

Gov 50: 5. Data Wrangling and Barplots

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Roadmap

1. Operating on rows
2. Operating on columns
3. Operating on groups
4. Creating barplots

Local news data

- How does station ownership affect local news coverage?
- Martin and McCrain (2019) use data on local news at TV stations before and after a large acquisition by a conglomerate.

Variable	Description
callsign	Callsign of the station
affiliation	Network affiliation of the station
date	Airdate of news
weekday	Day of the week of airdate
ideology	Measure of news slant (bigger is more conservative)
national_politics	Avg proportion of segments on national politics
local_politics	Avg proportion of segments on local politics
sinclair2017	Station acquired by Sinclair group in Sept 2017
post	Date is before/after acquisition (0/1)

```
library(gov50data)
data(news)
news
```

```
## # A tibble: 3,137 x 10
##   callsign affil~1 date      weekday ideol~2 natio~3 local~4 sincl~5
##   <chr>      <chr>   <date>      <ord>      <dbl>    <dbl>    <dbl>    <dbl>
## 1 KRBC      NBC     2017-06-05 Mon      NA        0.0286   0.0190     0
## 2 KTAB      CBS     2017-06-05 Mon      NA        0.0286   0.0190     0
## 3 KXVA      FOX     2017-06-05 Mon      NA        0.0393   0.0262     0
## 4 KPAX      CBS     2017-06-06 Tue      NA        0.00357  0.194      0
## 5 KTAB      CBS     2017-06-06 Tue      NA        0.0945   0.109      0
## 6 KECI      NBC     2017-06-07 Wed      0.0655  0.225      0.148      1
## 7 KPAX      CBS     2017-06-07 Wed      0.0853  0.283      0.123      0
## 8 KRBC      NBC     2017-06-07 Wed      0.0183  0.130      0.189      0
## 9 KTAB      CBS     2017-06-07 Wed      0.0850  0.0901     0.138      0
## 10 KTMF      ABC     2017-06-07 Wed      0.0842  0.152      0.129      0
## # ... with 3,127 more rows, 2 more variables: post <dbl>,
## #   month <ord>, and abbreviated variable names 1: affiliation,
## #   2: ideology, 3: national_politics, 4: local_politics,
## #   5: sinclair2017
```

1/ Operating on rows

slice()

slice() can give you a specific set of rows:

```
## first and third row
news |>
  slice(1, 3)
```

```
## # A tibble: 2 x 10
##   callsign affili~1 date      weekday ideol~2 natio~3 local~4 sincl~5
##   <chr>      <chr>    <date>    <ord>    <dbl>    <dbl>    <dbl>    <dbl>
## 1 KRBC      NBC      2017-06-05 Mon      NA    0.0286    0.0190      0
## 2 KXVA      FOX      2017-06-05 Mon      NA    0.0393    0.0262      0
## # ... with 2 more variables: post <dbl>, month <ord>, and abbreviated
## #   variable names 1: affiliation, 2: ideology, 3: national_politics,
## #   4: local_politics, 5: sinclair2017
```

You can ask for a range of rows with `start:stop` syntax:

```
## first three rows
news |>
  slice(1:3)
```

```
## # A tibble: 3 x 10
##   callsign affili~1 date      weekday ideol~2 natio~3 local~4 sincl~5
##   <chr>      <chr>   <date>    <ord>    <dbl>   <dbl>   <dbl>   <dbl>
## 1 KRBC      NBC     2017-06-05 Mon      NA    0.0286  0.0190    0
## 2 KTAB      CBS     2017-06-05 Mon      NA    0.0286  0.0190    0
## 3 KXVA      FOX     2017-06-05 Mon      NA    0.0393  0.0262    0
## # ... with 2 more variables: post <dbl>, month <ord>, and abbreviated
## #   variable names 1: affiliation, 2: ideology, 3: national_politics,
## #   4: local_politics, 5: sinclair2017
```

slice_max()

`slice_max(var, n = 5)` will return the top 5 observations on column `var`

```
news |>
  slice_max(ideology, n = 5)
```

```
## # A tibble: 5 x 10
##   callsign affili~1 date       weekday ideol~2 natio~3 local~4 sincl~5
##   <chr>      <chr>    <date>      <ord>    <dbl>    <dbl>    <dbl>    <dbl>
## 1 KAEF      ABC      2017-06-19 Mon      0.778    0.0823    0.179      1
## 2 WYDO      FOX      2017-07-19 Wed      0.580    0.126     0.121      1
## 3 KRCR      ABC      2017-10-03 Tue      0.566    0.123     0.192      1
## 4 KAEF      ABC      2017-10-18 Wed      0.496    0.0892    0.217      1
## 5 KBVU      FOX      2017-11-16 Thu      0.491    0.159     0.184      1
## # ... with 2 more variables: post <dbl>, month <ord>, and abbreviated
## #   variable names 1: affiliation, 2: ideology, 3: national_politics,
## #   4: local_politics, 5: sinclair2017
```


slice_min()

`slice_min(var, n = 5)` will return the bottom 5 observations on column `var`

```
news |>
  slice_min(ideology, n = 5)
```

```
## # A tibble: 5 x 10
##   callsign affili~1 date       weekday ideol~2 natio~3 local~4 sincl~5
##   <chr>    <chr>    <date>    <ord>    <dbl>    <dbl>    <dbl>    <dbl>
## 1 KRBC     NBC      2017-10-19 Thu      -0.674    0.0731    0.161      0
## 2 WJHL     CBS      2017-12-08 Fri      -0.673    0.0364    0.206      0
## 3 KRBC     NBC      2017-10-18 Wed      -0.586    0.0470    0.135      0
## 4 KCVU     FOX       2017-06-22 Thu      -0.414    0.158     0.172      1
## 5 KRBC     NBC      2017-12-11 Mon      -0.365    0.0674    0.163      0
## # ... with 2 more variables: post <dbl>, month <ord>, and abbreviated
## #   variable names 1: affiliation, 2: ideology, 3: national_politics,
## #   4: local_politics, 5: sinclair2017
```

2/ Operating on columns

rename()

`rename(new_name = old_name)` renames the `old_name` variable to `new_name`

```
news |>
  rename(call_sign = callsign)
```

```
## # A tibble: 3,137 x 10
##   call_s~1 affil~2 date       weekday ideol~3 natio~4 local~5 sincl~6
##   <chr>      <chr>   <date>      <ord>      <dbl>    <dbl>    <dbl>    <dbl>
## 1 KRBC      NBC     2017-06-05 Mon      NA        0.0286   0.0190    0
## 2 KTAB      CBS     2017-06-05 Mon      NA        0.0286   0.0190    0
## 3 KXVA      FOX     2017-06-05 Mon      NA        0.0393   0.0262    0
## 4 KPAX      CBS     2017-06-06 Tue      NA        0.00357  0.194     0
## 5 KTAB      CBS     2017-06-06 Tue      NA        0.0945   0.109     0
## 6 KECI      NBC     2017-06-07 Wed      0.0655  0.225     0.148     1
## 7 KPAX      CBS     2017-06-07 Wed      0.0853  0.283     0.123     0
## 8 KRBC      NBC     2017-06-07 Wed      0.0183  0.130     0.189     0
## 9 KTAB      CBS     2017-06-07 Wed      0.0850  0.0901    0.138     0
## 10 KTMF     ABC     2017-06-07 Wed      0.0842  0.152     0.129     0
## # ... with 3,127 more rows, 2 more variables: post <dbl>,
## #   month <ord>, and abbreviated variable names 1: call_sign,
## #   2: affiliation, 3: ideology, 4: national_politics,
## #   5: local_politics, 6: sinclair2017
```

mutate()

`mutate(new_var = fun(old_vars))` adds new columns that are functions of existing columns.

```
news |>
  mutate(
    national_local_diff = national_politics - local_politics,
    national_politics_perc = national_politics * 100
  ) |>
  select(callsign, date, national_politics, local_politics,
         national_local_diff, national_politics_perc)
```

```
## # A tibble: 3,137 x 6
```

##	callsign	date	national_politics	local_politics	national_local_diff	national_politics_perc
##	<chr>	<date>	<dbl>	<dbl>	<dbl>	<dbl>
## 1	KRBC	2017-06-05	0.0286	0.0190	0.00952	2.86
## 2	KTAB	2017-06-05	0.0286	0.0190	0.00952	2.86
## 3	KXVA	2017-06-05	0.0393	0.0262	0.0131	3.93
## 4	KPAX	2017-06-06	0.00357	0.194	-0.191	0.357
## 5	KTAB	2017-06-06	0.0945	0.109	-0.0145	9.45
## 6	KECI	2017-06-07	0.225	0.148	0.0761	22.5
## 7	KPAX	2017-06-07	0.283	0.123	0.160	28.3
## 8	KRBC	2017-06-07	0.130	0.189	-0.0589	13.0
## 9	KTAB	2017-06-07	0.0901	0.138	-0.0476	9.01
## 10	KTMF	2017-06-07	0.152	0.129	0.0229	15.2

```
## # ... with 3,127 more rows
```

if_else()

`if_else(test_condition, yes, no)` allows us to create a vector that depends on a logical

New vector gets `yes` expression when `test_condition` is `TRUE`, no otherwise

```
news |>
  mutate(Ownership = if_else(sinclair2017 == 1,
                             "Acquired by Sinclair",
                             "Not Acquired")) |>
  select(callsign, affiliation, date, Ownership)
```

```
## # A tibble: 3,137 x 4
##   callsign affiliation date      Ownership
##   <chr>      <chr>      <date>      <chr>
## 1 KRBC      NBC        2017-06-05 Not Acquired
## 2 KTAB      CBS        2017-06-05 Not Acquired
## 3 KXVA      FOX        2017-06-05 Not Acquired
## 4 KPAX      CBS        2017-06-06 Not Acquired
## 5 KTAB      CBS        2017-06-06 Not Acquired
## 6 KECI      NBC        2017-06-07 Acquired by Sinclair
## 7 KPAX      CBS        2017-06-07 Not Acquired
## 8 KRBC      NBC        2017-06-07 Not Acquired
## 9 KTAB      CBS        2017-06-07 Not Acquired
## 10 KTMF     ABC        2017-06-07 Not Acquired
## # ... with 3,127 more rows
```


3/ Operating on groups

group_by()

`group_by(var)` divides the data into groups based on the `var` variable.

Doesn't change data yet, but subsequent operations will be by `var`.

```
news |>
  group_by(month)
```

```
## # A tibble: 3,137 x 10
## # Groups:   month [7]
##   callsign affil~1 date      weekday ideol~2 natio~3 local~4 sincl~5
##   <chr>      <chr> <date>      <ord>      <dbl>    <dbl>    <dbl>    <dbl>
## 1 KRBC      NBC    2017-06-05 Mon      NA        0.0286    0.0190    0
## 2 KTAB      CBS    2017-06-05 Mon      NA        0.0286    0.0190    0
## 3 KXVA      FOX    2017-06-05 Mon      NA        0.0393    0.0262    0
## 4 KPAX      CBS    2017-06-06 Tue      NA        0.00357   0.194     0
## 5 KTAB      CBS    2017-06-06 Tue      NA        0.0945    0.109     0
## 6 KECI      NBC    2017-06-07 Wed      0.0655    0.225     0.148     1
## 7 KPAX      CBS    2017-06-07 Wed      0.0853    0.283     0.123     0
## 8 KRBC      NBC    2017-06-07 Wed      0.0183    0.130     0.189     0
## 9 KTAB      CBS    2017-06-07 Wed      0.0850    0.0901    0.138     0
## 10 KTMF     ABC    2017-06-07 Wed      0.0842    0.152     0.129     0
## # ... with 3,127 more rows, 2 more variables: post <dbl>,
## #   month <ord>, and abbreviated variable names 1: affiliation,
## #   2: ideology, 3: national_politics, 4: local_politics,
## #   5: sinclair2017
```

summarize()

`summarize(sum_var = fun(curr_var))` calculates summaries of variables by groups.

Ideological slant by weekday

```
news |>
  group_by(month) |>
  summarize(
    slant_mean = mean(ideology, na.rm = TRUE)
  )
```

```
## # A tibble: 7 x 2
##   month slant_mean
##   <ord>     <dbl>
## 1 Jun      0.0786
## 2 Jul      0.103
## 3 Aug      0.105
## 4 Sep      0.0751
## 5 Oct      0.0862
## 6 Nov      0.0972
## 7 Dec      0.0774
```

Summaries by ownership and pre/post

```
news |>
  group_by(sinclair2017, post) |>
  summarize(
    slant_mean = mean(ideology, na.rm = TRUE),
    national_mean = mean(national_politics, na.rm = TRUE)
  )
```

```
## # A tibble: 4 x 4
## # Groups:   sinclair2017 [2]
##   sinclair2017 post slant_mean national_mean
##         <dbl> <dbl>         <dbl>         <dbl>
## 1           0     0         0.100         0.118
## 2           0     1         0.0768        0.107
## 3           1     0         0.0936        0.124
## 4           1     1         0.0938        0.144
```

Summarize across types of variables

`across()` will apply a summary function across many variables

```
news |>
  group_by(sinclair2017, post) |>
  summarize(
    across(where(is.numeric), mean, na.rm = TRUE),
  )
```

```
## # A tibble: 4 x 5
## # Groups:   sinclair2017 [2]
##   sinclair2017 post ideology national_politics local_politics
##           <dbl> <dbl>      <dbl>           <dbl>           <dbl>
## 1             0     0    0.100             0.118             0.158
## 2             0     1    0.0768            0.107             0.150
## 3             1     0    0.0936            0.124             0.170
## 4             1     1    0.0938            0.144             0.147
```

kable() to produce nice tables

```
news |>
  group_by(month) |>
  summarize(
    slant_mean = mean(ideology, na.rm = TRUE)
  ) |>
  knitr::kable()
```

month	slant_mean
Jun	0.079
Jul	0.103
Aug	0.105
Sep	0.075
Oct	0.086
Nov	0.097
Dec	0.077

Giving nicer column names

```
news |>
  group_by(month) |>
  summarize(
    slant_mean = mean(ideology, na.rm = TRUE)
  ) |>
  knitr::kable(col.names = c("Month", "Avg. Slant"))
```

Month	Avg. Slant
Jun	0.079
Jul	0.103
Aug	0.105
Sep	0.075
Oct	0.086
Nov	0.097
Dec	0.077

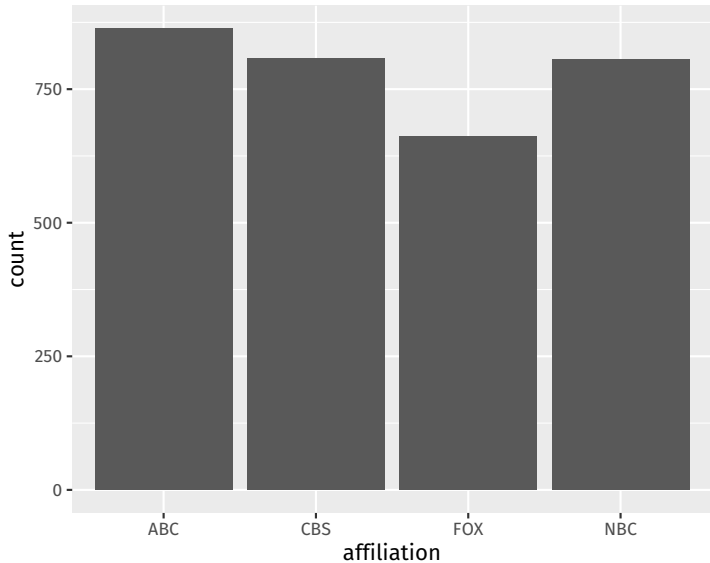
4/ Creating barplots

Combining our skills

Let's combine our tools to produce a bar plot with `geom_bar()`

By default, bar plots take a single variable and show the number of observations in each category.

```
ggplot(news, mapping = aes(x = affiliation)) +  
  geom_bar()
```



Barplots of non-counts

Barplots can represent a lot beyond counts, including variables in our dataset or group summaries.

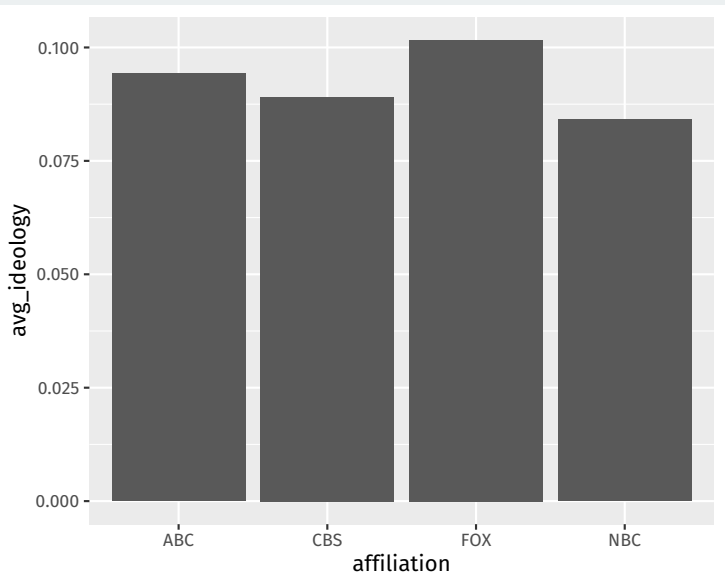
When the height of the bar is another variable in our data and not just a count, we set the x and y aesthetics and use `geom_col()` instead of `geom_bar()`.

Let's create a group summary:

```
aff_ideology_means <- news |>
  group_by(affiliation) |>
  summarize(avg_ideology = mean(ideology, na.rm = TRUE))
aff_ideology_means
```

```
## # A tibble: 4 x 2
##   affiliation avg_ideology
##   <chr>         <dbl>
## 1 ABC           0.0943
## 2 CBS           0.0891
## 3 FOX           0.102
## 4 NBC           0.0841
```

```
ggplot(aff_ideology_means, aes(x = affiliation, y = avg_ideology)) +
  geom_col()
```



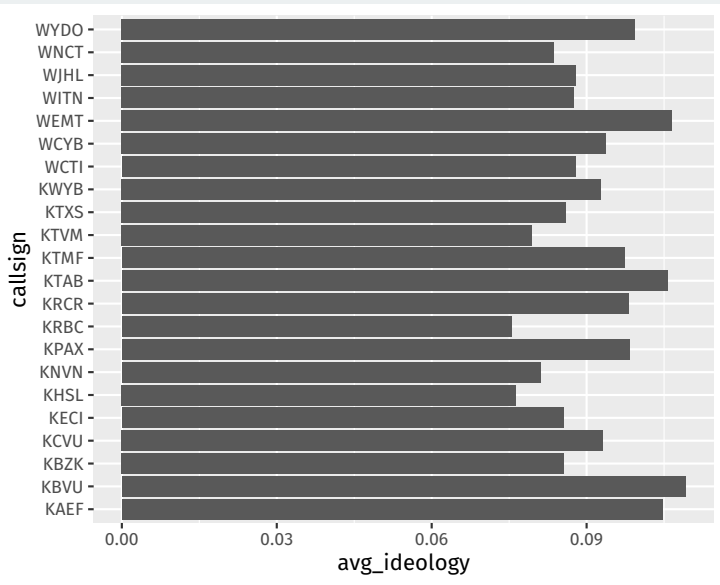
A more complicated example

Let's create a barplot that shows the top 10 stations in terms of slant. First, let's get the data:

```
station_ideology <- news |>
  group_by(callsign, affiliation) |>
  summarize(avg_ideology = mean(ideology, na.rm = TRUE)) |>
  slice_max(avg_ideology, n = 20)
```



```
ggplot(station_ideology, aes(x = avg_ideology, y = callsign)) +  
  geom_col()
```

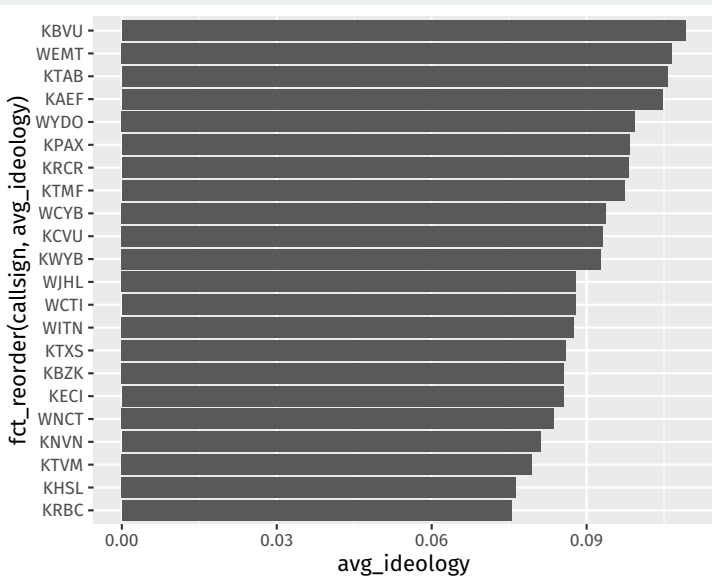


How do we reorder the stations?

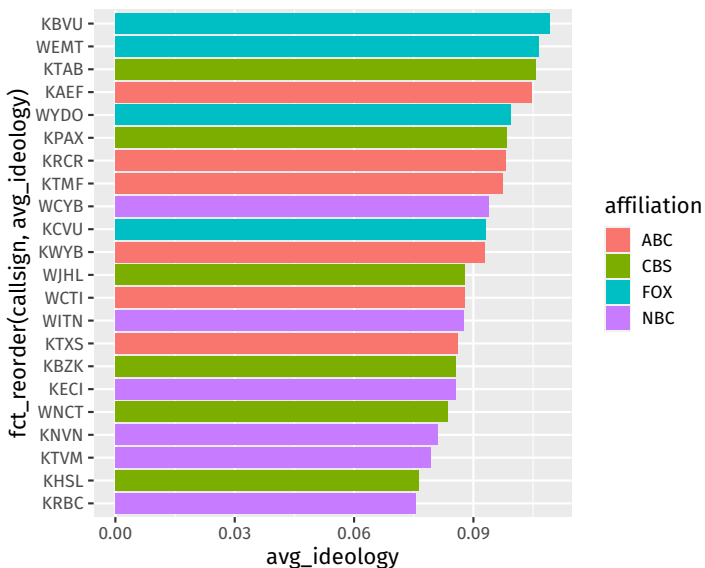
We would like to order the stations by ideology.

`fct_reorder(group, order_var)` function (loaded with tidyverse) will reorder the groups by the order bar (low to high). Easiest to put this in the mapping.

```
ggplot(station_ideology,
       mapping = aes(x = avg_ideology,
                     y = fct_reorder(callsign, avg_ideology))) +
  geom_col()
```



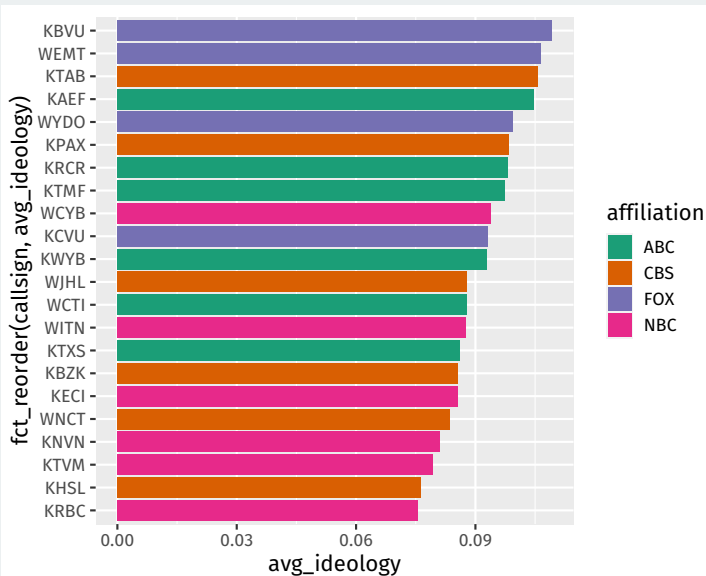
```
ggplot(station_ideology,
       mapping = aes(x = avg_ideology,
                     y = fct_reorder(callsign, avg_ideology))) +
  geom_col(mapping = aes(fill = affiliation))
```



Setting the color palette

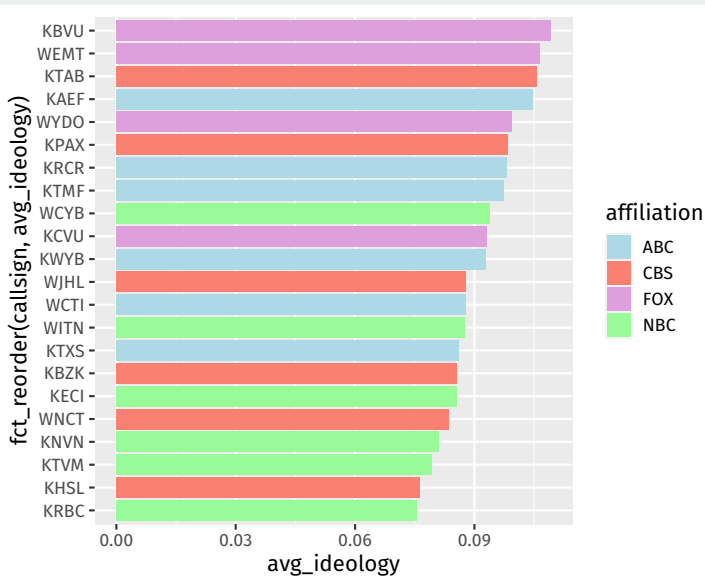
We can use color palettes from a project called ColorBrewer

```
ggplot(station_ideology,  
  mapping = aes(x = avg_ideology,  
                y = fct_reorder(callsign, avg_ideology))) +  
  geom_col(mapping = aes(fill = affiliation)) +  
  scale_fill_brewer(palette = "Dark2")
```



Manually setting the color palette

```
ggplot(station_ideology,  
  mapping = aes(x = avg_ideology,  
                 y = fct_reorder(callsign, avg_ideology))) +  
  geom_col(mapping = aes(fill = affiliation)) +  
  scale_fill_manual(values = c(ABC = "lightblue",  
                               CBS = "salmon",  
                               FOX = "plum",  
                               NBC = "palegreen"))
```



Fun with colors

Other packages provide more palettes:

```
library(wesanderson)
ggplot(station_ideology,
       mapping = aes(x = avg_ideology,
                     y = fct_reorder(callsign, avg_ideology))) +
  geom_col(mapping = aes(fill = affiliation)) +
  scale_fill_manual(values = wes_palette("Moonrise3"))
```

