Visualization - Aesthetic Mapping

A visualization:

- is a geometry object (a geom)
- whose aesthetics
- represents variables
- from a data set

Aesthetics mean

- “something you can see”.

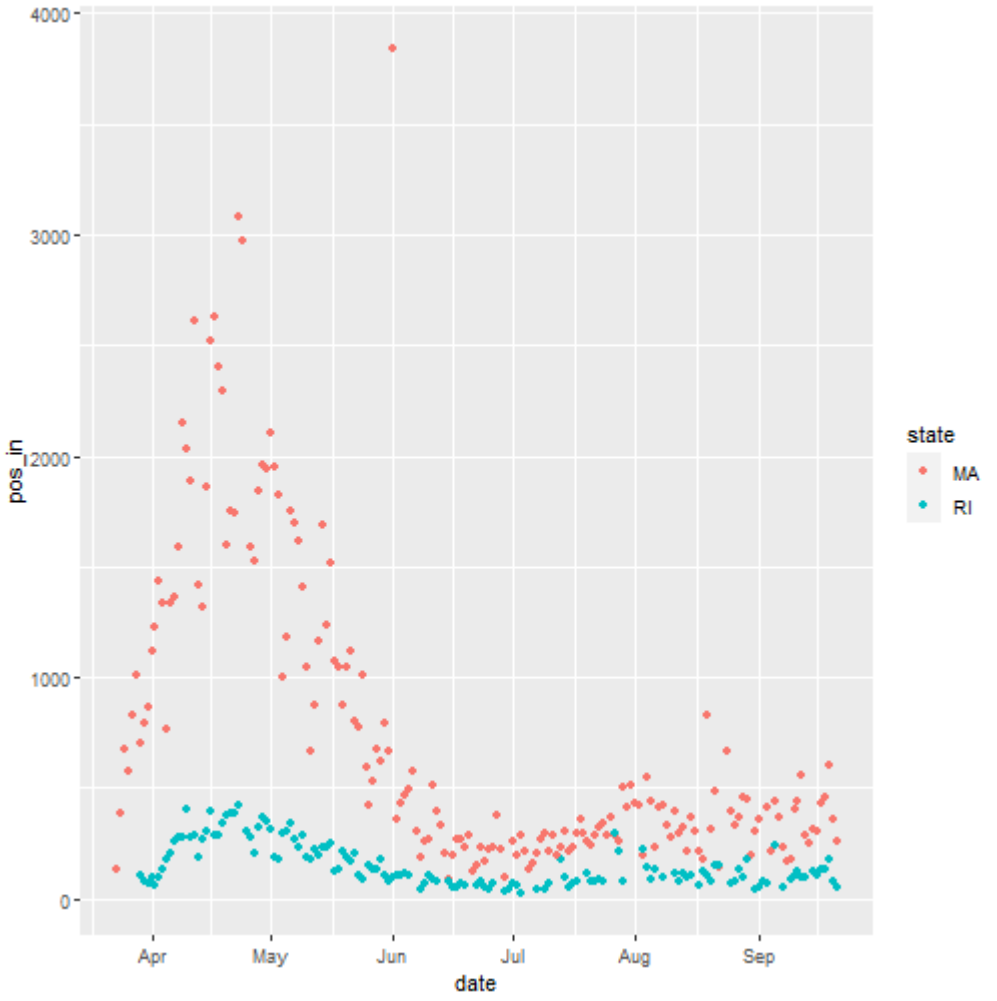
Examples include:

- position (i.e., on the x and y axes)
- color (“outside” color)
- fill (“inside” color)
- shape (of points)
- size

Aesthetics Mapping

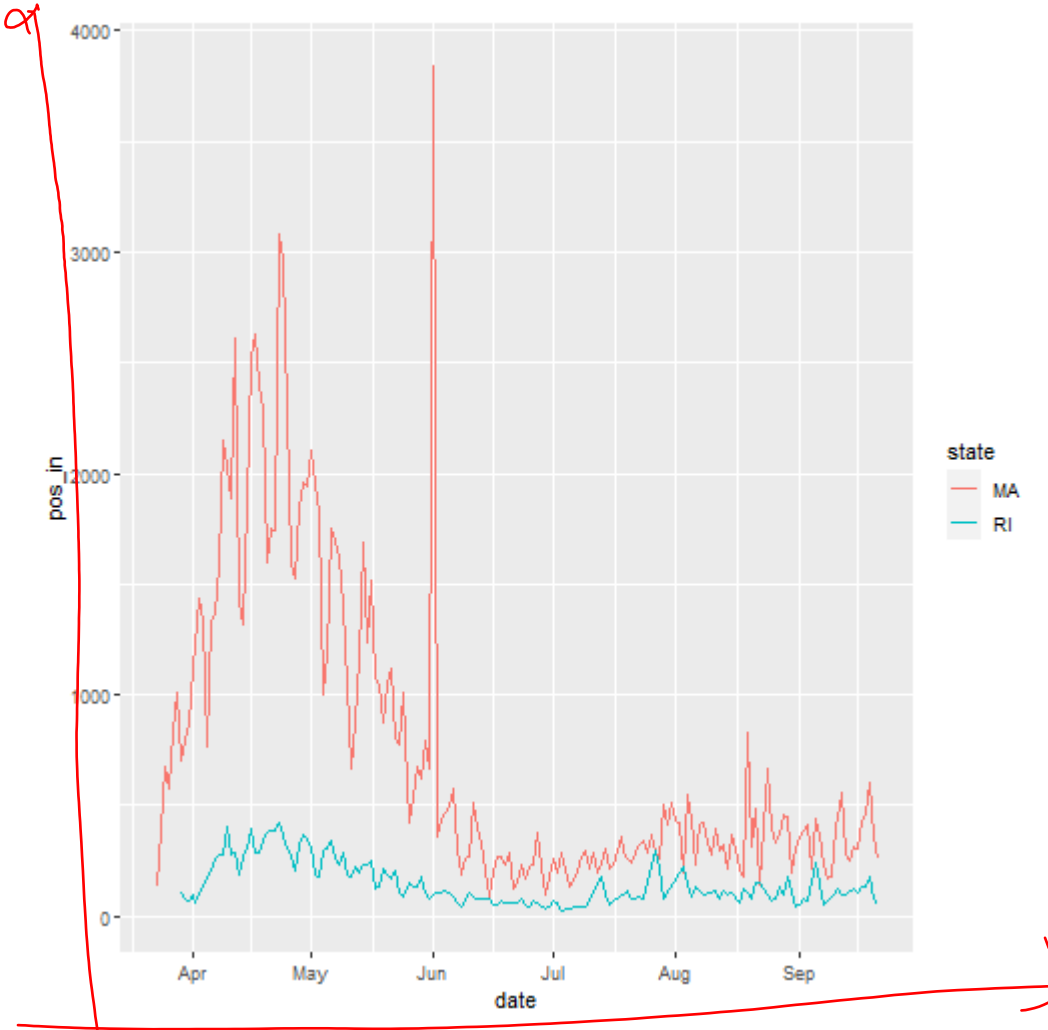
- map
- variables
- to aesthetics

```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date, y = pos_in, color = state))
```



Aesthetic
- x - axis
- y - axis
- color

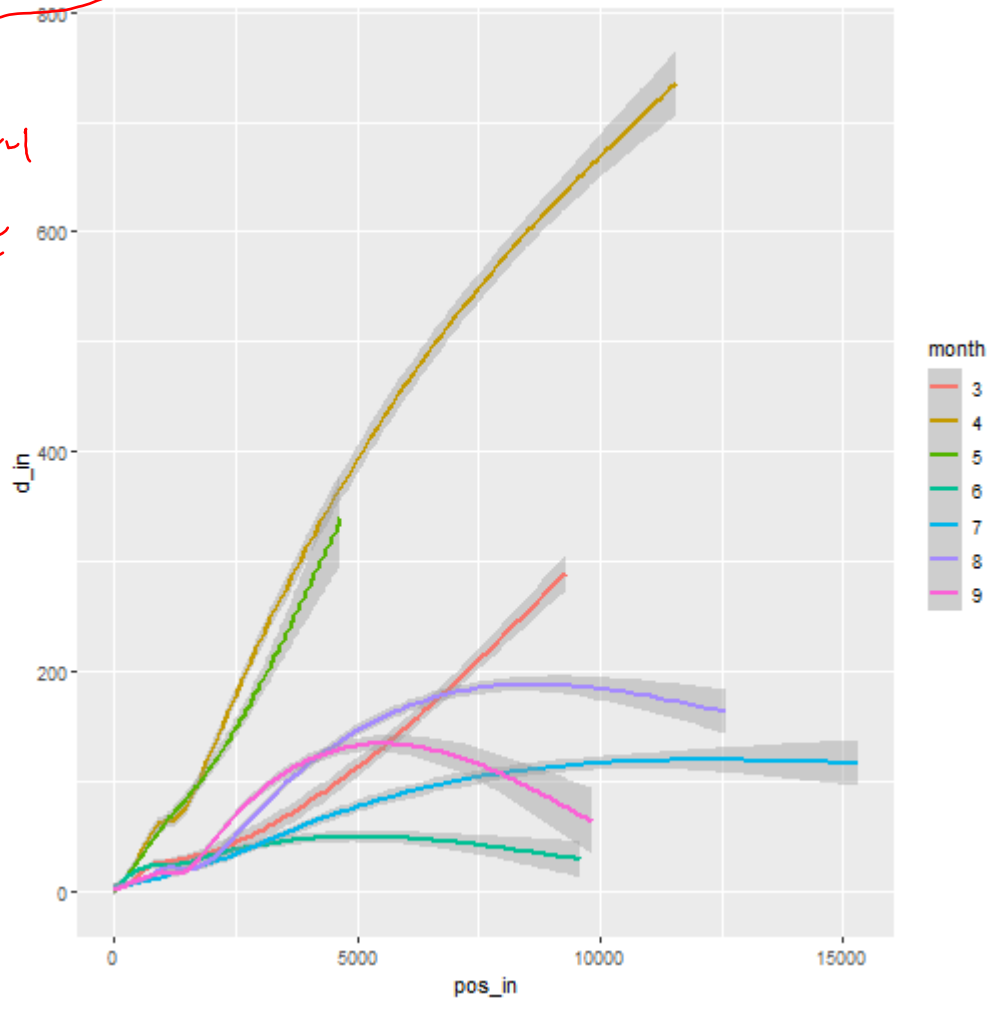
```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_line(mapping = aes(x = date, y = pos_in, color = state))
```



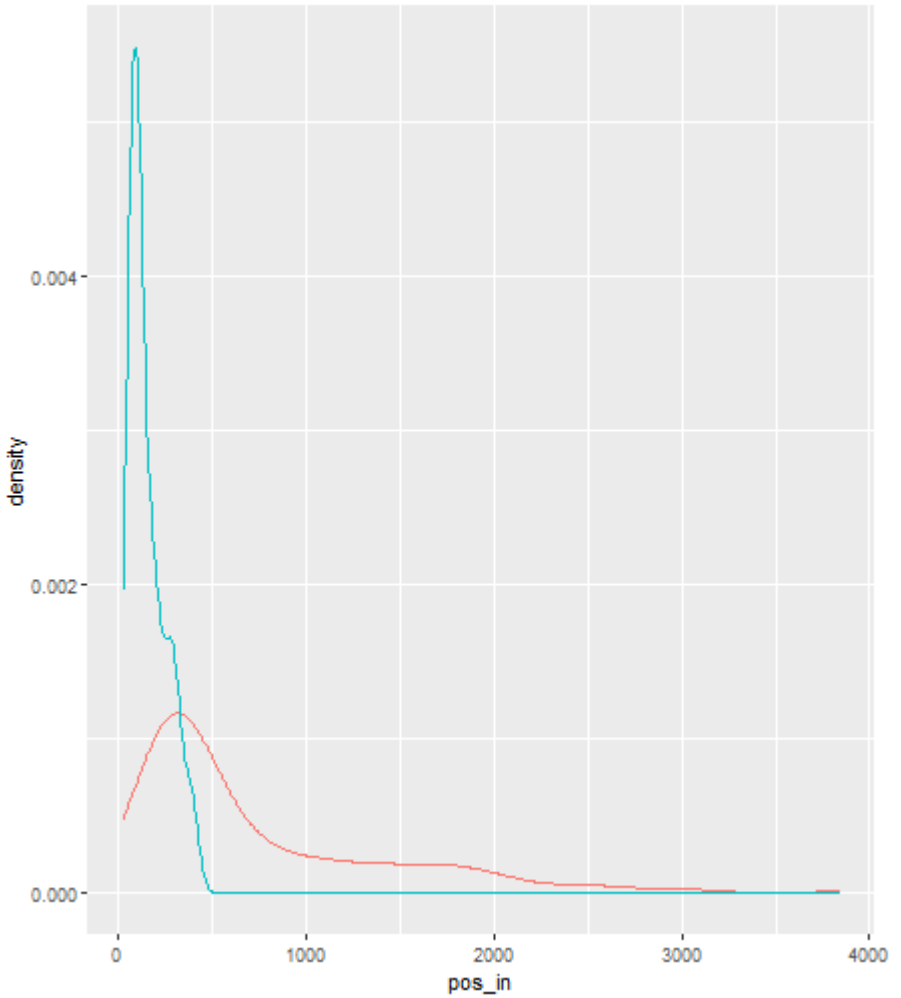
define

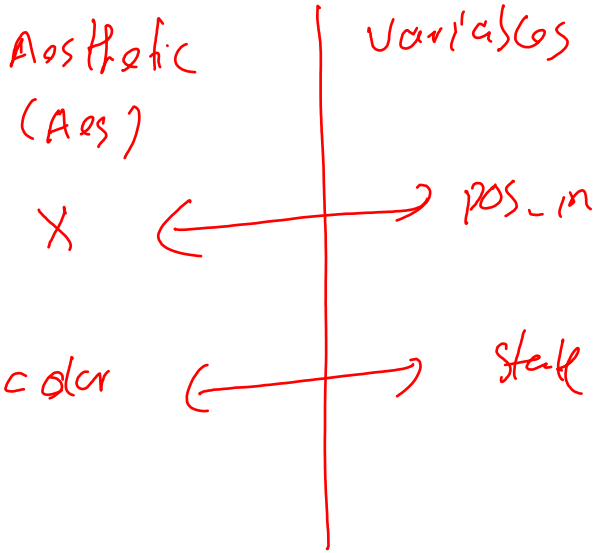
```
df %>% ggplot()+
  geom_smooth(mapping = aes(x = pos_in, y = d_in, color = month))
```

Geometry object



```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_density(mapping = aes(x = pos_in, color = state))
```

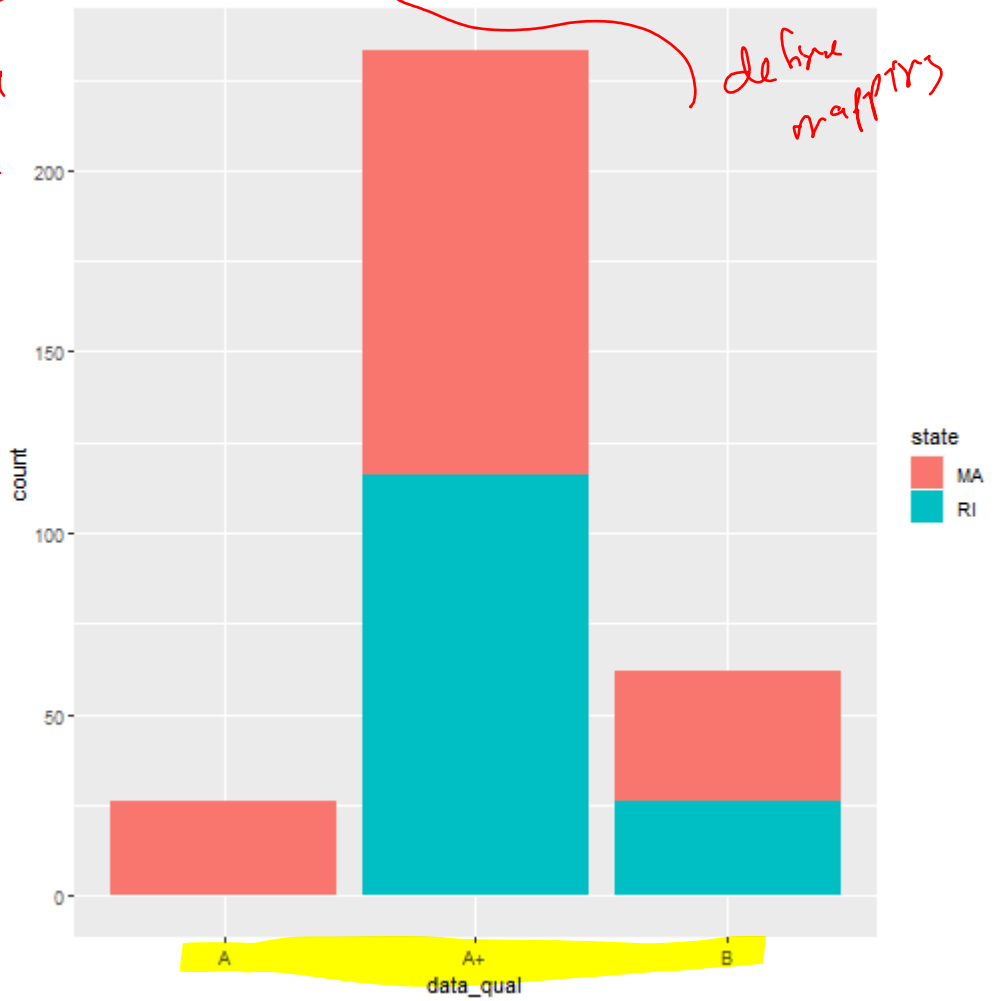




```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_bar(mapping = aes(x = data_qual, fill = state))
```

Define geometric object

define mappings

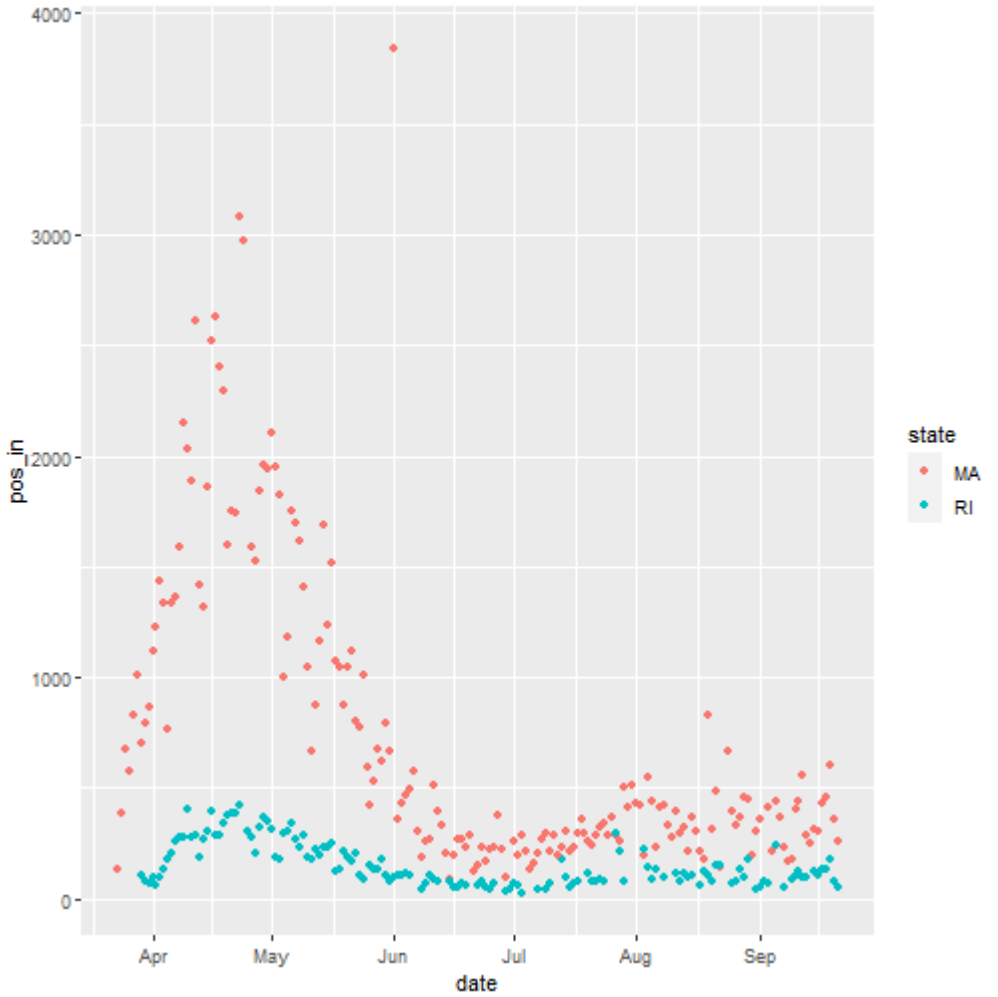


Aesthetic of a geom

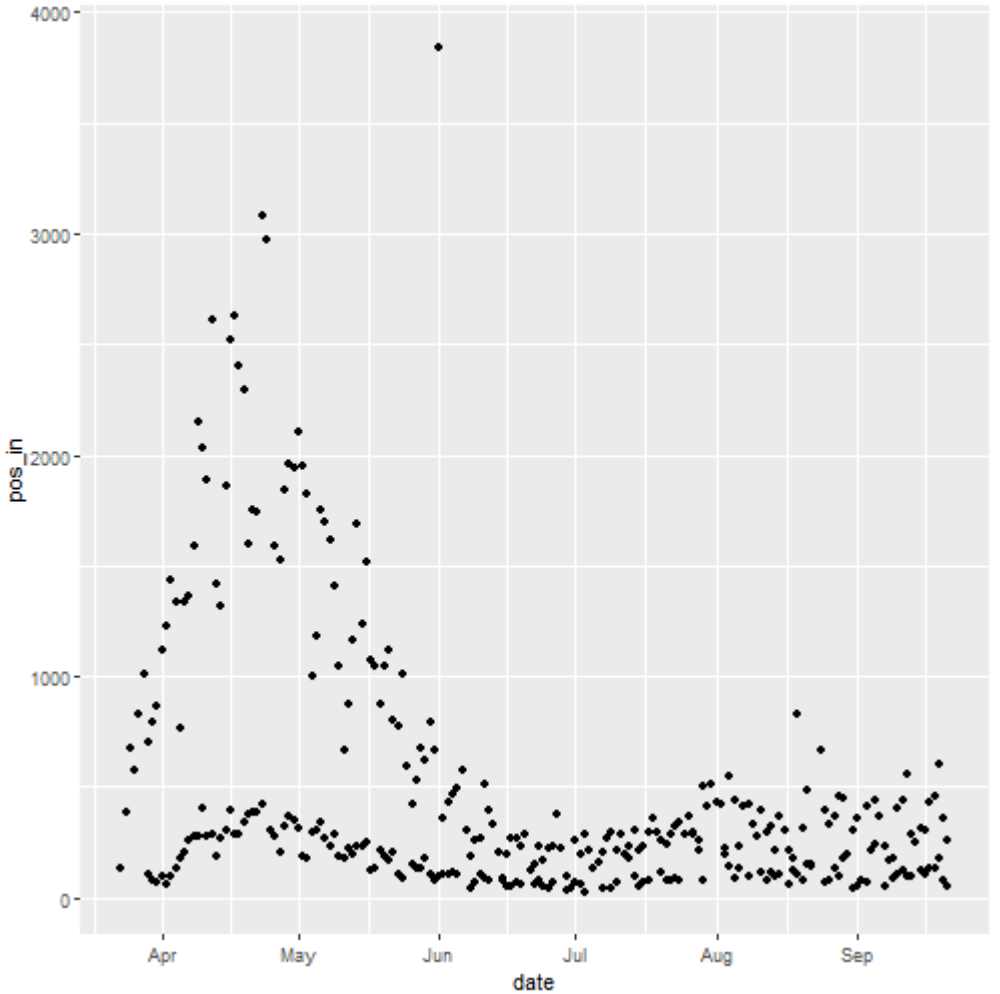
- A geom has its list of own aesthetics
- Use `?geom_point()` to check for the list of `geom_point`
- Some aesthetics are required, some are not

Required Aesthetics

```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date, y = pos_in, color = state))
```



```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date, y = pos_in))
```



```
df %>% filter(state=='RI'|state=='MA') %>% ggplot()+
  geom_point(mapping = aes(x = date))
```

- Will produce an error since `y` aesthetic is required for `geom_point`.

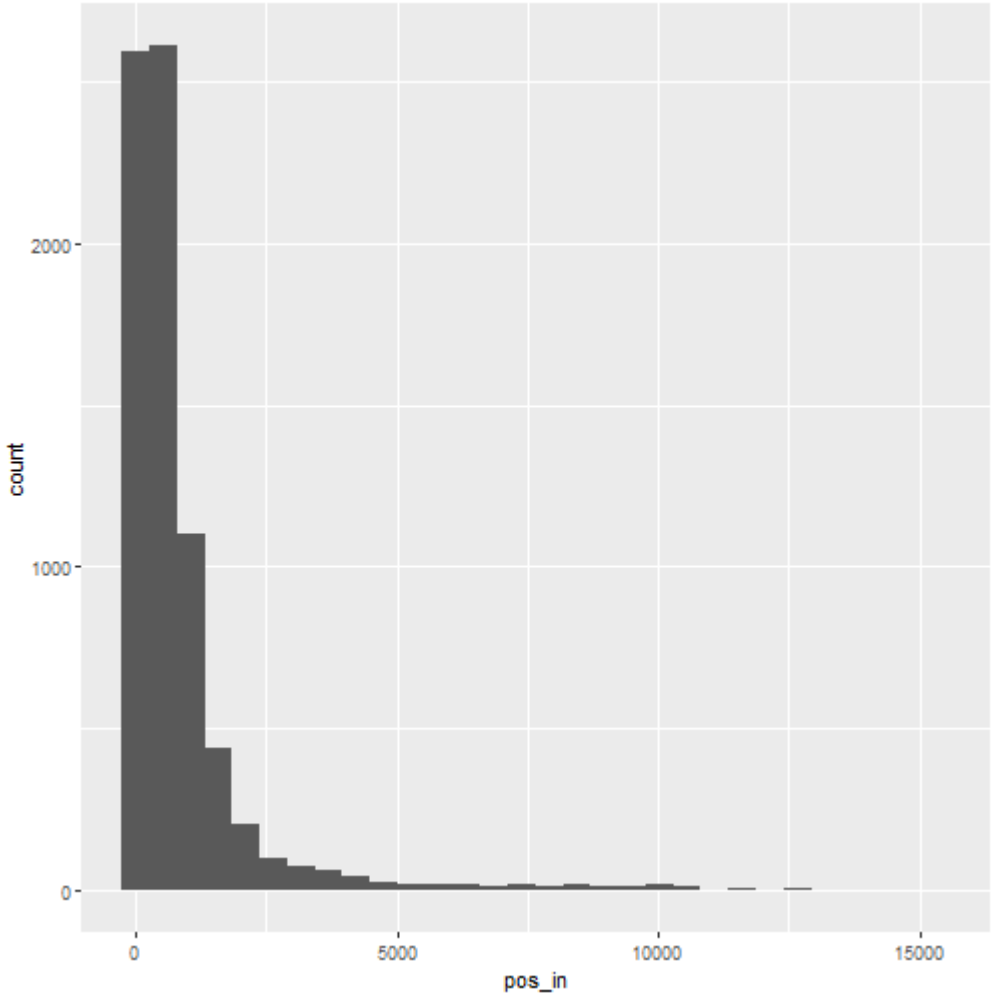
Common Visualization Practices

One Continuous Variable

- Density: `geom_density`
- Histogram: `geom_histogram`
- Boxplot: `geom_boxplot`

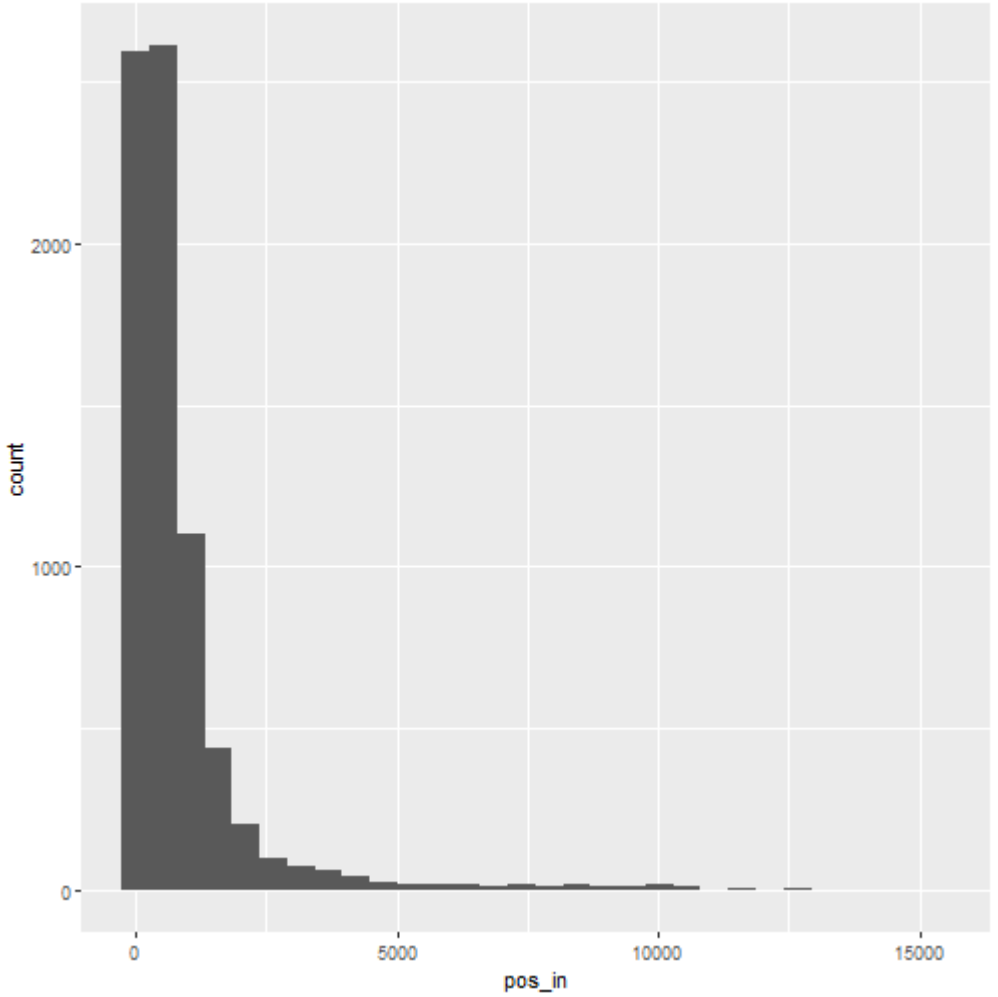
One Continuous Variable: Density

```
df %>% ggplot()+
  geom_histogram(mapping = aes(x = pos_in))
```



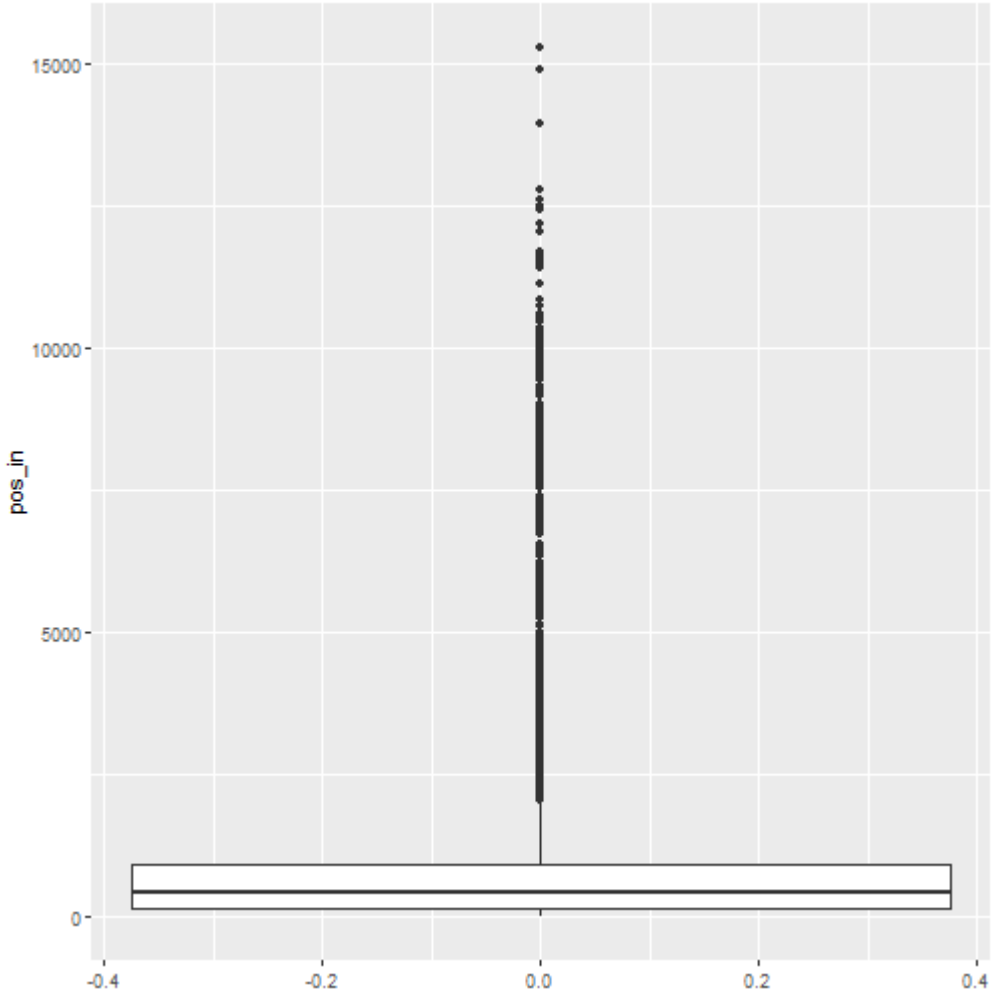
One Continuous Variable: Histogram

```
df %>% ggplot()+
  geom_histogram(mapping = aes(x = pos_in))
```



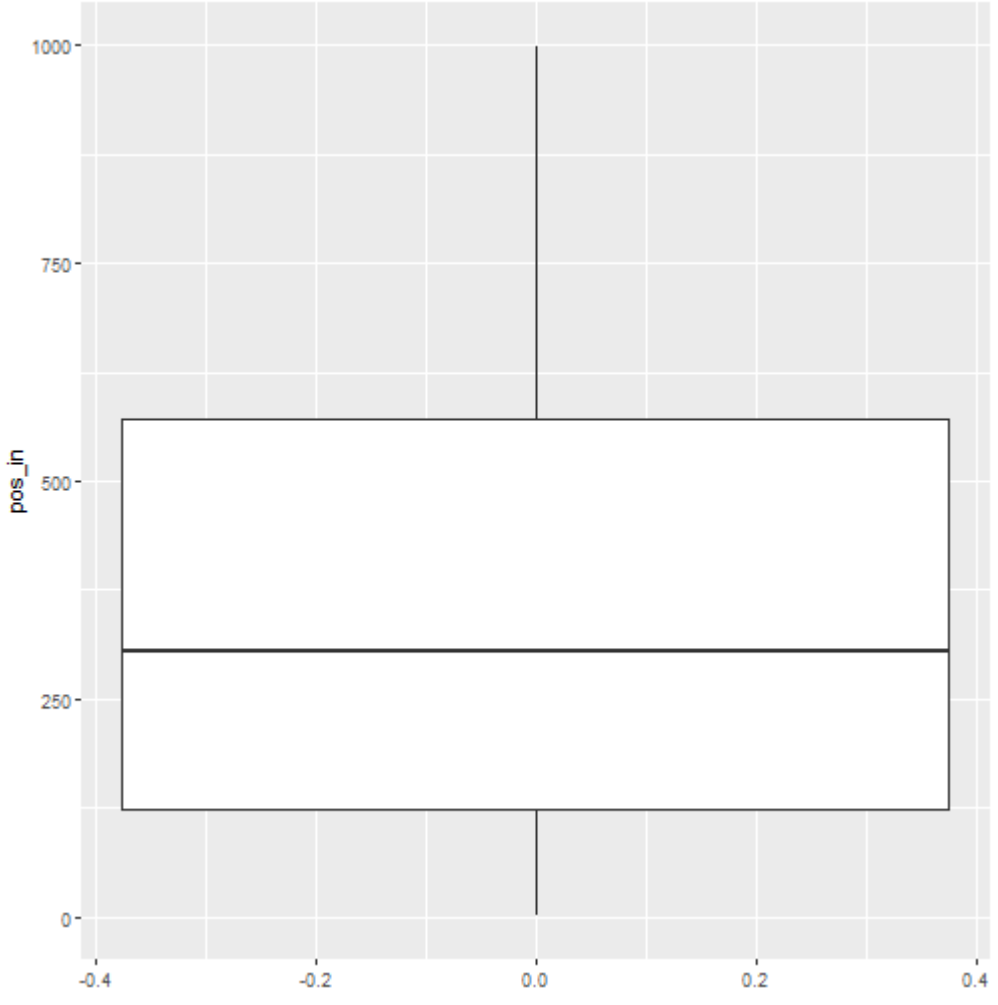
One Continuous Variable: Boxplot

```
df %>% ggplot()+
  geom_boxplot(mapping = aes(y = pos_in))
```



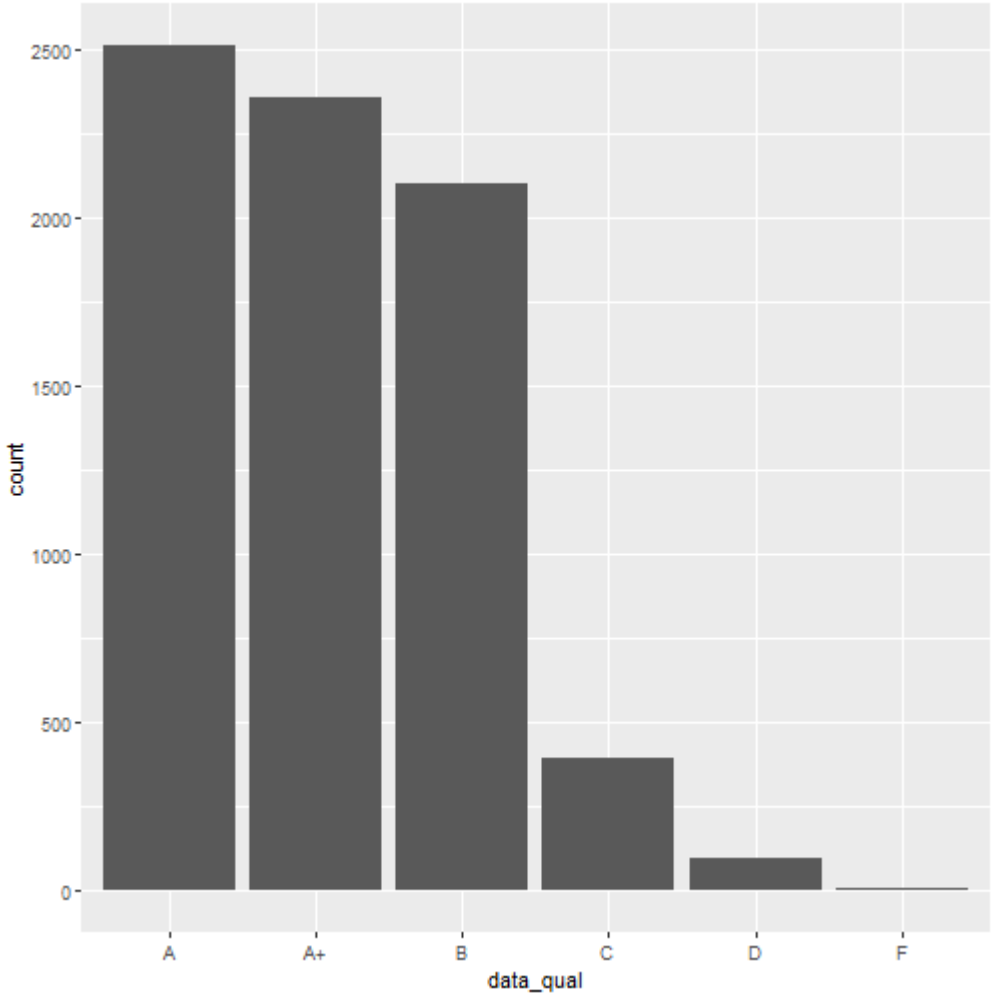
One Continuous Variable: Boxplot

```
df %>% filter(pos_in<1000) %>% ggplot()+
  geom_boxplot(mapping = aes(y = pos_in))
```



One Categorical Variable: Bar chart

```
df %>% ggplot()+
  geom_bar(mapping = aes(x = data_qual))
```



Two Continuous Variables

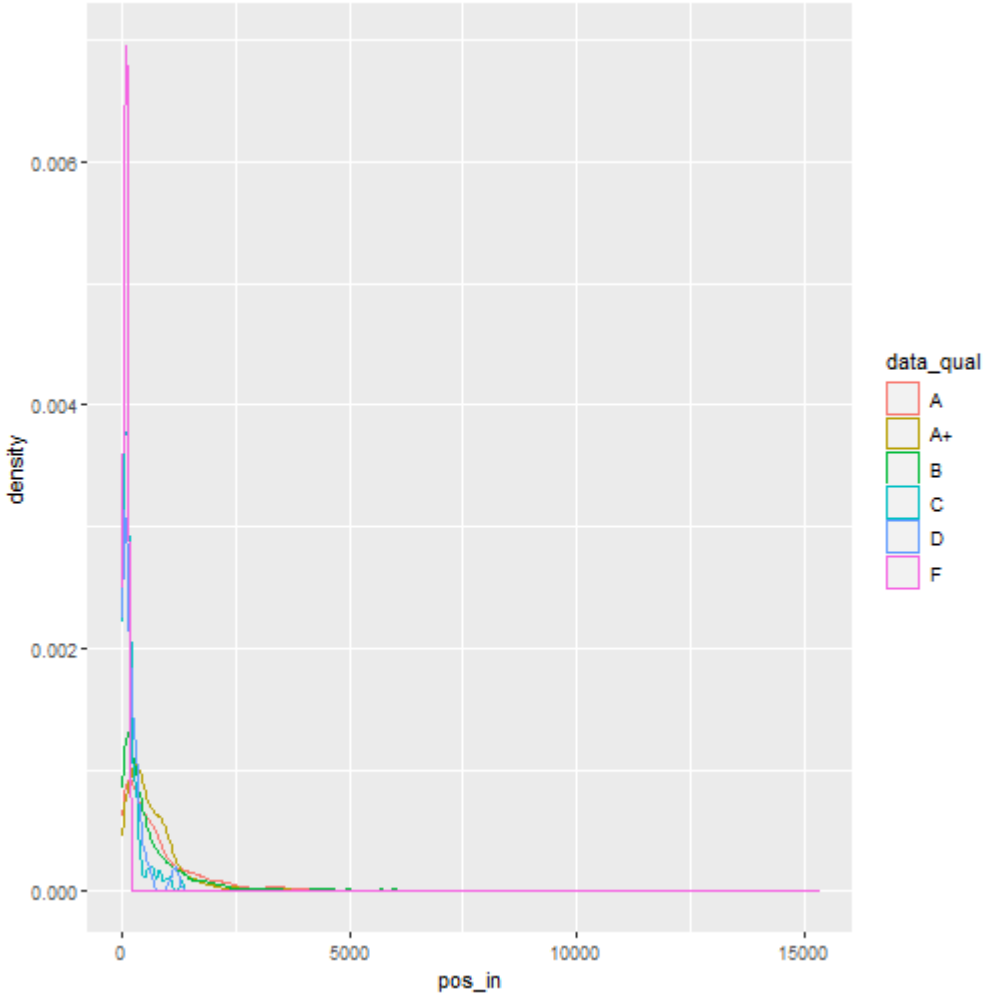
- Scatter Plot: `geom_point`
- Line Plot: `geom_line`
- Smooth Plot: `geom_smooth`

One Continuous Variable + One Categorical Variable

- Density
- BoxPlot

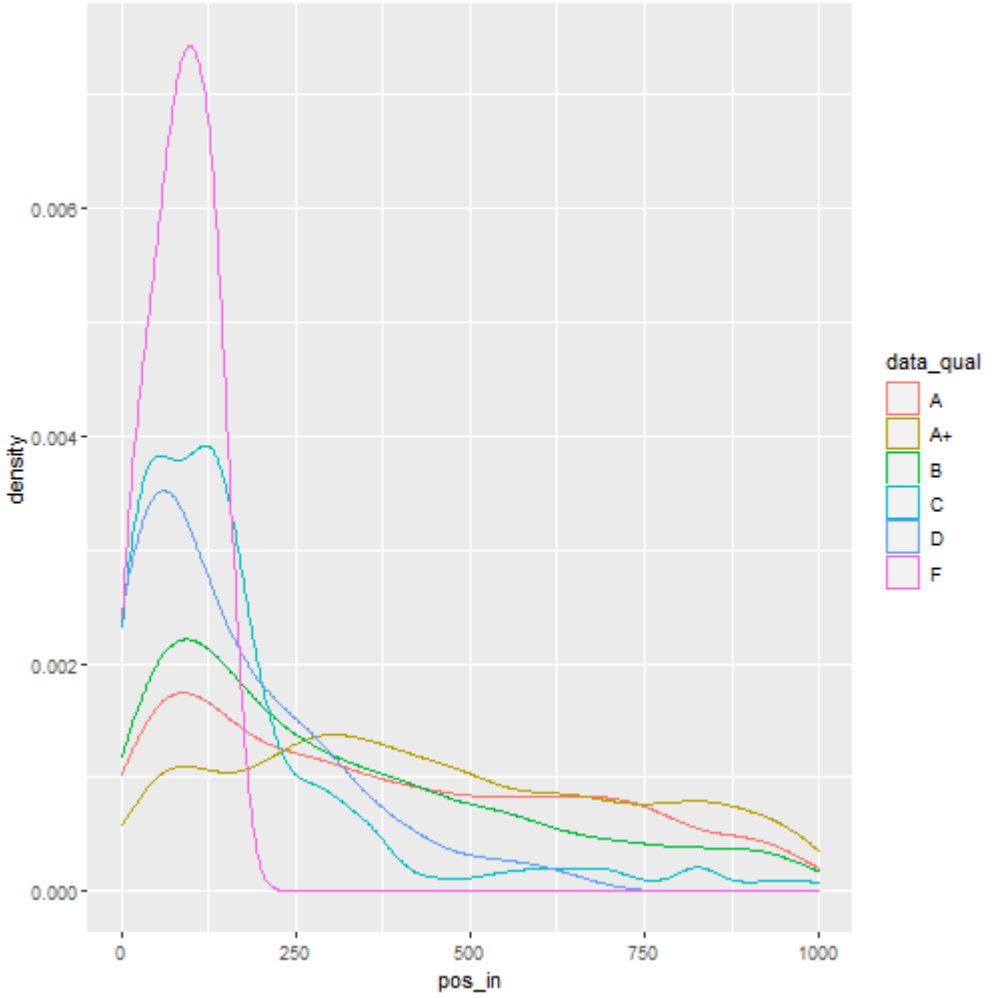
One Continuous + One Categorical: Density

```
df %>% ggplot()+
  geom_density(mapping = aes(x = pos_in, color = data_qual))
```



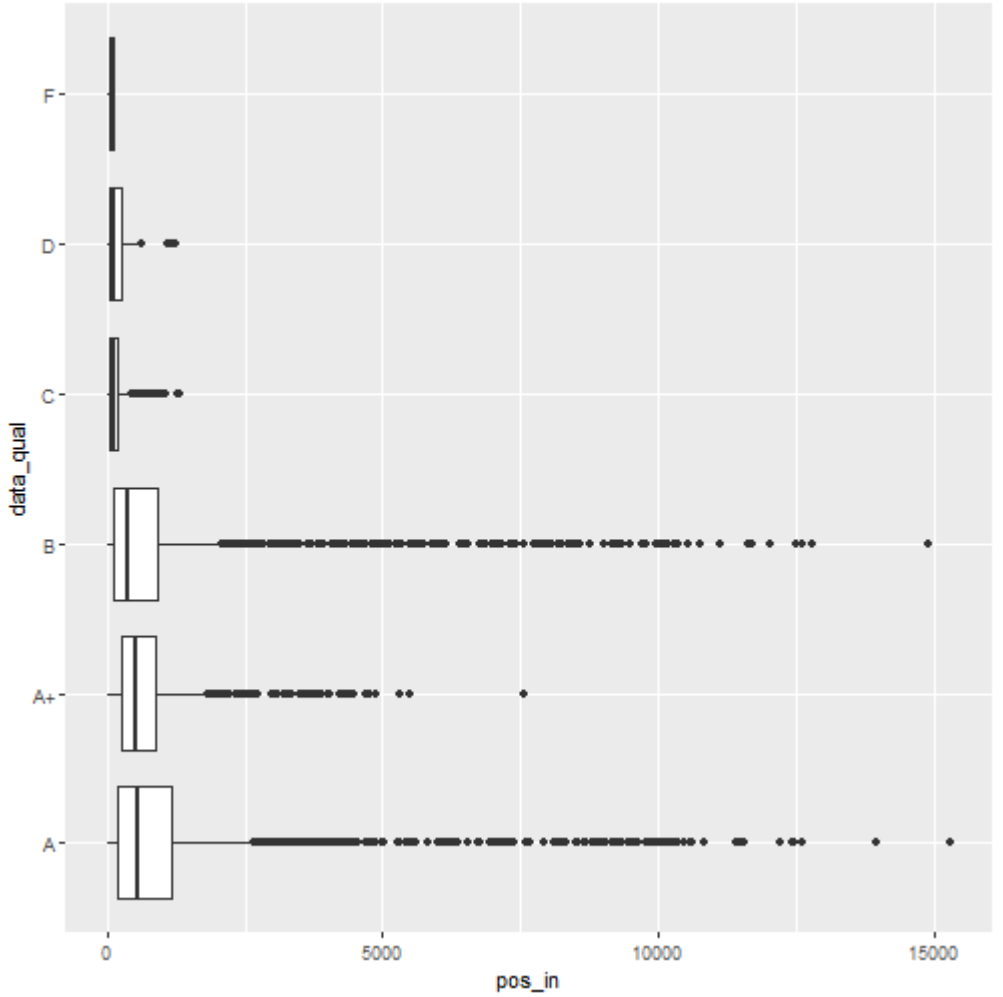
One Continuous + One Categorical: Density

```
df %>% filter(pos_in<1000) %>% ggplot()+
  geom_density(mapping = aes(x = pos_in, color = data_qual))
```



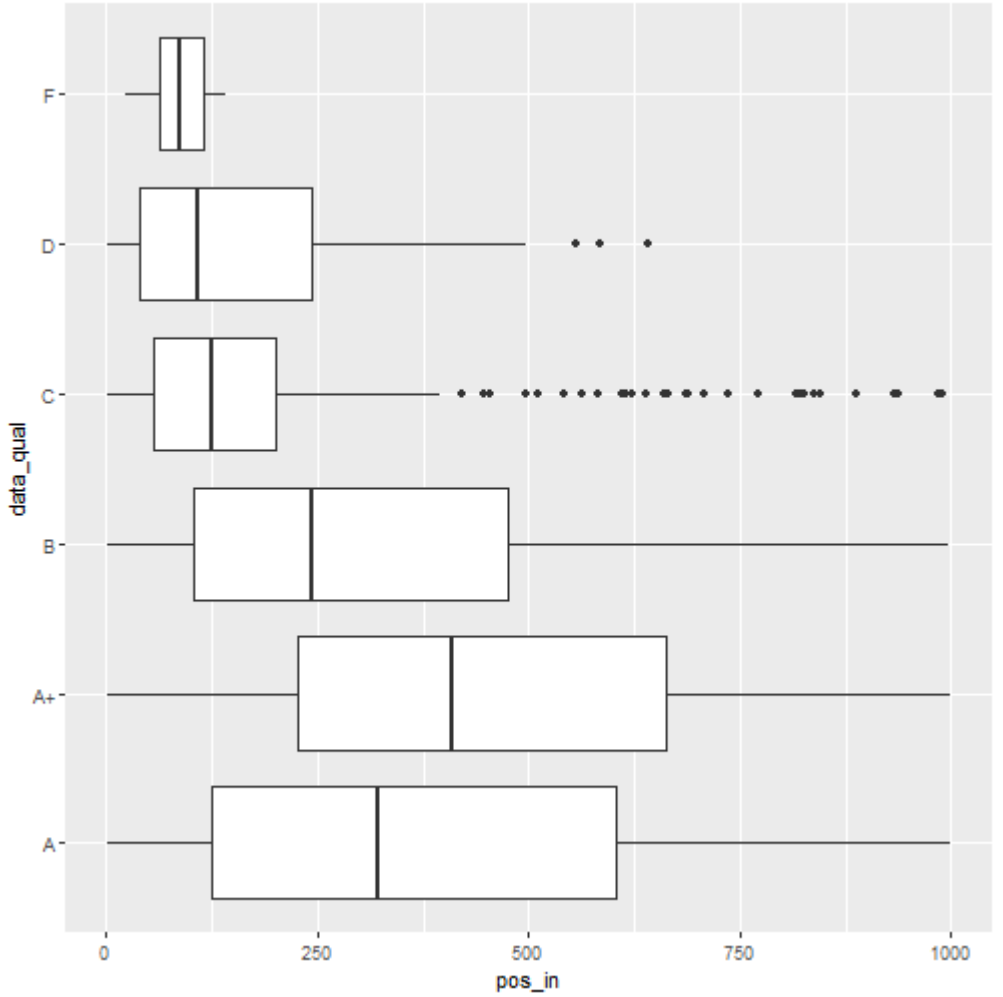
One Continuous + One Categorical: Boxplot

```
df %>% ggplot()+
  geom_boxplot(mapping = aes(x = pos_in, y = data_qual))
```



One Continuous + One Categorical: Boxplot

```
df %>% filter(pos_in<1000) %>% ggplot()+
  geom_boxplot(mapping = aes(x = pos_in, y = data_qual))
```

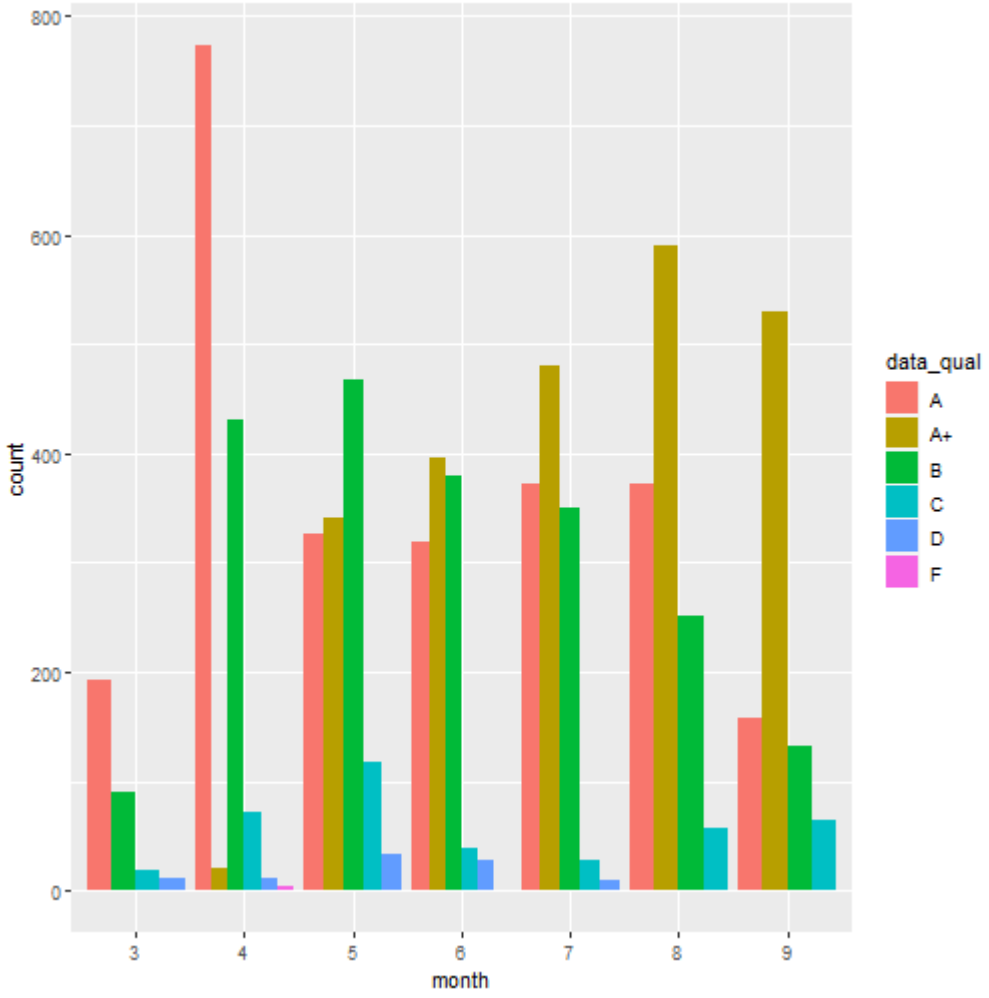


One Categorical Variable + One Categorical Variable

- Barplot

One Categorical + One Categorical: Barplot

```
df %>% ggplot()+
  geom_bar(mapping=aes(x=month, fill=data_qual), position='dodge')
```



More

- ggplot cheat sheet