Graphs with ggplot

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What is ggplot2?

- An implementation of the **Grammar of Graphics** by Leland Wilkinson
- Grammar of graphics represents and abstraction of graphics ideas/objects
- Think "verb", "noun", "adjective" for graphics
- Allows for a "theory" of graphics on which to build new graphics and graphics objects

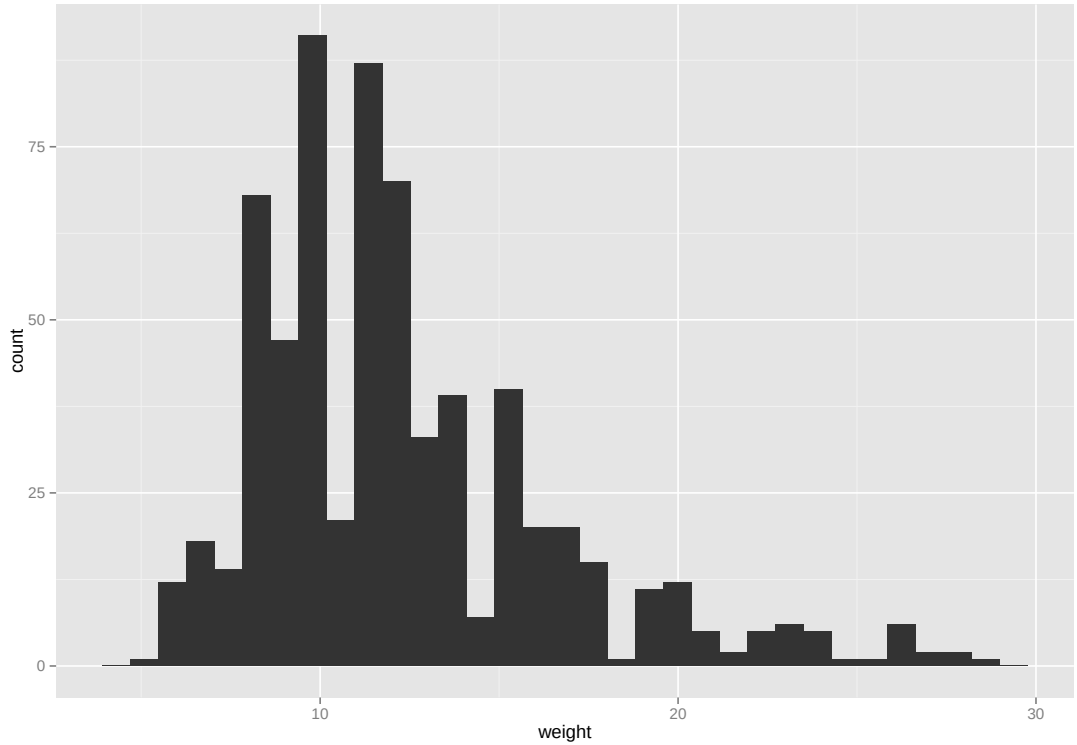
Basic Components of a ggplot2 Plot

- A *data frame*
- *aesthetic mappings*: how data are mapped to color, size
- *geoms*: geometric objects like points, lines, shapes.
- *facets*: for conditional plots.
- *stats*: statistical transformations like binning, quantiles, smoothing.
- *scales*: what scale an aesthetic map uses (example: male = red, female = blue).
- *coordinate system*

Basic Quick Plot

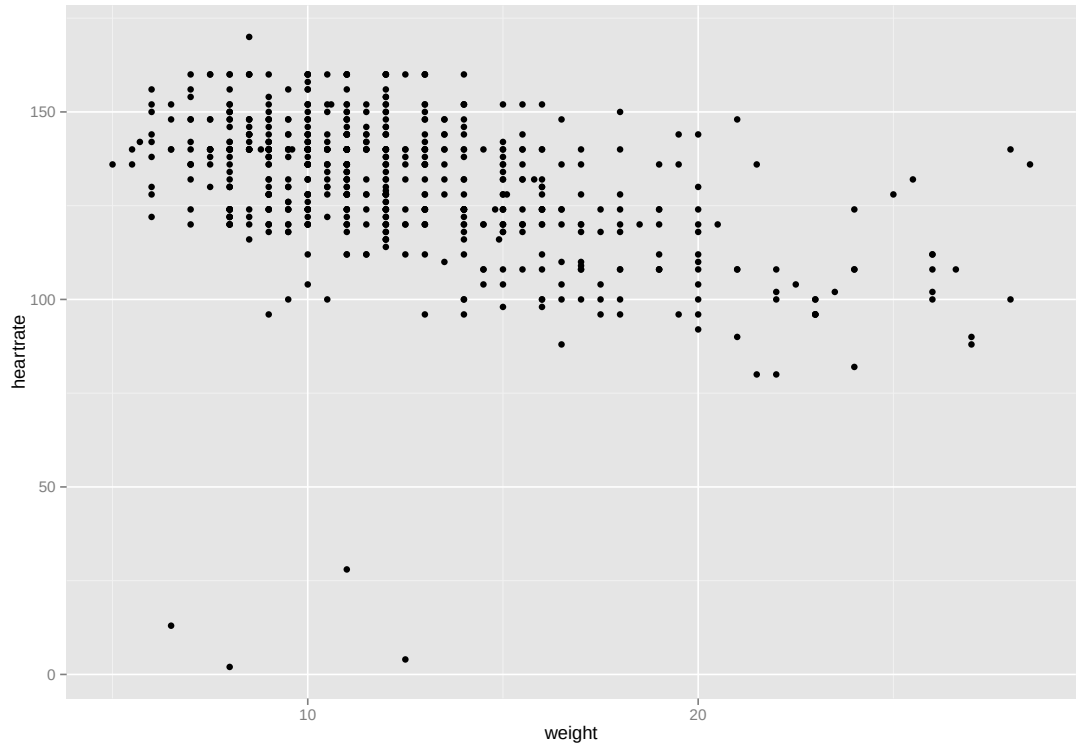
- Load the maltreat dataset

```
library(ggplot2)
qplot(x = weight , data = maltreat )
```



Basic Quick scatter plot

```
library(ggplot2)
qplot(x = weight   , y=heartrate, data = maltreat )
```



Build your graph in layers

Basic Components of a ggplot2 Plot

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- *scales*: what scale an aesthetic map uses (example: m = red, f = blue).
- *coordinate system*

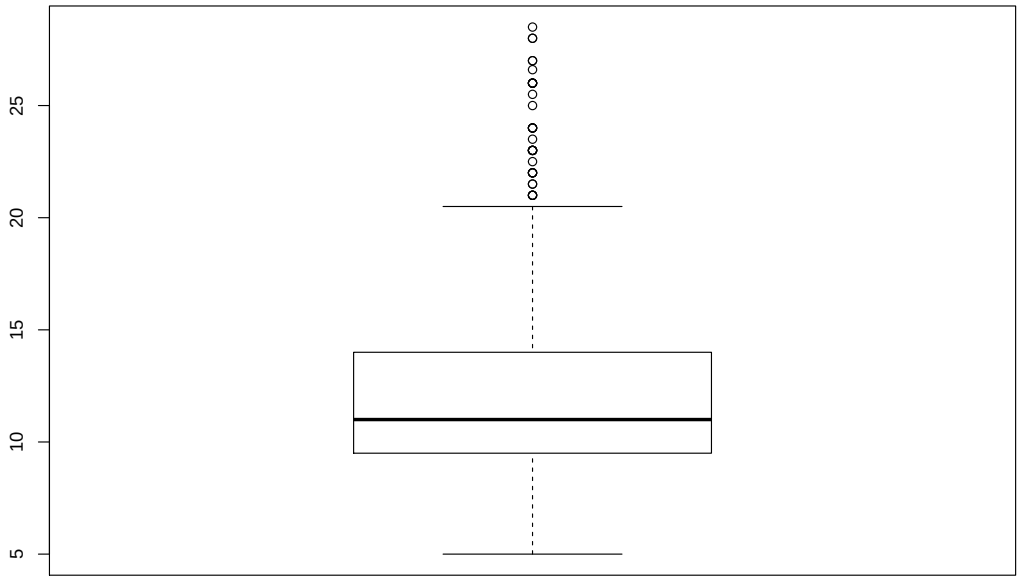
- ggplot(df – **Data**, aes(x, y,) – **what to map**)
- geoms_ **what type of graph**

Types of Geoms

- geom_bar() for **bar graphs**
- geom_histogram() for **histograms** – diff??
- geom_line() for **line graphs**
- geom_boxplot() **Box and whiskers plot**
- geom_errorbar() **Error bars.**

Example - Box Plot

```
boxplot(maltreat$weight)
```

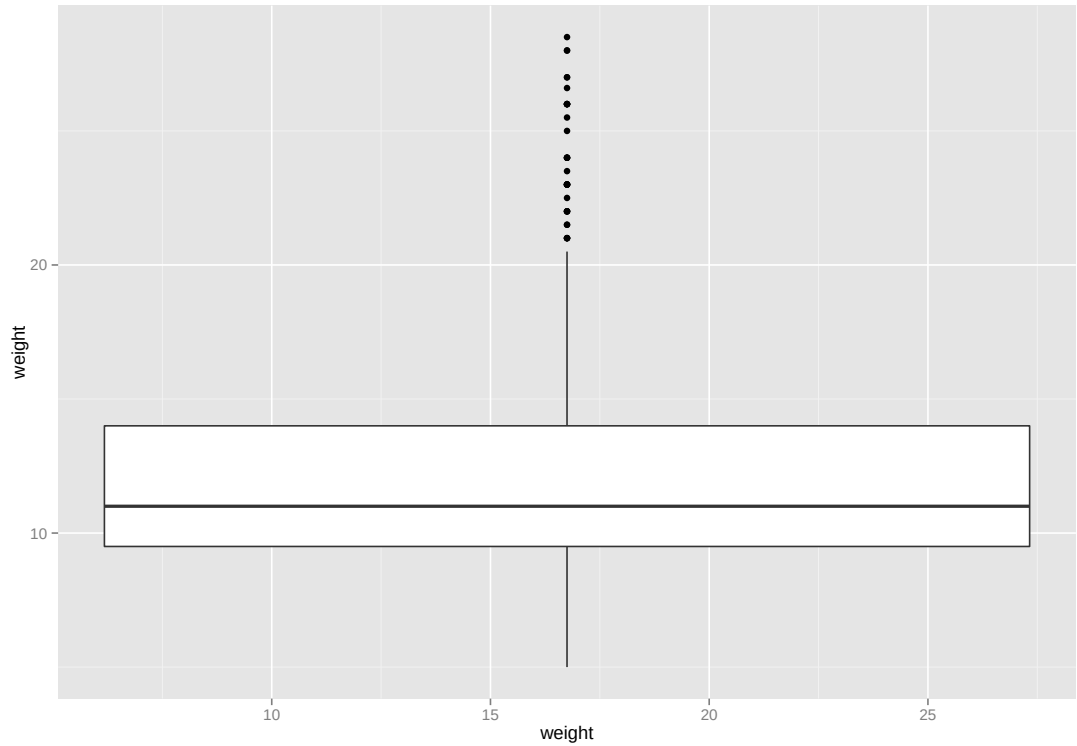


- call library(ggplot2)
- ggplot(data = maltreat)
- ggplot(data = maltreat , aes(weight))

```
library(ggplot2)
g <- ggplot(data = maltreat , aes(weight))
```

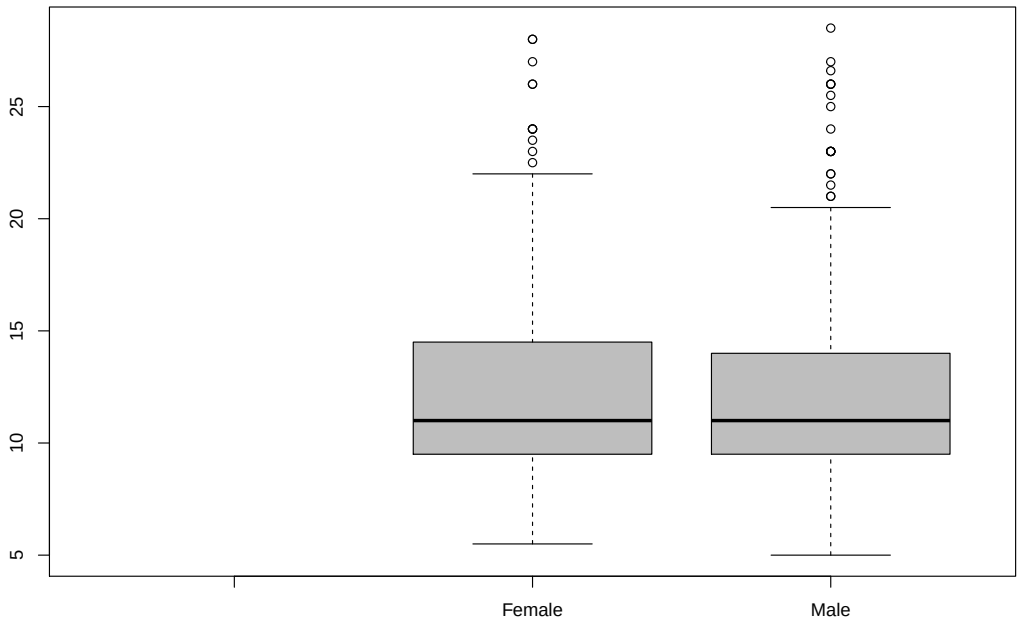
- ggplot(data = maltreat , aes(weight)) + geom_boxplot()

```
library(ggplot2)
ggplot(data = maltreat , aes(x=weight , y=weight)) +
  geom_boxplot()
```



Boxplot of weight and sex

```
boxplot(maltreat$weight~maltreat$sex,col="grey")
```

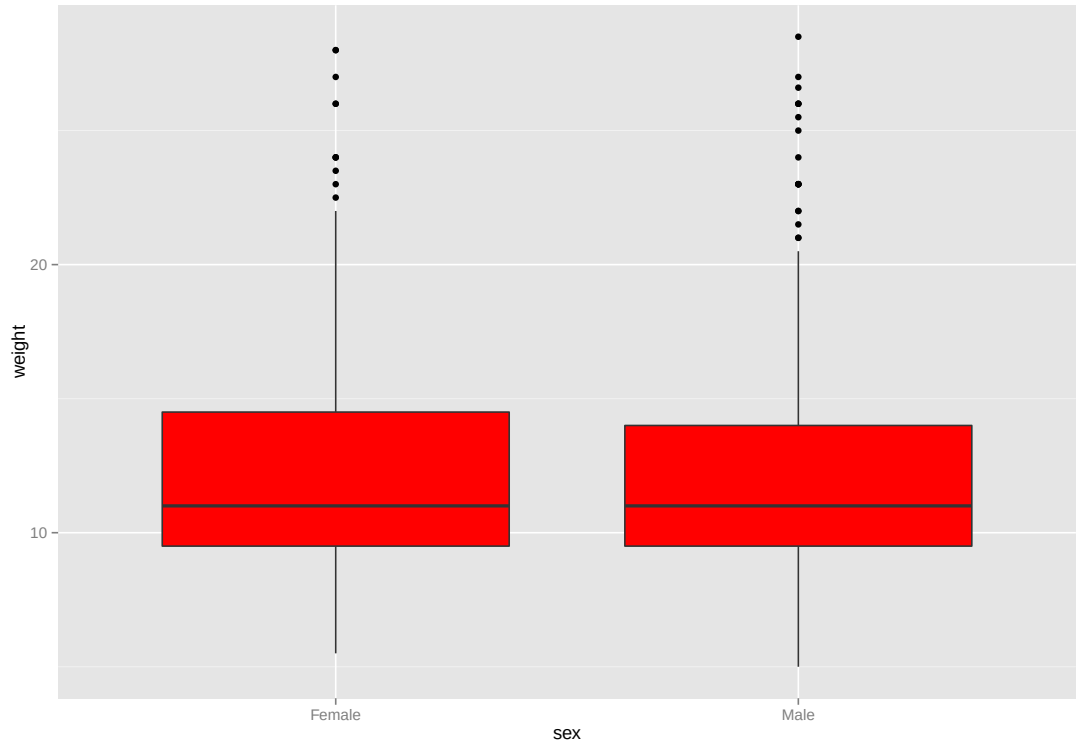


- Prepare in ggplot2

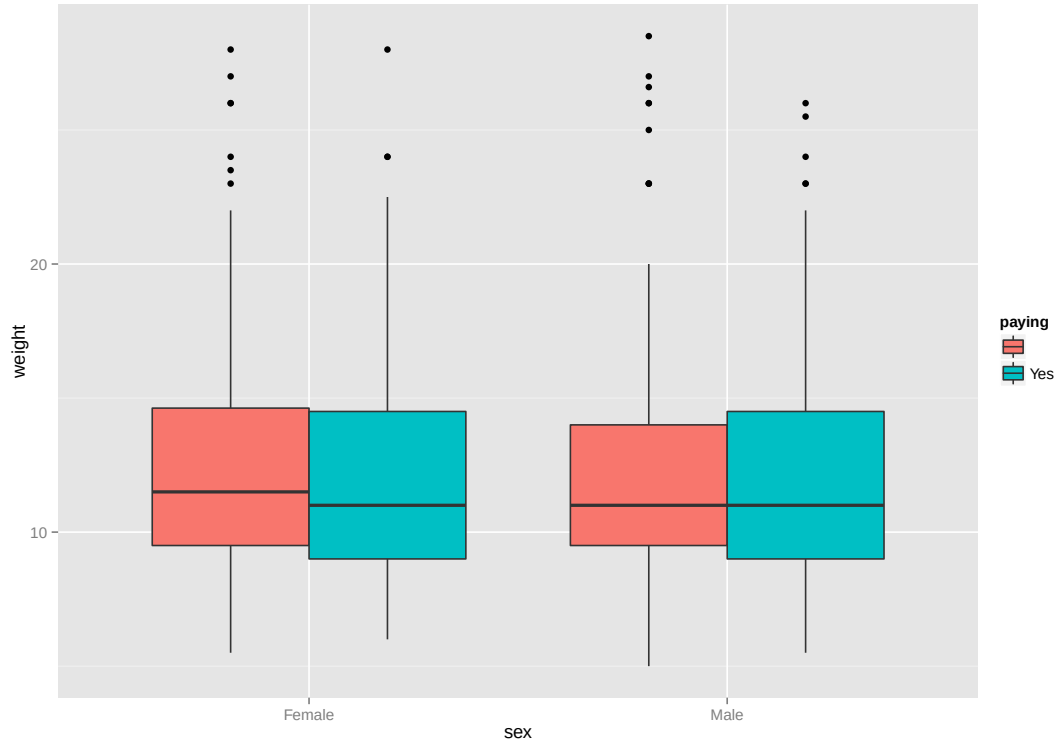
- This is it

})

```
library(ggplot2)
ggplot(data = maltreat , aes(x=sex , y=weight)) +
  geom_boxplot(fill = "red")
```

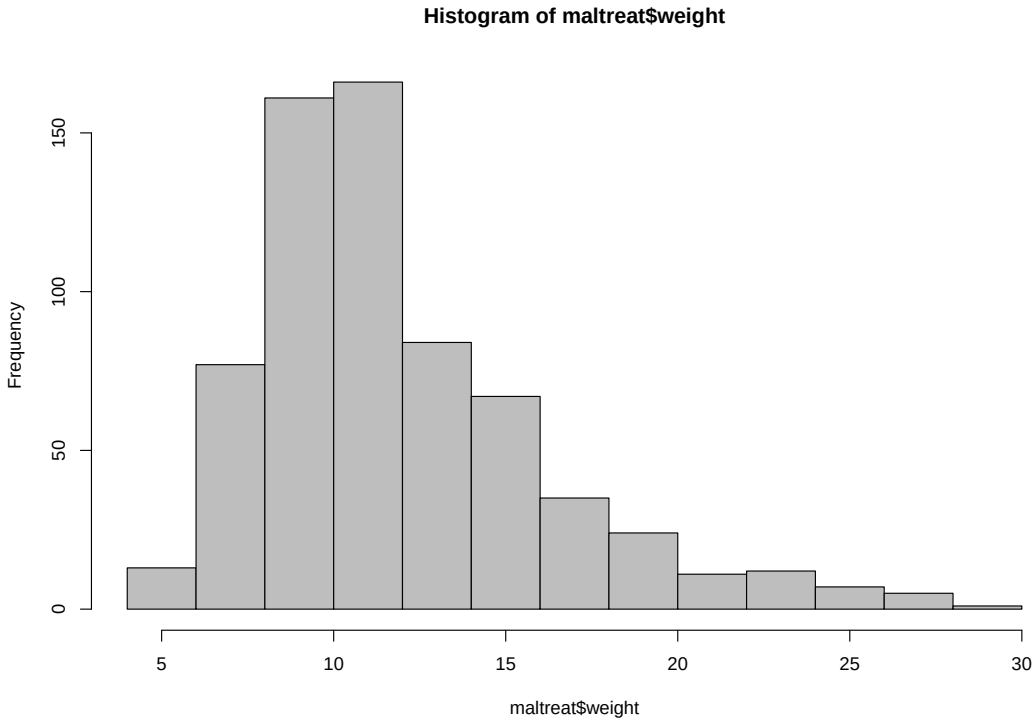


```
library(ggplot2)
ggplot(data = maltreat , aes(x=sex ,
                             y=weight ,fill=paying)) +
  geom_boxplot()
```



Histogram of weight

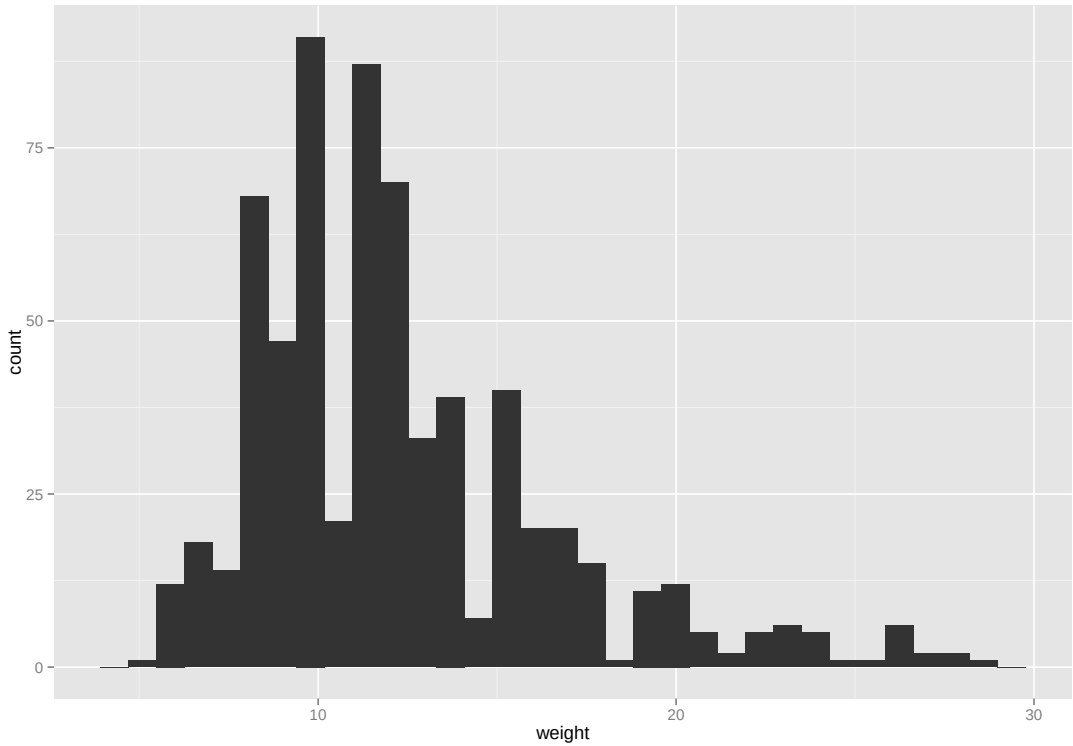
```
hist(maltreat$weight, col="grey")
```



- Prepare in ggplot2

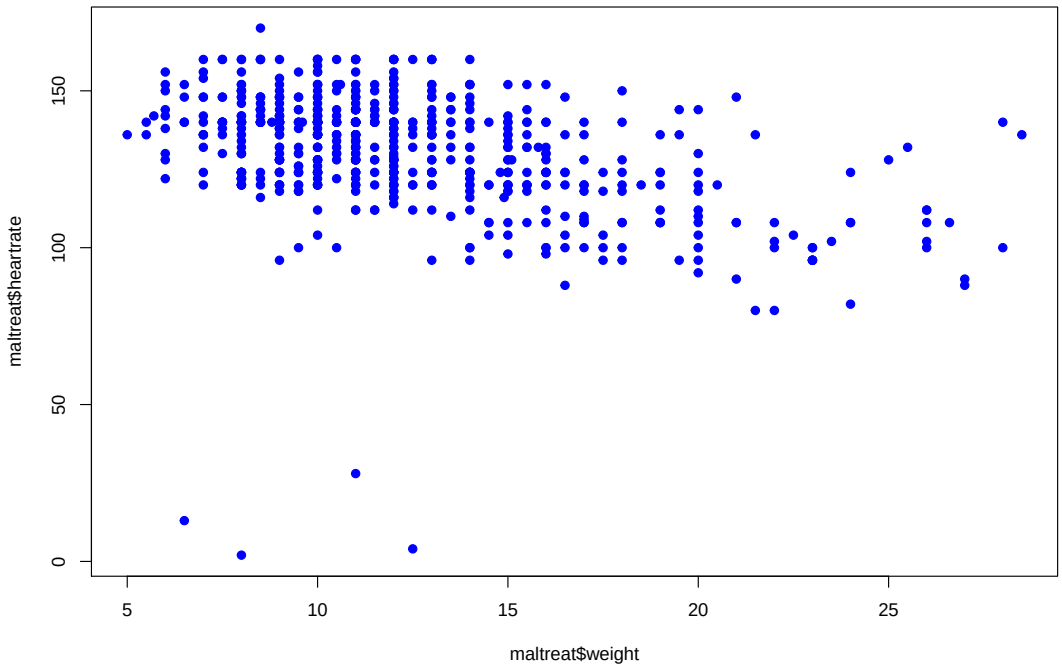
- This is the Histogram

```
library(ggplot2)
ggplot(data = maltreat , aes(weight)) + geom_histogram()
```



Scatter of weight vs heartrate

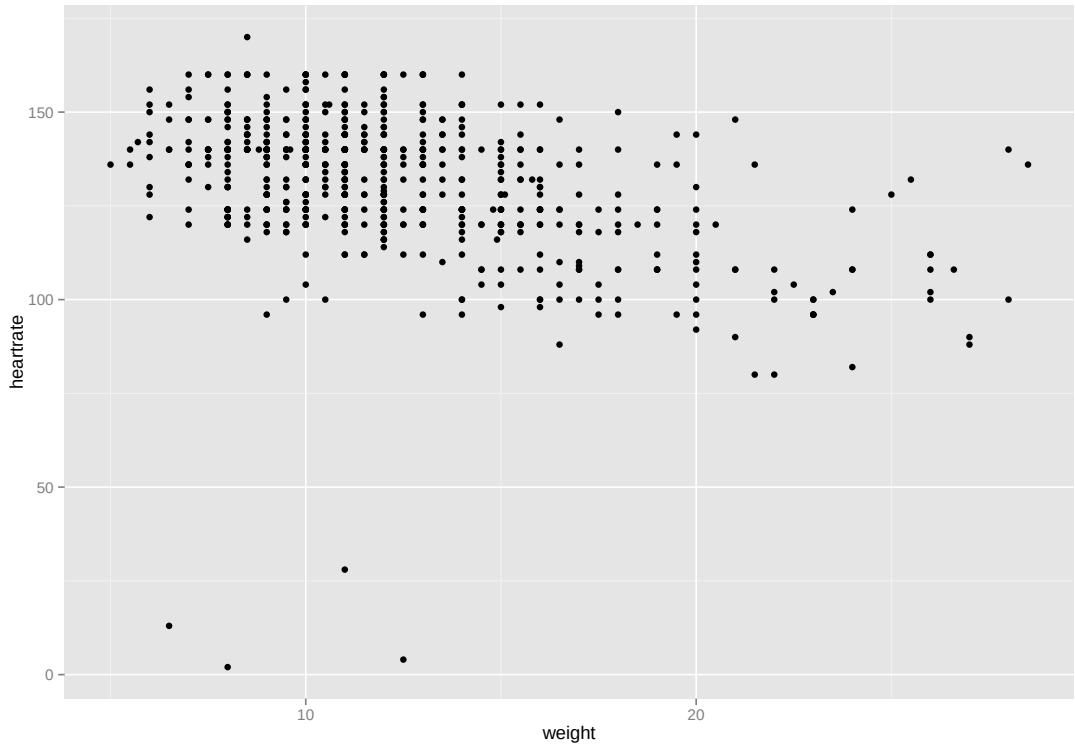
```
plot(maltreat$weight,maltreat$heartrate, pch=19,col="blue")
```



- Prepare in ggplot2

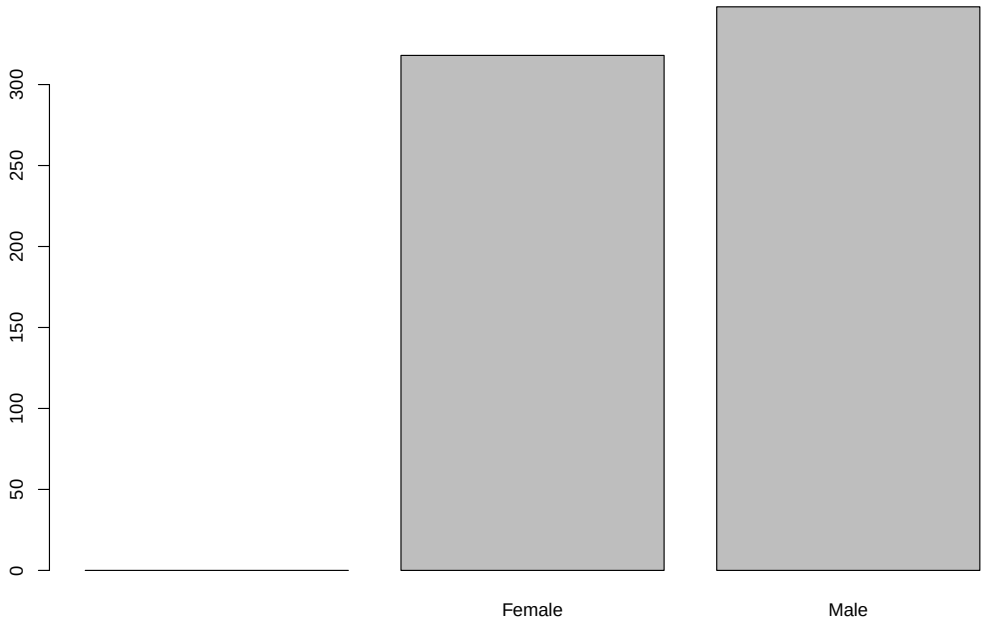
- This is the scatter

```
library(ggplot2)
ggplot(data = maltreat , aes(x=weight , y=heartrate)) +
  geom_point()
```



Bar plot of sex

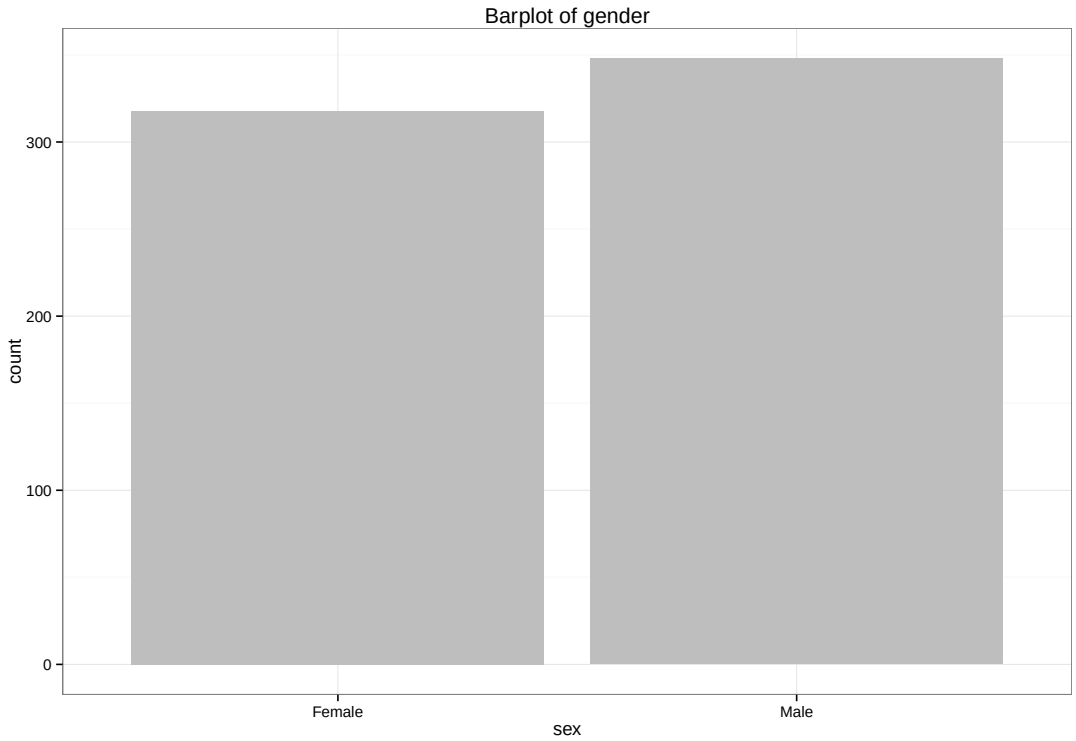
```
barplot(table(maltreat$sex))
```



- Prepare in ggplot2

- This is the barplot \o/

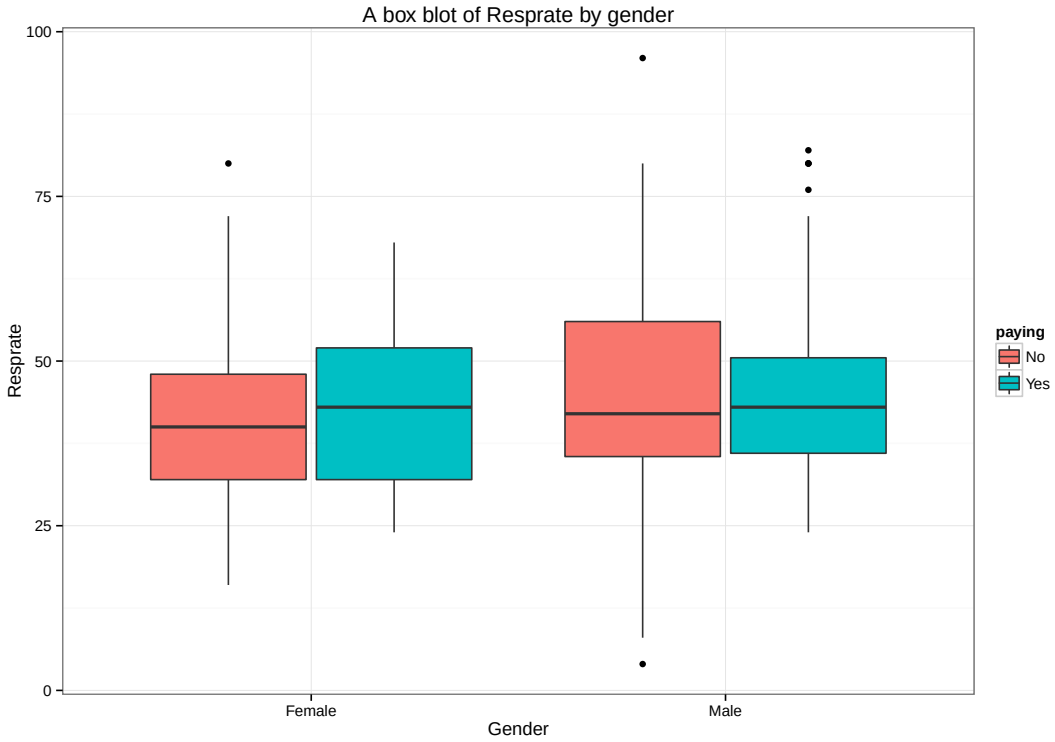
```
library(ggplot2)
ggplot(data = maltreat , aes(sex)) + geom_bar(fill='grey') +
  theme_bw() + ggtitle("Barplot of gender")
```



A detailed boxplot

- draw a boxplot of resprate by gender
- filled by paying
- has a titlle
- has an xlabel
- has a y label
- saved in png

Like This


A box blot of Resprate by gender
100
75
50
25
0
Resprate
Female
Male
Gender
paying
No
Yes

```
library(ggplot2)
maltreat$paying<- factor(maltreat$paying,
levels = c("","Yes"),
labels = c("No", "Yes"))
ggplot(data = maltreat , aes(x=sex , y=resprate ,fill=paying))
  geom_boxplot(position=position_dodge(.8)) +
  ggtitle("A box blot of Resprate by gender") +
  xlab("Gender") + ylab("Resprate") +
  theme_bw()
```