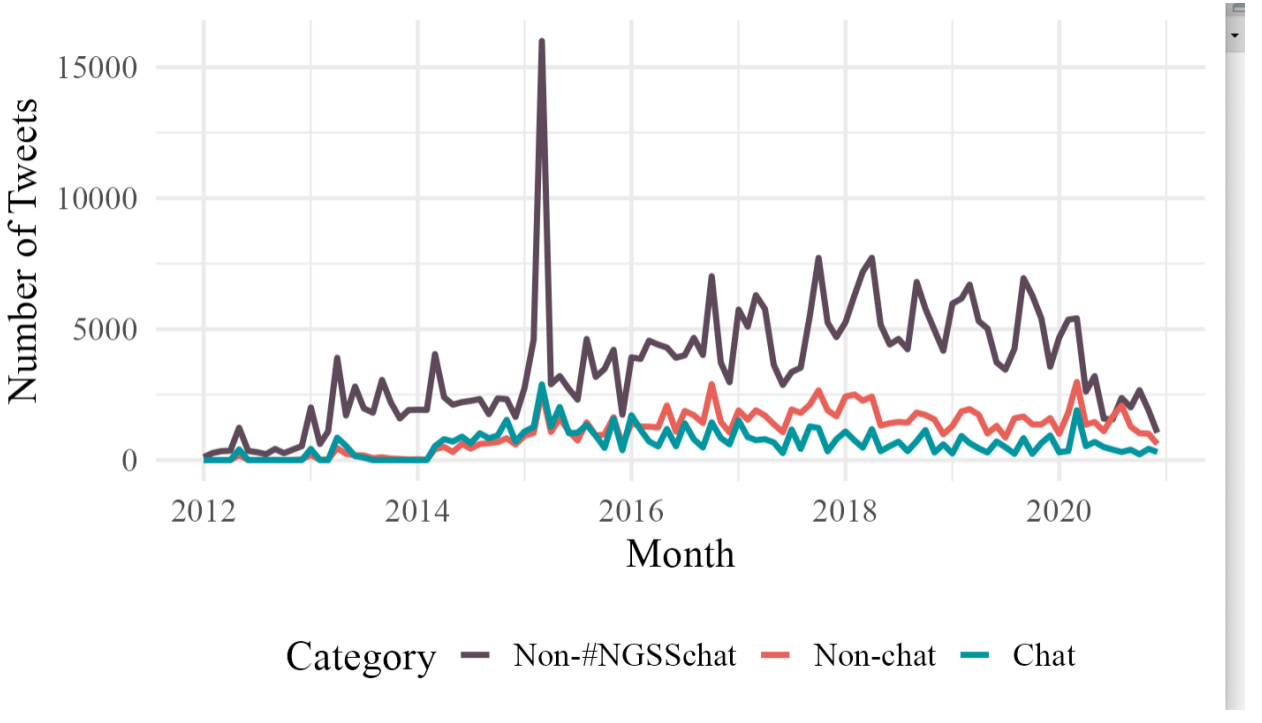
But first: an example



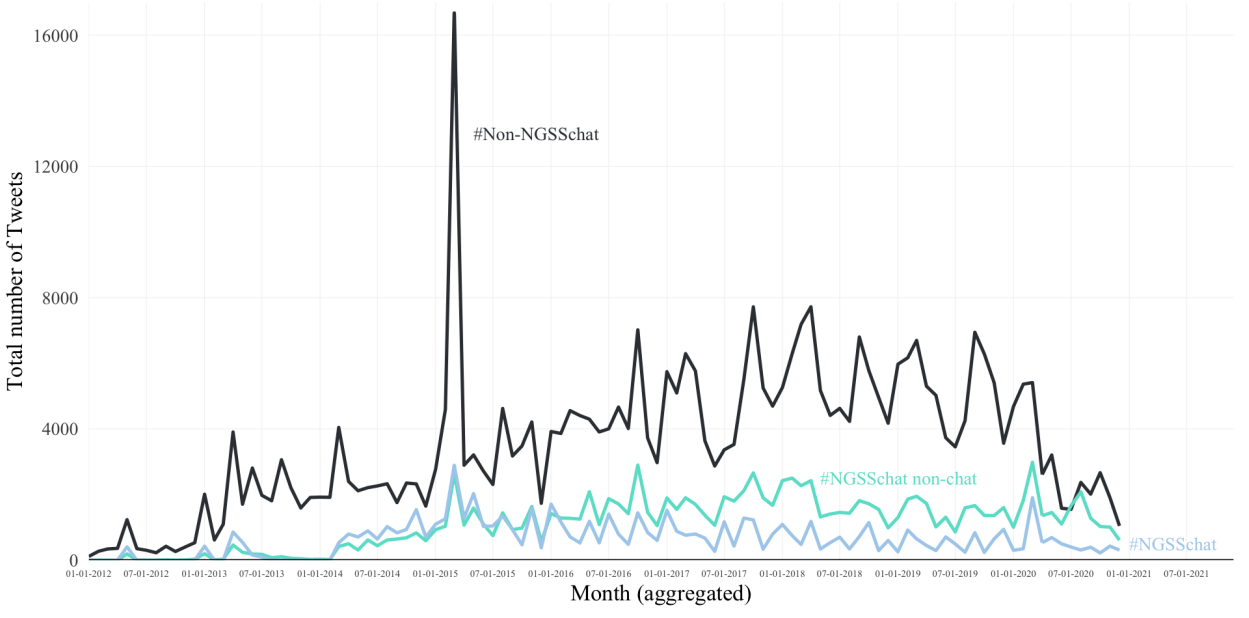
But first: an example



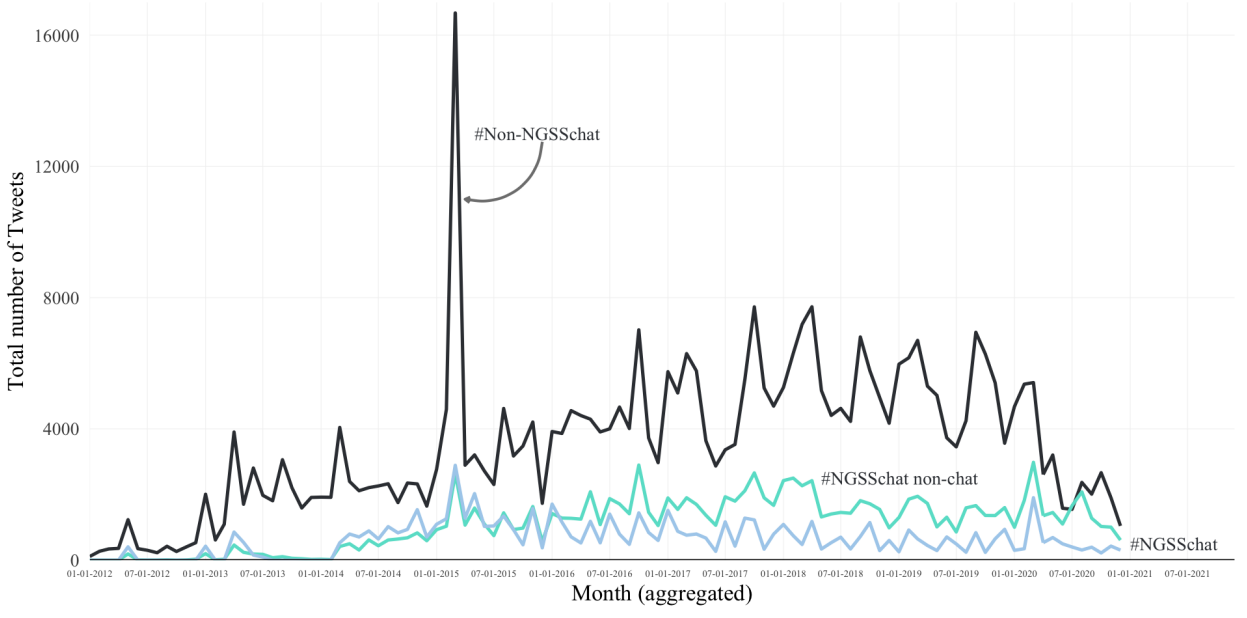
But first: an example



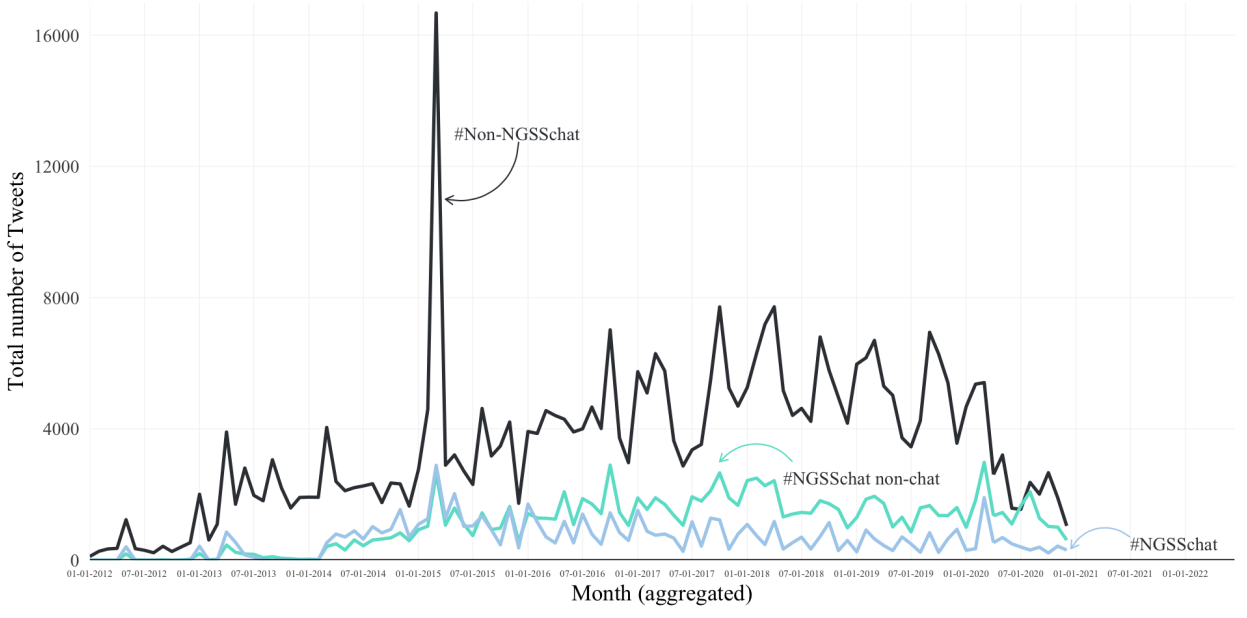
But first: an example



But first: an example



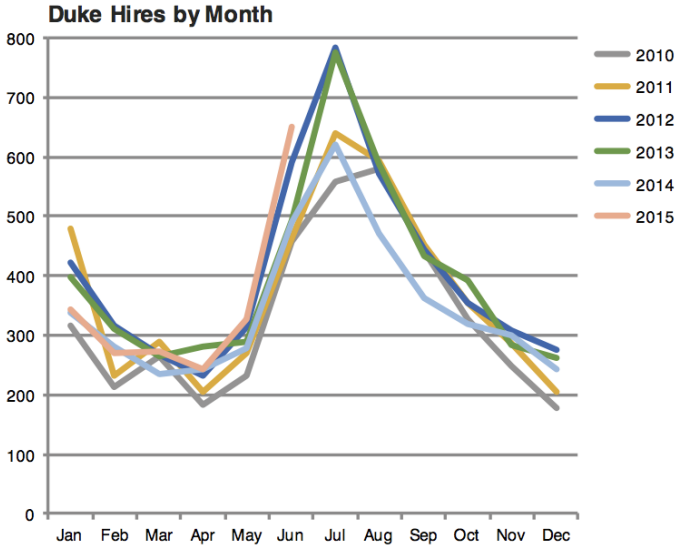
But first: an example

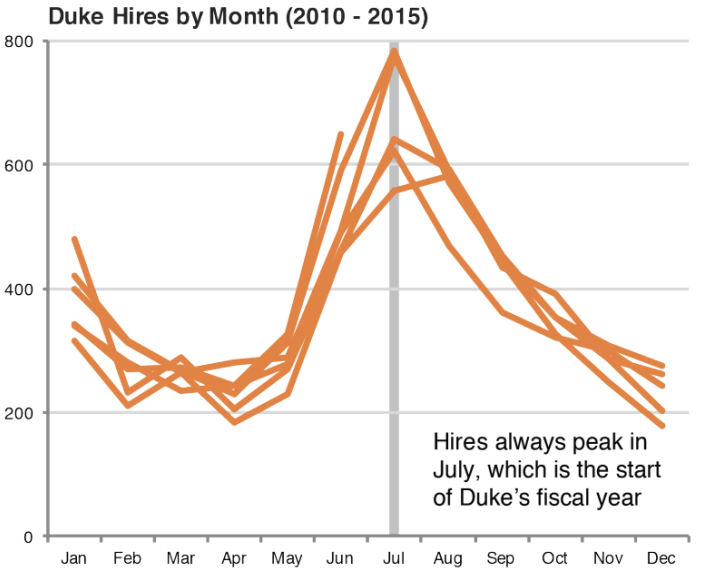


Two overarching goals of learning data viz in R

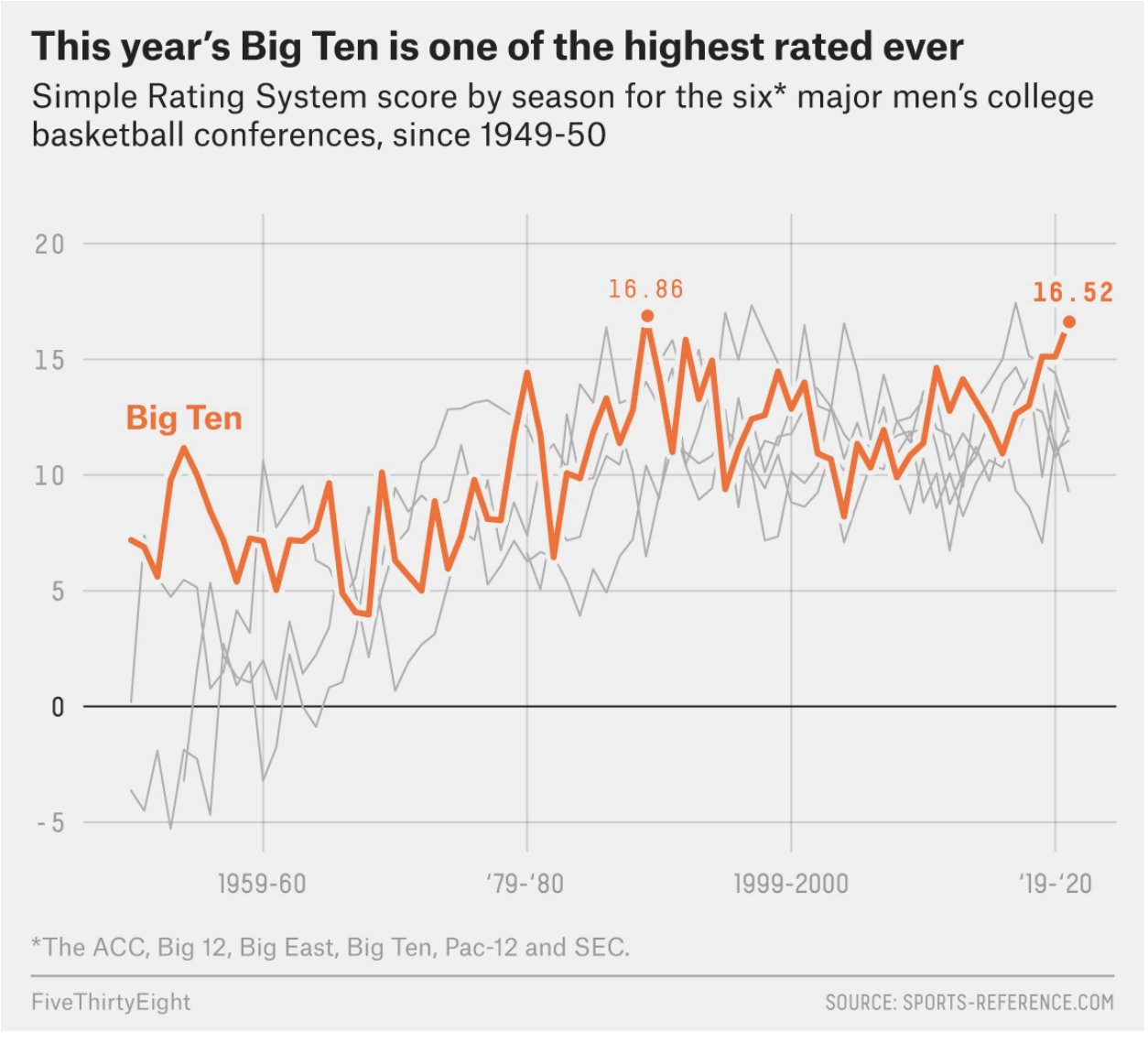
- Conceptual framework of visualization
- Grammar of graphics and different mappings of data onto visual elements
- Details of implementation
- How to build and refine plots layer by layer
- Eventually: Interactive data viz with ggviz and shiny

Telling a story





Telling a story



This week's topics

Overview

A. Using color
B. Grouping and stacking bar charts
C. Faceting plots

A. Using color

One high-level distinction to consider:

- Assigning a color to a geom
- Mapping a variable (with `aes()`) a color to a geom

A. Using color

Assigning a color to a geom

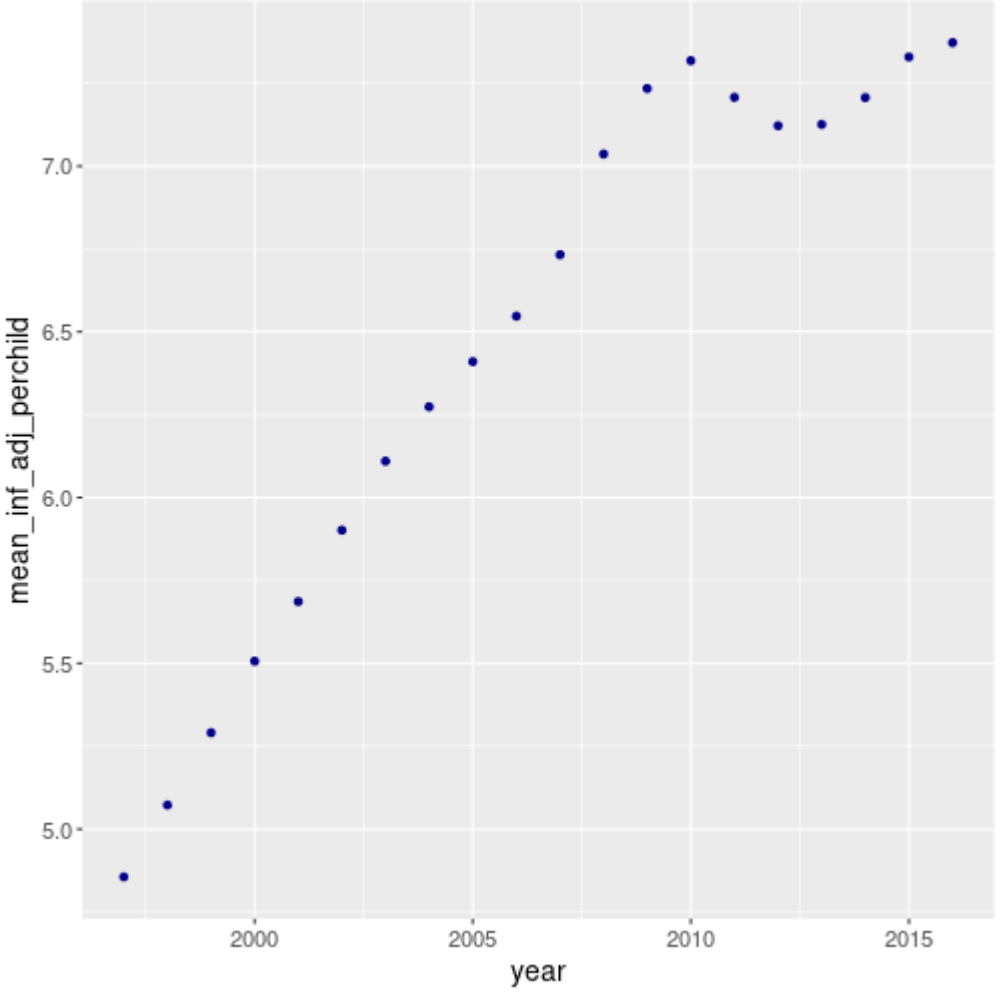
```
colors()
```

```
tidykids <- read_csv(here("content", "data", "tidykids.csv"))

tidykids %>%
  filter(variable == "PK12ed") %>%
  group_by(year) %>%
  summarize(mean_inf_adj_perchild = mean(inf_adj_perchild)) %>% # b/c of multiple states
  ggplot(aes(x = year, y = mean_inf_adj_perchild)) +
  geom_point(color = "darkblue") +
  theme(text = element_text(size = 14))
```

A. Using color

Assigning a color to a geom



A. Using color

Mapping a color to a geom

```
tidykids %>%
  filter(variable %in% c("PK12ed", "highered", "pell")) %>%
  group_by(variable, year) %>%
  summarize(mean_inf_adj_perchild = mean(inf_adj_perchild)) %>% # b/c of multiple states
  ggplot(aes(x = year, y = mean_inf_adj_perchild, color = variable)) +
  geom_point() +
  theme(text = element_text(size = 14))
```

A. Using color

Mapping a color to a geom

A. Using color

Use a scale function to modify a scale

- `scale_color_*`
  - `scale_color_discrete`
  - `scale_color_continous`
  - `scale_color_brewer`
  - `scale_color_manual()`
- `scale_fill_*`
  - `scale_fill_discrete`
  - `scale_fill_continous`
  - `scale_fill_brewer`
  - `scale_color_manual()`

A. Using color

Removing the title from a scale

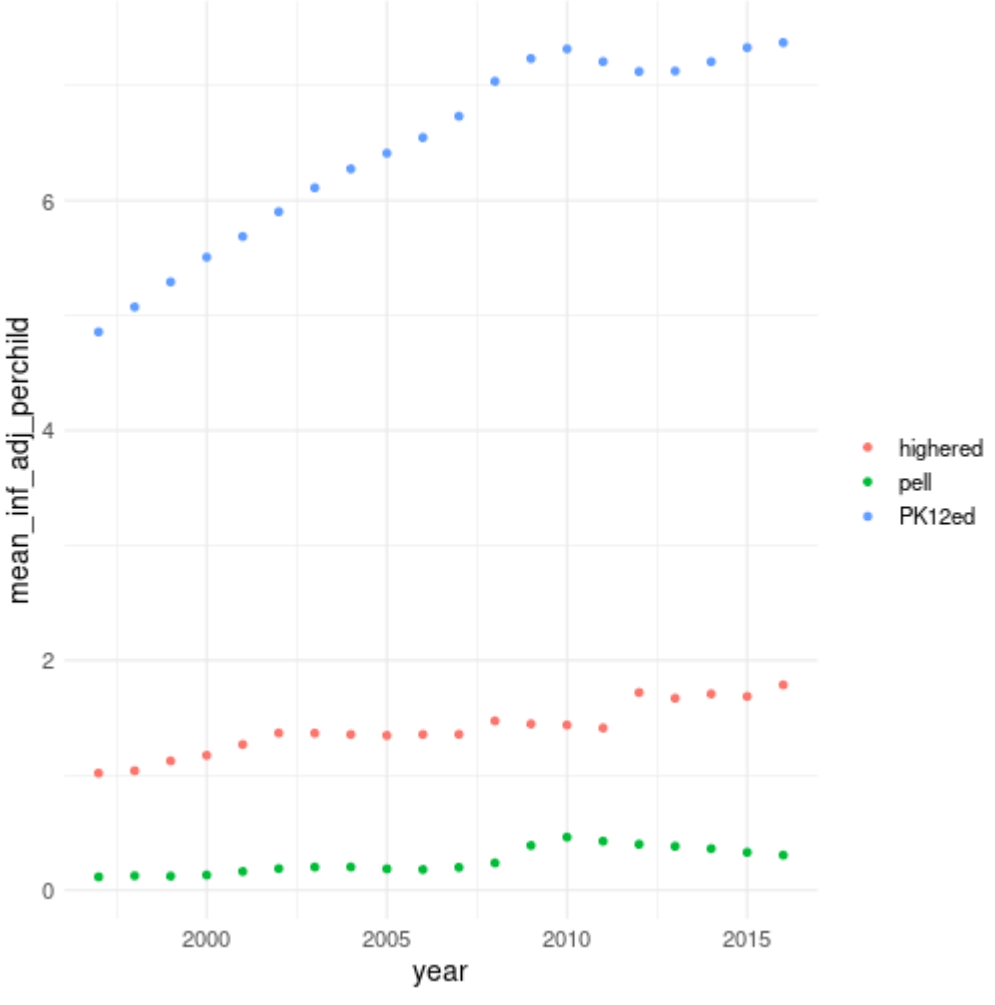
```
p <- tidykids %>%
  filter(variable %in% c("PK12ed", "highered", "pell")) %>%
  group_by(variable, year) %>%
  summarize(mean_inf_adj_perchild = mean(inf_adj_perchild)) %>% # b/c of multiple states
  ggplot(aes(x = year, y = mean_inf_adj_perchild, color = variable)) +
  geom_point() +
  theme(text = element_text(size = 14))

p +
  scale_color_discrete("")
```

See the result on the next slide.

A. Using color

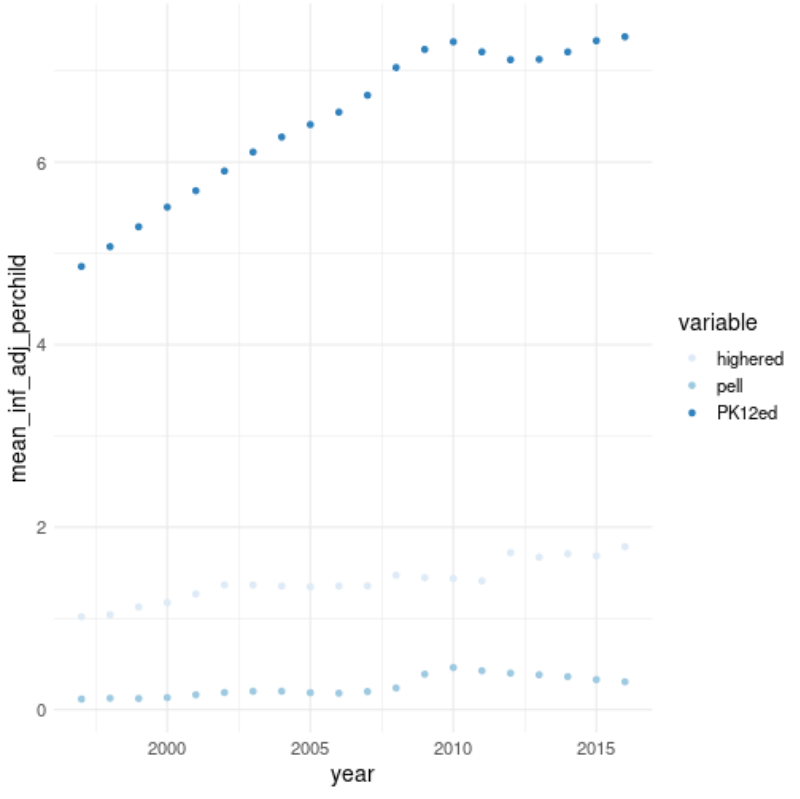
Removing the title from a scale



A. Using color

Changing the colors of a scale using a "color brewer" scale:

```
p +
  scale_color_brewer()
```



A. Using color

Changing the colors of a scale using a "color brewer" scale:

The "color brewer" functions support three kinds of scales:

- sequential (`type = "seq"`) for ordered data
- divergent (`type = "div"`) for data with a natural midpoint and two extremes
- qualitative (`type = "qual"`) for categorical/qualitative data

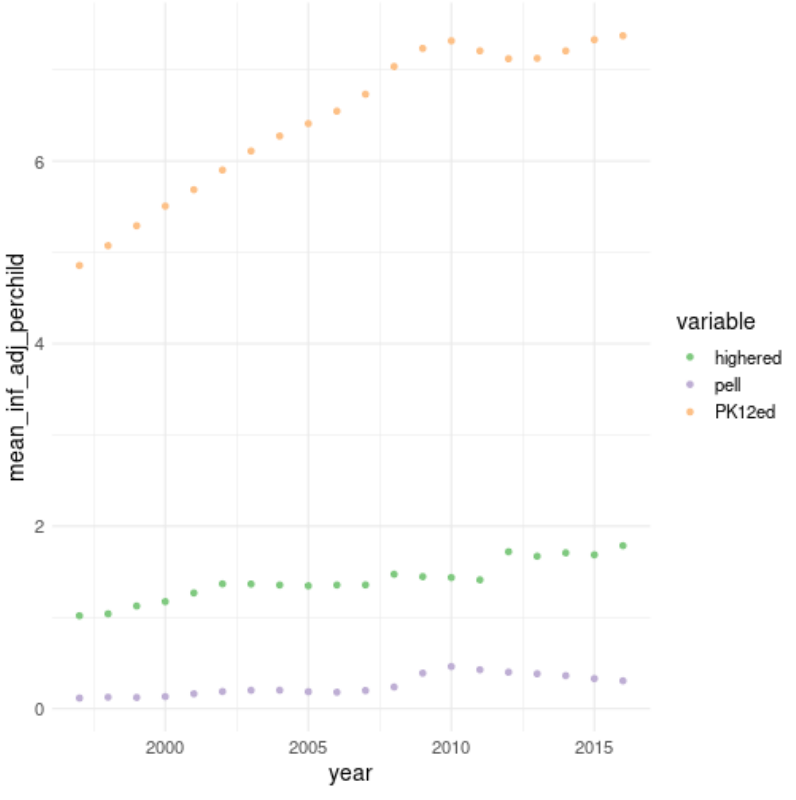
https://colorbrewer2.org/#type=sequential&scheme=BuGn&n=3 https://www.r-graph-gallery.com/38-rcolorbrewers-palettes.html

What kind of palette would be best for our last plot?

A. Using color

Changing the colors of a scale using a "color brewer" scale:

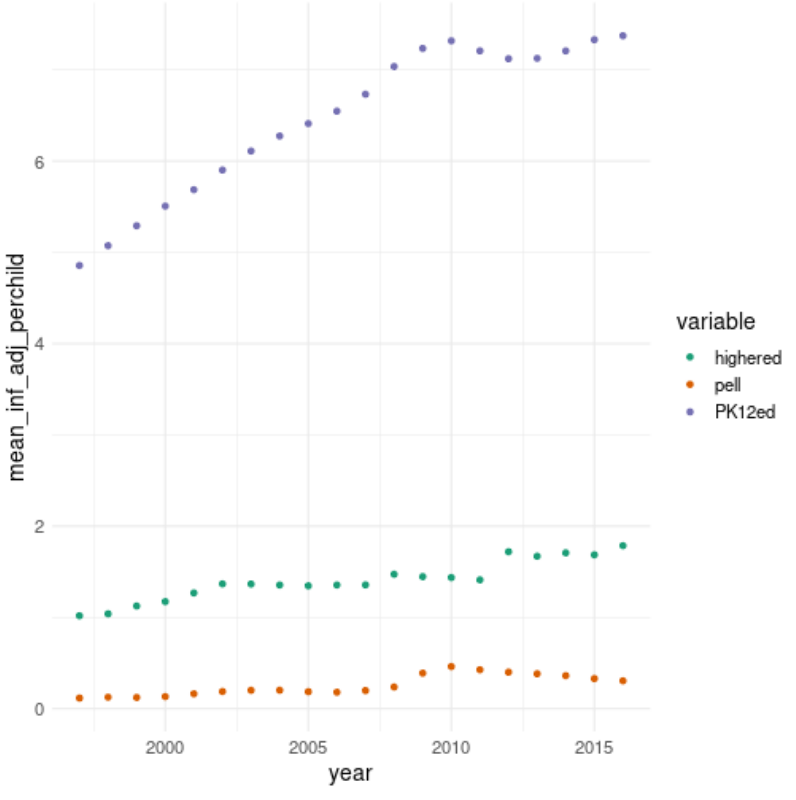
```
p +
  scale_color_brewer(type = "qual")
```



A. Using color

Changing the colors of a scale using a "color brewer" scale:

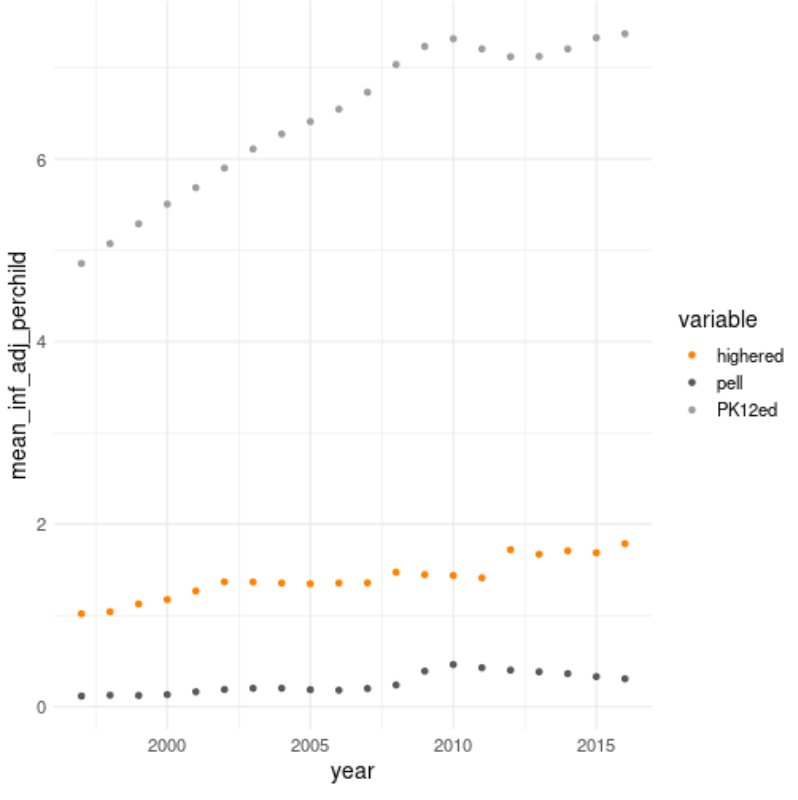
```
p +
  scale_color_brewer(type = "qual", palette = 2)
```



A. Using color

https://brand.utk.edu/standards/colors/

```
p +
  scale_color_manual(values = c("#FF8200", "#58595B", "8D2048"))
```



B. Grouping and stacking bar charts

Removing the title from a scale

```
p <- tidykids %>%
  filter(variable %in% c("PK12ed", "highered", "pell")) %>%
  group_by(variable, year) %>%
  summarize(mean_inf_adj_perchild = mean(inf_adj_perchild)) %>% # b/c of multiple states
  ggplot(aes(x = year, y = mean_inf_adj_perchild, color = variable)) +
  geom_col() +
  theme_minimal() +
  theme(text = element_text(size = 14))

p +
  scale_color_discrete("")
```

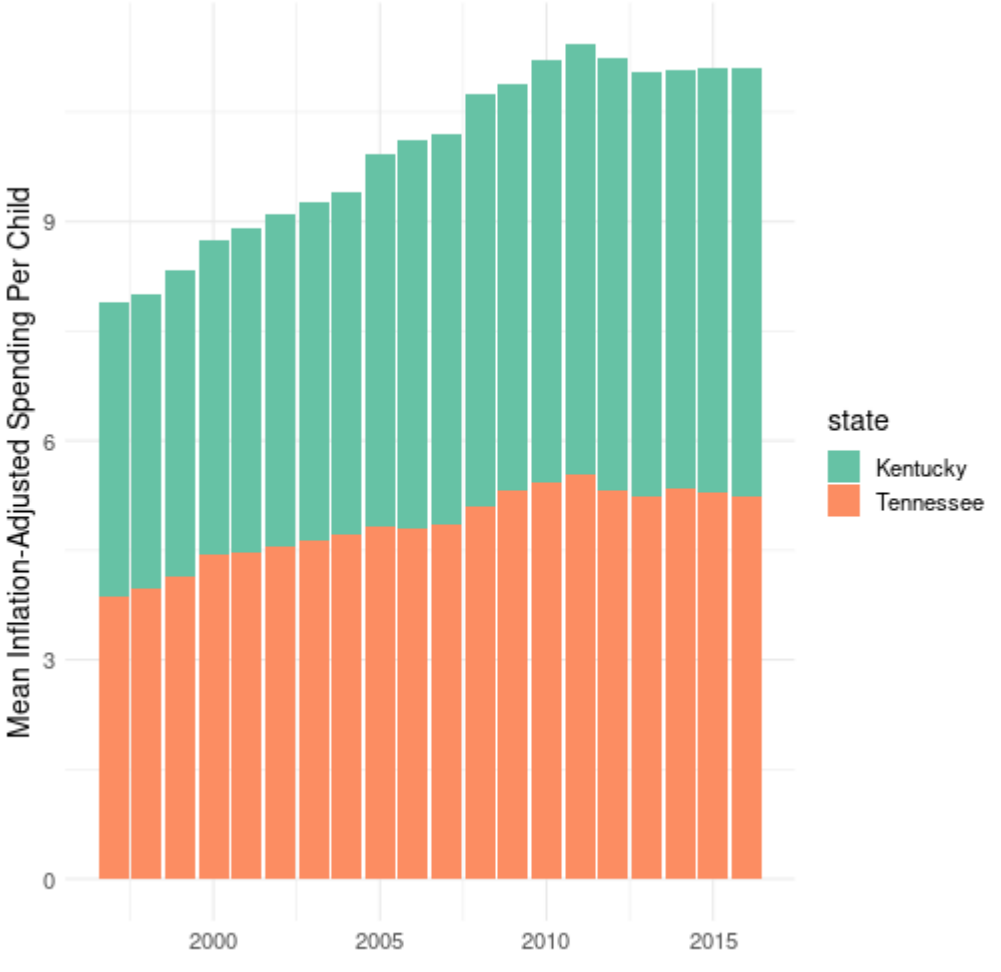
See the result on the next slide.

B. Grouping and stacking bar charts

What might we change?

```
tidykids %>%
  filter(variable == "PK12ed",
         state %in% c("Tennessee", "Kentucky")) %>%
  ggplot(aes(x = year, y = inf_adj_perchild, fill = state)) +
  geom_col() +
  theme_minimal() +
  theme(text = element_text(size = 14)) +
  scale_fill_brewer(type = "qual", palette = 7) +
  xlab("") +
  ylab("Mean Inflation-Adjusted Spending Per Child")
```

B. Grouping and stacking bar charts

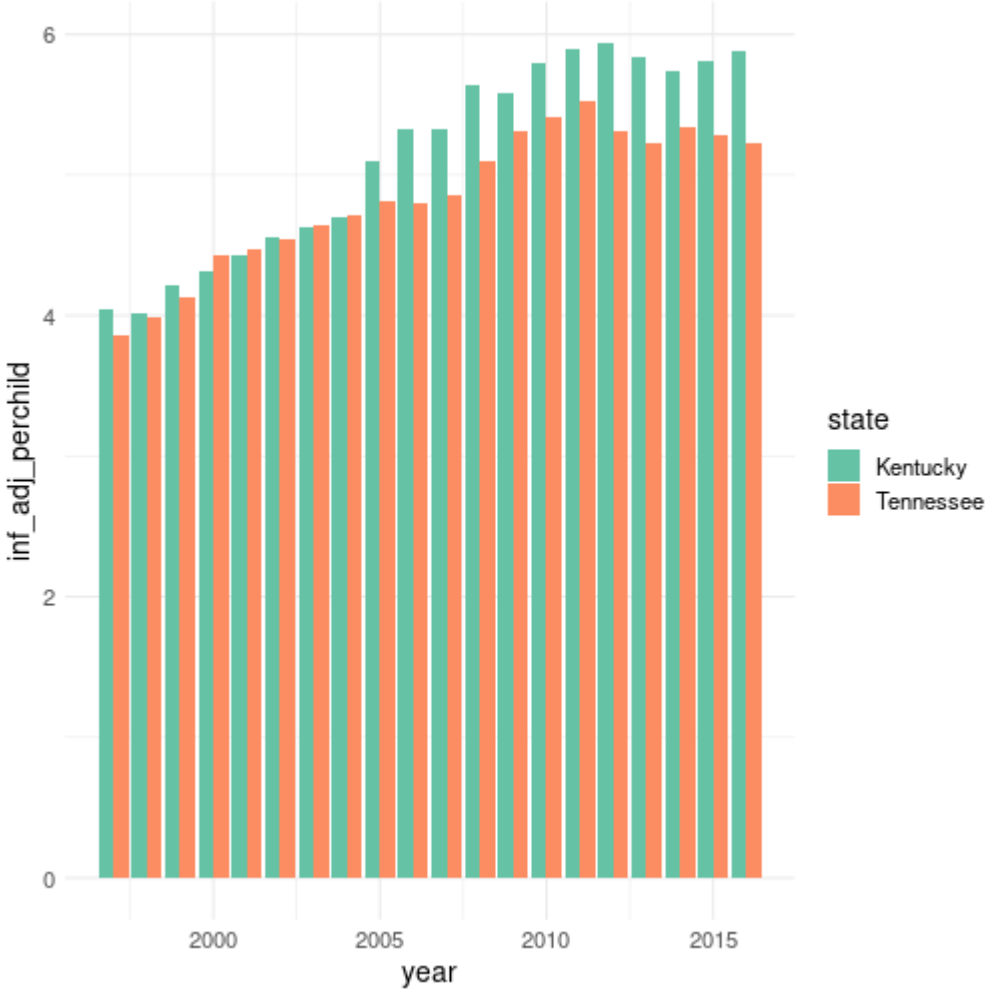


B. Grouping and stacking bar charts

Using the `position = "dodge"` argument

```
tidykids %>%
  filter(variable == "PK12ed",
         state %in% c("Tennessee", "Kentucky")) %>%
  ggplot(aes(x = year, y = inf_adj_perchild, fill = state)) +
  geom_col(position = "dodge") +
  theme_minimal() +
  theme(text = element_text(size = 14)) +
  scale_fill_brewer(type = "qual", palette = 7)
```

B. Grouping and stacking bar charts



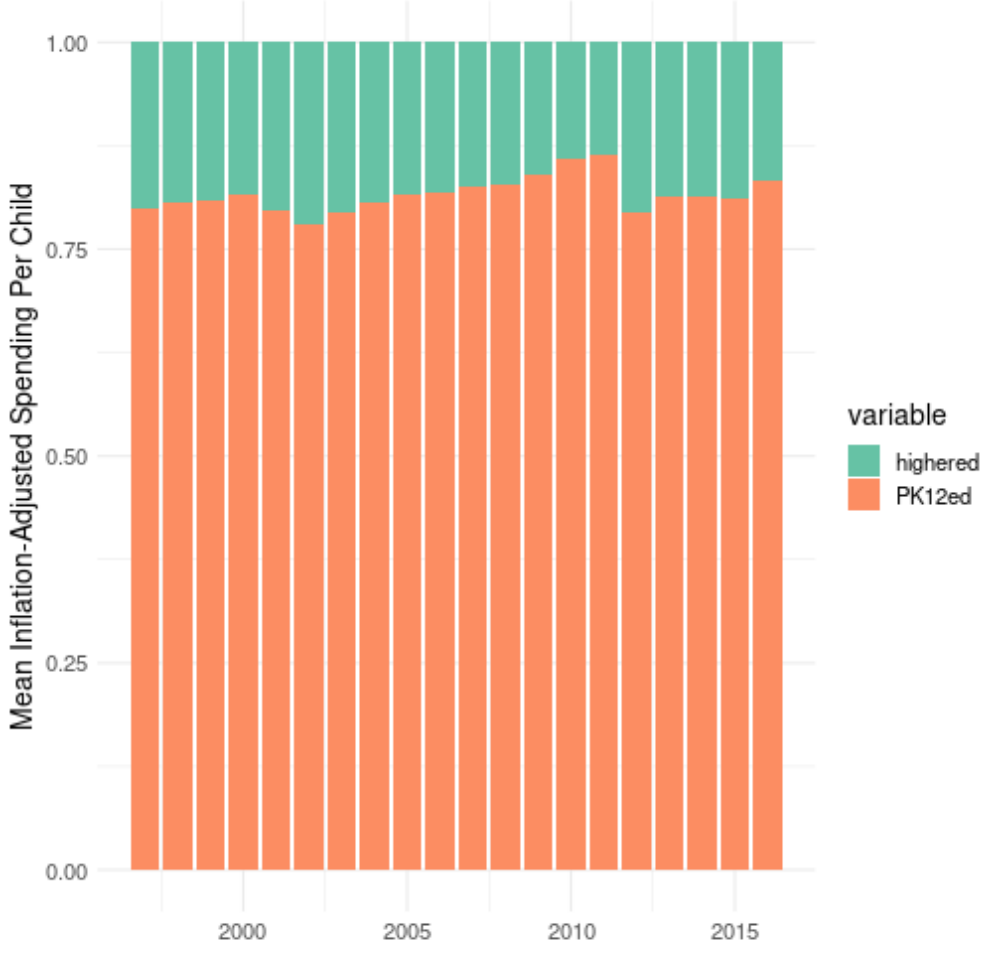
B. Grouping and stacking bar charts

A use for stacking

```
tidykids %>%
  filter(variable %in% c("PK12ed", "highered"),
         state %in% c("Tennessee")) %>%
  group_by(year) %>%
  mutate(prop_of_edu_spending = inf_adj_perchild / sum(inf_adj_perchild)) %>%
  ggplot(aes(x = year, y = prop_of_edu_spending, fill = variable)) +
  geom_col(position = "stack") +
  theme_minimal() +
  theme(text = element_text(size = 14)) +
  scale_fill_brewer(type = "qual", palette = 7) +
  xlab("") +
  ylab("Mean Inflation-Adjusted Spending Per Child")
```

B. Grouping and stacking bar charts

A use for stacking



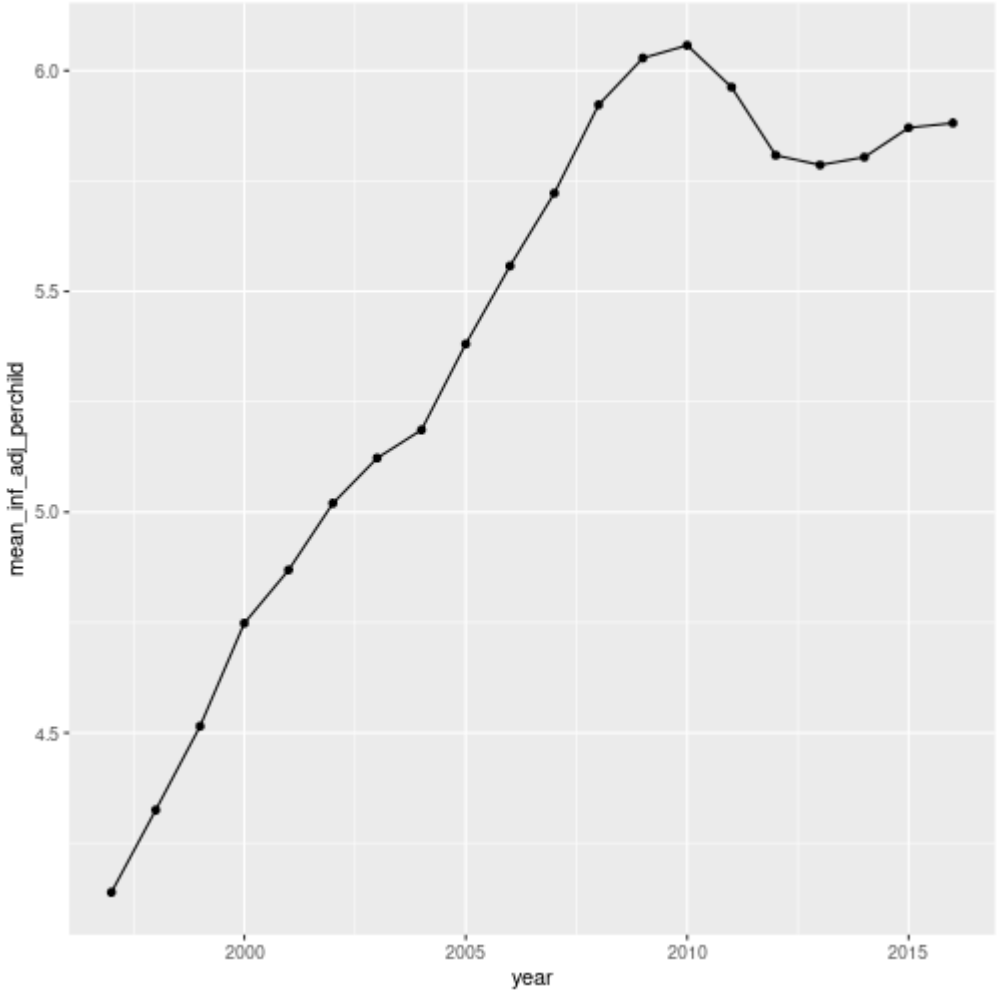
C. Faceting plots

Faceting plots with `facet_wrap()`

States combined

```
tidykids %>%
  filter(variable == "PK12ed",
         state %in% c("Tennessee", "Kentucky", "North Carolina", "Virginia", "Georgia", "Alabama", "M
  group_by(year) %>%
  summarize(mean_inf_adj_perchild = mean(inf_adj_perchild)) %>%
  ggplot(aes(x = year, y = mean_inf_adj_perchild)) +
  geom_point() +
  geom_line()
```

C. Faceting plots

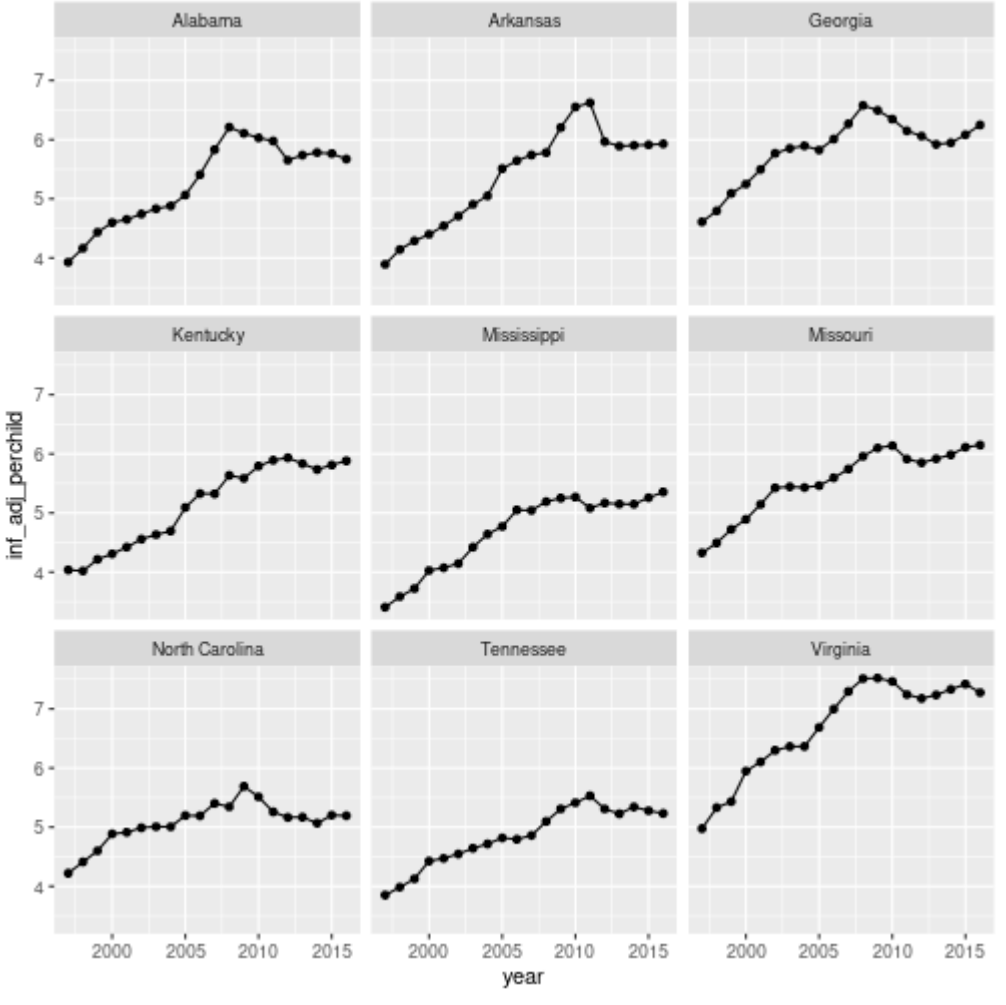


C. Faceting plots

States faceted

```
tidykids %>%
  filter(variable == "PK12ed",
         state %in% c("Tennessee", "Kentucky", "North Carolina", "Virginia", "Georgia", "Alabama", "M
  ggplot(aes(x = year, y = inf_adj_perchild)) +
  geom_point() +
  geom_line() +
  facet_wrap(~state)
```

C. Faceting plots

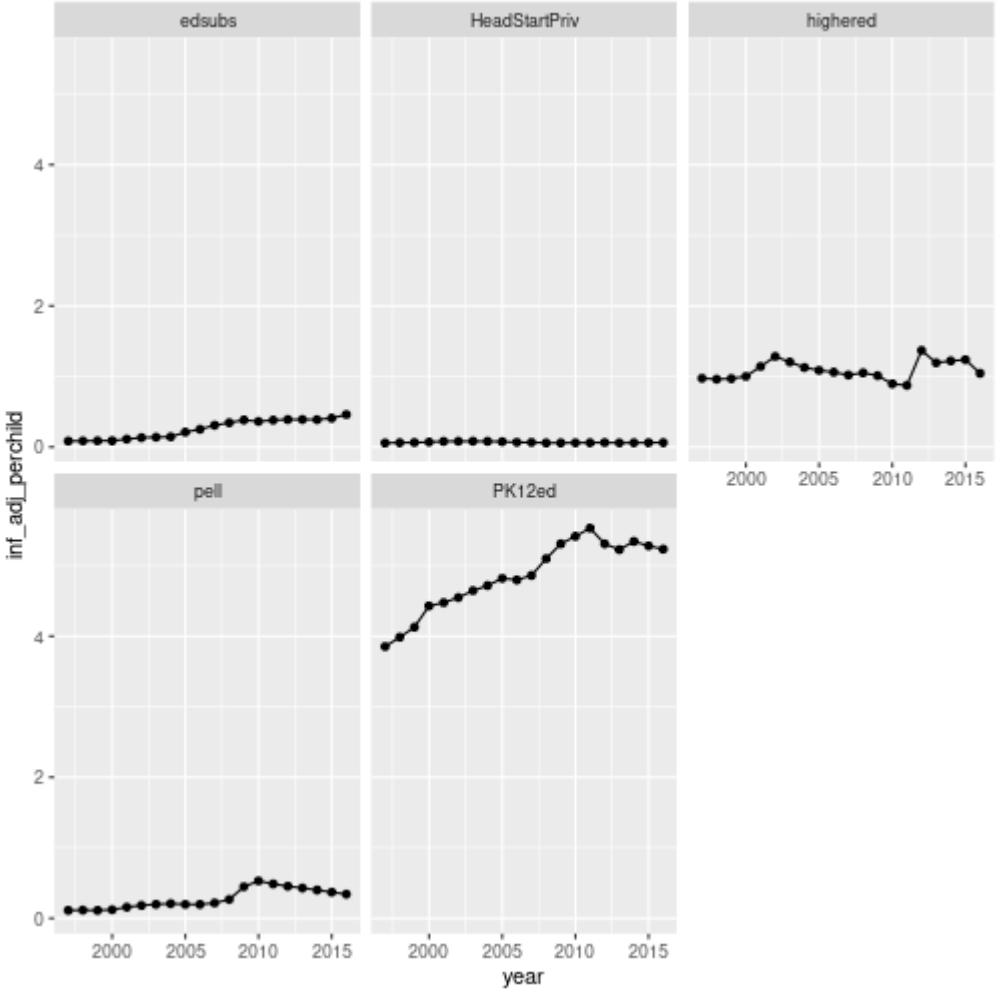


C. Faceting plots

Variables of spending faceted

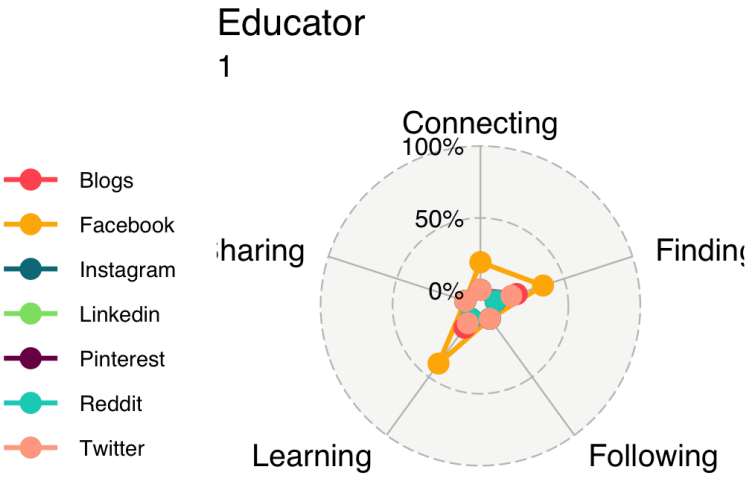
```
tidykids %>%
  filter(state == "Tennessee",
         variable %in% c("HeadStartPriv", "highered", "PK12ed", "pell", "edserv", "edsubs")) %>%
  group_by(year) %>%
  ggplot(aes(x = year, y = inf_adj_perchild)) +
  geom_point() +
  geom_line() +
  facet_wrap(~variable)
```

C. Faceting plots



Where to next with respect to data viz?

- Interactive visualizations?
    - gganimate: https://gganimate.com/articles/gganimate.html
    - magick: https://cran.r-project.org/web/packages/magick/vignettes/intro.html
    - Shiny: https://shiny.rstudio.com
- Books:
    - https://socviz.co/
    - https://clauswilke.com/dataviz
- Resources
    - http://rweekly.org/
    - https://github.com/rfordatascience/tidytuesday; #tidytuesday on Twitter


Educator
1
Connecting
100%
50%
0%
haring
Findin
Learning
Following
Blogs
Facebook
Instagram
Linkedin
Pinterest
Reddit
Twitter

This week

- Homework 5: Available Thursday (combination of previous HWs 5 and 6)
    - Theming with color
    - Stacking and dodging
    - Faceting
- Readings
    - https://r4ds.had.co.nz/graphics-for-communication.html
    - https://clauswilke.com/dataviz/figure-titles-captions.html
    - https://clauswilke.com/dataviz/color-pitfalls.html

Wrapping up

On Slack channel:

- What is one thing you learned today?
- What is something you want to learn more about?
- Share your feelings in GIF form!

We really appreciate being able to see these reactions and get this feedback!