ggplot – annotations and text

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PLS 397 Analyzing and Visualizing Data
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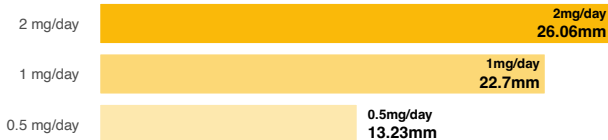
Text and annotation

- ▶ Adding annotations directly to the figure is a powerful technique for helping your reader interpret your figure.
- ▶ We can add text: labels to points or lines (letting us skip a legend)
- ▶ Or areas to draw attention to particular areas.
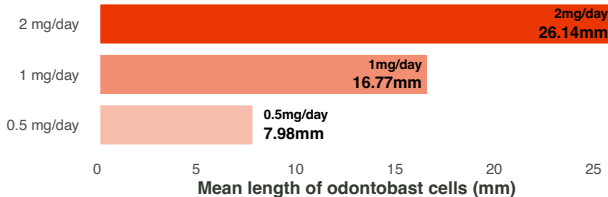- ▶ Lots of fancy annotations require making a second dataframe–more on this when we cover dplyr.

In smaller doses, Orange Juice was associated with greater mean tooth growth, compared to equivalent doses of Vitamin C

With the highest dose, the mean recorded length was almost identical.

Orange Juice

2 mg/day	2mg/day 26.06mm
1 mg/day	1mg/day 22.7mm
0.5 mg/day	0.5mg/day 13.23mm

Vitamin C

2 mg/day	2mg/day 26.14mm
1 mg/day	1mg/day 16.77mm
0.5 mg/day	0.5mg/day 7.98mm

0   5   10   15   20   25
Mean length of odontobast cells (mm)

Credit:

https://www.cararthompson.com/talks/rl-cambridge-beautifully-annotated/

Increased dose was associated with greater tooth growth across both Orange Juice and Vitamin C, with diminishing returns for Vitamin C.

Vitamin C was also associated with greater variability at the highest dose.

Credit:
https://www.cararthompson.com/talks/rl-cambridge-beautifully-annotated/
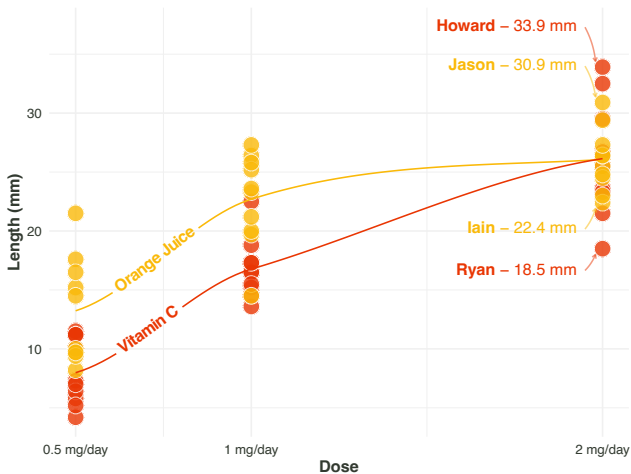
Annotation commands and libraries

Three useful commands/libraries:

- ▶ annotate: built into ggplot. Can take either a "text" or "area" argument. Lets you (makes you) directly specify where you want it.
- ▶ geom_text: uses `aes` to draw text according to variables you set.
- ▶ ggtext: a library for better formatting of text (see above) and labeling plots.
- ▶ ggrepel: a library for labeling points without the labels overlapping
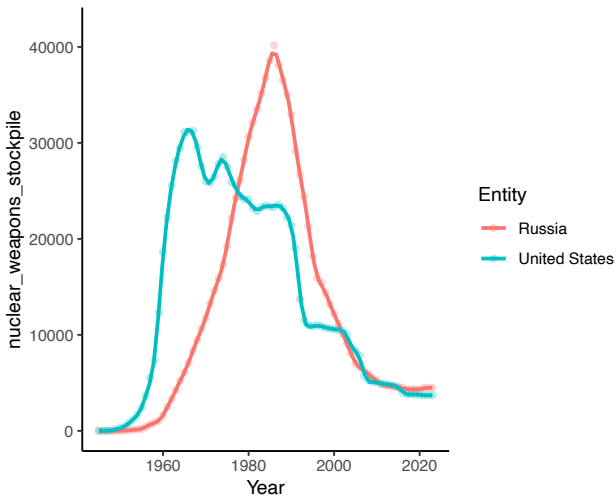
```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
  geom_point() +
  geom_smooth()
```
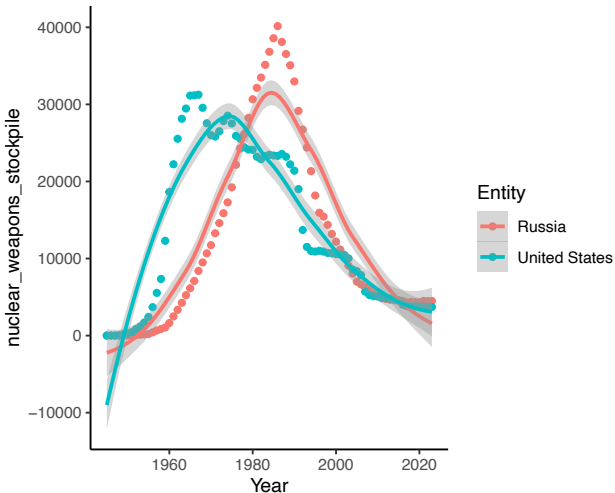
```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
  geom_point(alpha=0.3) +
  geom_smooth(se=FALSE) +
  ylim(0, 42000)
```
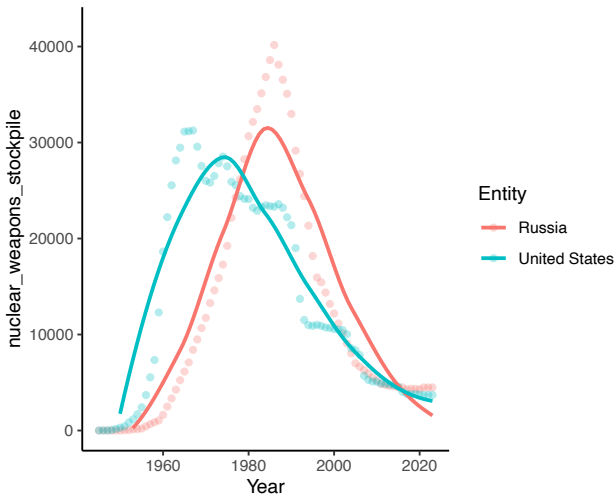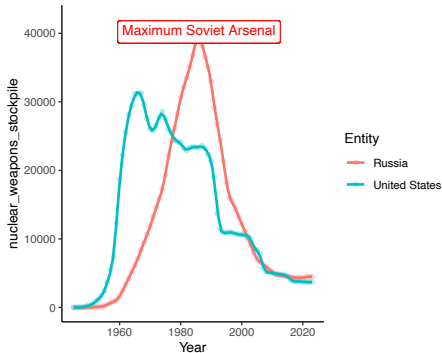
```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
  geom_point(alpha=0.3) +
  geom_smooth(se=FALSE, span=0.1) +
  ylim(0, 42000)
```

Adding an annotation

```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
geom_point(alpha=0.3) +
geom_smooth(se=FALSE, span=0.1) +
ylim(0, 42000) +
ggtext::geom_richtext(
        label = "Maximum Soviet Arsenal",
        x = 1986,
        y = 40200,
        color = "red")
```
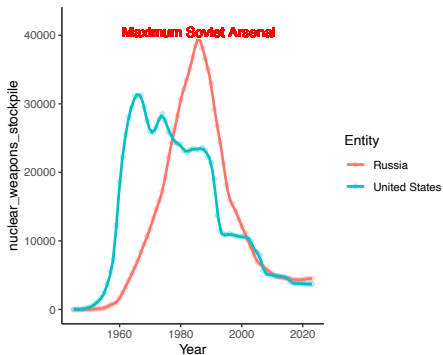
Adding an annotation

```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
geom_point(alpha=0.3) +
geom_smooth(se=FALSE, span=0.1) +
ylim(0, 42000) +
ggtext::geom_richtext(
        label = "Maximum Soviet Arsenal",
        x = 1986,
        y = 40300,
        color = "red",
        label.colour = NA,
        fill = NA
        )
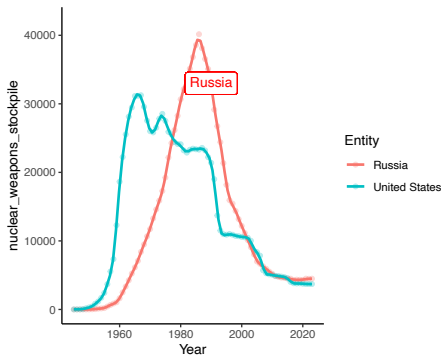```
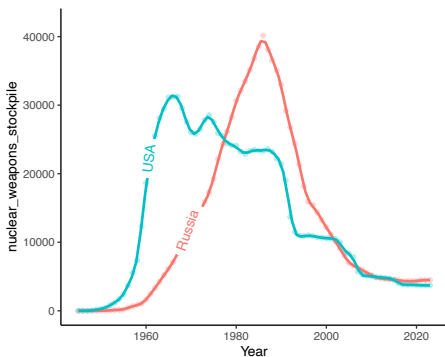
# Adding an annotation

```r
ggplot(usa_russia, aes(x = Year,
                        y = nuclear_weapons_stockpile,
                        color = Entity)) +
  geom_point(alpha=0.3) +
  geom_smooth(se=FALSE, span=0.1) +
  ylim(0, 42000) +
  ggtext::geom_richtext(
          label = "Russia",
          x = 1990,
          y = 32980,
          color = "red")
```
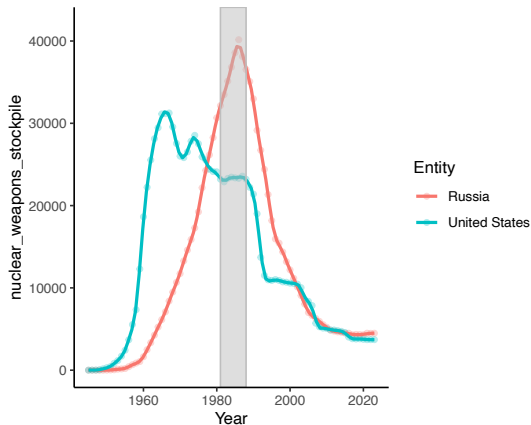
Adding an (fancy) annotation

```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
  geom_point(alpha=0.3) +
  geom_smooth(se=FALSE, span=0.1) +
  ylim(0, 42000) +
  ggtext::geom_richtext(
          label = "Russia",
          color = "#F8766D",
          x = 1969.5,
          y = 11736,
          angle = 71,
          label.colour = "white") +
  ggtext::geom_richtext(
          label = "USA",
          x = 1961,
          y = 22229,
          angle = 83,
          color = "#00BFC4",
          label.colour = "white") +
  theme(legend.position="none")
```
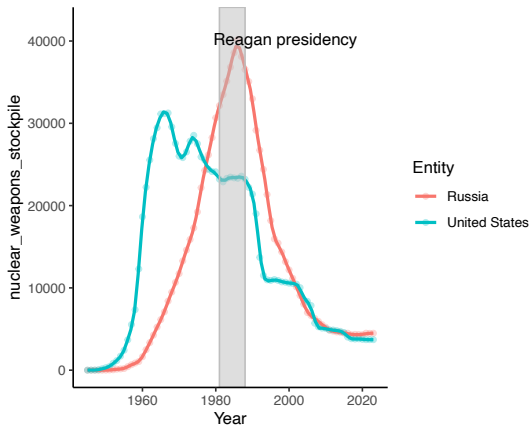
area annotation

```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
  geom_point(alpha=0.3) +
  geom_smooth(se=FALSE, span=0.1) +
  ylim(0, 42000) +
  annotate("rect",
           xmin=1981, xmax = 1988,
               ymin = -Inf, ymax = Inf,
           alpha = 0.5,
           color = "grey",
           fill = "grey")
```

area annotation

```
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
  geom_point(alpha=0.3) +
  geom_smooth(se=FALSE, span=0.1) +
  ylim(0, 42000) +
  annotate("rect",
           xmin=1981, xmax = 1988,
               ymin = -Inf, ymax = Inf,
            alpha = 0.5,
            color = "grey",
            fill = "grey") +
annotate("text", label = "Reagan presidency",
            x = 1999,
            y = 40200,
            color = "black")
```

area annotation


```r
ggplot(usa_russia, aes(x = Year,
                       y = nuclear_weapons_stockpile,
                       color = Entity)) +
  geom_point(alpha=0.3) +
  geom_smooth(se=FALSE, span=0.1) +
  ylim(0, 42000) +
  annotate("rect",
           xmin=1981, xmax = 1988,
                ymin = -Inf, ymax = Inf,
            alpha = 0.5,
            color = "grey",
            fill = "grey") +
  annotate("text", label = "Reagan presidency",
           x = 2005,
           y = 40200,
           color = "black")
```
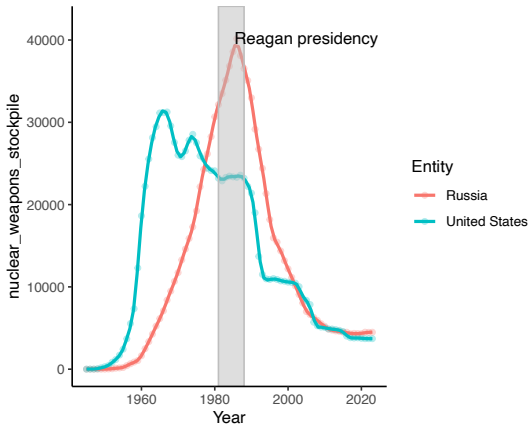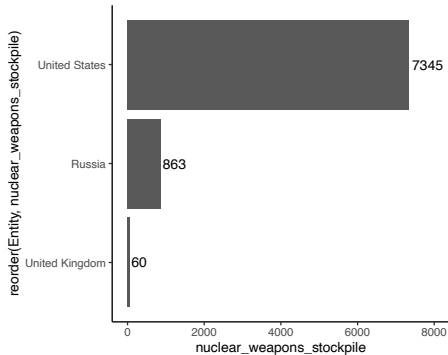
Labeling bars with `geom_text`

```r
fe <- nukes %>%
  filter(Year == 1958) %>%
  filter(nuclear_weapons_stockpile > 0) %>%
  filter(Entity != "World")
```

```r
ggplot(fe, aes(y = nuclear_weapons_stockpile,
               x = reorder(Entity,
                           nuclear_weapons_stockpile))) +
geom_col() +
geom_text(aes(label = nuclear_weapons_stockpile),
          hjust = -1,
          colour = "black") +
coord_flip()
```
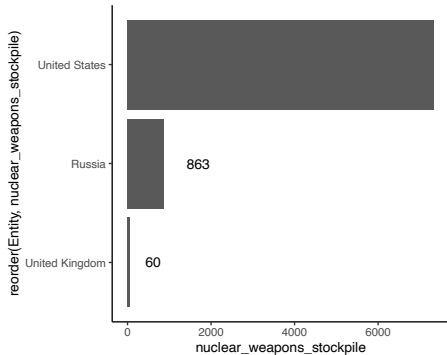
Labeling bars with `geom_text`

```
ggplot(fe, aes(y = nuclear_weapons_stockpile,
               x = reorder(Entity, nuclear_weapons_stockpile))) +
  geom_col() +
  geom_text(aes(label = nuclear_weapons_stockpile),
            hjust = -0.1,
            colour = "black") +
  coord_flip() +
  ylim(0, 8000)
```
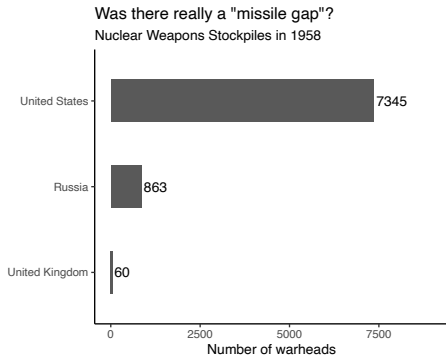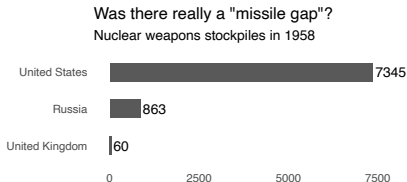
Labeling bars with `geom_text`

```
ggplot(fe, aes(y = nuclear_weapons_stockpile,
               x = reorder(Entity, nuclear_weapons_stockpile))) +
geom_col() +
geom_text(aes(label = nuclear_weapons_stockpile),
          hjust = -0.1,
          colour = "black") +
coord_flip() +
labs(y = "Number of warheads",
     y = "Country",
     title = "Was there really a \"missile gap\"?",
     subtitle = "Nuclear Weapons Stockpiles in 1958") +
scale_y_discrete(labels = scales::label_comma()) +
ylim(0, 9000)
```


Was there really a "missile gap"?
Nuclear Weapons Stockpiles in 1958

Labeling bars with `geom_text`

```r
ggplot(fe, aes(y = nuclear_weapons_stockpile,
               x = reorder(Entity, nuclear_weapons_stockpile))) +
  geom_col(width = 0.5) +
  geom_text(aes(label = nuclear_weapons_stockpile),
            hjust = -0.1,
            colour = "black") +
  coord_flip() +
  labs(x = NULL,
       y = NULL,
       title = "Was there really a \"missile gap\"?",
       subtitle = "Nuclear weapons stockpiles in 1958") +
  scale_y_discrete(labels = scales::label_comma()) +
  theme(axis.ticks = element_blank(),
        axis.line.y = element_blank(),
        axis.line.x = element_blank()) +
  theme(aspect.ratio = 1/3) +
  ylim(0, 9000)
```


Was there really a "missile gap"?
Nuclear weapons stockpiles in 1958

Labeling points with `ggrepel`

```
df <- nukes %>%
  filter(Entity != "World",
         Year > 1960,
         Year < 1980)

ggplot(df, aes(x = Year,
               y = nuclear_weapons_tests,
               label = Entity)) +
  geom_point() +
  geom_text_repel(data = subset(df,
                       nuclear_weapons_tests > 25))
```