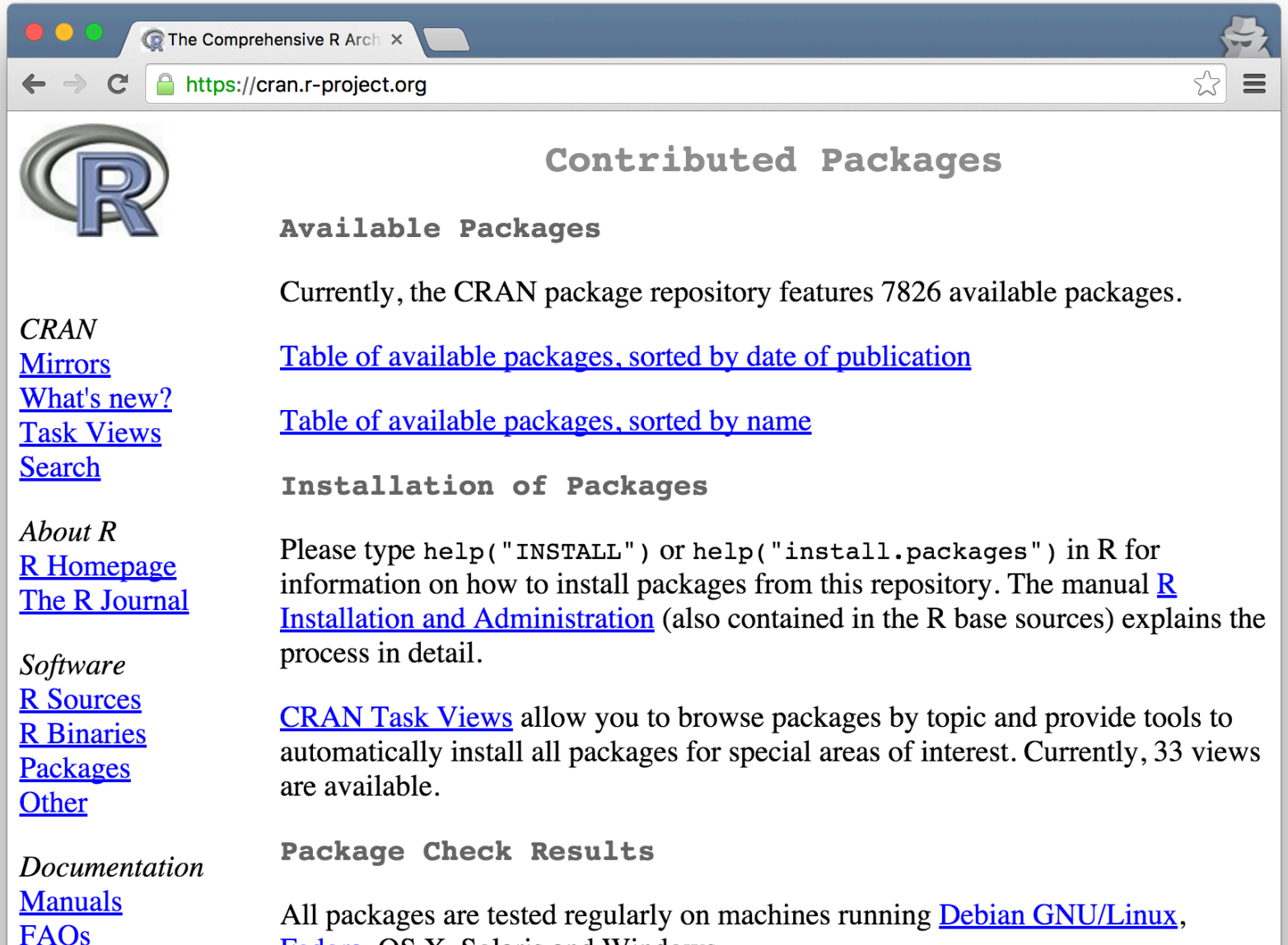
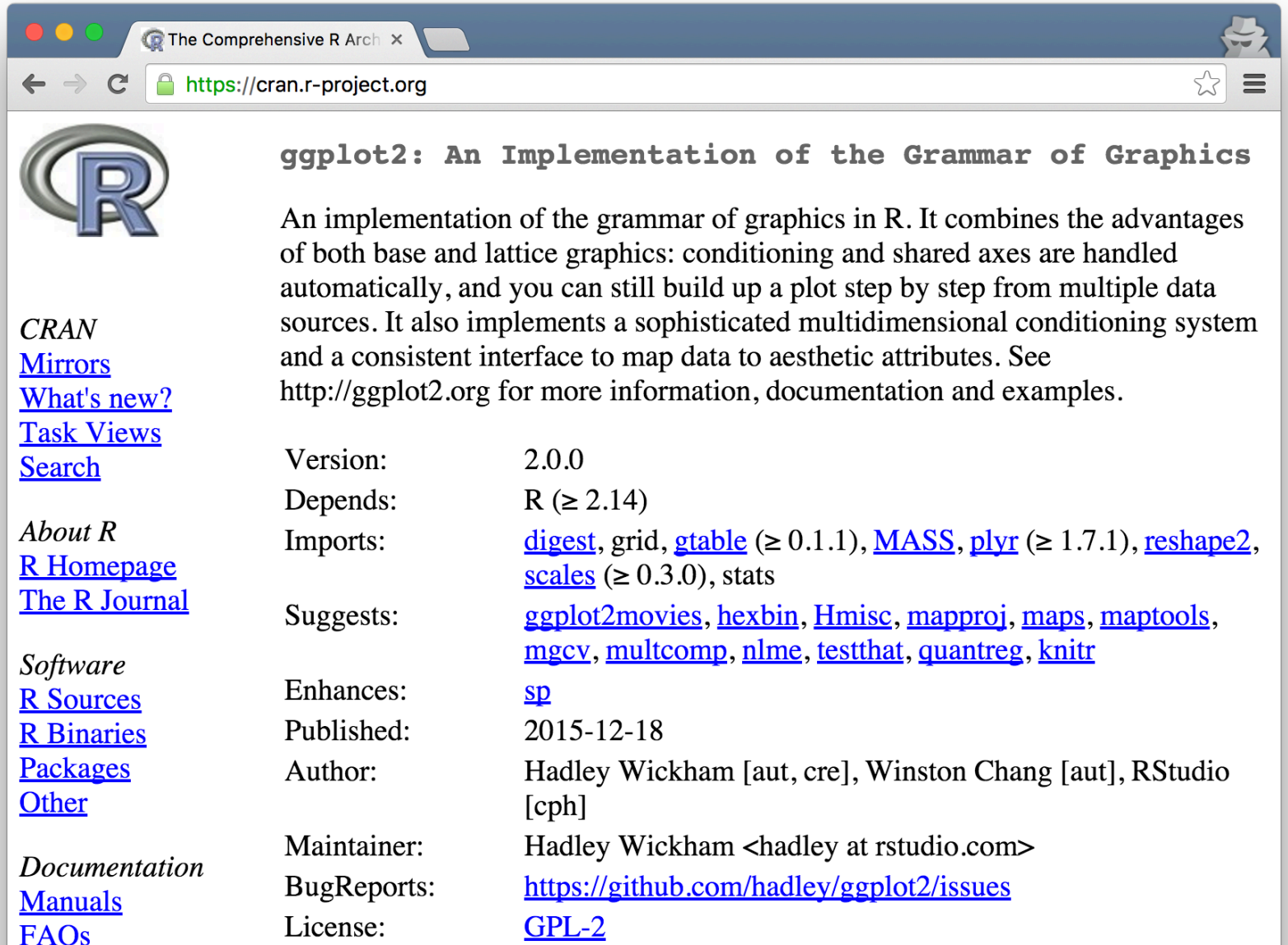
Extending R through packages: There's a package for everything

R packages are available on CRAN (Comprehensive R Archive Network)

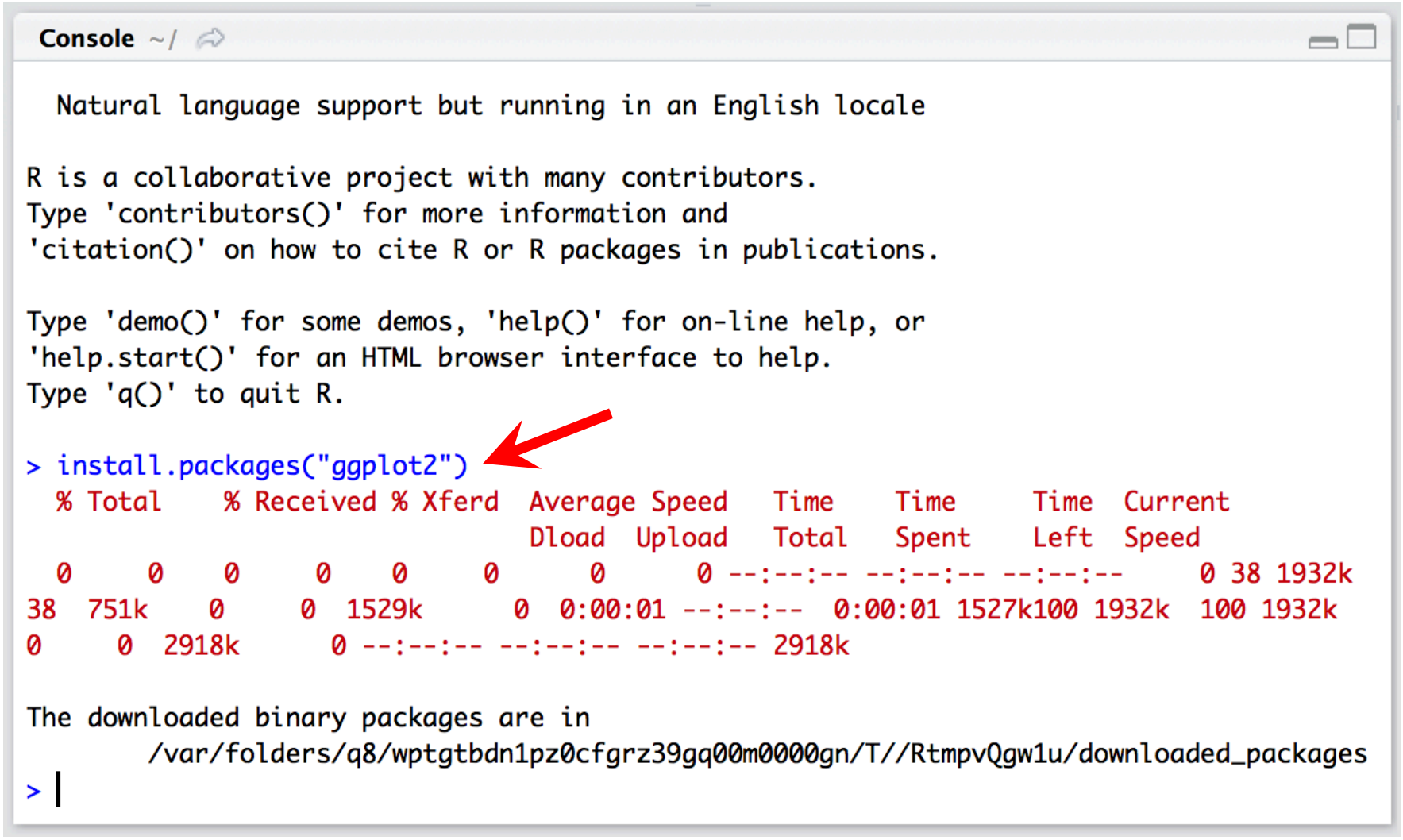


R packages are available on CRAN (Comprehensive R Archive Network)

We'll be working with the package ggplot2



You can install this package using `install.packages()` in RStudio



ggplot2: A grammar of graphics

Traditional plotting: You **are** a painter

- Manually place individual graphical elements

ggplot2: You **employ** a painter

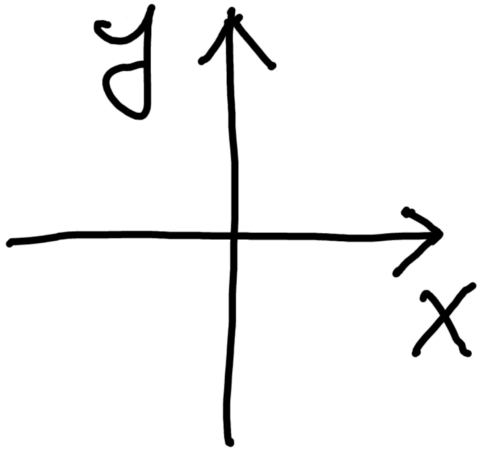
- Describe conceptually how data should be visualized

Most confusing key concept: aesthetic mapping

Maps data values to visual elements of the plot

A few examples of aesthetics

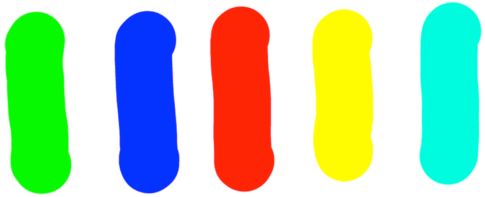
position



shape

size

color



angle

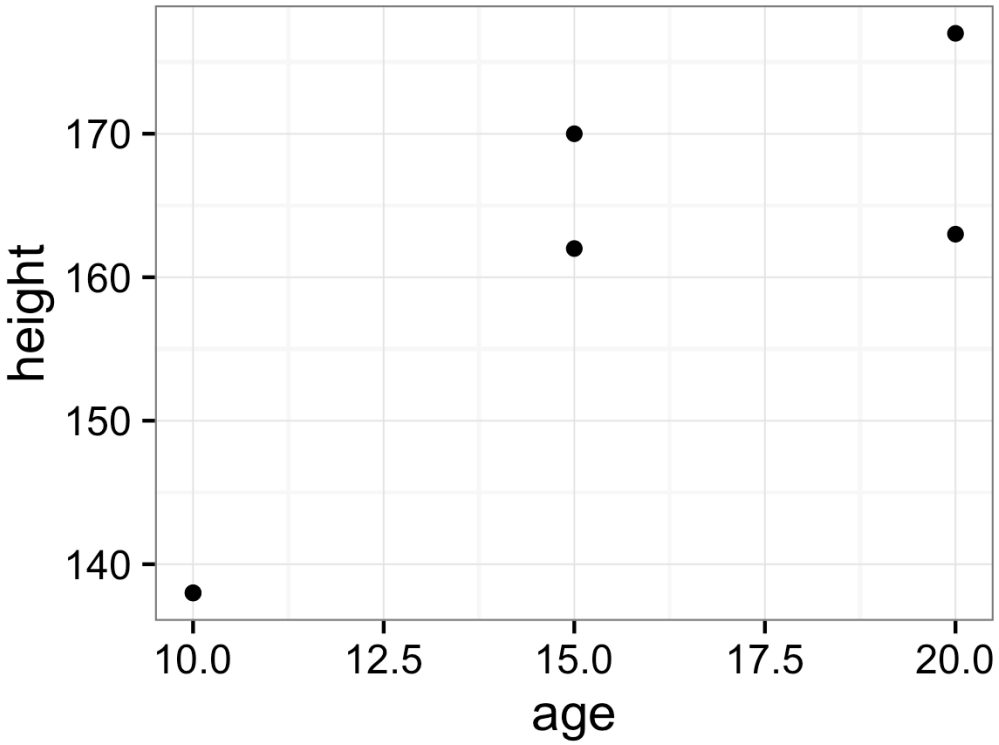
Let's go over a simple example: mean height and weight of boys/girls ages 10-20

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

Data from: http://www.cdc.gov/growthcharts/

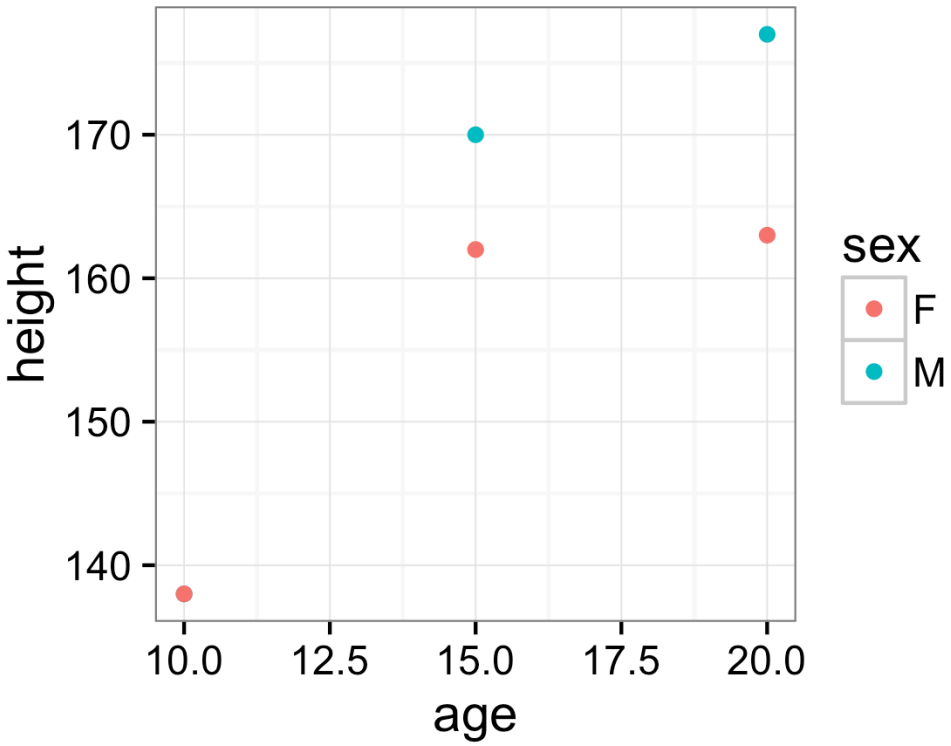
Map age to x, height to y, visualize using points

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



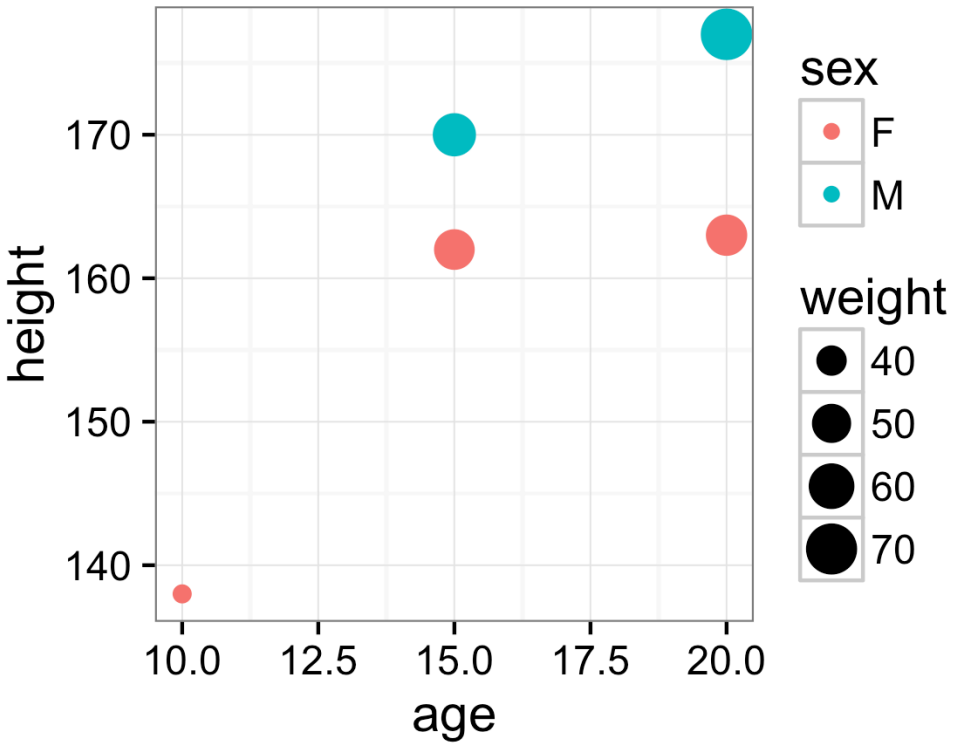
Let's color the points by sex

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



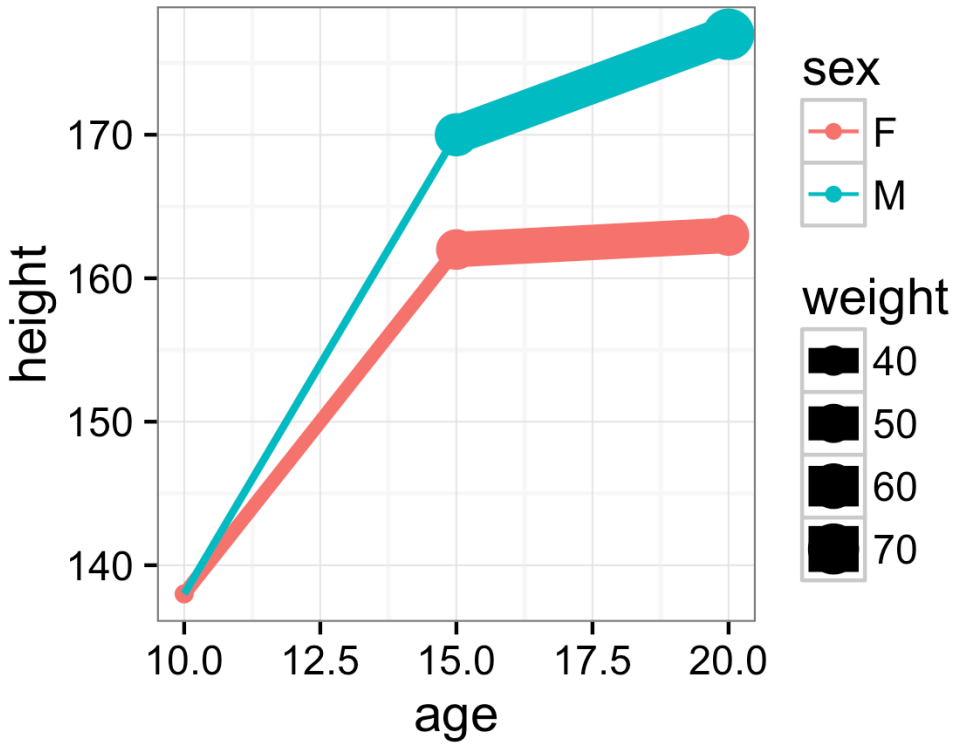
And change point size by weight

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



And connect the points with lines

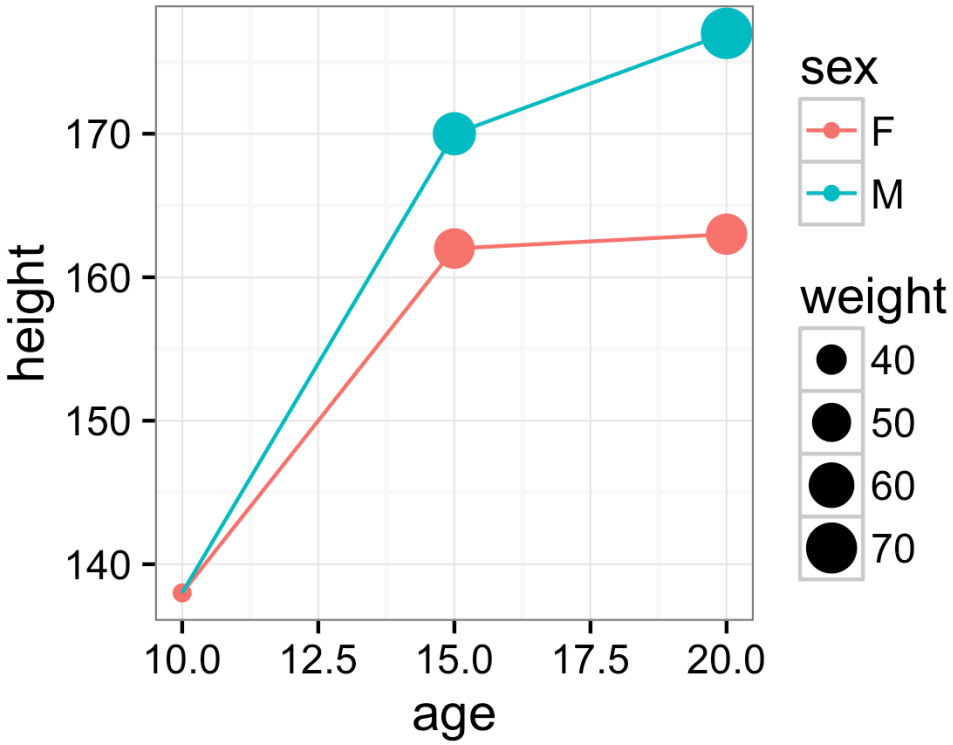
```
ggplot(data, aes(x=age, y=height,
       color=sex, size=weight)) +
                    geom_point() + geom_line()
```



Oops!

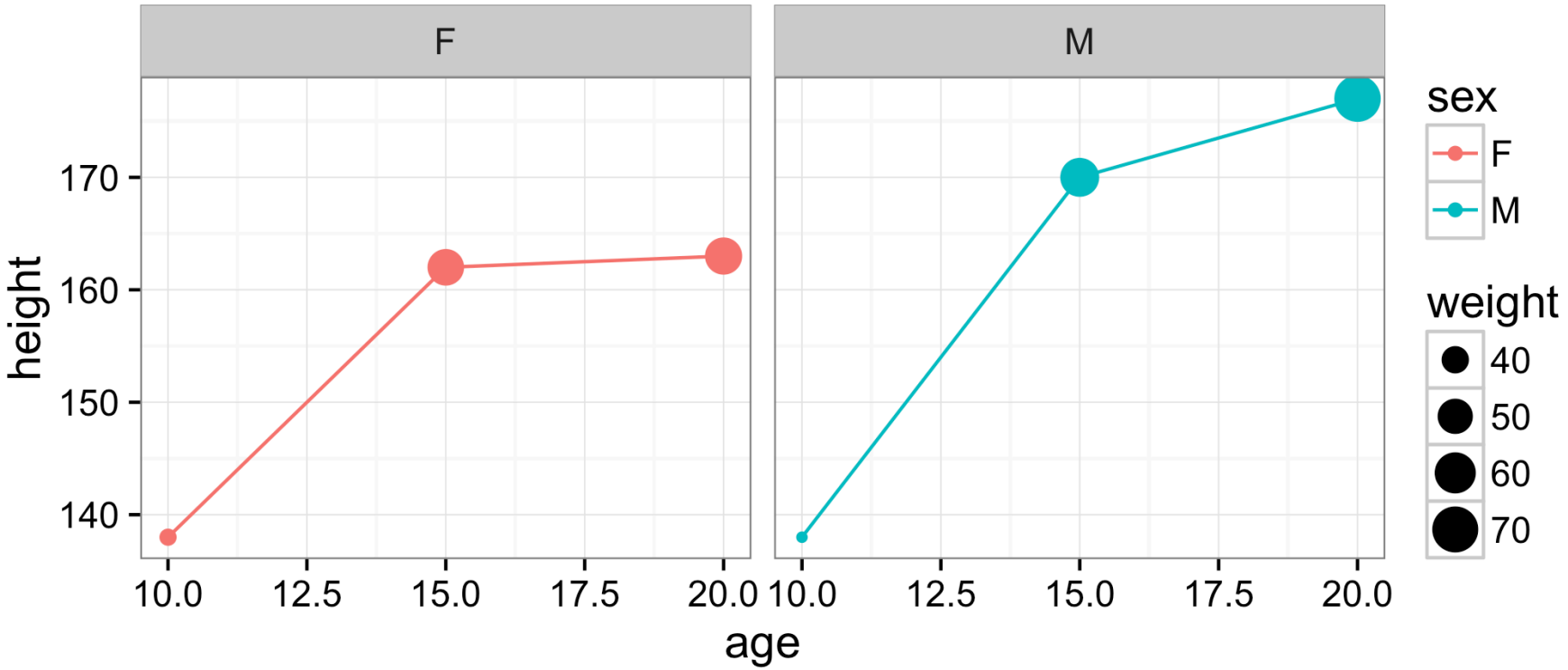
The weight-to-size mapping should only be applied to points

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



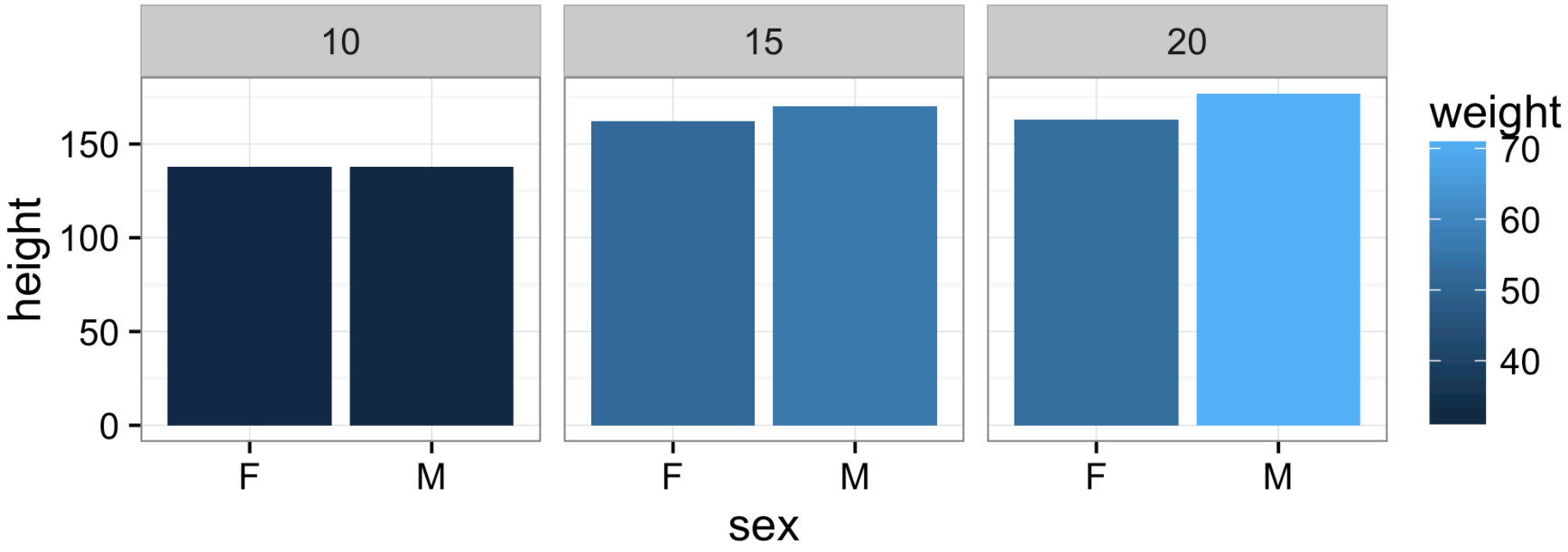
We can also make side-by-side plots (called facets)

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



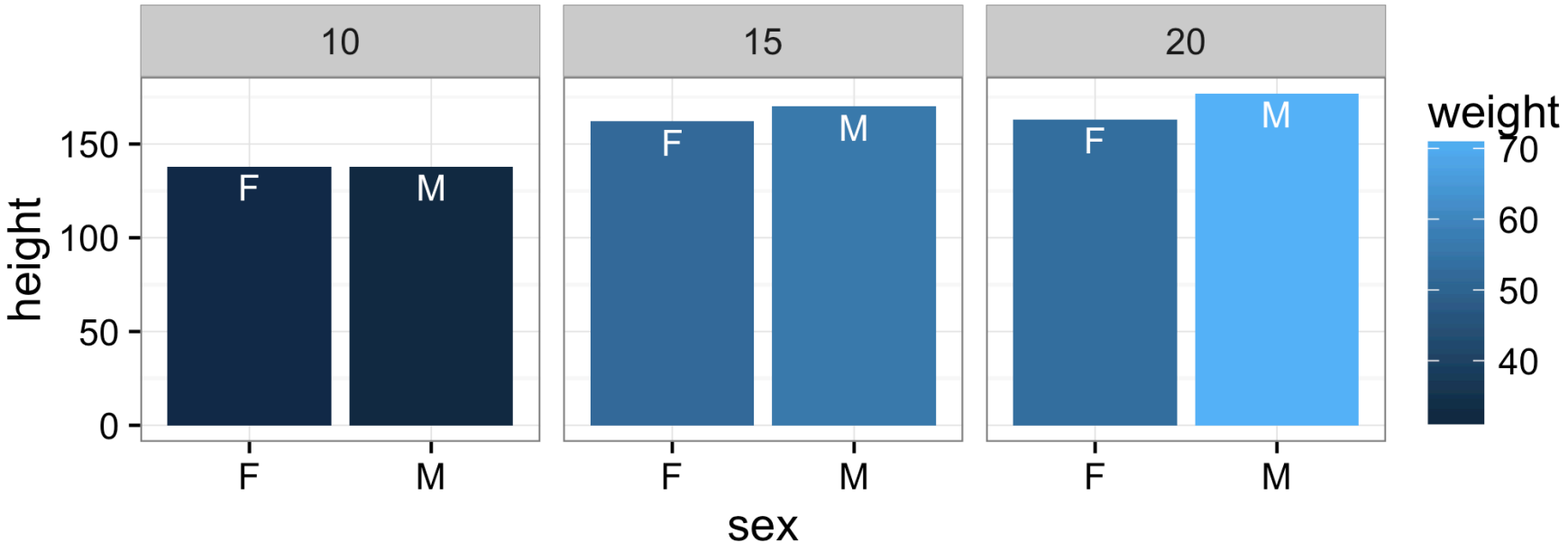
Now let's facet by age, color by weight, and use bars (columns) to plot height

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



Let's plot the sex also at the top of the bar

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



All the geom's with all their options are described on the ggplot2 web page

http://ggplot2.tidyverse.org/reference/