Week 7: *Factors, Amounts, & Proportions*

EMSE 4572 / 6572: Exploratory Data Analysis

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October 11, 2022

Next projects due:

- Mini project 2: Exploring Data (Due 10/17)
- Project Progress Report (Due 10/29)

Today's data

```r
avengers         <- read_csv(here('data', 'avengers.csv'))
bears            <- read_csv(here('data', 'north_america_bear_killings.csv'))
federal_spending <- read_csv(here('data', 'fed_spend_long.csv'))
gapminder        <- read_csv(here('data', 'gapminder.csv'))
lotr_words       <- read_csv(here('data', 'lotr_words.csv'))
milk_production  <- read_csv(here('data', 'milk_production.csv'))
wildlife_impacts <- read_csv(here('data', 'wildlife_impacts.csv'))
```

New packages

The {waffle} package

```r
install.packages("waffle")
```

Week 7: *Factors, Amounts, & Proportions*

1. Manipulating factors

2. Graphing amounts

BREAK

3. Graphing proportions

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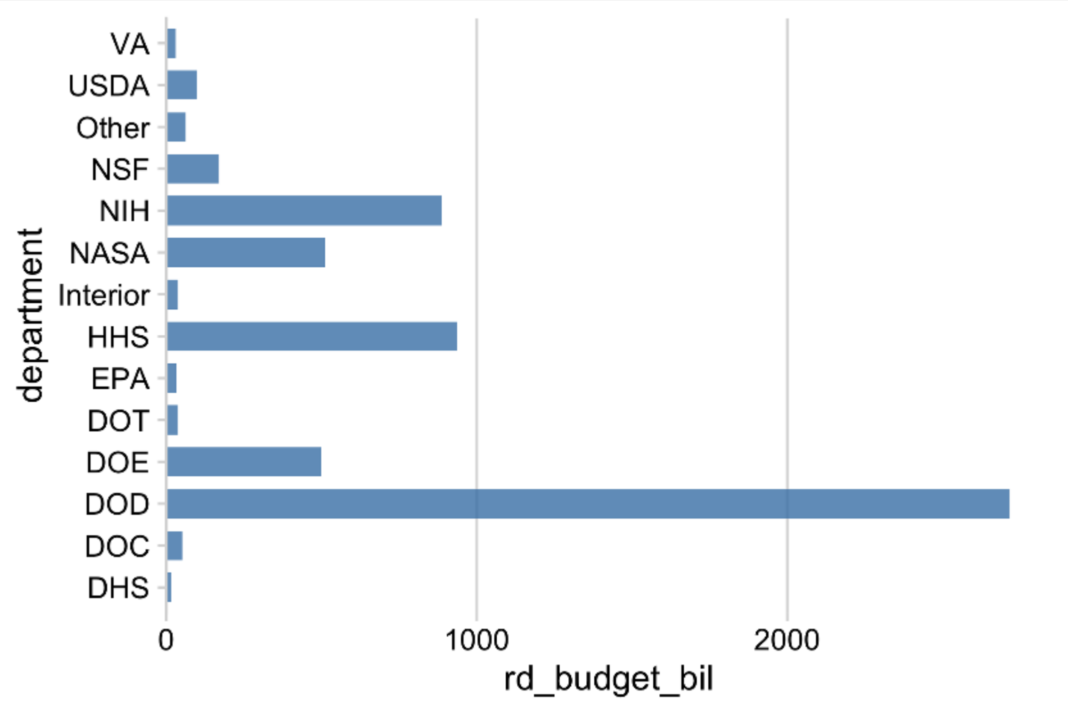
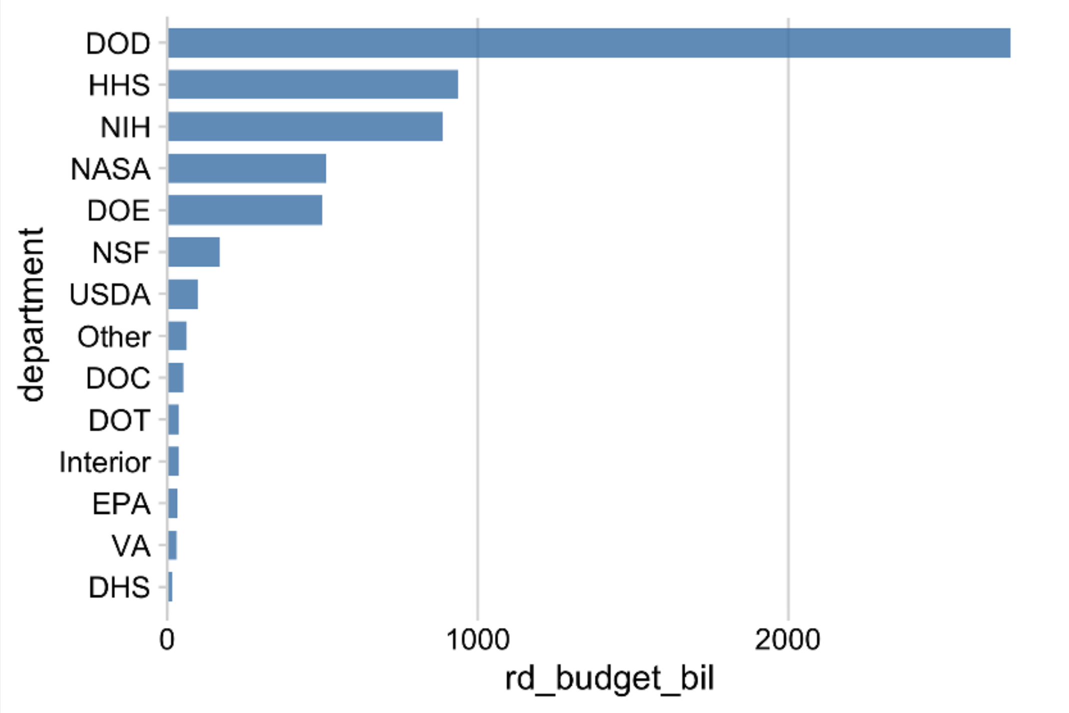
Sorting in ggplot is done by reordering factors

✗



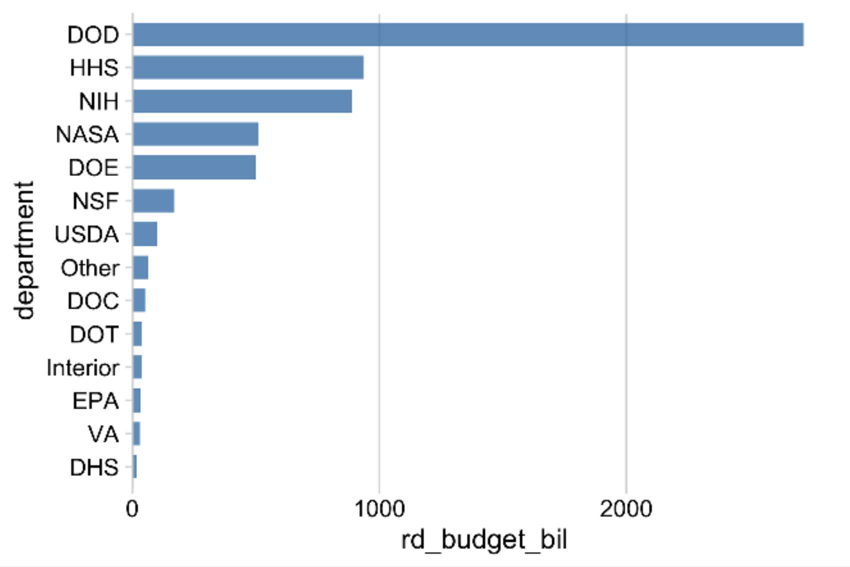
✓



Two ways to sort

Method 1: Use `reorder()` inside aesthetic mapping

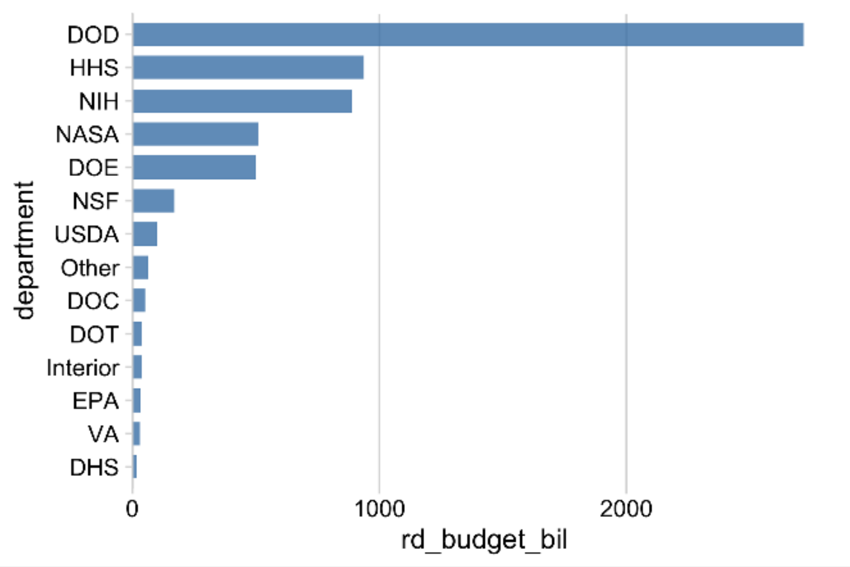
```
# Format the data frame
federal_spending %>%
  group_by(department) %>%
  summarise(
    rd_budget_bil = sum(rd_budget_mil) / 10^3) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(
      x = rd_budget_bil,
      y = reorder(department, rd_budget_bil)
    ),
    width = 0.7, alpha = 0.8,
    fill = "steelblue"
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



Two ways to sort

Method 2: Use `fct_reorder()` when formatting the data frame

```r
# Format the data frame
federal_spending %>%
  group_by(department) %>%
  summarise(
    rd_budget_bil = sum(rd_budget_mil) / 10^3) %>%
  mutate(
    department = fct_reorder(department, rd_budget_bil)
  ) %>%
# Make the chart
  ggplot() +
  geom_col(
    aes(x = rd_budget_bil, y = department),
    width = 0.7, alpha = 0.8,
    fill = "steelblue"
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



Reorder & modify factors with the **forcats** library

Loaded with `library(tidyverse)`

Common situations for modifying / reording factors:

1. Reorder factors based on another numerical variable

2. Reorder factors manually

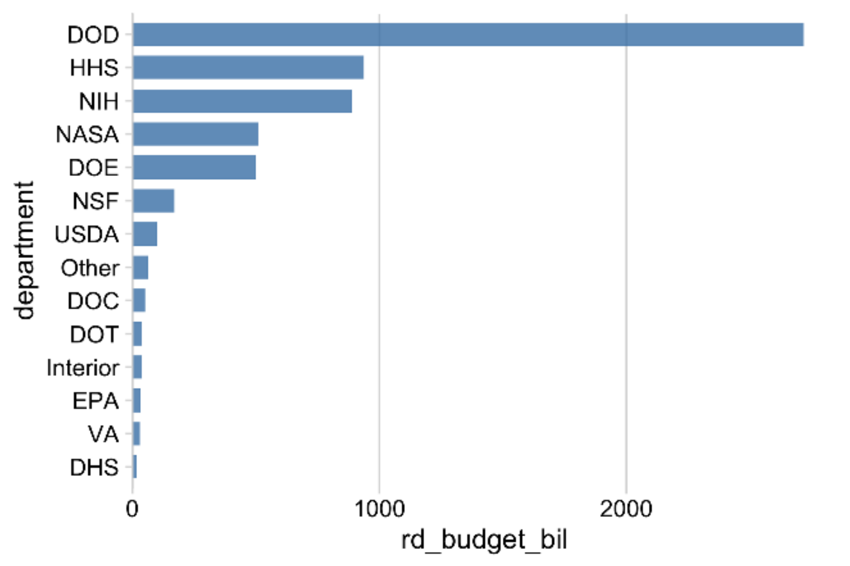
3. Modify factors manually

4. What if there are too many factor levels?

1. Reorder factors based on another **numerical variable**

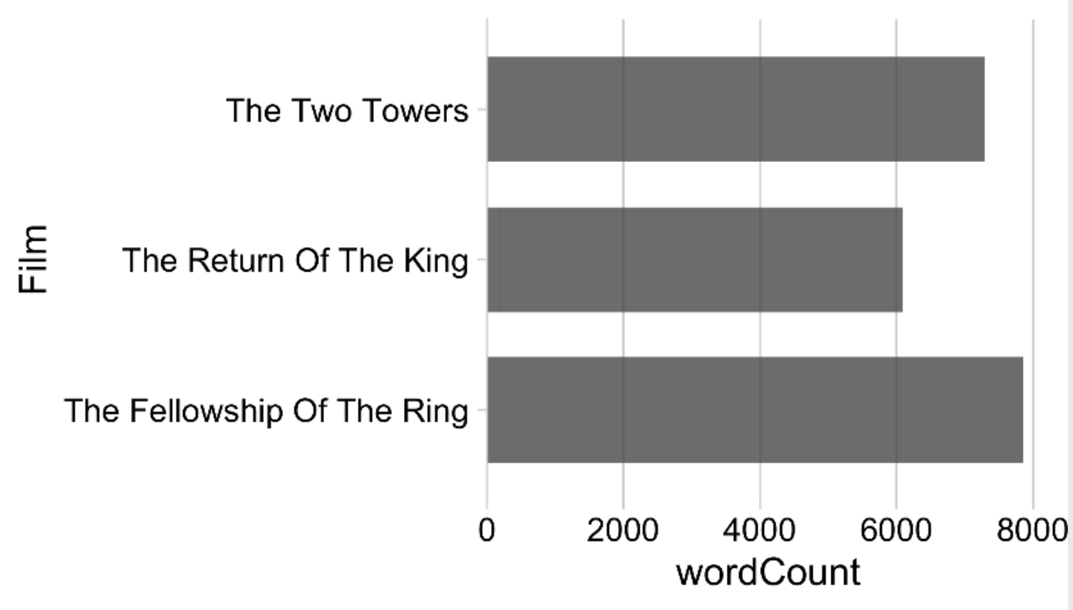
Use `fct_reorder()`

```
# Format the data frame
federal_spending %>%
  group_by(department) %>%
  summarise(
    rd_budget_bil = sum(rd_budget_mil) / 10^3) %>%
  mutate(
    department = fct_reorder(department, rd_budget_bil)
  ) %>%
# Make the chart
  ggplot() +
  geom_col(
    aes(x = rd_budget_bil, y = department),
    width = 0.7, alpha = 0.8,
    fill = "steelblue"
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



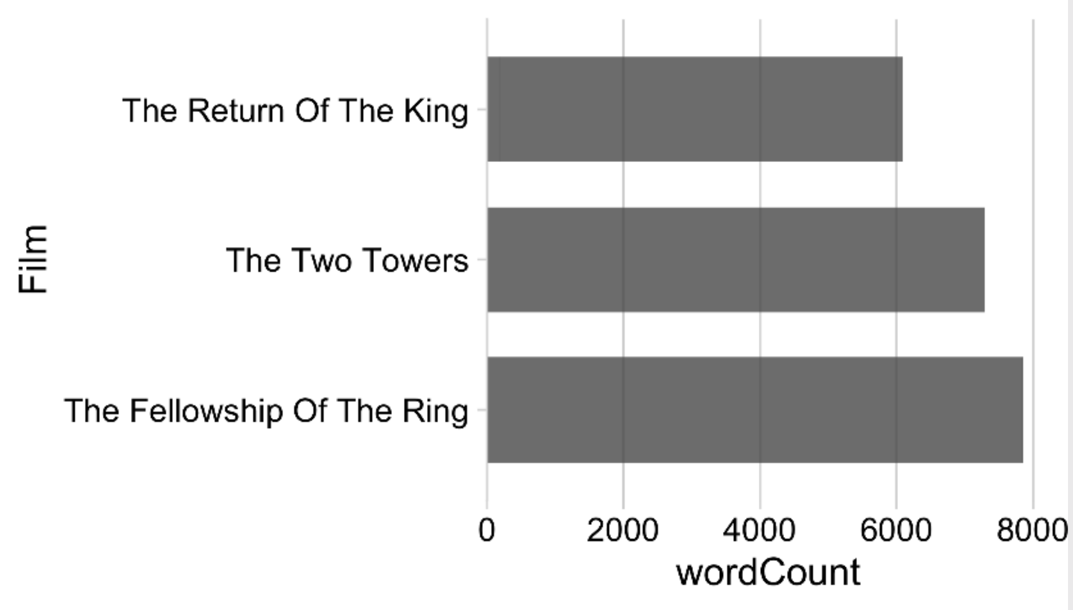
2. Reorder factors **manually**

```
# Format the data frame
lotr_words %>%
  pivot_longer(
      names_to = 'gender',
      values_to = 'wordCount',
      cols = Female:Male) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = wordCount, y = Film),
    width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



2. Reorder factors **manually** with `fct_relevel()`

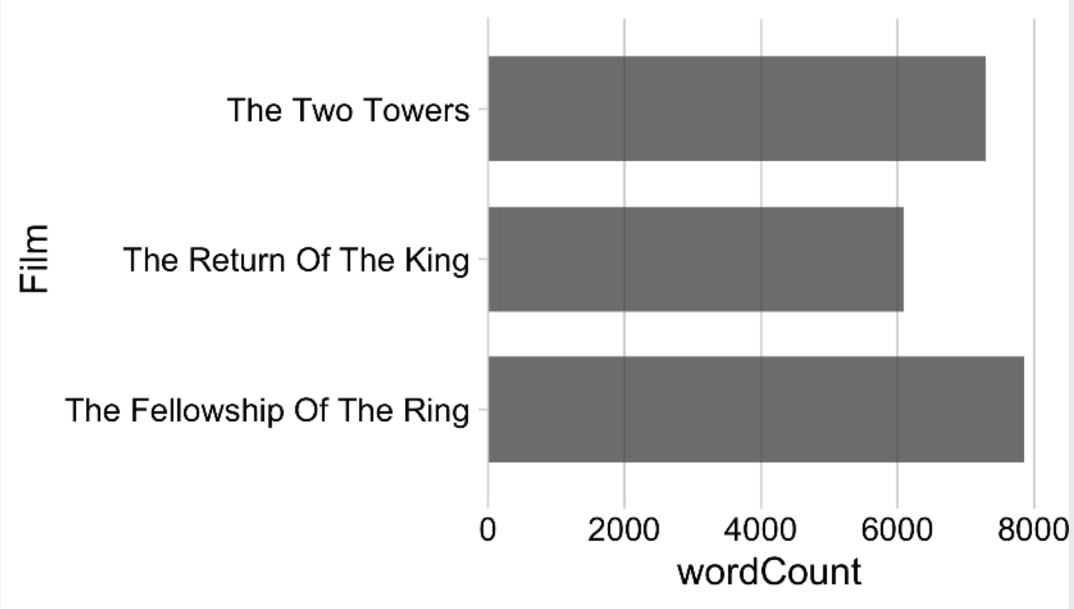
```r
# Format the data frame
lotr_words %>%
  pivot_longer(
      names_to = 'gender',
      values_to = 'wordCount',
      cols = Female:Male) %>%
  mutate(
    Film = fct_relevel(Film, levels = c(
      'The Fellowship Of The Ring',
      'The Two Towers',
      'The Return Of The King'))) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = wordCount, y = Film),
    width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



3. Modify factors manually

```
# Format the data frame
lotr_words %>%
  pivot_longer(
      names_to = 'gender',
      values_to = 'wordCount',
      cols = Female:Male) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = wordCount, y = Film),
    width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```

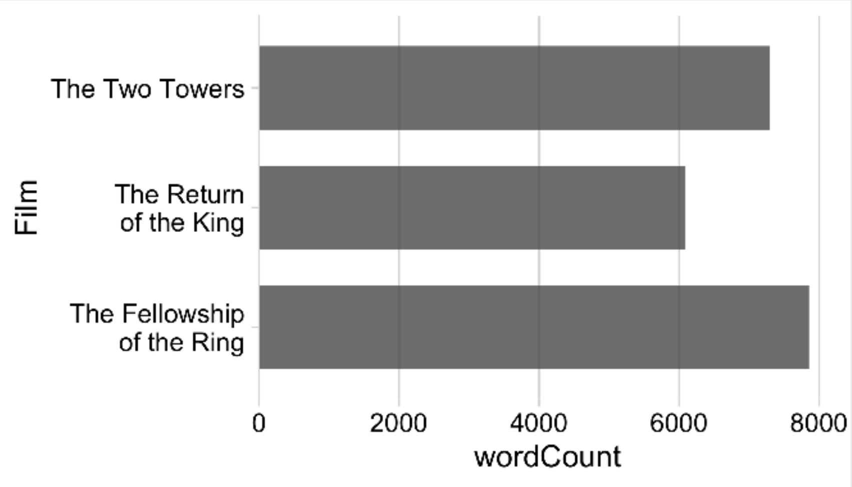
The film names here are too long



3. Modify factors manually with `fct_recode()`

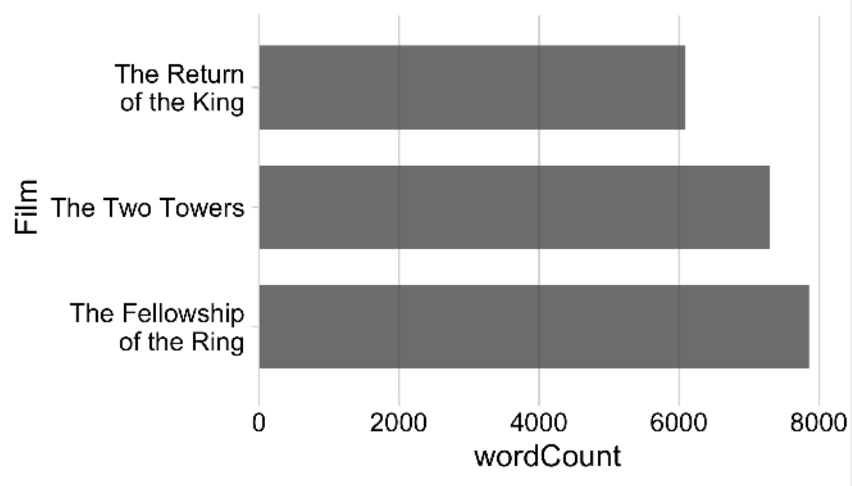
`"new label" = "old label"`

```
# Format the data frame
lotr_words %>%
  pivot_longer(
      names_to = 'gender',
      values_to = 'wordCount',
      cols = Female:Male) %>%
  mutate(
    Film = fct_recode(Film,
      'The Fellowship\nof the Ring' = 'The Fellowship Of
      'The Return\nof the King' = 'The Return Of The Kin

# Make the chart
  ggplot() +
  geom_col(
    aes(x = wordCount, y = Film),
    width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



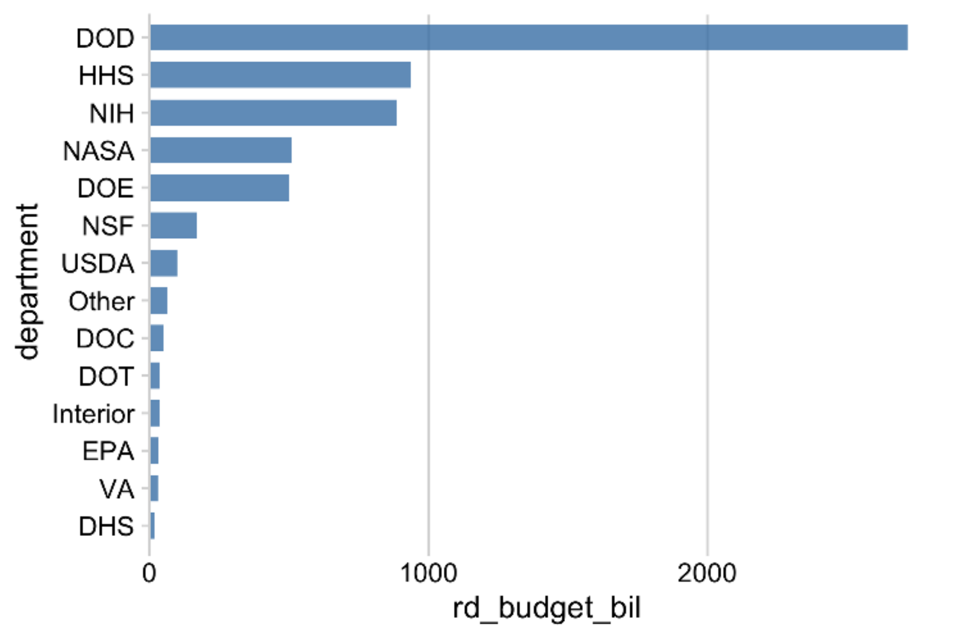
2 & 3. Modify and reorder factors manually

```
# Format the data frame
lotr_words %>%
  pivot_longer(
      names_to = 'gender',
      values_to = 'wordCount',
      cols = Female:Male) %>%
  mutate(
    Film = fct_relevel(Film, levels = c(
      'The Fellowship Of The Ring',
      'The Two Towers',
      'The Return Of The King')),
    Film = fct_recode(Film,
      'The Fellowship\nof the Ring' = 'The Fellowship Of
      'The Return\nof the King' = 'The Return Of The Kin

# Make the chart
  ggplot() +
  geom_col(
      aes(x = wordCount, y = Film),
      width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



4. What if there are too many factor levels?

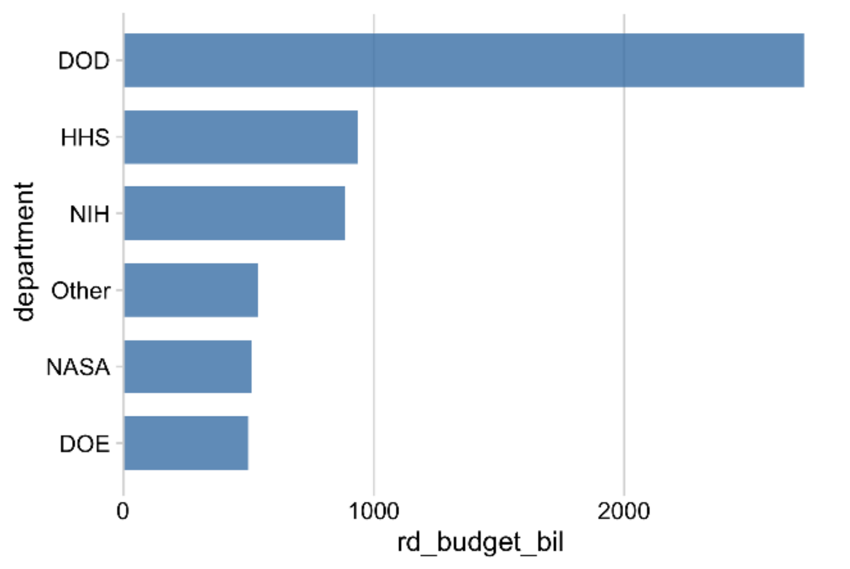
```
# Format the data frame
federal_spending %>%
  group_by(department) %>%
  summarise(
    rd_budget_bil = sum(rd_budget_mil) / 10^3) %>%
  mutate(
    department = fct_reorder(department, rd_budget_
  ) %>%
# Make the chart
  ggplot() +
  geom_col(
    aes(x = rd_budget_bil, y = department),
    width = 0.7, alpha = 0.8,
    fill = "steelblue"
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



4. What if there are too many factor levels?

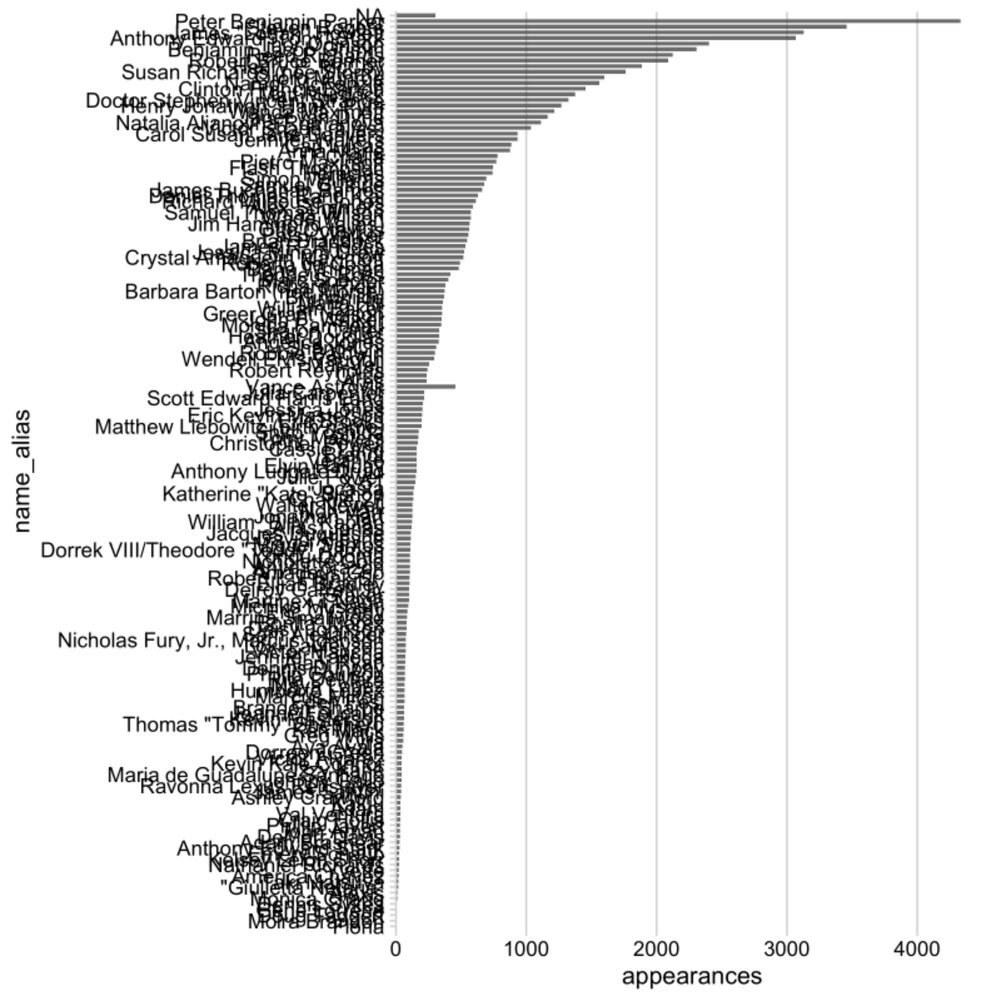
Strategy: Merge smaller factors into "Other" with `fct_other()`

```
# Format the data frame
federal_spending %>%
  mutate(
    department = fct_other(department,
      keep = c('DOD', 'HHS', 'NIH', 'NASA', 'DOE'))) %>%
  group_by(department) %>%
  summarise(
    rd_budget_bil = sum(rd_budget_mil) / 10^3) %>%
  mutate(
    department = fct_reorder(department, rd_budget_bil))

# Make the chart
  ggplot() +
  geom_col(
    aes(x = rd_budget_bil, y = department),
    width = 0.7, alpha = 0.8,
    fill = "steelblue"
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



4. What if there are *really* too many factor levels?

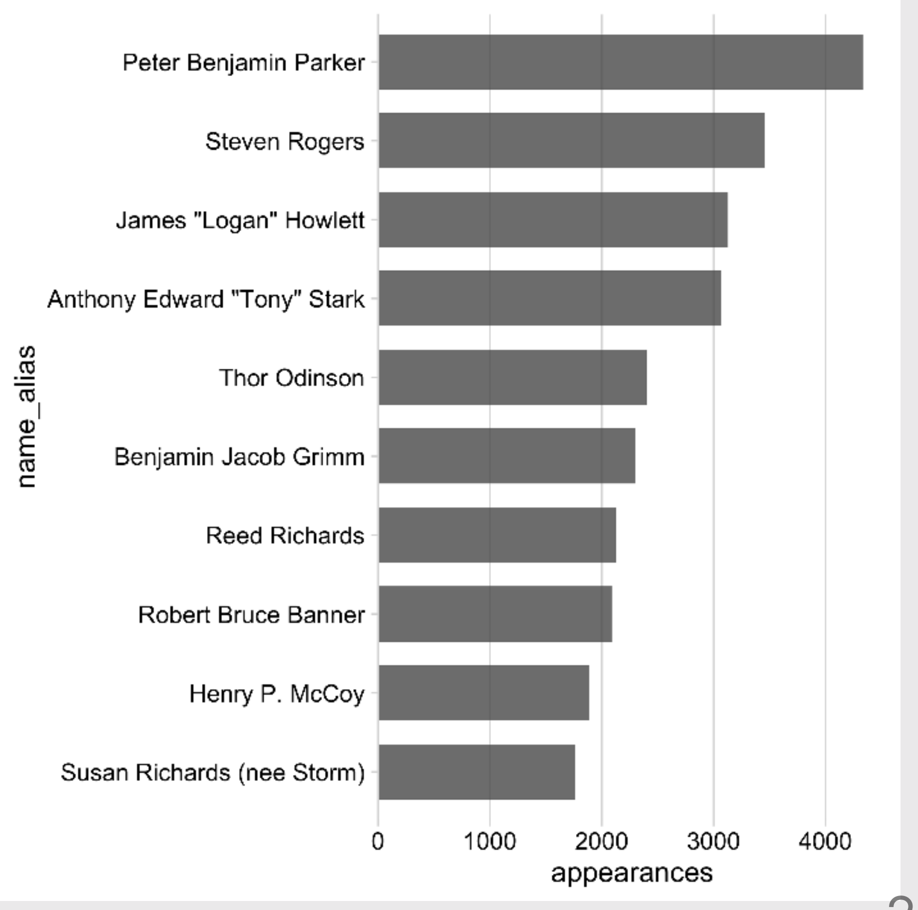
```
# Format the data frame
avengers %>%
  mutate(
    name_alias = fct_reorder(name_alias, appear

# Make the chart
  ggplot() +
  geom_col(
    aes(x = appearances,y = name_alias),
    width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



4. What if there are *really* too many factor levels?

Strategy: Keep top N, drop the rest with `slice()`

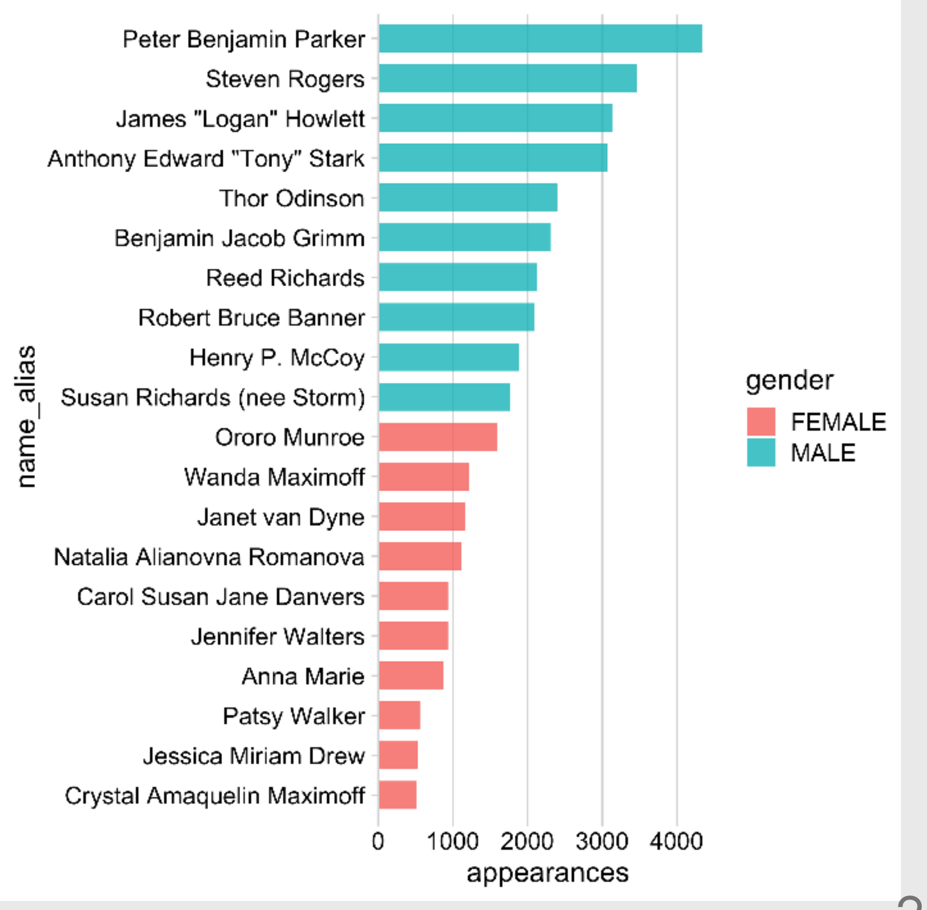
```
# Format the data frame
avengers %>%
  mutate(
    name_alias = fct_reorder(name_alias, appear
  arrange(desc(appearances)) %>%
  slice(1:10) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = appearances, y = name_alias),
    width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



4. What if there are *really* too many factor levels?

`slice()` works with grouping too!

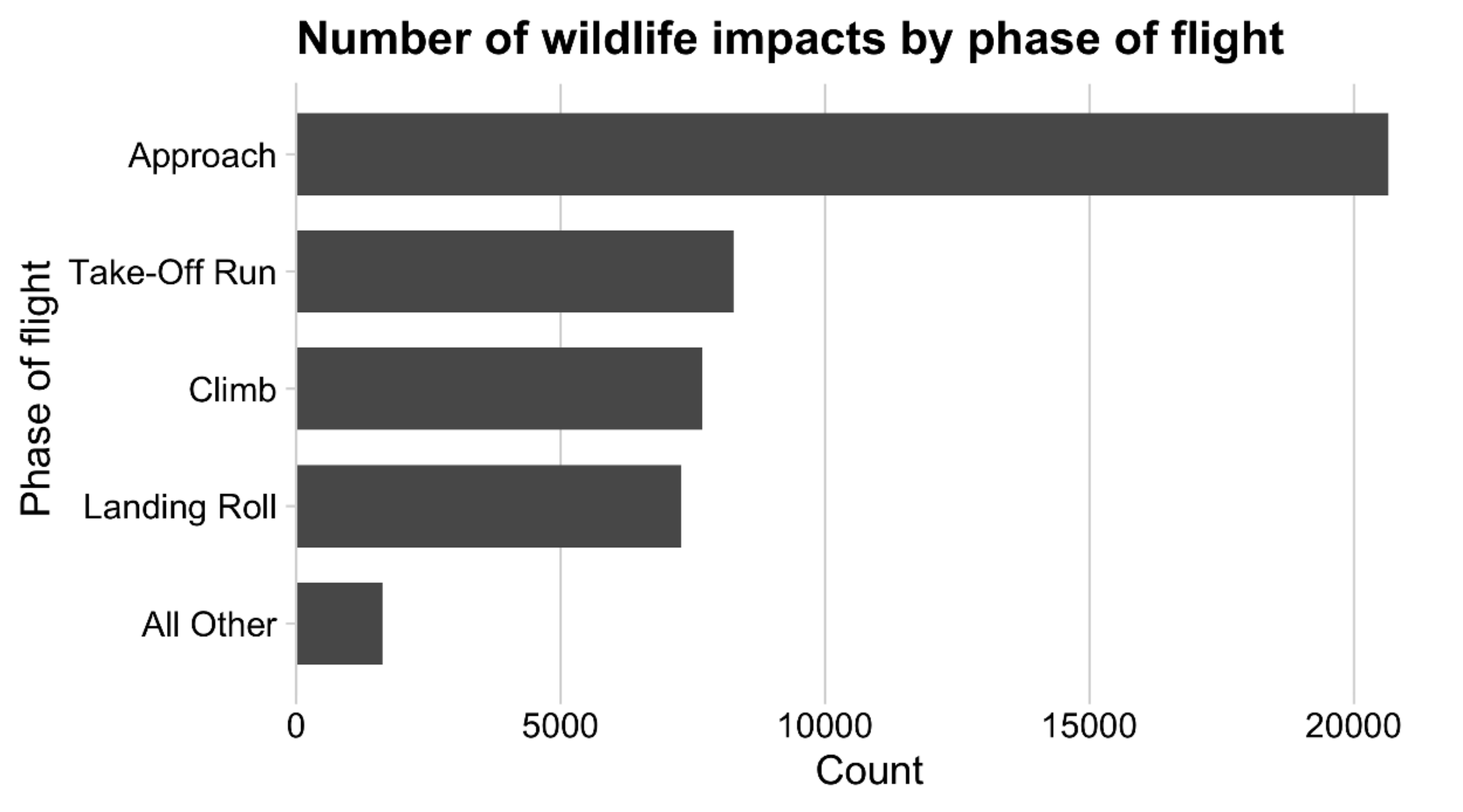
```
# Format the data frame
avengers %>%
  mutate(
    name_alias = fct_reorder(name_alias, appear
  arrange(desc(appearances)) %>%
  group_by(gender) %>%
  slice(1:10) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(
      x = appearances,
      y = name_alias,
      fill = gender
    ),
    width = 0.7, alpha = 0.8
  ) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



Your turn - practice manipulating factors

15:00

Use the `wildlife_impacts` data to create the following plot



Week 7: *Factors, Amounts, & Proportions*

1. Manipulating factors

2. Graphing amounts

BREAK

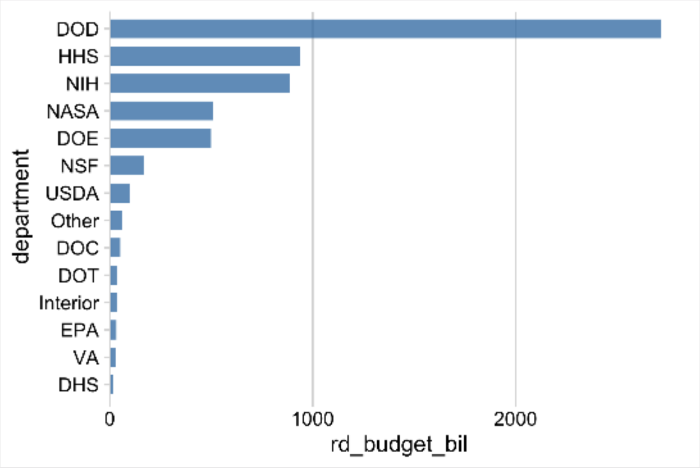
3. Graphing proportions

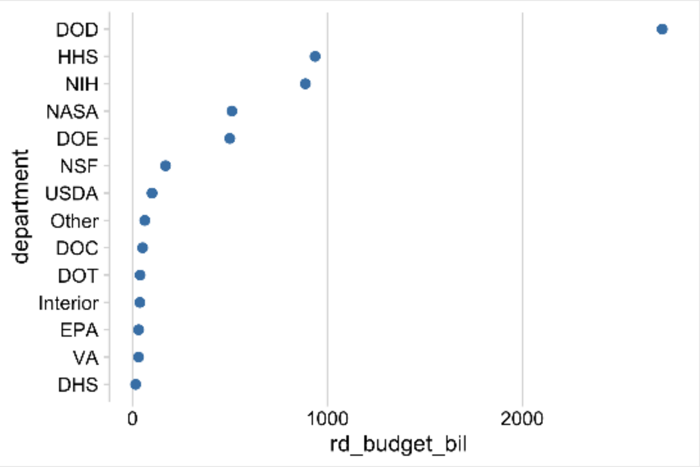
Show amounts with:

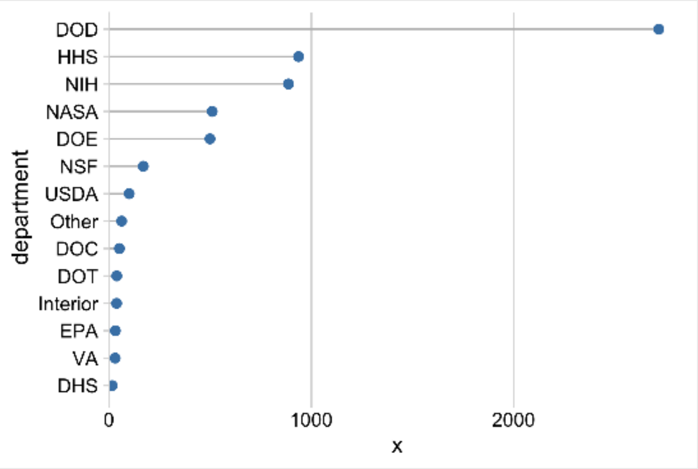
Bar chart

Dot chart

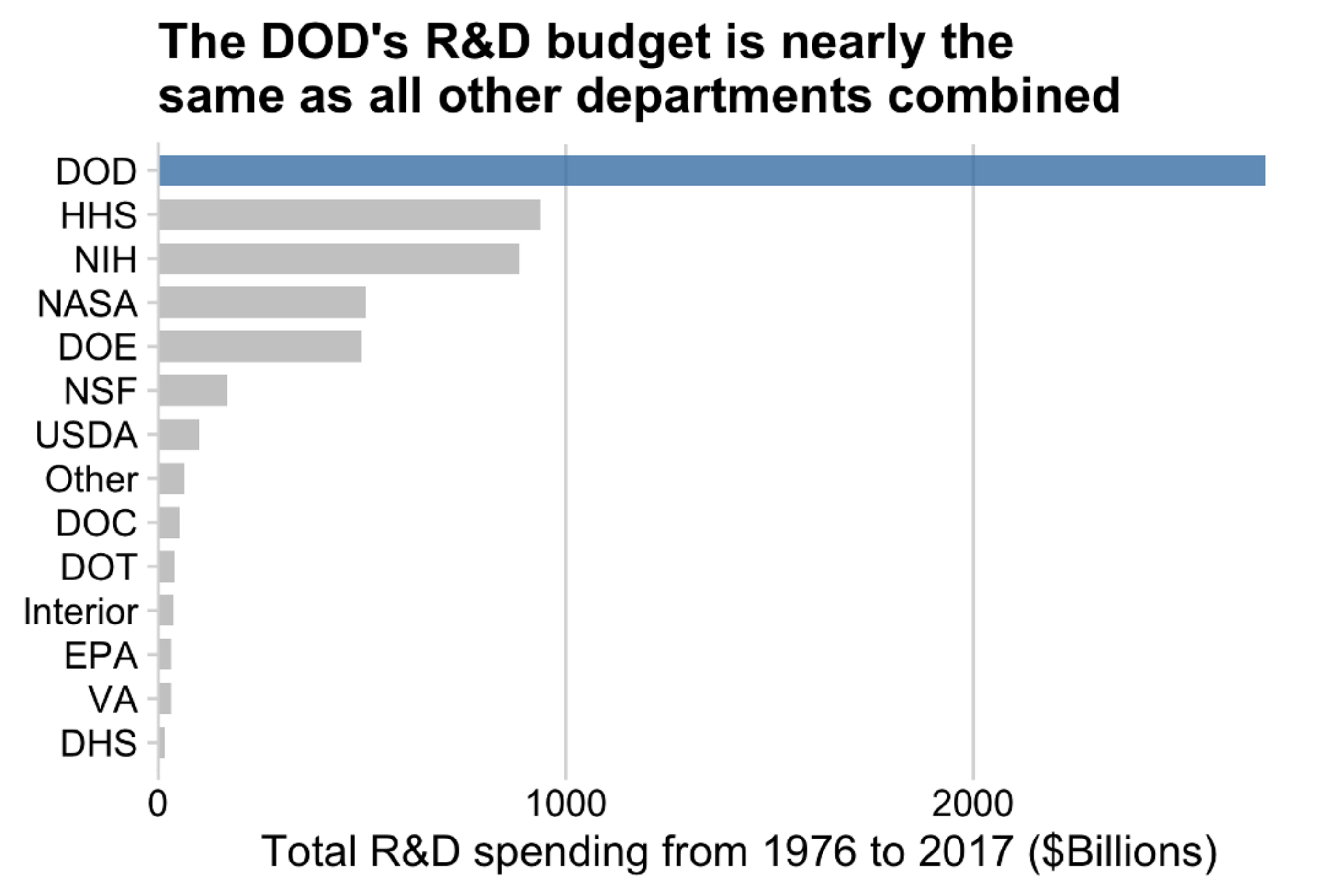
Lollipop chart





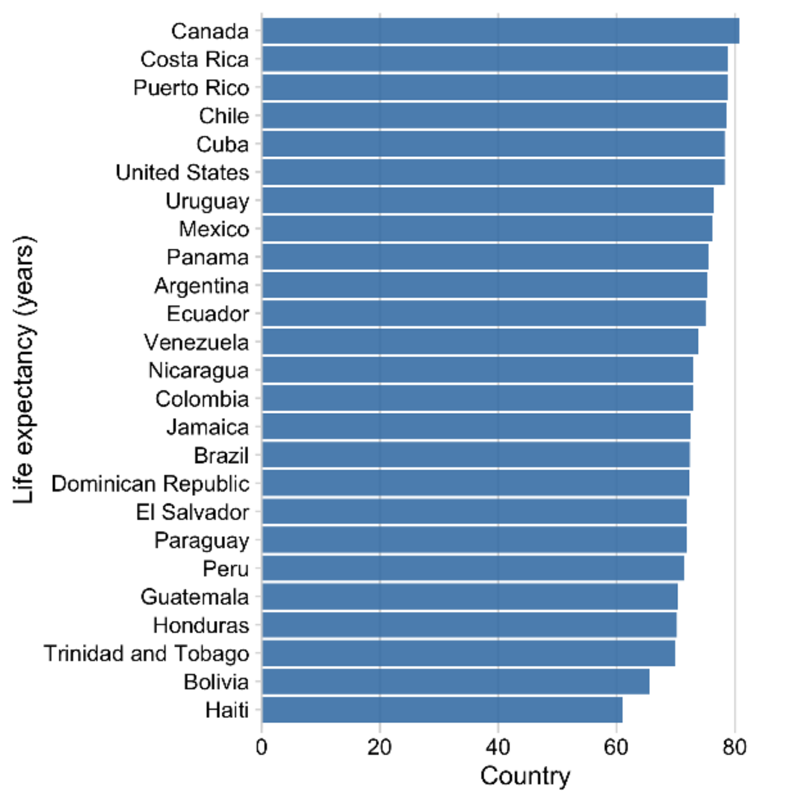


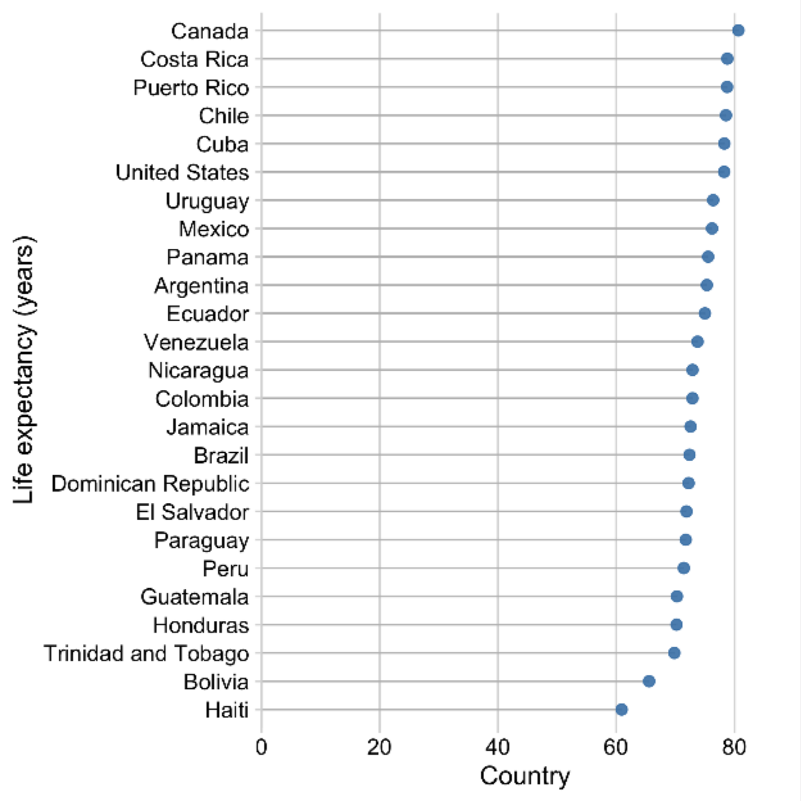
Bars are good for highlighting specific categories



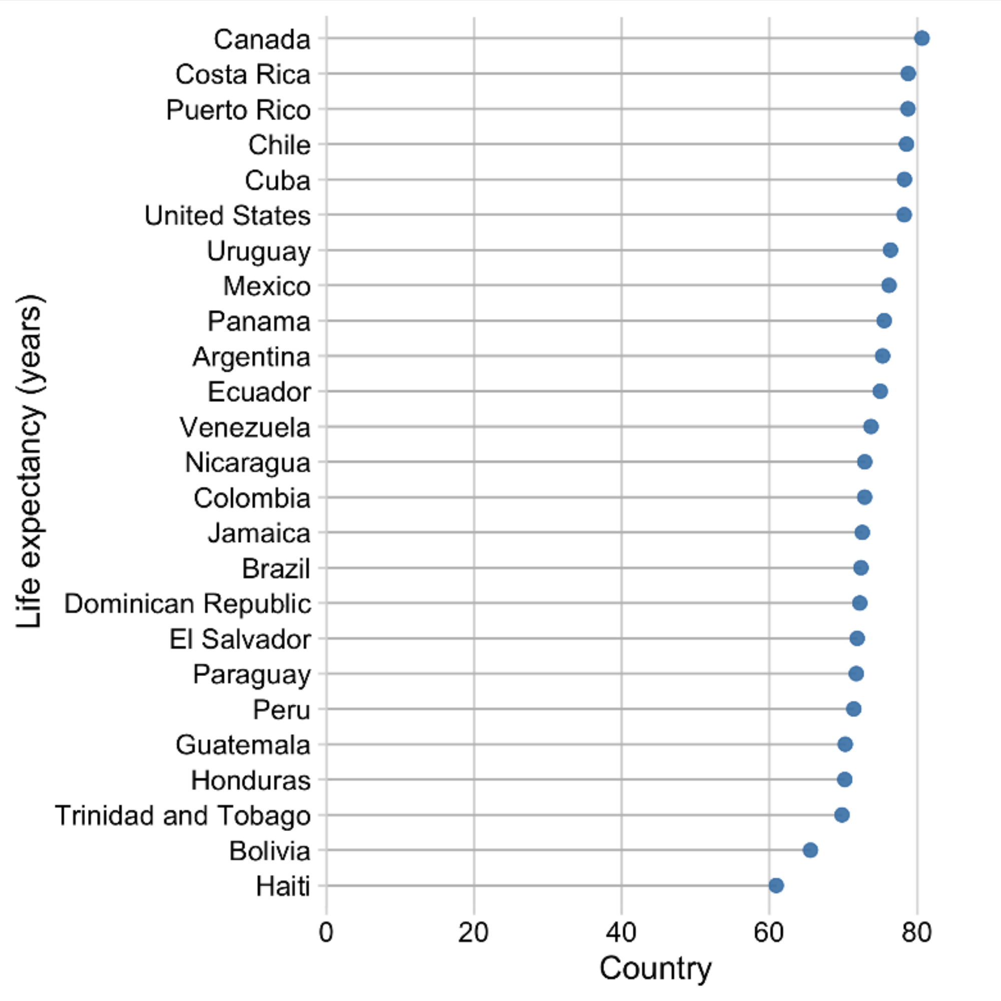
Use lollipops when:

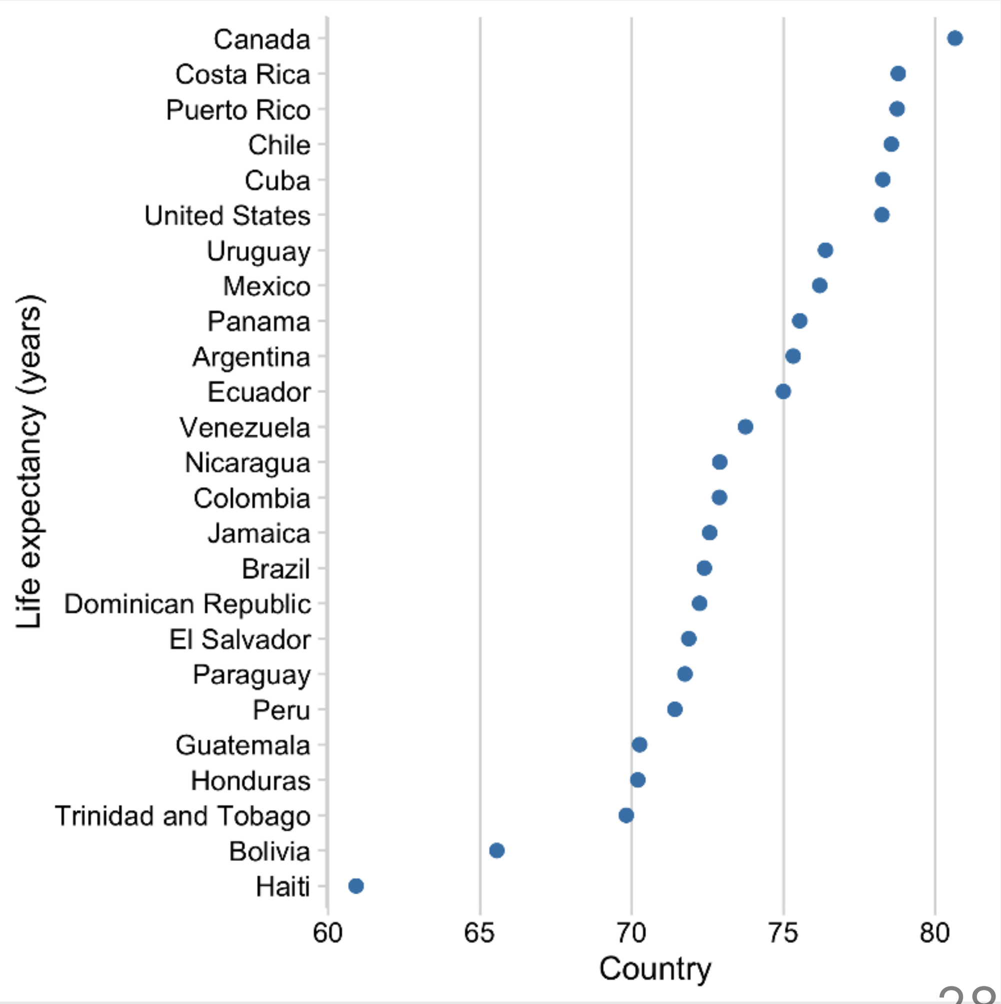
- The bars are overwhelming
- You're not highlighting categories





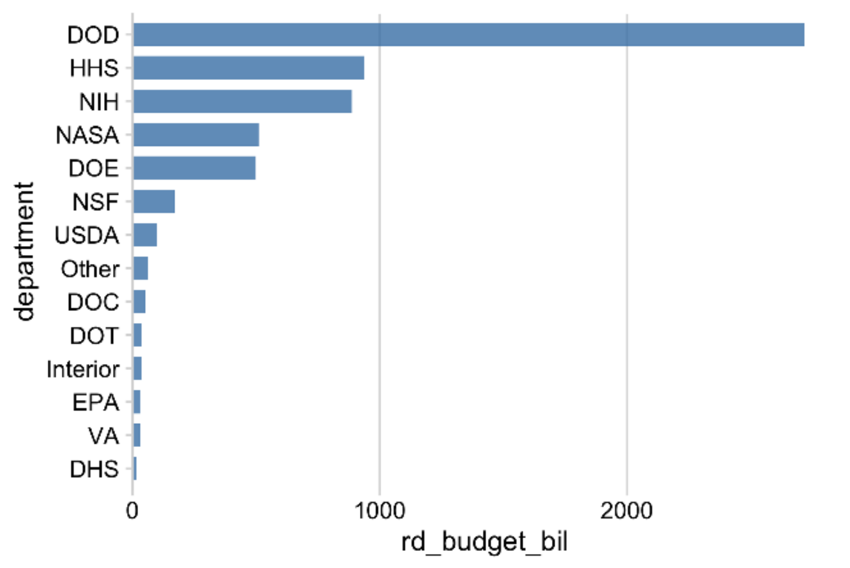
Or use dots and don't set axis to 0





How to make a **Bar chart**

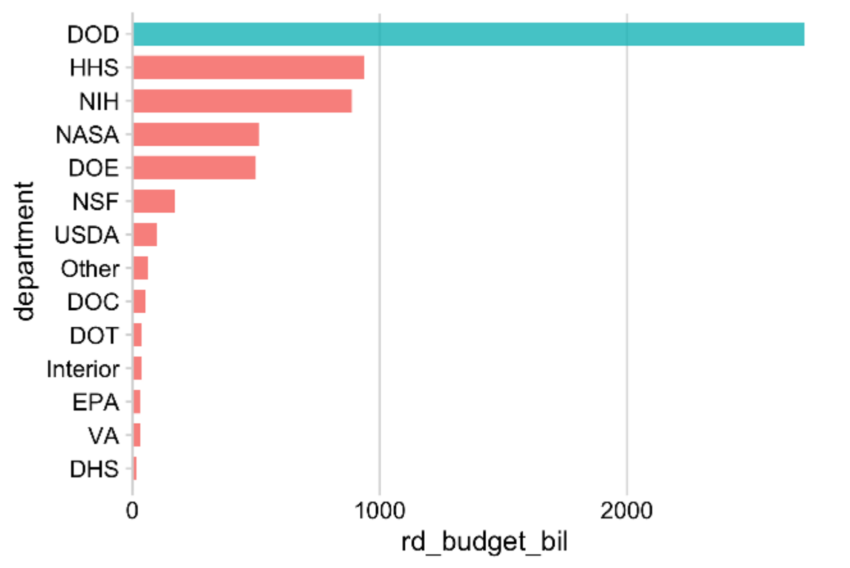
```r
# Summarize the data
federal_spending %>%
  group_by(department) %>%
  summarise(rd_budget_bil = sum(rd_budget_mil) / 10^3) %
  mutate(department = fct_reorder(department, rd_budget_

# Make chart
  ggplot() +
  geom_col(
    aes(x = rd_budget_bil, y = department),
    width = 0.7, alpha = 0.8,
    fill = 'steelblue') +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid()
```



Filling the bars with color

```r
# Summarize the data
federal_spending %>%
  group_by(department) %>%
  summarise(rd_budget_bil = sum(rd_budget_mil) / 10^3) %
  mutate(
    department = fct_reorder(department, rd_budget_bil),
    is_dod = if_else(
      department == 'DOD', TRUE, FALSE)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = rd_budget_bil, y = department,
        fill = is_dod),
    width = 0.7, alpha = 0.8) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid() +
  theme(legend.position = 'none')
```

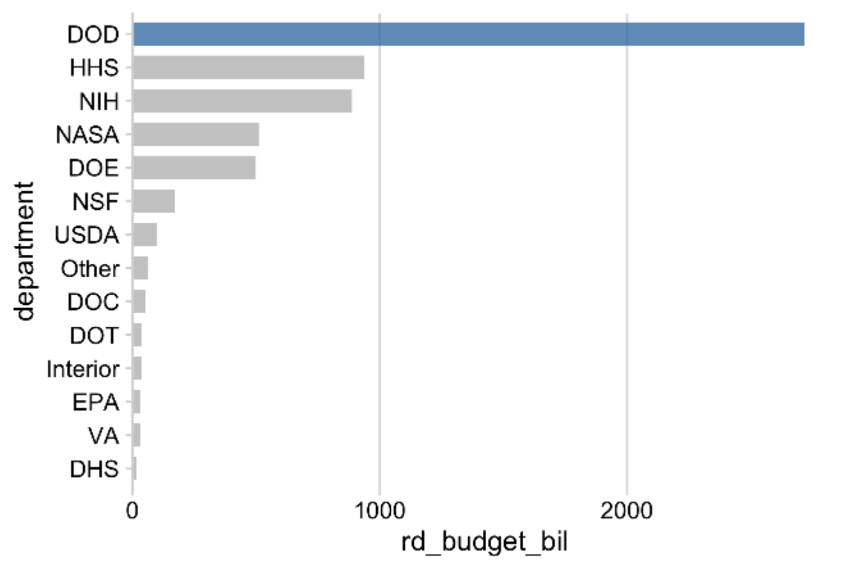
The DOD's R&D budget is nearly the same as all other departments combined



Filling the bars with color

```r
# Summarize the data
federal_spending %>%
  group_by(department) %>%
  summarise(rd_budget_bil = sum(rd_budget_mil) / 10^3) %>
  mutate(
    department = fct_reorder(department, rd_budget_bil),
    is_dod = if_else(
      department == 'DOD', TRUE, FALSE)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = rd_budget_bil, y = department,
        fill = is_dod),
    width = 0.7, alpha = 0.8) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  scale_fill_manual(values = c('grey', 'steelblue')) +
  theme_minimal_vgrid() +
  theme(legend.position = 'none')
```

The DOD's R&D budget is nearly the same as all other departments combined

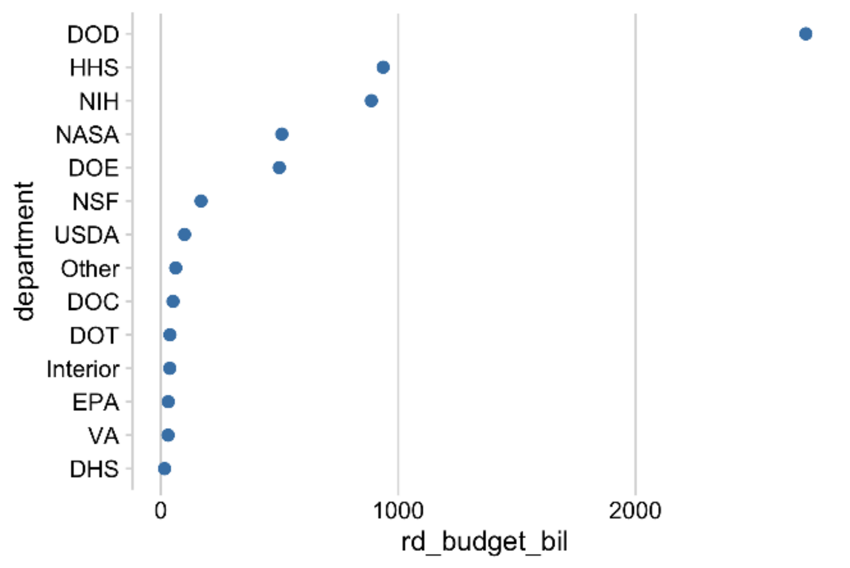


How to make a **Dot chart**

Summarize data frame:

```
# Summarize the data
federal_spending %>%
  group_by(department) %>%
  summarise(
    rd_budget_bil = sum(rd_budget_mil) / 10^3) %>%
  mutate(
    department = fct_reorder(department, rd_budget_bil))

# Make the chart
  ggplot() +
  geom_point(
    aes(x = rd_budget_bil, y = department),
    size = 2.5, color = 'steelblue') +
  theme_minimal_vgrid()
```

Dot chart of federal R&D spending by department

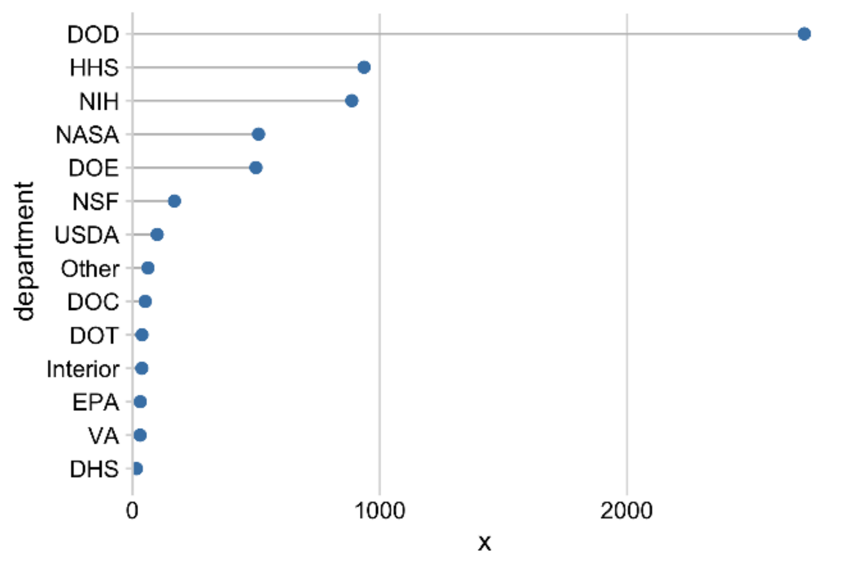


How to make a **Lollipop chart**

Summarize data frame:

```
# Summarize the data
federal_spending %>%
  group_by(department) %>%
  summarise(
    rd_budget_bil = sum(rd_budget_mil) / 10^3) %>%
  mutate(
    department = fct_reorder(department, rd_budget_bil))

# Make the chart
  ggplot() +
  geom_segment(
    aes(x = 0, xend = rd_budget_bil,
        y = department, yend = department),
    color = 'grey') +
  geom_point(
    aes(x = rd_budget_bil, y = department),
    size = 2.5, color = 'steelblue') +
  theme_minimal_vgrid()
```

Lollipop chart of federal R&D spending by department

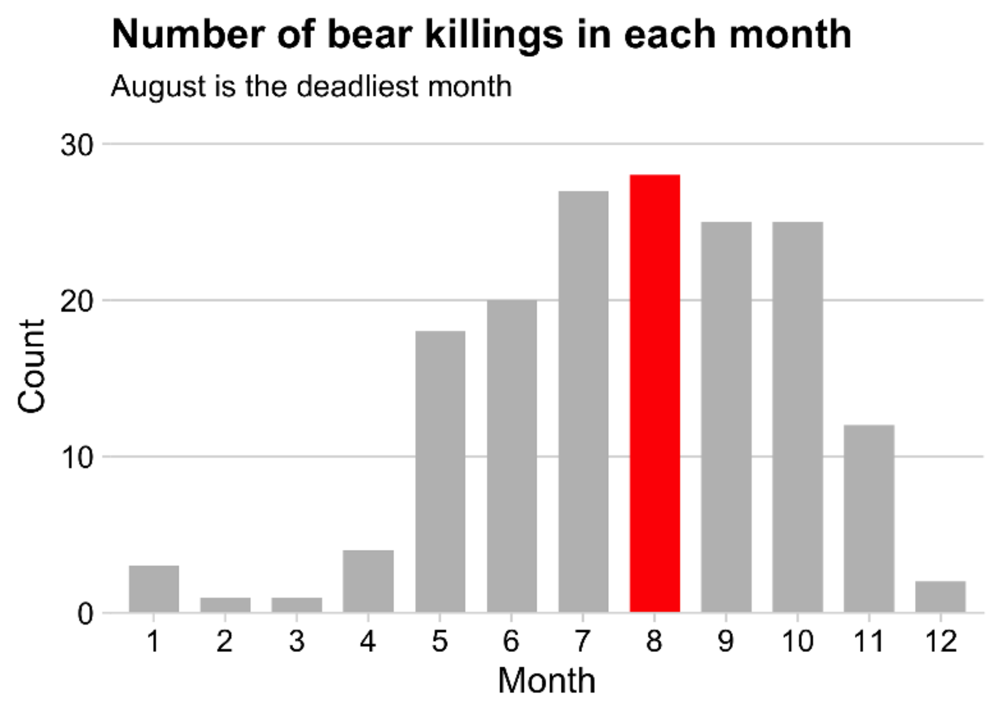


Your turn - practice plotting amounts

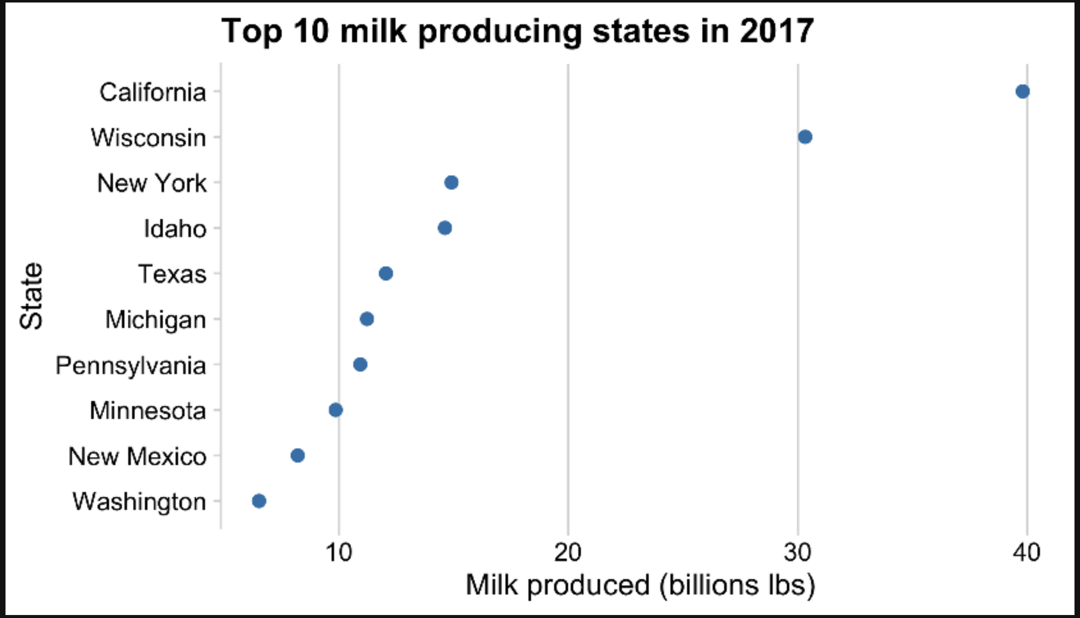
20:00

Create the following charts:

Data: `bears`



Data: `milk_production`



Break!

Stand up, Move around, Stretch!

05:00

Week 7: *Factors, Amounts, & Proportions*

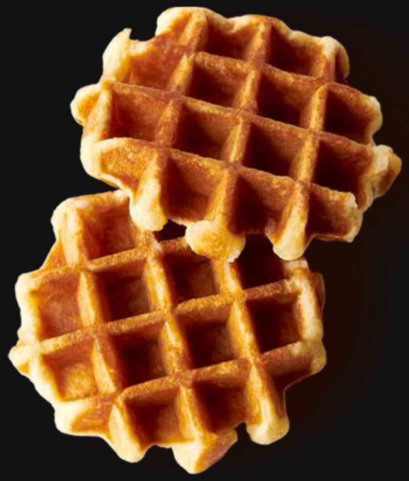
1. Manipulating factors

2. Graphing amounts

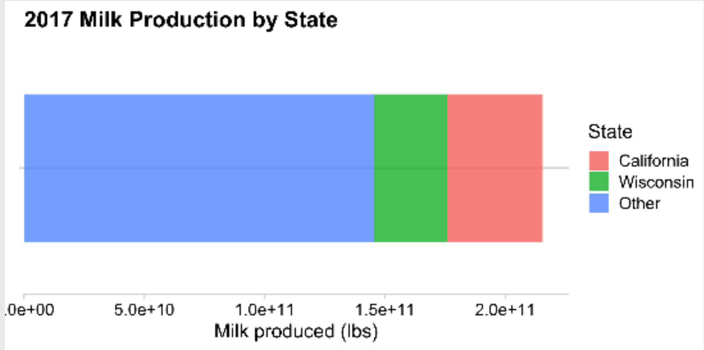
BREAK

3. Graphing proportions

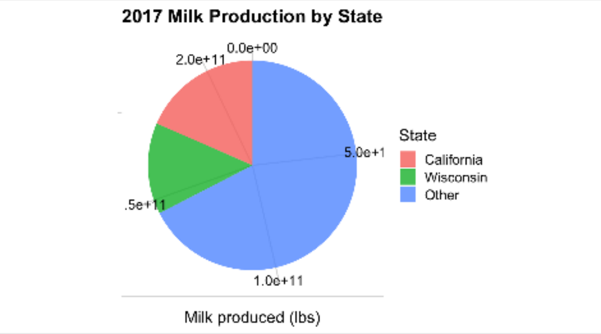
Show proportions with:

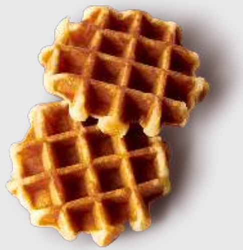


Bar charts

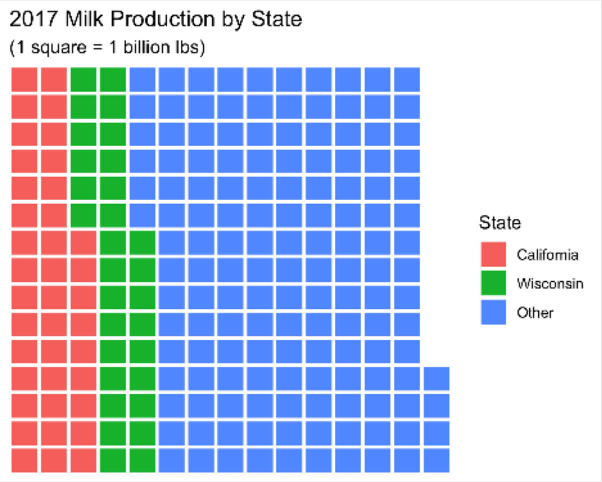


Pie charts



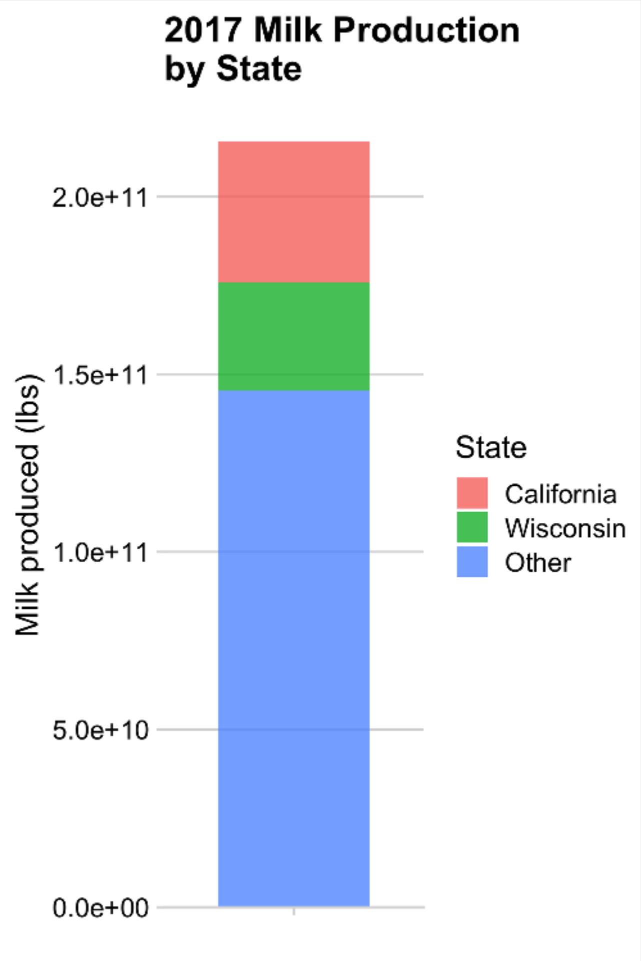


Waffle charts



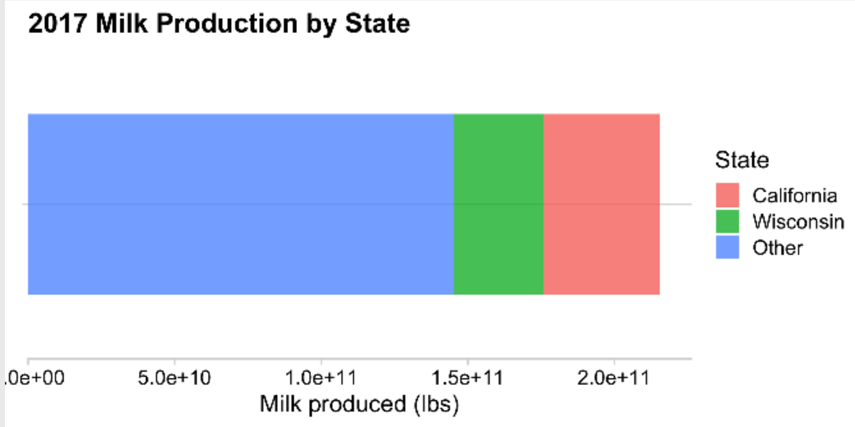
Stacked bars

```r
# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = "", y = milk_produced, fill = state),
    width = 0.7, alpha = 0.8) +
  scale_y_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_hgrid() +
  labs(x = NULL,
       y = 'Milk produced (lbs)',
       fill = 'State',
       title = '2017 Milk Production\nby State')
```



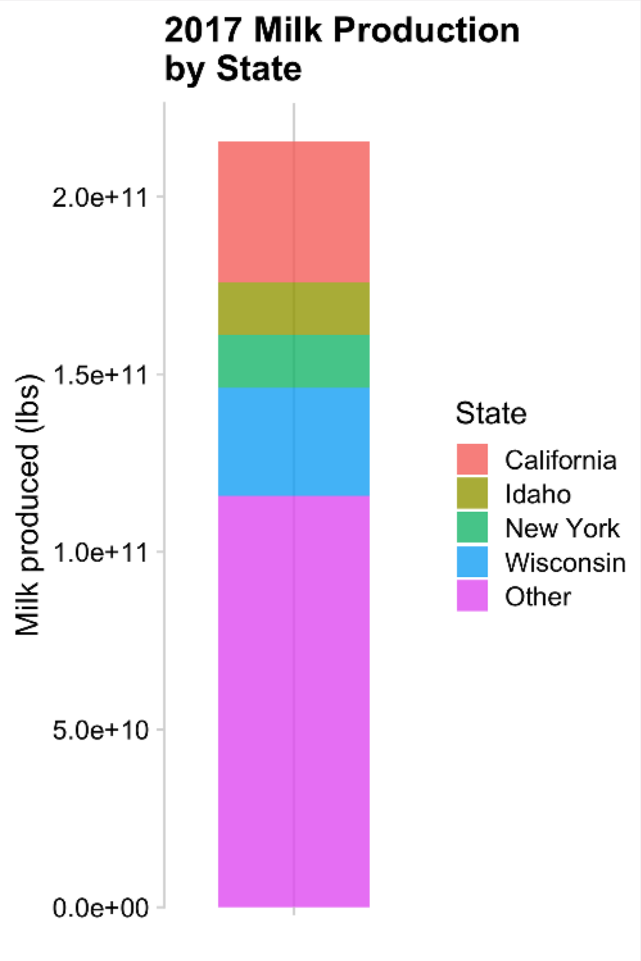
Stacked bars - Rotated also looks good

```r
# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = milk_produced, y = "", fill = state),
    width = 0.7, alpha = 0.8) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_hgrid() +
  labs(y = NULL,
       x = 'Milk produced (lbs)',
       fill = 'State',
       title = '2017 Milk Production by State')
```



Stacked bars - not great for more than a few categories

```r
# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin',
             'New York', 'Idaho'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced))

# Make the chart
  ggplot() +
  geom_col(
    aes(x = "", y = milk_produced, fill = state),
    width = 0.7, alpha = 0.8) +
  scale_y_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid() +
  labs(x = NULL,
       y = 'Milk produced (lbs)',
       fill = 'State',
       title = '2017 Milk Production\nby State')
```

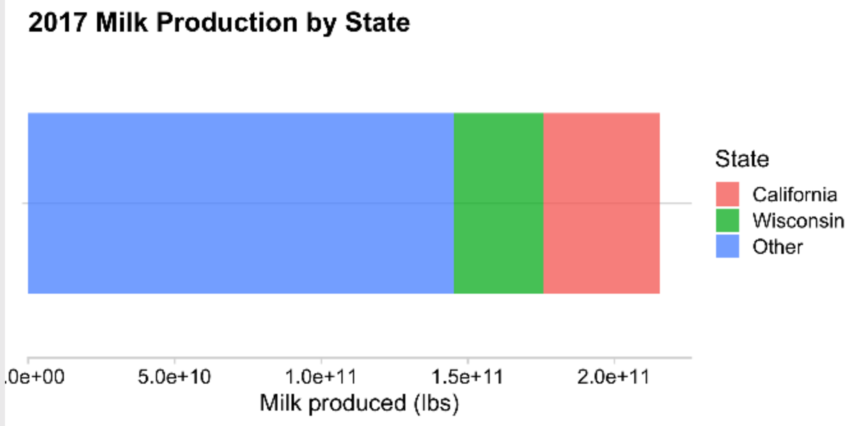


Dodged bars

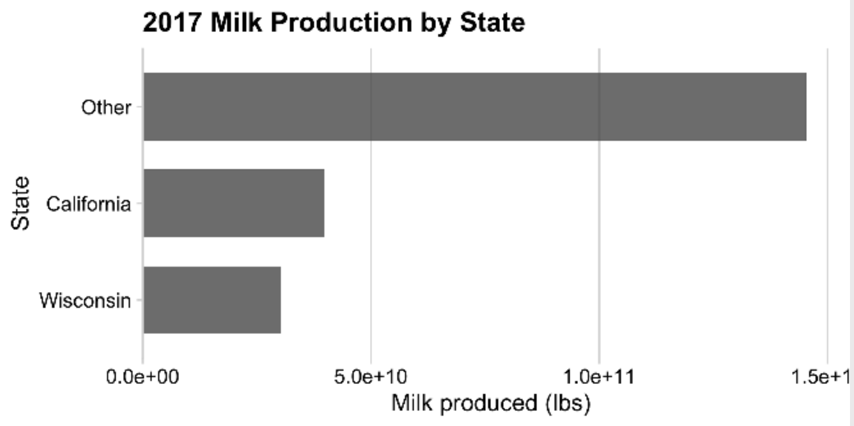
Better for **part-to-whole comparison**

```
# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%
  mutate(state = fct_reorder(state, milk_produced)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = milk_produced, y = state),
    width = 0.7, alpha = 0.8) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid() +
  labs(x = 'Milk produced (lbs)',
       y = 'State',
       title = '2017 Milk Production by State')
```

Okay:



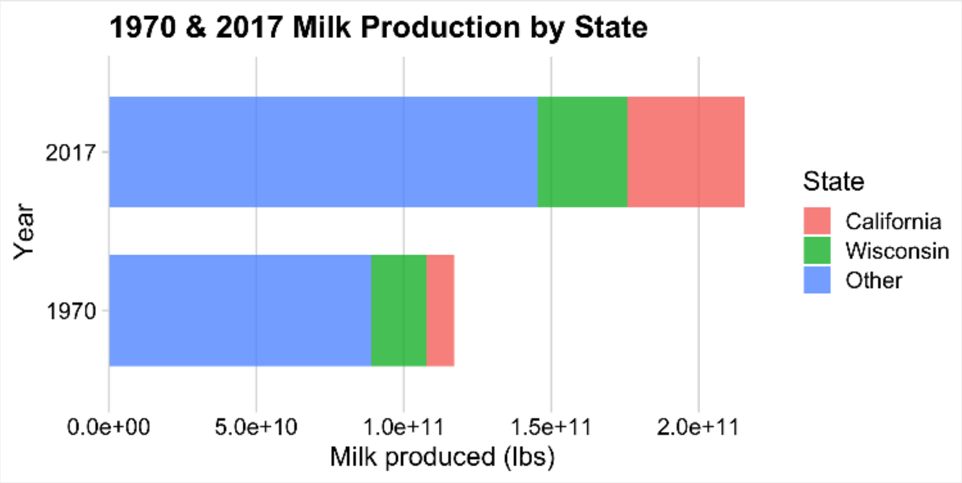
Better:



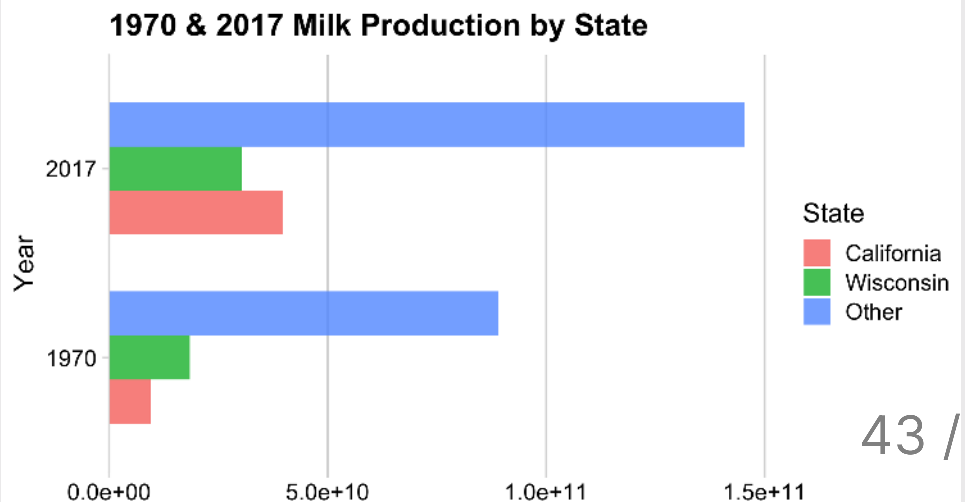
Dodged bars

```
milk_production %>%
  filter(year %in% c(1970, 2017)) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(year, state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = milk_produced,
        y = as.factor(year),
        fill = state),
    position = 'dodge',
    width = 0.7, alpha = 0.8) +
  scale_x_continuous(
    expand = expansion(mult = c(0, 0.05))) +
  theme_minimal_vgrid() +
  labs(x = 'Milk produced (lbs)',
       y = 'Year',
       fill = 'State',
       title = '1970 & 2017 Milk Production by State
```

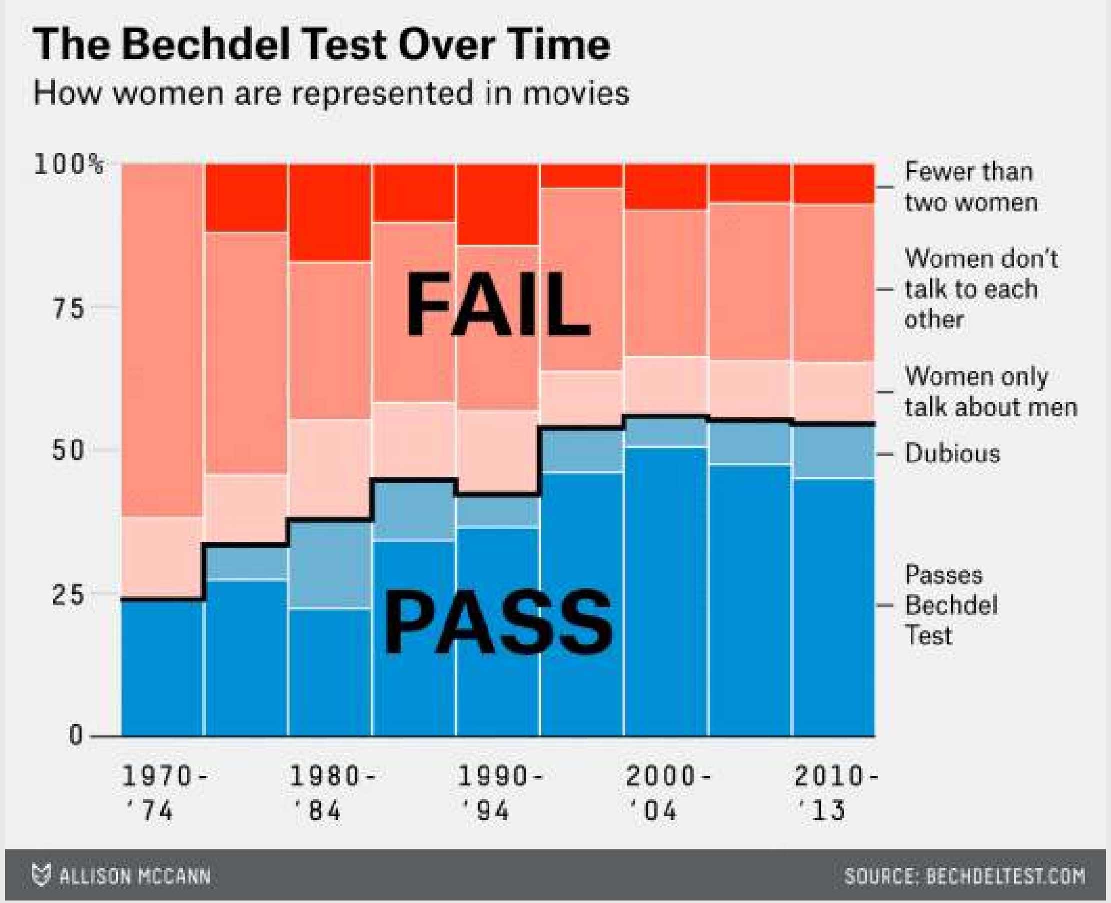
Better for comparing **total**:



Better for comparing **parts**:



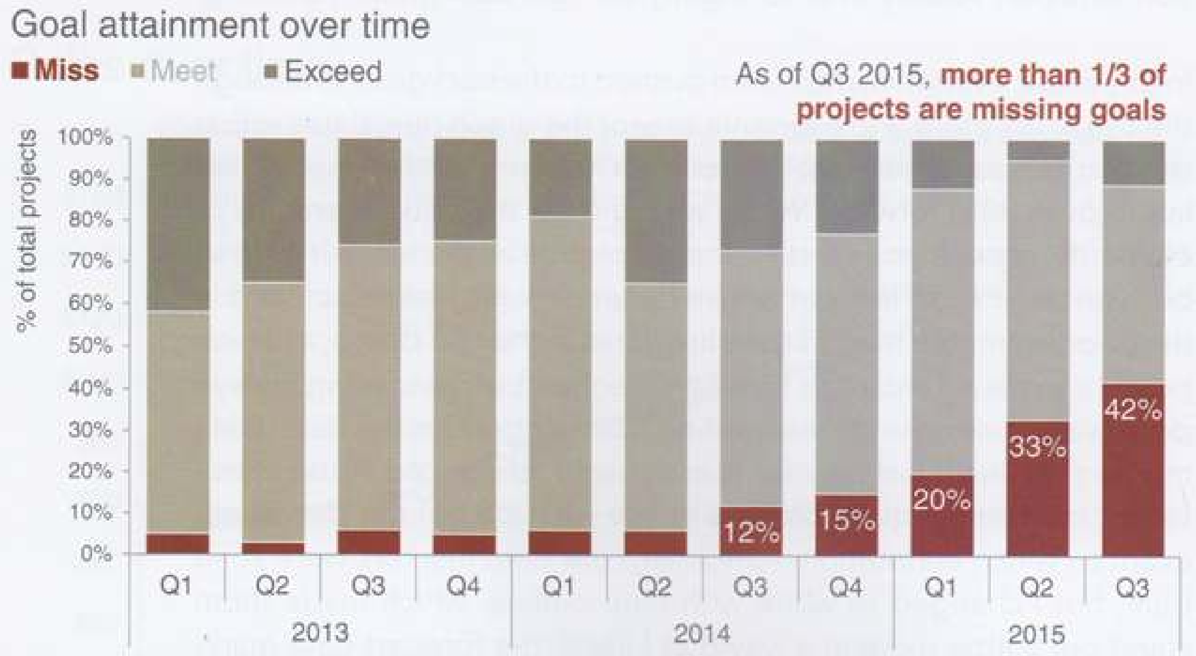
Where stacking is useful



- **2 to 3 groups**
- Proportions over time

https://fivethirtyeight.com/features/the-dollar-and-cents-case-against-hollywoods-exclusion-of-women/

Where stacking is useful



Goal attainment over time

As of Q3 2015, **more than 1/3 of projects are missing goals**

Data source: XYZ Dashboard; the total number of projects has increased over time from 230 in early 2013 to nearly 270 in Q3 2015.

FIGURE 6.3 100% stacked bars

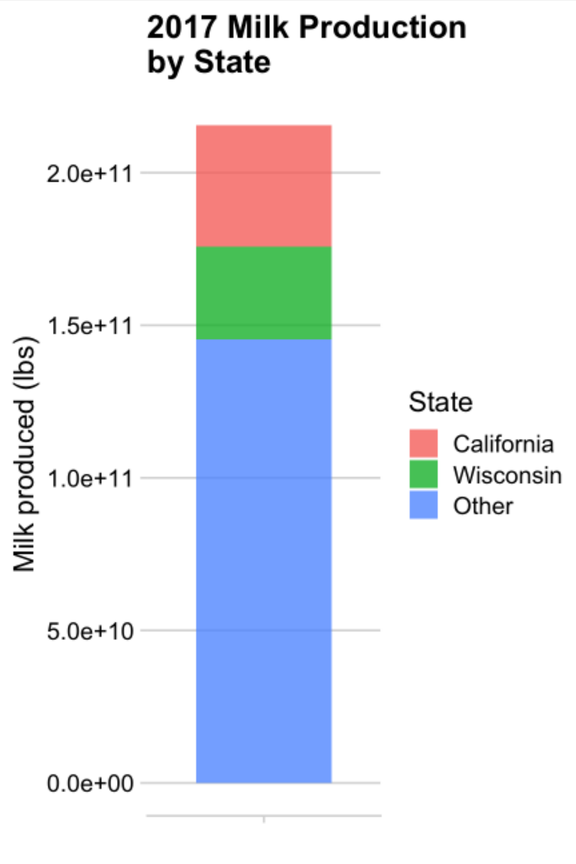
- 2 to 3 groups
- **Proportions over time**

https://www.perceptualedge.com/blog/?p=2239

The Notorious P-I-E

Start with a bar chart

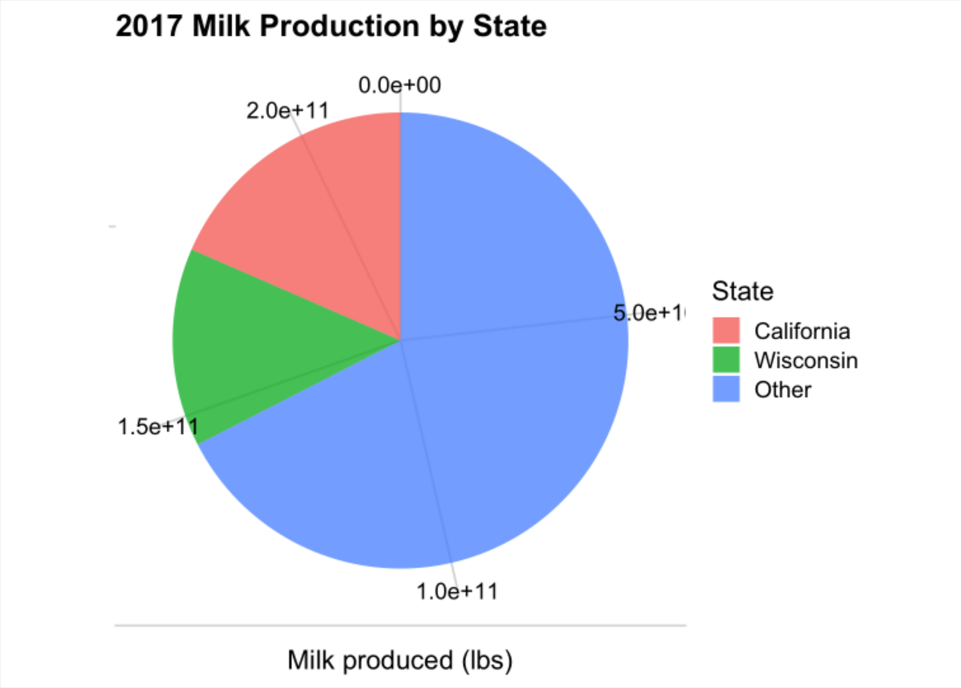
```
# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = "", y = milk_produced, fill = state),
    width = 0.7, alpha = 0.8) +
  theme_minimal_hgrid() +
  labs(x = NULL,
       y = 'Milk produced (lbs)',
       fill = 'State',
       title = '2017 Milk Production\nby State')
```



The Notorious P-I-E

Convert bar to pie with `coord_polar()`

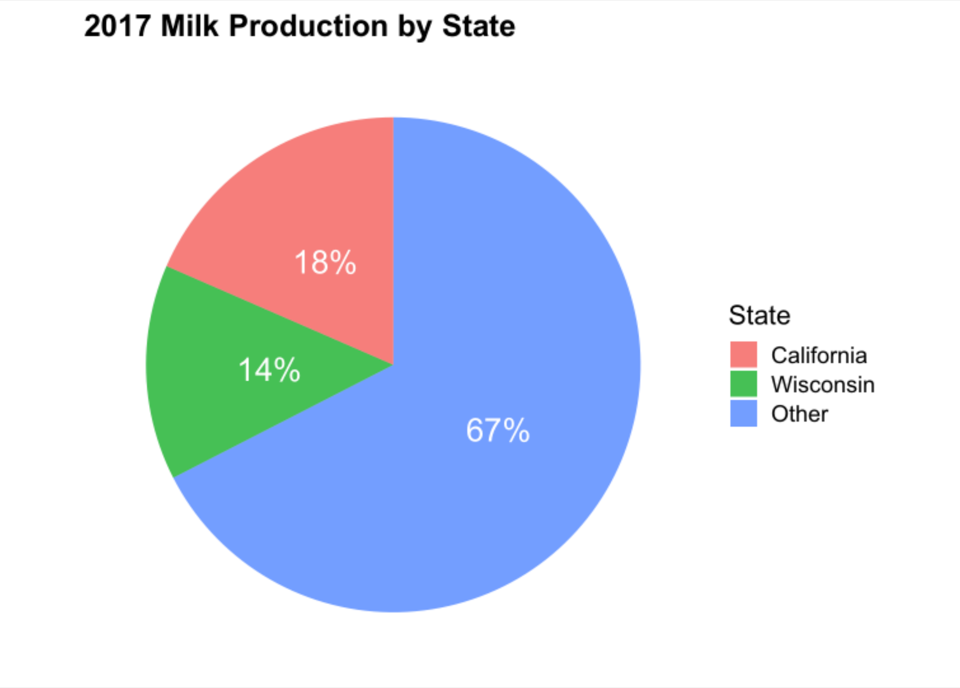
```r
# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = "", y = milk_produced, fill = state),
    width = 0.7, alpha = 0.8) +
  coord_polar(theta = "y") +
  theme_minimal_hgrid() +
  labs(x = NULL,
       y = 'Milk produced (lbs)',
       fill = 'State',
       title = '2017 Milk Production by State')
```



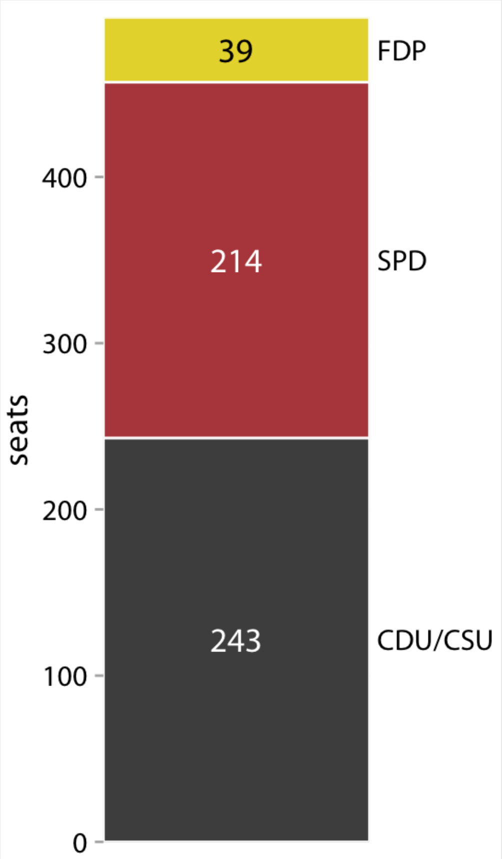
```
# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%
  arrange(desc(state)) %>%
  mutate(p = 100*(milk_produced / sum(milk_produced)
         label = str_c(round(p), '%')) %>%

# Make the chart
  ggplot() +
  geom_col(
    aes(x = "", y = milk_produced, fill = state),
    width = 0.7, alpha = 0.8) +
  geom_text(
    aes(x = "", y = milk_produced, label = label),
    color = "white", size = 6,
    position = position_stack(vjust = 0.5)) +
  coord_polar(theta = "y") +
  theme_map() +
  labs(x = NULL,
       y = NULL,
       fill = 'State',
       title = '2017 Milk Production by State')
```

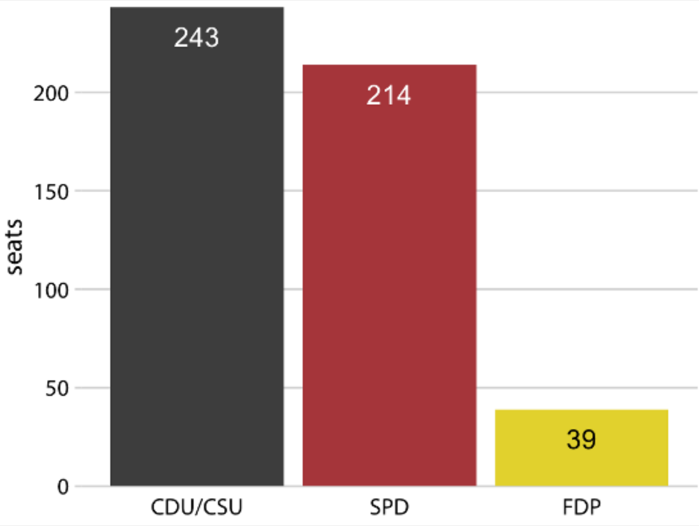
The Notorious P-I-E

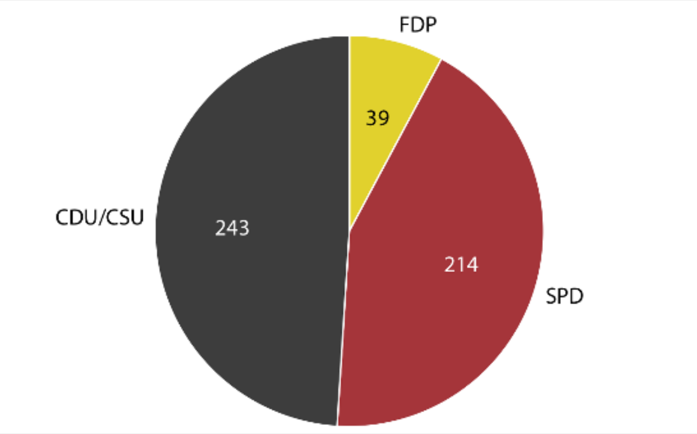
Final chart with labels & `theme_map()`



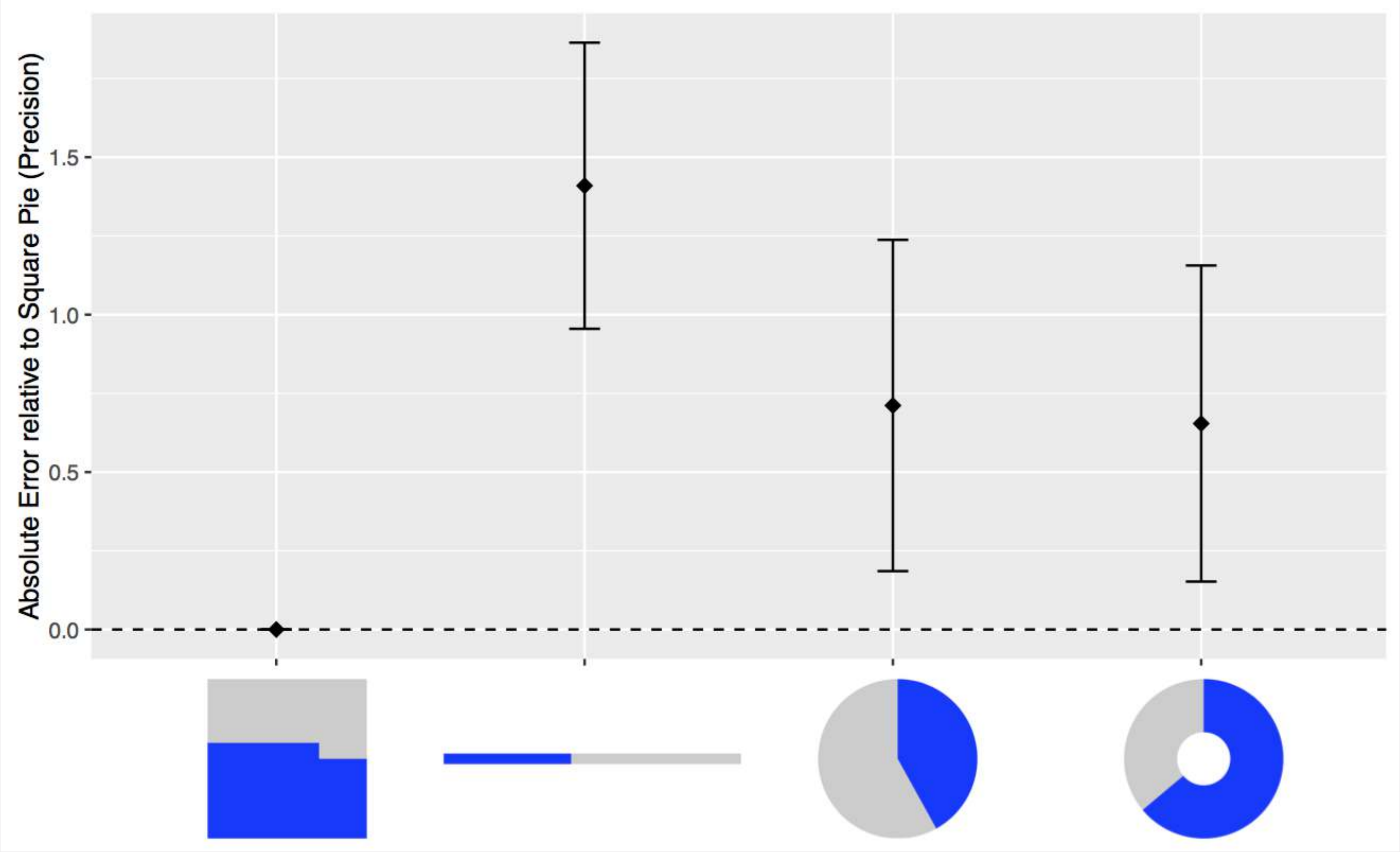
Pies are still useful if the sum of components matters







The best pies are **square pies**



https://eagereyes.org/blog/2016/a-reanalysis-of-a-study-about-square-pie-charts-from-2009

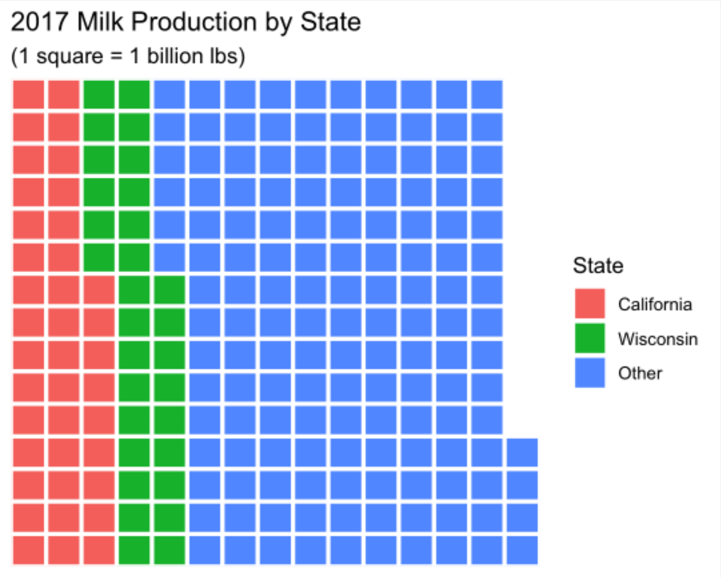
Waffle plots

```r
library(waffle)

# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%
  mutate(milk_produced = milk_produced / 10^9) %>%

# Make the chart
  ggplot() +
  geom_waffle(
    aes(fill = state, values = milk_produced),
    color = "white", size = 1, n_rows = 15) +
  scale_x_discrete(expand = c(0, 0)) +
  scale_y_discrete(expand = c(0, 0)) +
  theme_minimal() +
  labs(fill = 'State',
       x = NULL, y = NULL,
       title = '2017 Milk Production by State',
       subtitle = '(1 square = 1 billion lbs)')
```

Use values between 100 - 1,000

(You don't want 1,000,000,000 boxes!)

```
#> # A tibble: 3 × 2
#>   state      milk_produced
#>   <fct>              <dbl>
#> 1 California          39.8
#> 2 Wisconsin           30.3
#> 3 Other              145.
```



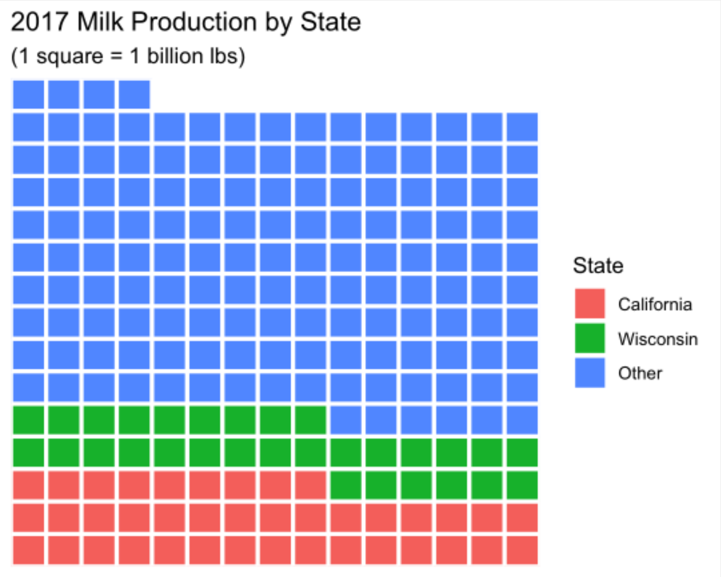
Waffle plots

```r
library(waffle)

# Format the data
milk_production %>%
  filter(year == 2017) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%
  mutate(milk_produced = milk_produced / 10^9) %>%

# Make the chart
  ggplot() +
  geom_waffle(
    aes(fill = state, values = milk_produced),
    color = "white", size = 1, n_rows = 15,
    flip = TRUE) +
  scale_x_discrete(expand = c(0, 0)) +
  scale_y_discrete(expand = c(0, 0)) +
  theme_minimal() +
  labs(fill = 'State',
       x = NULL, y = NULL,
       title = '2017 Milk Production by State',
       subtitle = '(1 square = 1 billion lbs)')
```

Use values between 100 - 1,000

(You don't want 1,000,000,000 boxes!)

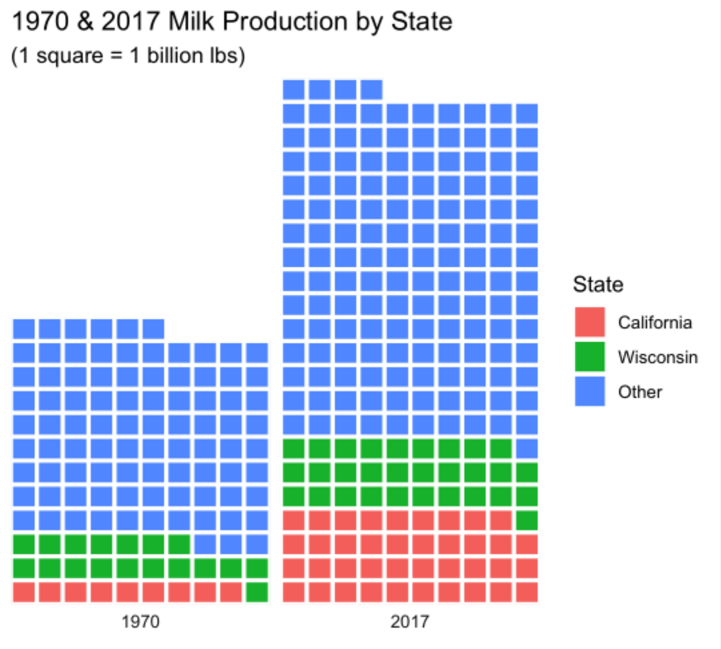
```
#> # A tibble: 3 × 2
#>   state      milk_produced
#>   <fct>              <dbl>
#> 1 California          39.8
#> 2 Wisconsin           30.3
#> 3 Other              145.
```



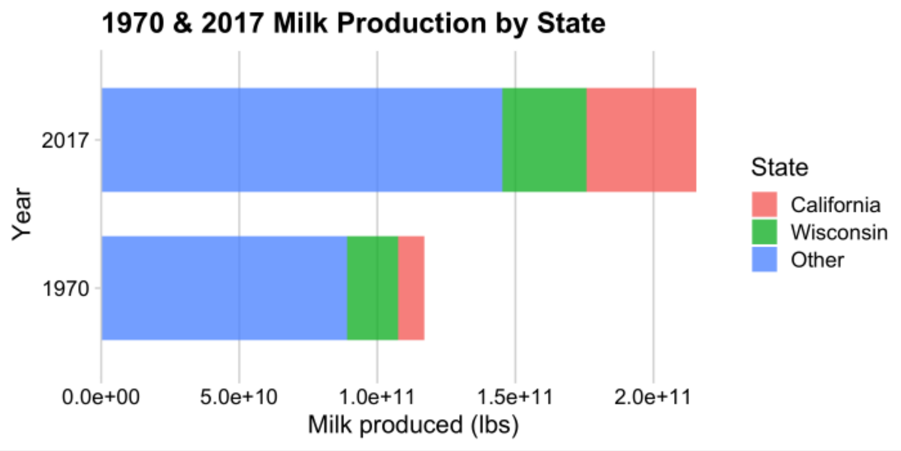
```r
library(waffle)

# Format the data
milk_production %>%
  filter(year %in% c(1970, 2017)) %>%
  mutate(state = fct_other(state,
    keep = c('California', 'Wisconsin'))) %>%
  group_by(year, state) %>%
  summarise(milk_produced = sum(milk_produced)) %>%
  mutate(milk_produced = milk_produced / 10^9) %>%

# Make the chart
  ggplot() +
  geom_waffle(
    aes(fill = state, values = milk_produced),
    color = "white", size = 1, n_rows = 10,
    flip = TRUE) +
  facet_wrap(vars(year), strip.position = 'bottom')
  scale_x_discrete(expand = c(0, 0)) +
  scale_y_discrete(expand = c(0, 0)) +
  theme_minimal() +
  labs(fill = 'State',
       x = NULL, y = NULL,
       title = '1970 & 2017 Milk Production by State
       subtitle = '(1 square = 1 billion lbs)')
```

Waffle comparison

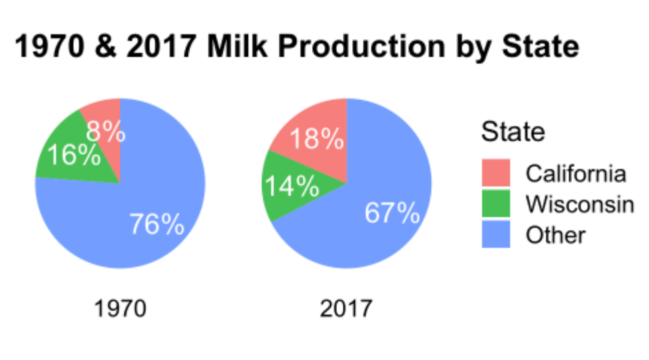
```
#> # A tibble: 3 × 2
#>   state      milk_produced
#>   <fct>              <dbl>
#> 1 California          39.8
#> 2 Wisconsin           30.3
#> 3 Other              145.
```



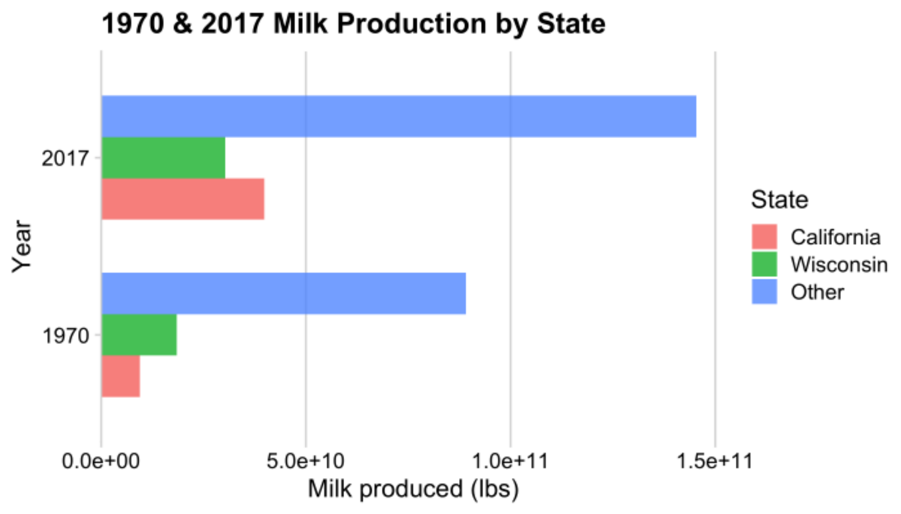
Stacked bars



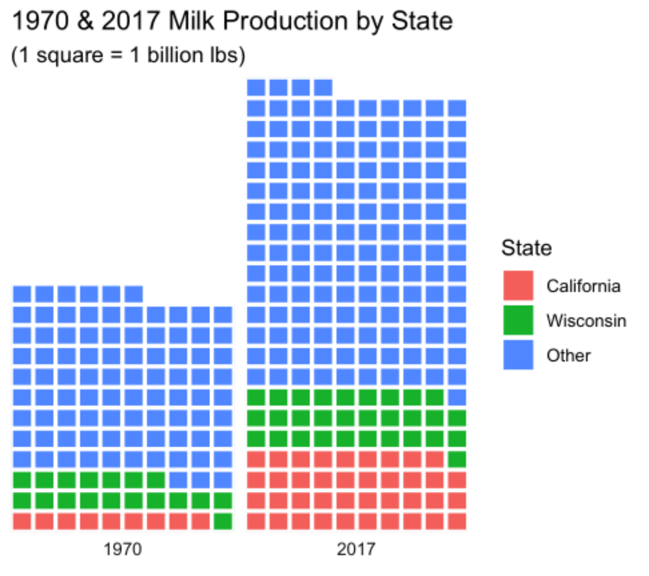
Pie chart



Dodged bars



Waffle chart



Your turn

20:00

Using the `wildlife_impacts` data, create plots that shows the proportion of incidents that occur at each different time of day.

For this exercise, you can remove NA values.

Try to create the following plots:

- Stacked bars
- Dodged bars
- Pie chart
- Waffle chart

To get started, you'll need to first summarize the data:

```
wildlife_summary <- wildlife_impacts %>%
  filter(!is.na(time_of_day)) %>%
  count(time_of_day)

wildlife_summary
```

```
#> # A tibble: 4 × 2
#>   time_of_day     n
#>   <chr>       <int>
#> 1 Dawn         1270
#> 2 Day         25123
#> 3 Dusk         1717
#> 4 Night       12735
```