Data Viz: The Importance of Iteration

Birth Patterns in the US over a Single Year

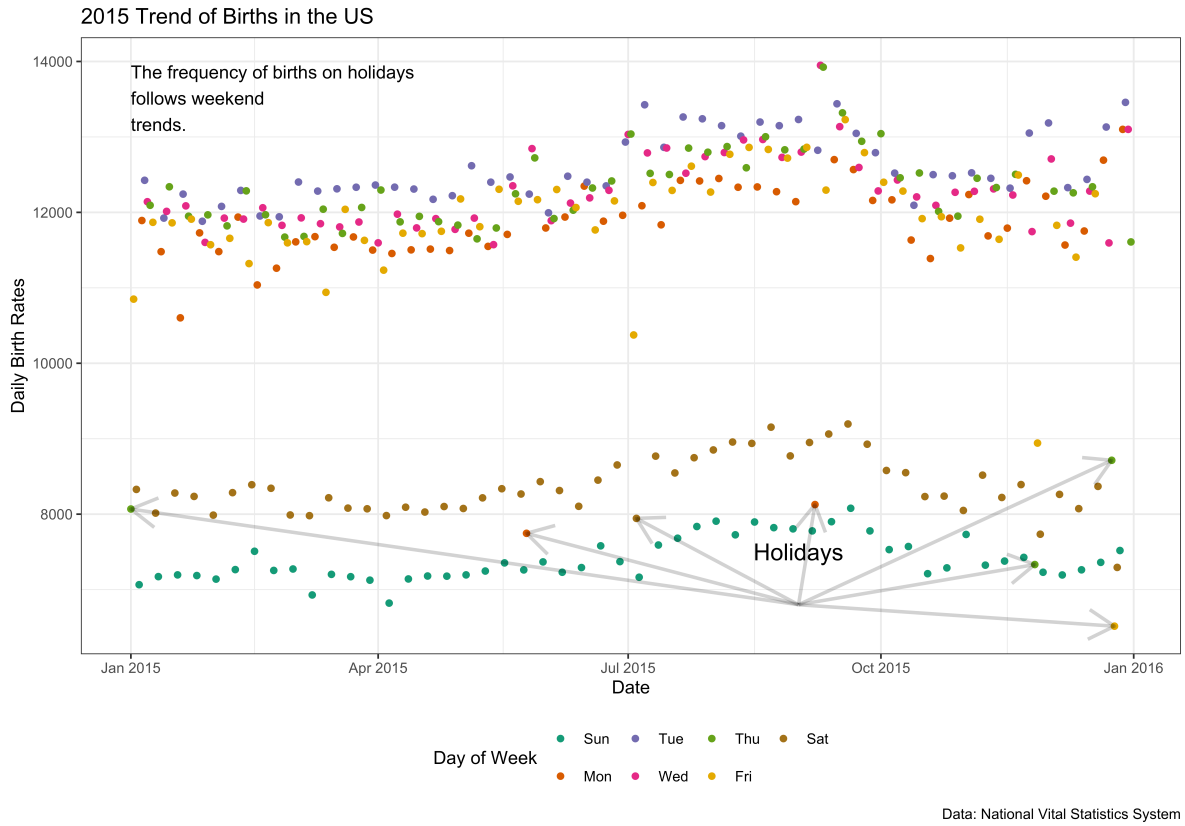
```
# Load tidyverse (which contains ggplot2)
library(tidyverse)

# Load ggrepel to help with labeling points
library(ggrepel)

# Load package that will graph emojis
library(emoGG)

# Load library that has dataset of interest
library(mosaicData)

# Grab data
data(Births2015)

# Look at the data
glimpse(Births2015)
```

```
Rows: 365
Columns: 8
$ date         <date> 2015-01-01, 2015-01-02, 2015-01-03, 2015-01-04, 2015-01-~
$ births       <dbl> 8068, 10850, 8328, 7065, 11892, 12425, 12141, 12094, 1186~
$ wday         <ord> Thu, Fri, Sat, Sun, Mon, Tue, Wed, Thu, Fri, Sat, Sun, Mo~
$ year         <dbl> 2015, 2015, 2015, 2015, 2015, 2015, 2015, 2015, 2015, 201~
$ month        <dbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, ~
$ day_of_year  <int> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17~
$ day_of_month <dbl> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17~
$ day_of_week  <dbl> 5, 6, 7, 1, 2, 3, 4, 5, 6, 7, 1, 2, 3, 4, 5, 6, 7, 1, 2, ~
```

Version 1: Graph with the Defaults

```
label_data <- data.frame(date = ymd("2015-01-01"),
                         births = max(Births2015$births),
label = "The frequency of births on holidays \nfollows weekend \ntrends.")


holidays <-
  data.frame(date = ymd("2015-01-01","2015-05-25", "2015-07-04",
                        "2015-12-25", "2015-11-26", "2015-12-24",
                        "2015-09-07"),
             occasion = c("New Year", "Memorial Day",
                          "Independence Day", "Christmas",
                          "Thanksgiving", "Christmas Eve",
                          "Labor Day"),
             emoji = c("1f389", "1f396", "1f386", "1f384",
                       "1f983", "1f381", "1f477"))
holidays <- left_join(holidays, Births2015)

 ggplot(data = Births2015, mapping = aes(x = date, y = births,
                                         color = wday)) +
   geom_point()  +
   scale_color_brewer(type = "qual", palette = 2) +
   theme_bw() +
   theme(legend.position = "bottom") +
   labs(x = "Date",
        y = "Daily Birth Rates",
        title = "2015 Trend of Births in the US",
        caption = "Data: National Vital Statistics System",
        color = "Day of Week") +
  annotate("segment", colour = "black",
           x = as_date("2015-09-01"),
           xend = holidays$date,
           y = 6800, yend = holidays$births,
           size = 1, alpha = 0.2, arrow = arrow())+
  annotate("text", x = as_date("2015-09-01"),
           y = 7500, label = "Holidays",
           color="black", size=5) +
  geom_text(mapping = aes(label = label),
            data = label_data,
            color = "black", vjust = "top",
```

```
            hjust = "left")
```



What stories do you see in this data visualization?

How could we make the story clearer?

Iterations

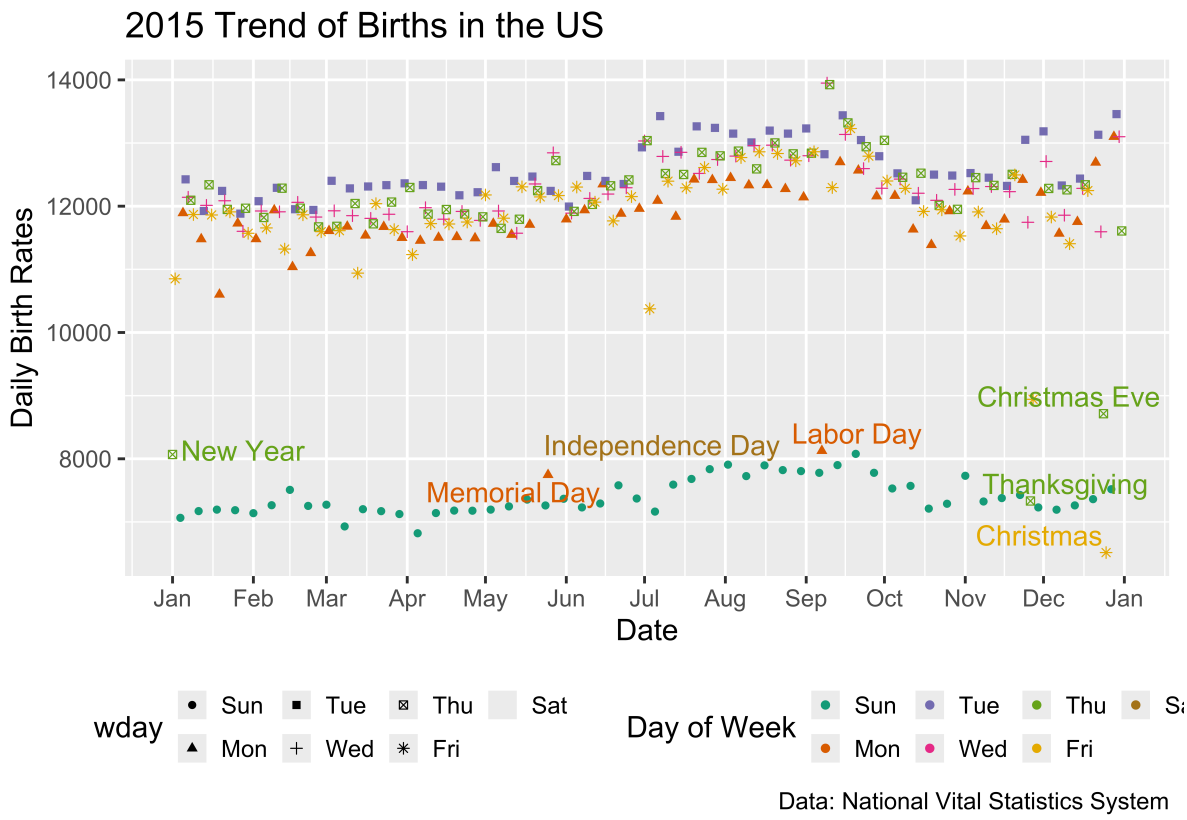
Edits to make:

- Don't keep line.
- Add color.
- Change colors.
- Move legend to fix aspect ratio.
- Consider different breaks.

- Size of points.
- Highlight the holidays: labels, arrows, text, emojis
- Font size

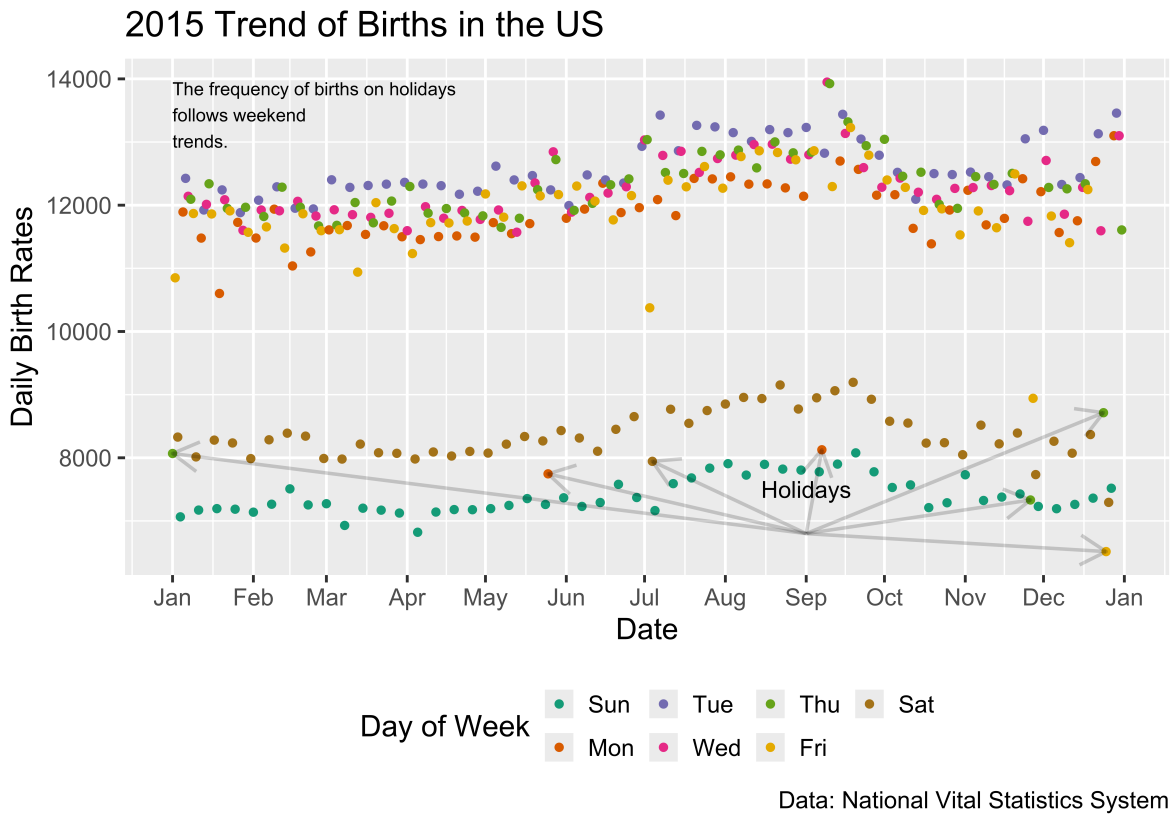
Final Versions

```
holidays <-
  data.frame(date = ymd("2015-01-01","2015-05-25", "2015-07-04",
                        "2015-12-25", "2015-11-26", "2015-12-24",
                        "2015-09-07"),
             occasion = c("New Year", "Memorial Day",
                          "Independence Day", "Christmas",
                          "Thanksgiving", "Christmas Eve",
                          "Labor Day"),
             emoji = c("1f389", "1f396", "1f386", "1f384",
                       "1f983", "1f381", "1f477"))
holidays <- left_join(holidays, Births2015)

ggplot(data = Births2015,
       mapping = aes(x = date, y = births,
                     color = wday,
                     shape = wday)) +
  geom_point(size = 2) +
  scale_x_date(date_labels = "%b",
               date_breaks = "1 month") +
  scale_color_brewer(type = "qual", palette = 2) +
   labs(x = "Date",
        y = "Daily Birth Rates",
        title = "2015 Trend of Births in the US",
        caption = "Data: National Vital Statistics System",
        color = "Day of Week") +
  geom_text_repel(data = holidays,
            mapping = aes(label = occasion), size = 6,
            show.legend = FALSE) +
  theme_gray(base_size = 18) +
  theme(legend.position = "bottom")
```



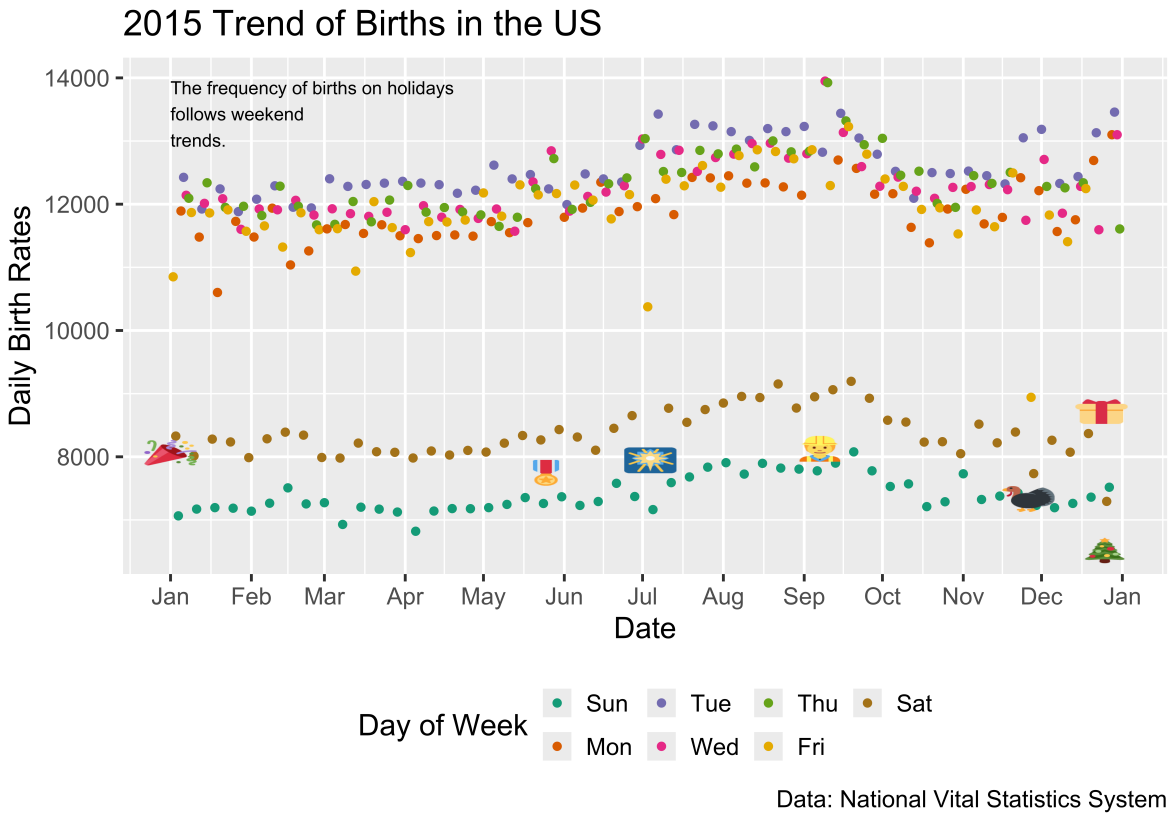

```
# Another way of signifying holidays
# Create a story label
label_data <- data.frame(date = ymd("2015-01-01"),
                         births = max(Births2015$births),
label = "The frequency of births on holidays \nfollows weekend \ntrends.")

ggplot(data = Births2015,
       mapping = aes(x = date, y = births,
                     color = wday)) +
  geom_point(size = 2)  +
  scale_x_date(date_labels = "%b",
               date_breaks = "1 month") +
  scale_color_brewer(type = "qual", palette = 2) +
   labs(x = "Date",
        y = "Daily Birth Rates",
        title = "2015 Trend of Births in the US",
        caption = "Data: National Vital Statistics System",
        color = "Day of Week") +
```

```
  annotate("segment", colour = "black",
           x = as_date("2015-09-01"),
           xend = holidays$date,
           y = 6800, yend = holidays$births,
           size = 1, alpha = 0.2, arrow = arrow())+
  annotate("text", x = as_date("2015-09-01"),
           y = 7500, label = "Holidays",
           color="black", size=5) +
  geom_text(mapping = aes(label = label),
            data = label_data,
            color = "black", vjust = "top",
            hjust = "left") +
  theme_gray(base_size = 18) +
  theme(legend.position = "bottom")
```




```
# Yet another option
ggplot(data = Births2015,
       mapping = aes(x = date, y = births,
```

```
                    color = wday)) +
geom_point(size = 2)  +
scale_x_date(date_labels = "%b",
             date_breaks = "1 month") +
scale_color_brewer(type = "qual", palette = 2) +
 labs(x = "Date",
      y = "Daily Birth Rates",
      title = "2015 Trend of Births in the US",
      caption = "Data: National Vital Statistics System",
      color = "Day of Week") +
geom_text(mapping = aes(label = label),
          data = label_data,
          color = "black", vjust = "top",
          hjust = "left") +
geom_emoji(data = holidays,
           mapping = aes(emoji = emoji,
                         x = date,
                         y = births),
           inherit.aes = FALSE) +
theme_gray(base_size = 18) +
theme(legend.position = "bottom")
```


2015 Trend of Births in the US
The frequency of births on holidays follows weekend trends.
Daily Birth Rates
14000
12000
10000
8000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Date
Day of Week
Sun
Mon
Tue
Wed
Thu
Fri
Sat
Data: National Vital Statistics System