# Drawing graphs

#### Our data

- To illustrate making graphs, we need some data.
- ▶ Data on 202 male and female athletes at the Australian Institute of Sport.
- Variables:
  - categorical: Sex of athlete, sport they play
  - quantitative: height (cm), weight (kg), lean body mass, red and white blood cell counts, haematocrit and haemoglobin (blood), ferritin concentration, body mass index, percent body fat.
- ▶ Values separated by tabs (which impacts reading in).

Packages for this section

library(tidyverse)

#### Reading data into R

- Use read\_tsv ("tab-separated values"), like read\_csv.
- ▶ Data in ais.txt:

```
my_url <- "http://ritsokiguess.site/datafiles/ais.txt"
athletes <- read_tsv(my_url)</pre>
```

#### The data (some)

A tibble: 202 x 13

i 1 more variable: Wt <dbl>

#### athletes

```
Sex
         Sport
                   RCC
                         WCC
                                Hс
                                      Hg
                                          Ferr
                                                 BMI
                                                       SSI
   <chr>
         <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <
 1 female Netball 4.56
                        13.3
                              42.2
                                    13.6
                                            20
                                                19.2
                                                      49
 2 female Netball 4.15
                         6
                              38
                                    12.7
                                            59
                                                21.2 110.
 3 female Netball 4.16 7.6 37.5
                                    12.3
                                            22
                                                21.4
                                                     89
 4 female Netball 4.32 6.4 37.7
                                    12.3
                                            30
                                                21.0
                                                      98.3
 5 female Netball 4.06 5.8 38.7 12.8
                                            78
                                                21.8 122.
 6 female Netball 4.12
                         6.1 36.6
                                    11.8
                                            21
                                                21.4
                                                    90.4
                         5
                                           109
                                                21.5 107.
 7 female Netball
                  4.17
                              37.4
                                    12.7
 8 female Netball 3.8
                         6.6
                              36.5
                                    12.4
                                           102
                                                24.4 157.
                                            71
 9 female Netball
                  3.96
                         5.5
                              36.3 12.4
                                                22.6 101.
10 female Netball 4.44
                         9.7
                              41.4
                                    14.1
                                            64
                                                22.8 126.
# i 192 more rows
```

#### Types of graph

Depends on number and type of variables:

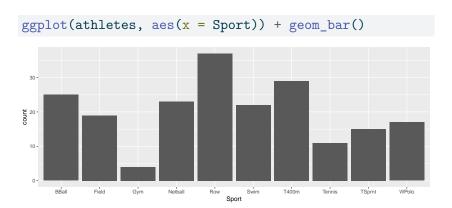
Categorical	Quantitative	Graph
1	0	bar chart
0	1	histogram
2	0	grouped bar charts
1	1	side-by-side boxplots
0	2	scatterplot
2	1	grouped boxplots
1	2	scatterplot with points identified by
		group (eg. by colour)

With more (categorical) variables, might want separate plots by groups. This is called facetting in R.

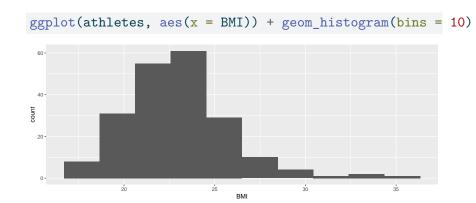
#### ggplot

- R has a standard graphing procedure ggplot, that we use for all our graphs.
- Use in different ways to get precise graph we want.
- Let's start with bar chart of the sports played by the athletes.

#### Bar chart



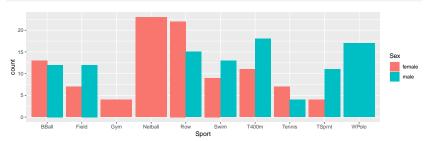
#### Histogram of body mass index



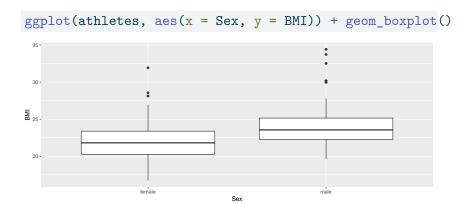
## Which sports are played by males and females?

#### Grouped bar chart:

```
ggplot(athletes, aes(x = Sport, fill = Sex)) +
  geom_bar(position = "dodge")
```



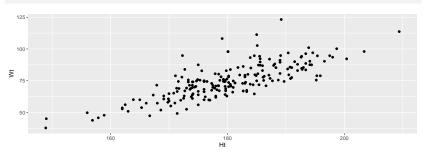
### BMI by gender



## Height vs. weight

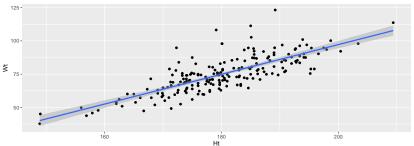
#### Scatterplot:

```
ggplot(athletes, aes(x = Ht, y = Wt)) + geom_point()
```



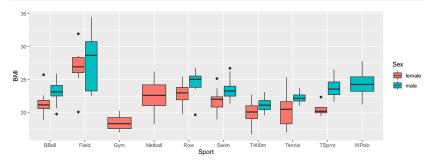
#### With regression line

```
ggplot(athletes, aes(x = Ht, y = Wt)) +
geom_point() + geom_smooth(method = "lm")
```



#### BMI by sport and gender

```
ggplot(athletes, aes(x = Sport, y = BMI, fill = Sex)) +
  geom_boxplot()
```



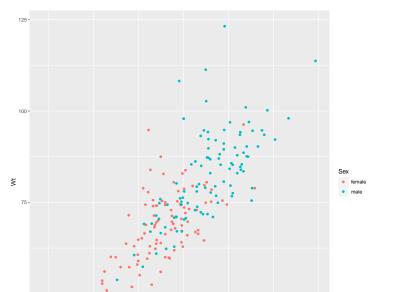
#### A variation that uses colour instead of fill:

```
ggplot(athletes, aes(x = Sport, y = BMI, colour = Sex)) +
geom_boxplot()
```

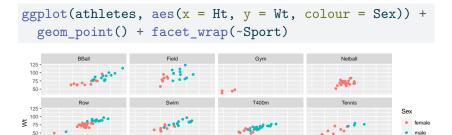


## Height and weight by gender

```
ggplot(athletes, aes(x = Ht, y = Wt, colour = Sex)) +
  geom_point()
```



## Height by weight by gender for each sport, with facets



WPolo

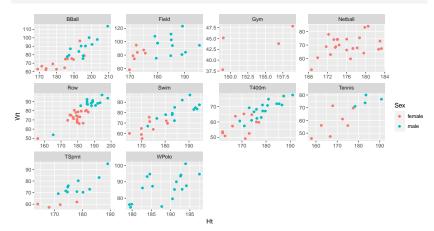
**TSprnt** 

125 -100 - 200

#### Filling each facet

Default uses same scale for each facet. To use different scales for each facet, this:

```
ggplot(athletes, aes(x = Ht, y = Wt, colour = Sex)) +
geom_point() + facet_wrap(~Sport, scales = "free")
```



## Another view of height vs weight

```
ggplot(athletes, aes(x = Ht, y = Wt)) +
geom_point() + facet_wrap(~ Sex)
```

