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)
```

The data (some)

```
athletes
```

```
# A tibble: 202 x 13
   Sex    Sport      RCC   WCC    Hc    Hg  Ferr   BMI   SSF `%
   <chr>  <chr>    <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
 7 female Netball   4.17   5    37.4  12.7   109  21.5 107.
 8 female Netball   3.8    6.6  36.5  12.4   102  24.4 157.
 9 female Netball   3.96   5.5  36.3  12.4    71  22.6 101.
10 female Netball   4.44   9.7  41.4  14.1    64  22.8 126.
# i 192 more rows
# i 1 more variable: Wt <dbl>
```

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)

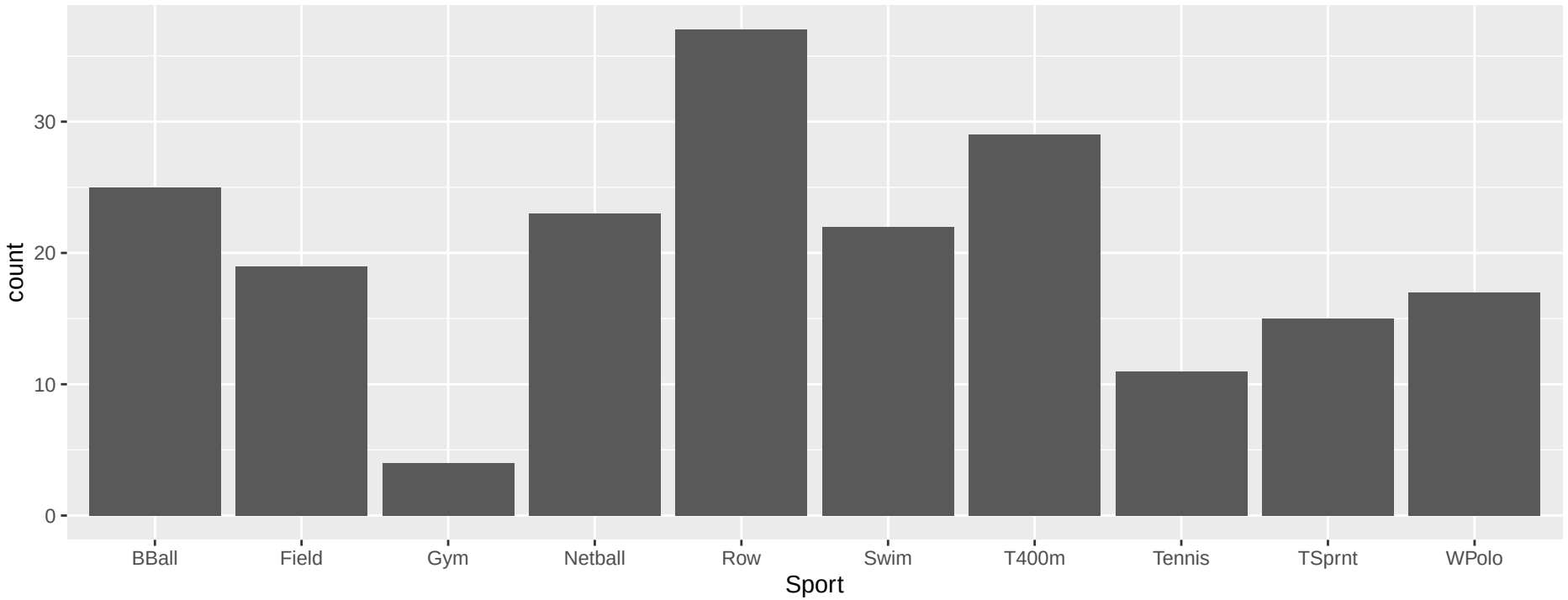
With more (categorical) variables, might want *separate plots by groups*. This is called `facetting` in R.

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.

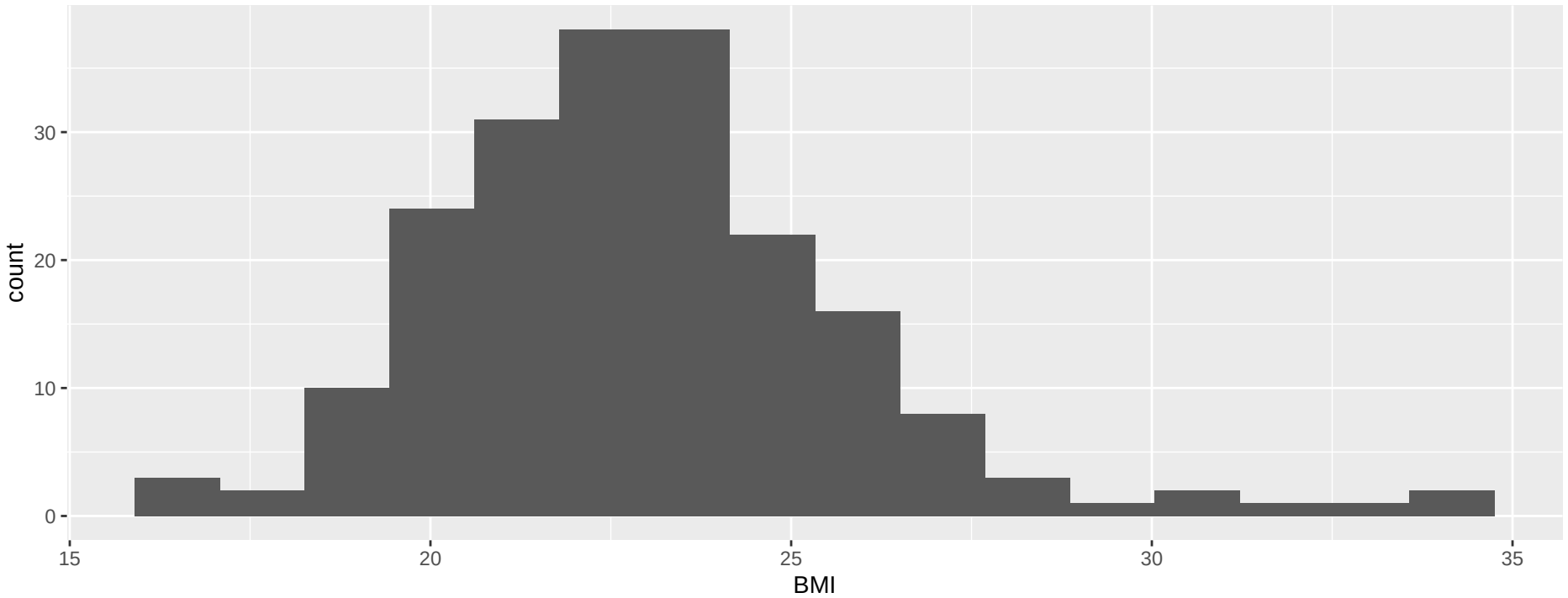
Bar chart

```
ggplot(athletes, aes(x = Sport)) + geom_bar()
```



Histogram of body mass index

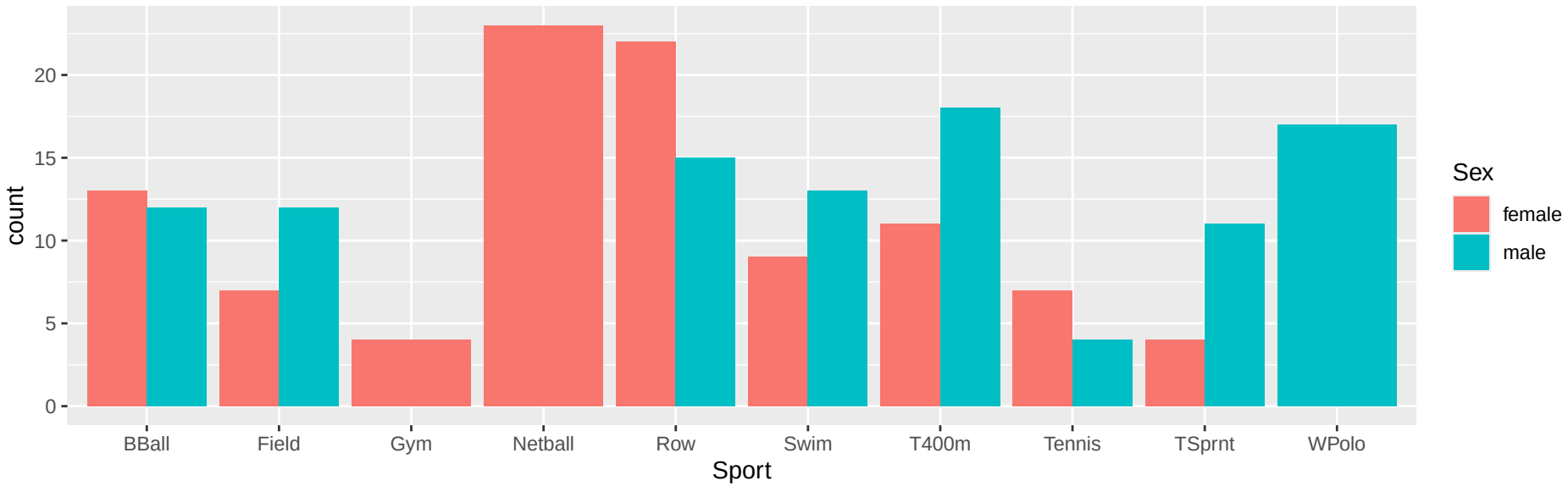
```
ggplot(athletes, aes(x = BMI)) + geom_histogram(bins = 16)
```



Which sports are played by males and females?

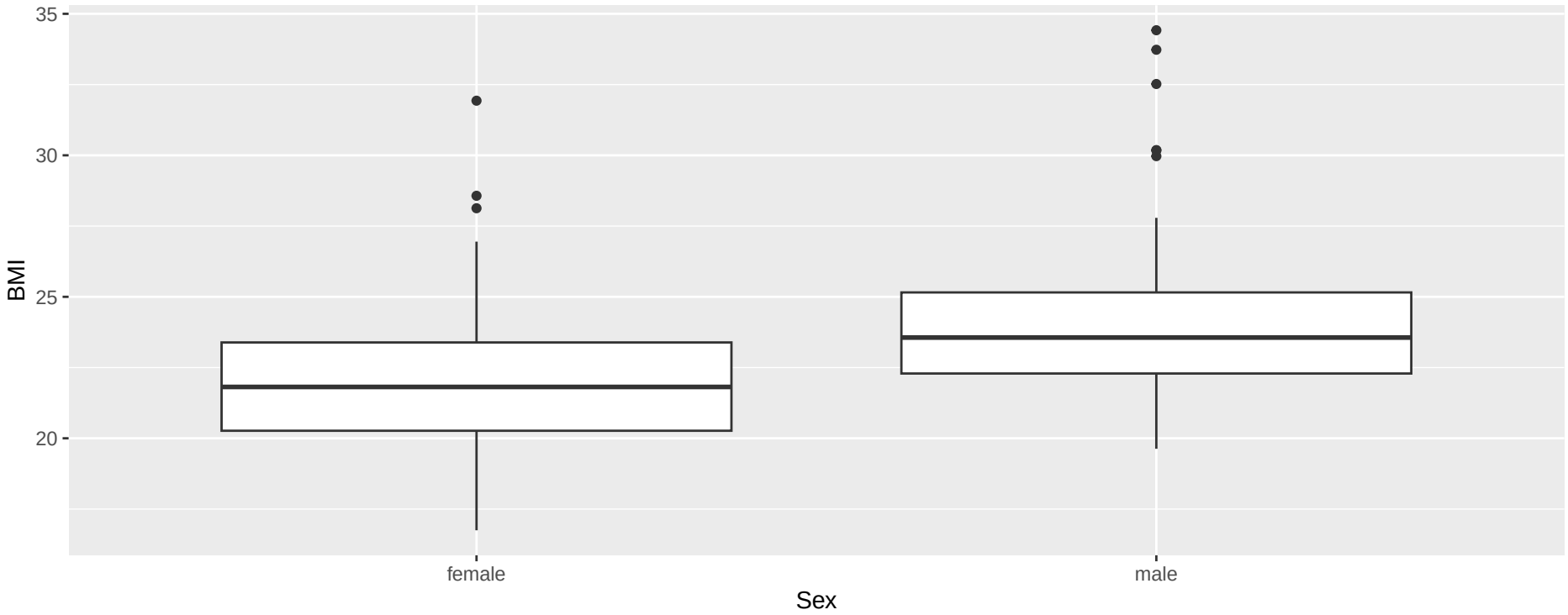
Grouped bar chart:

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



BMI by gender

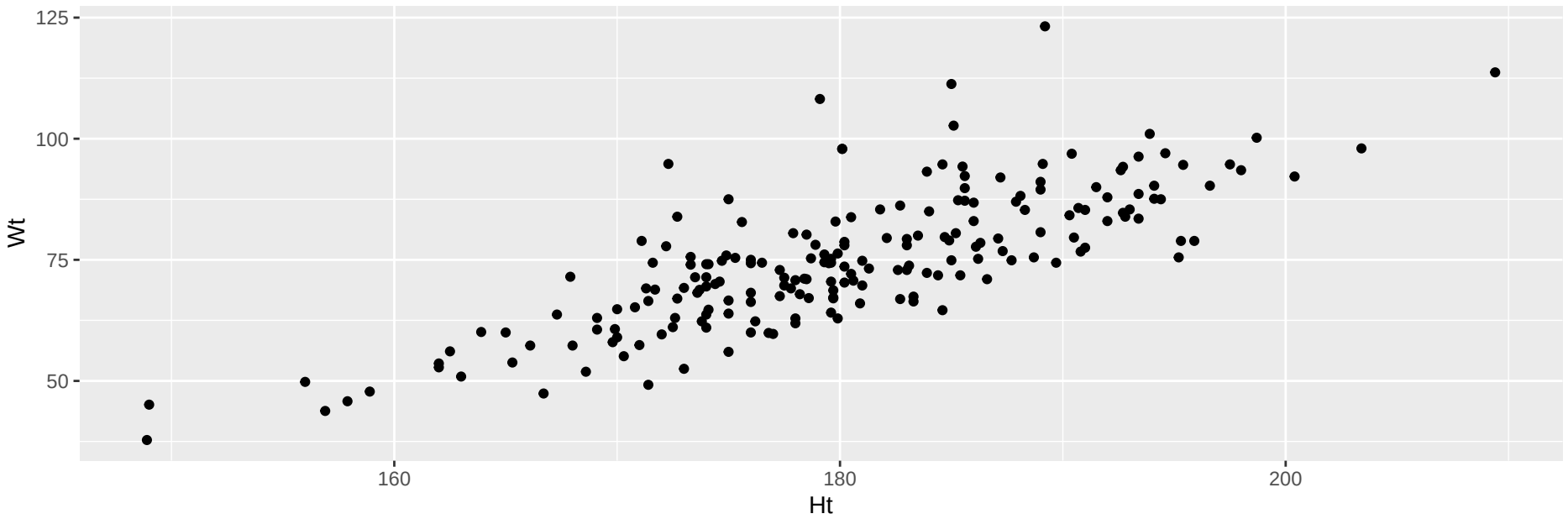
```
ggplot(athletes, aes(x = Sex, y = BMI)) + geom_boxplot()
```



Height vs. weight

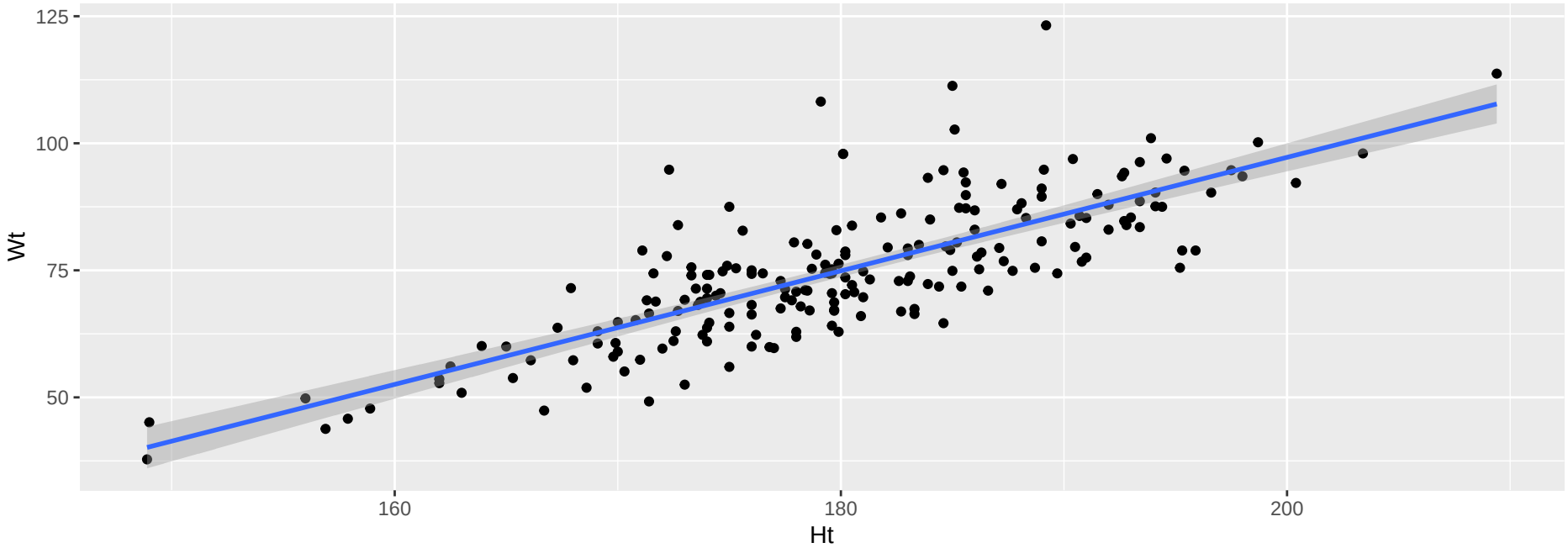
Scatterplot:

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



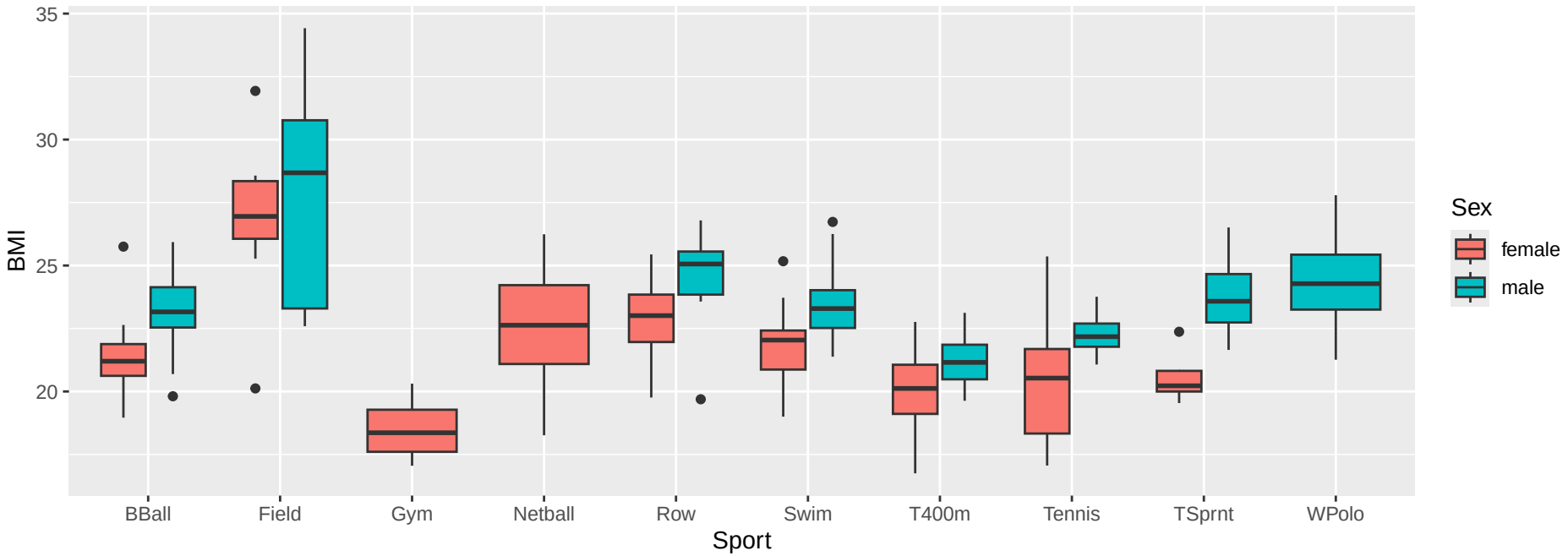
With regression line

```
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()
```

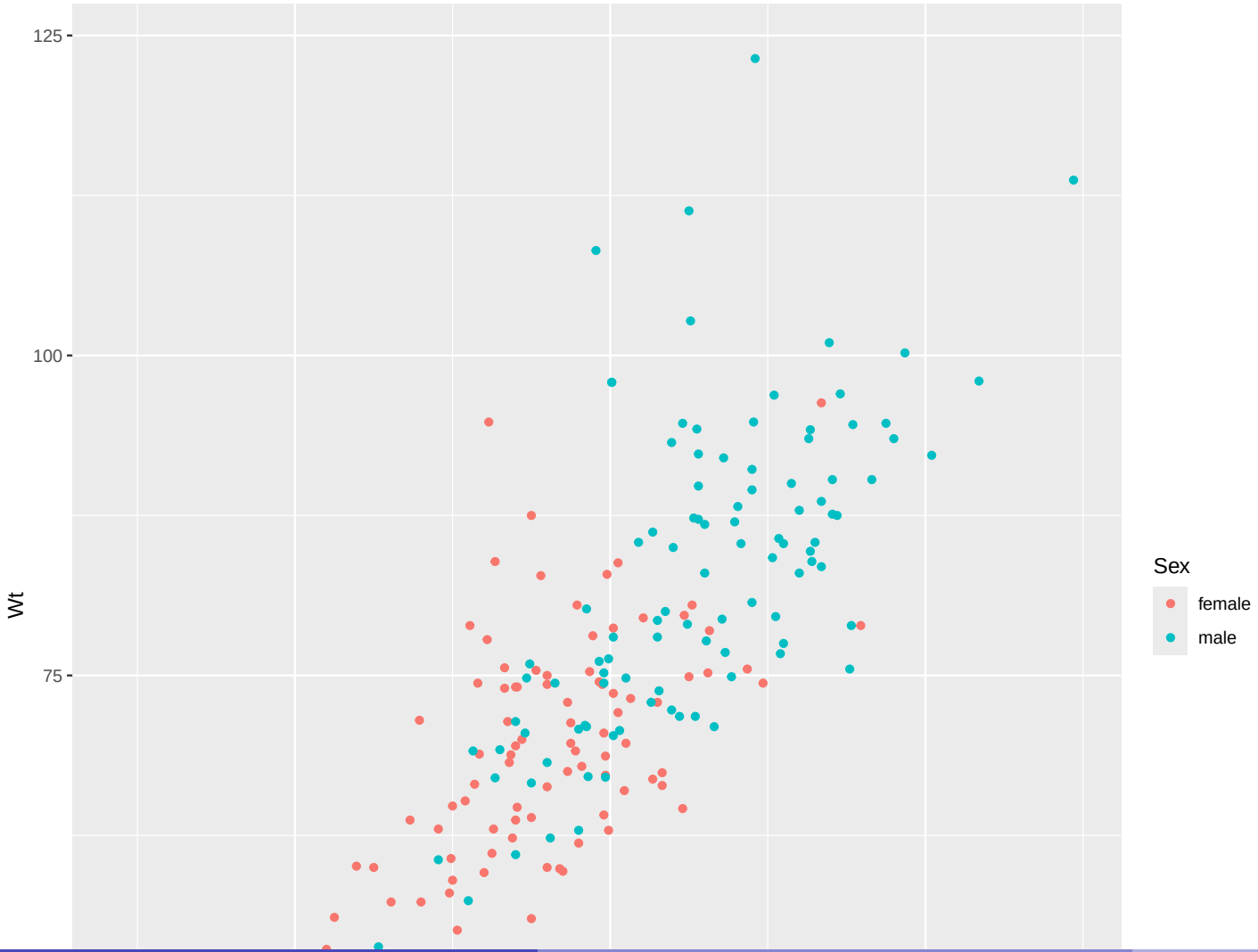


A variation that uses `colour` instead of `fill`:

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

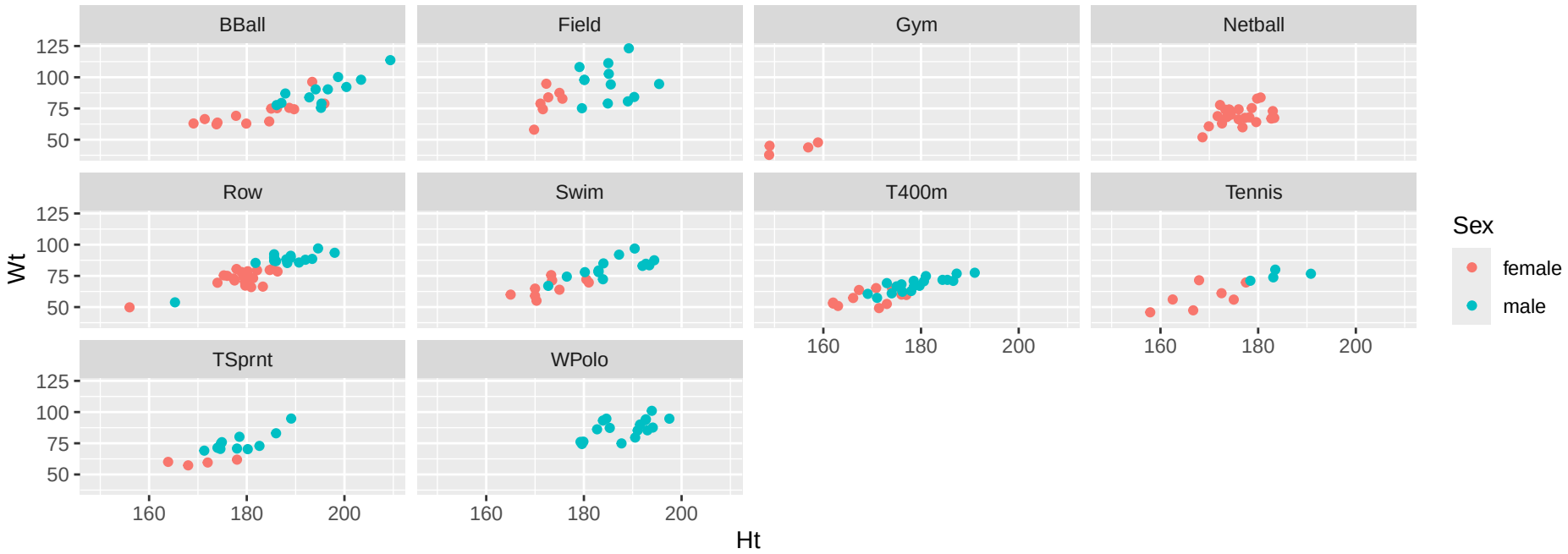
Height and weight by gender

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



Height by weight by gender for each sport, with facets

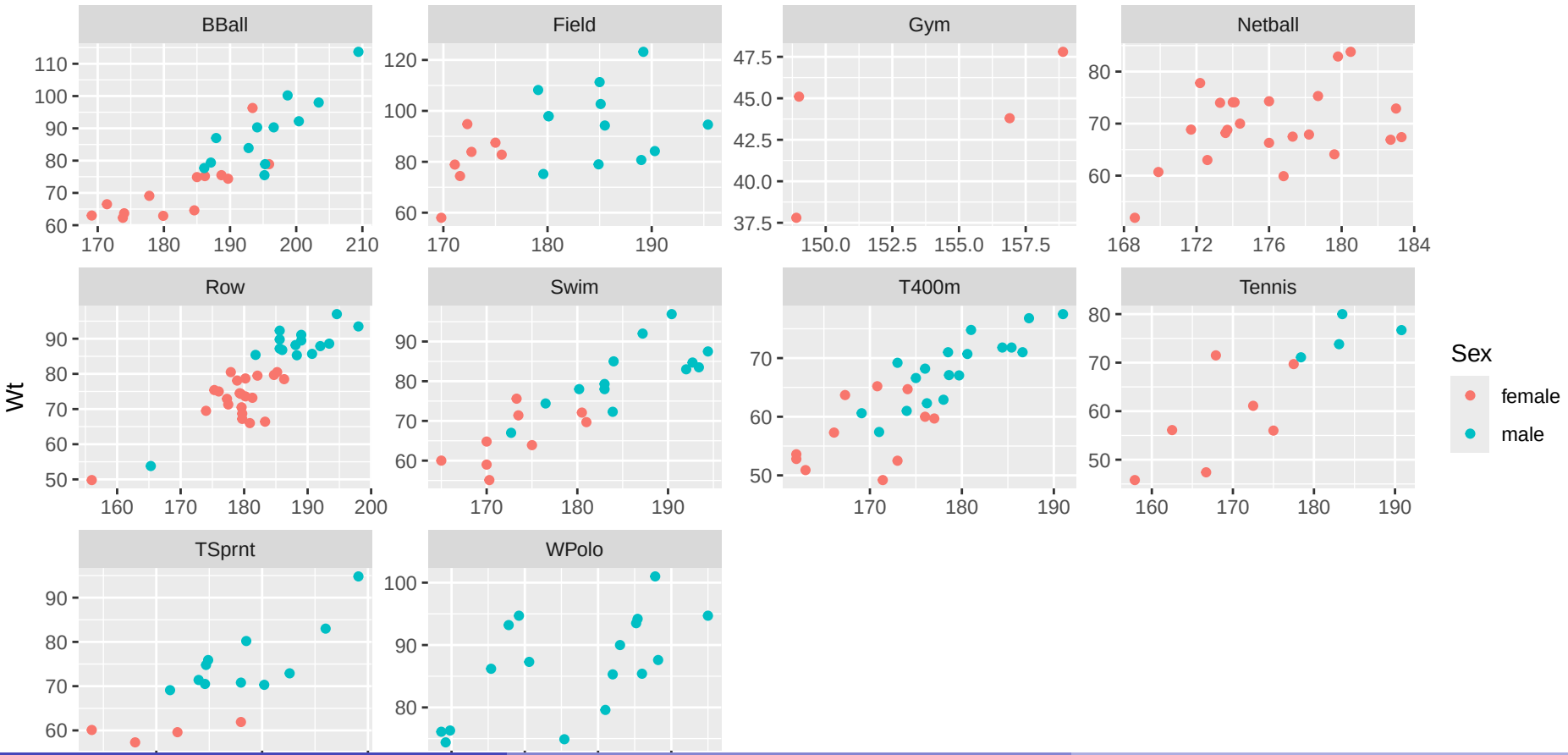
```
ggplot(athletes, aes(x = Ht, y = Wt, colour = Sex)) +
  geom_point() + facet_wrap(~Sport)
```



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)
```