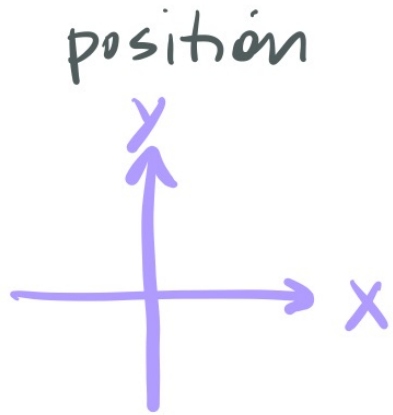


# Data visualization in R

# ggplot2 package

- Most confusing key concept: **aesthetic mapping**
- Maps data values to visual elements of the plot
- A few examples of aesthetics:



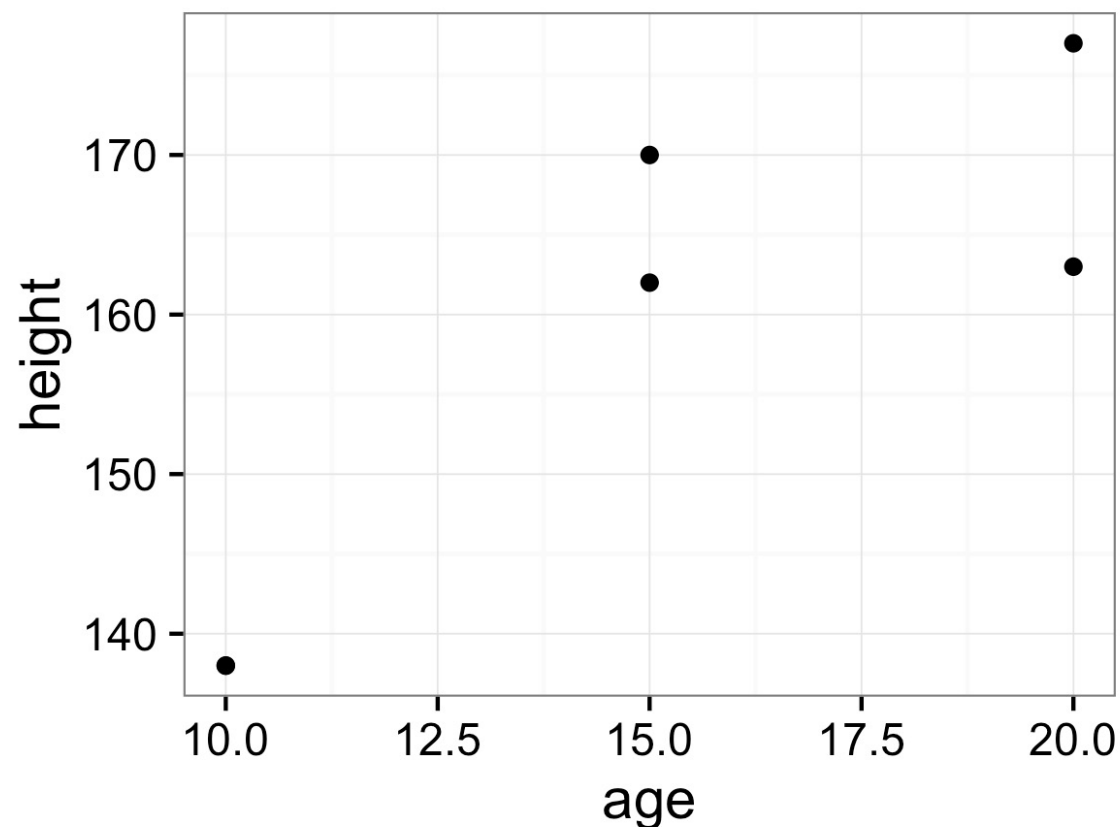
# Let's go over a simple example

- Mean height and weight of boys/girls ages 10–20

| age (yrs) | height (cm) | weight (kg) | sex |
|-----------|-------------|-------------|-----|
| 10        | 138         | 32          | M   |
| 15        | 170         | 56          | M   |
| 20        | 177         | 71          | M   |
| 10        | 138         | 33          | F   |
| 15        | 162         | 52          | F   |
| 20        | 163         | 53          | F   |

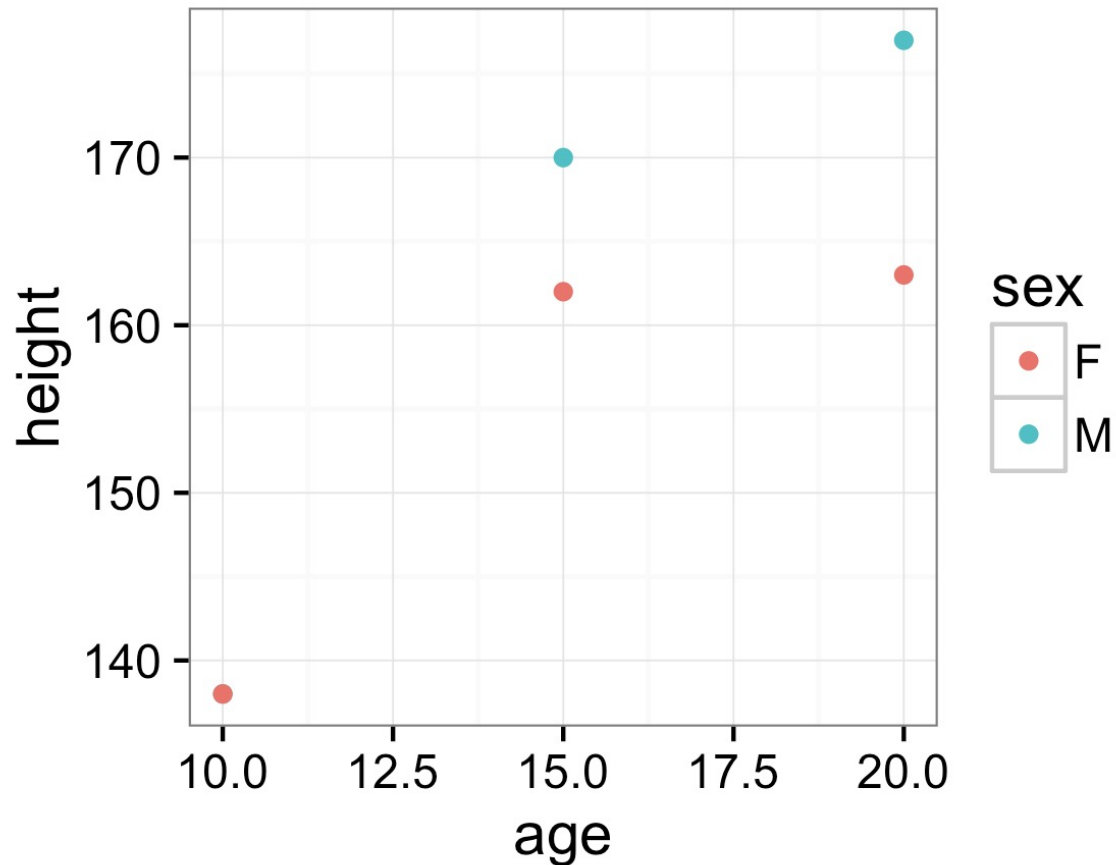
Map age to x-axis, height to y-axis, and visualize using points

```
ggplot(data, aes(x=age, y=height)) + geom_point()
```



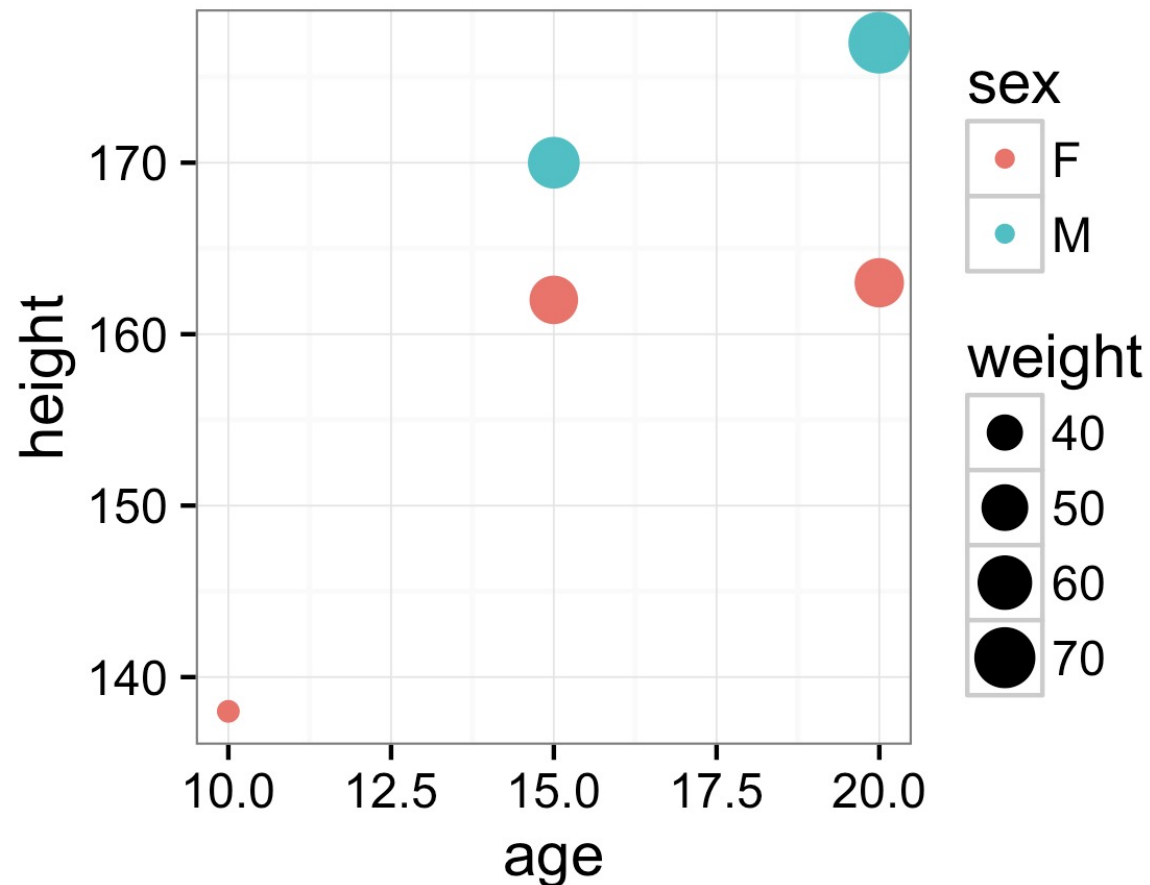
## Color the points by sex

```
ggplot(data, aes(x=age, y=height,  
  color=sex)) + geom_point()
```



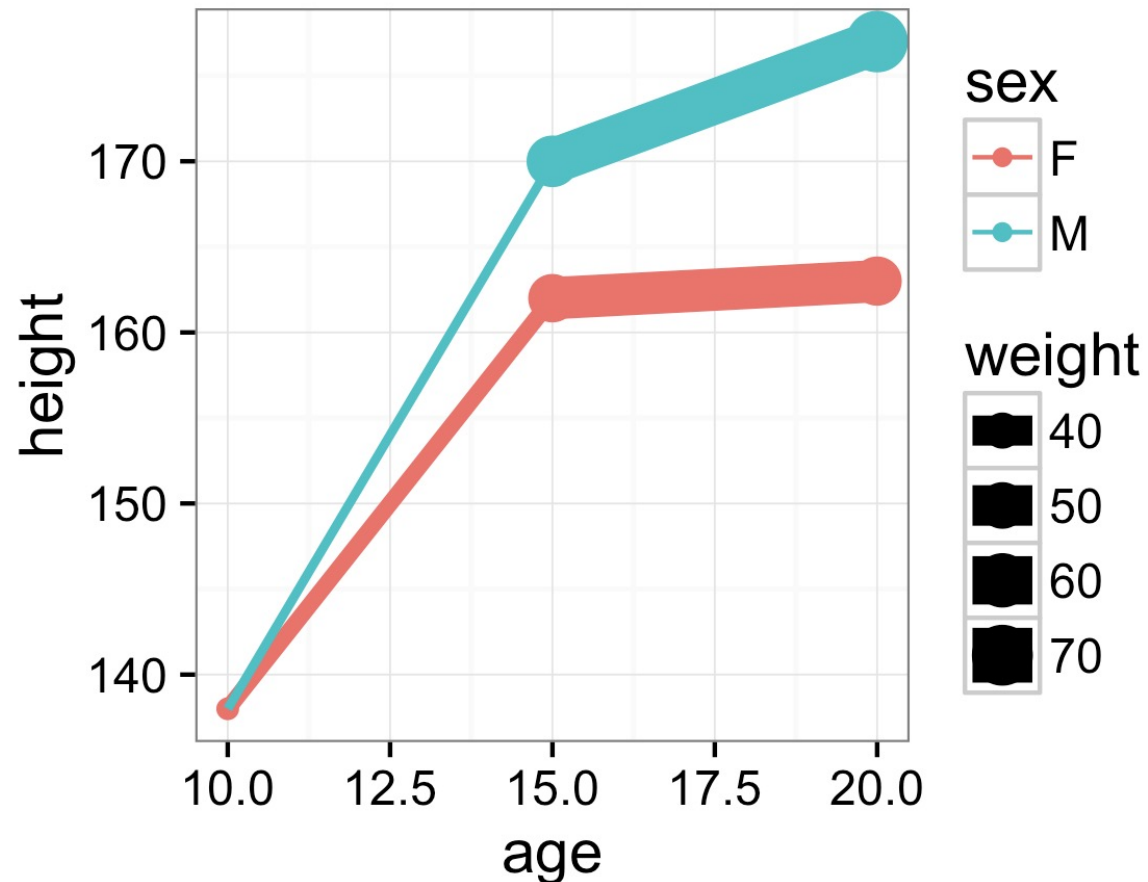
Change **point size** based on weight

```
ggplot(data, aes(x=age, y=height,  
                 color=sex, size=weight)) + geom_point()
```



And connect the points with **lines**

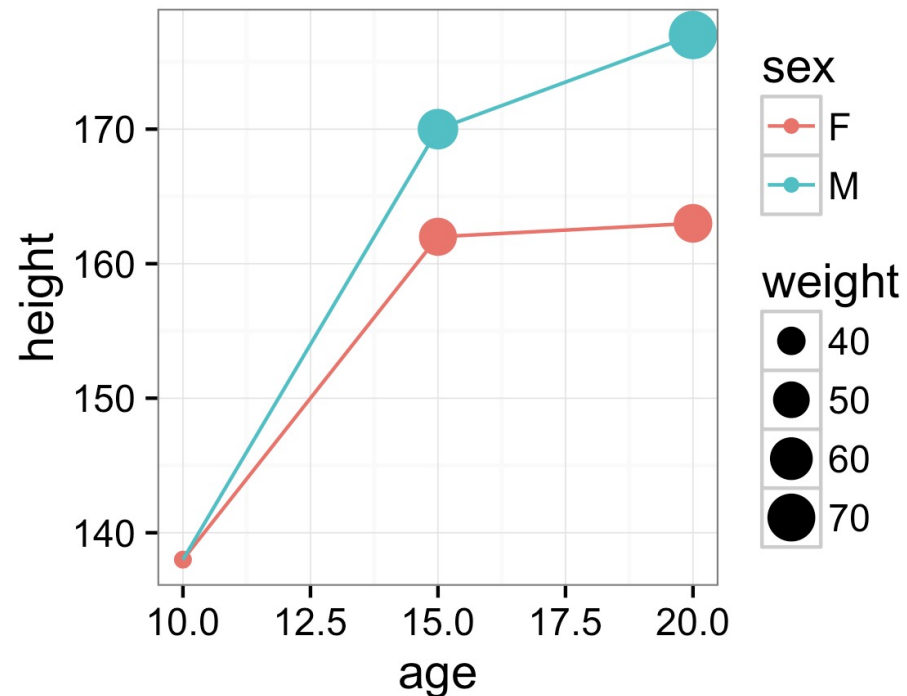
```
ggplot(data, aes(x=age, y=height,  
                 color=sex, size=weight)) + geom_point() +  
                 geom_line()
```



Oops!

The weight-to-size mapping should only be applied to points

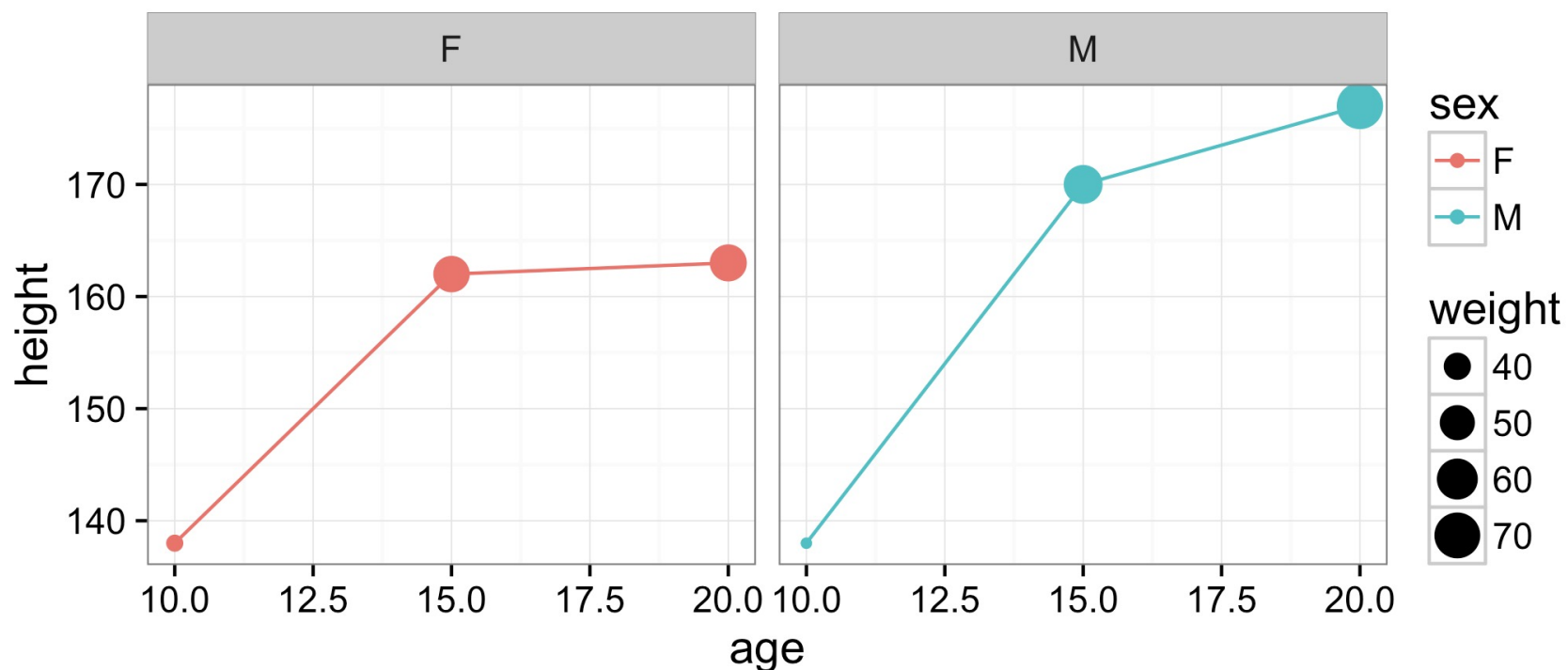
```
ggplot(data, aes(x=age, y=height,  
                 color=sex, size=weight)) +  
  geom_point(aes(size=weight)) +  
  geom_line()
```





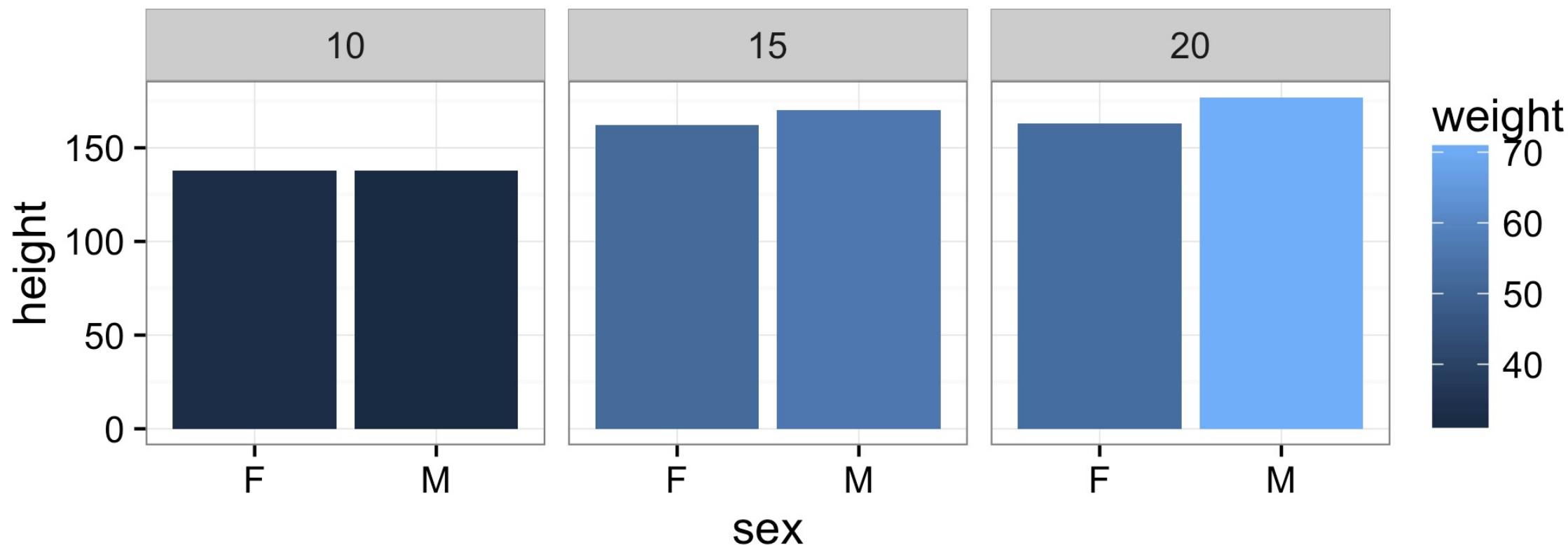
We can also make side-by-side plots (called **facets**)

```
ggplot(data, aes(x=age, y=height,  
                 color=sex, size=weight)) +  
  geom_point(aes(size=weight)) +  
  geom_line() + facet_wrap(~sex)
```



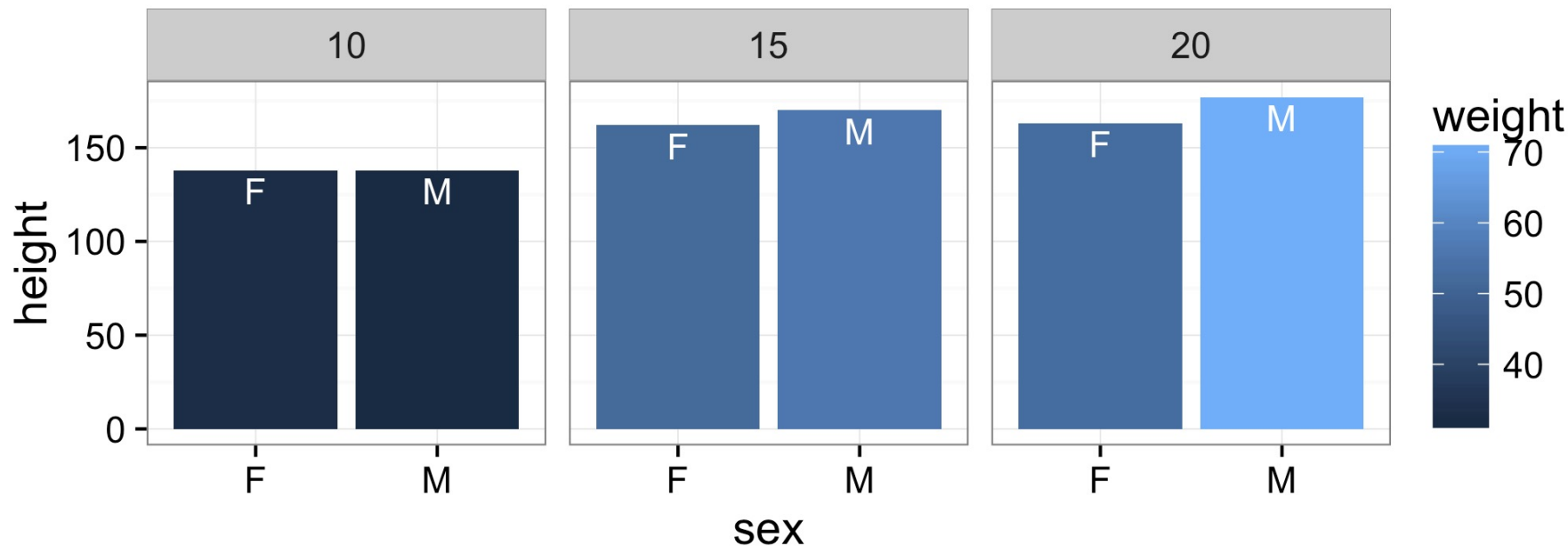
Facet by age, color by weight, and use bars to plot height

```
ggplot(data, aes(x=age, y=height, fill=weight)) +  
  geom_col() + facet_wrap(~age)
```



Also plot the sex at the top of the bars

```
ggplot(data, aes(x=age, y=height, fill=weight)) +  
  geom_col() +  
  geom_text(aes(label=sex), vjust=1.3, color="white") +  
  facet_wrap(~age)
```



# ggplot2 package

- All geoms are available here: <https://ggplot2.tidyverse.org/reference/>

## Exercise 1