

# 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

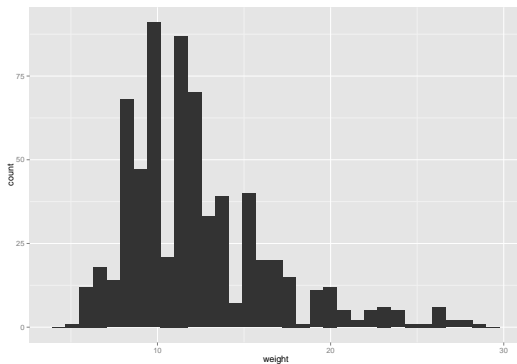
# Basic Components of a ggplot2 Plot

- *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

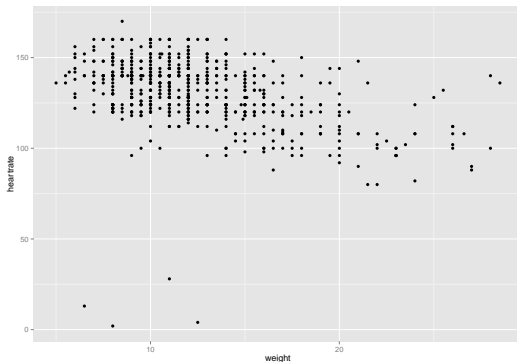
- Load the maltreat dataset

```
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

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## Basic Components of a ggplot2 Plot

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- *A data frame*
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  - *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: m = red, f = blue).
  - *coordinate system*
-

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

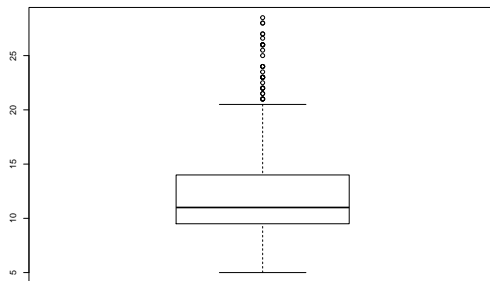
# Types of Geoms

- `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)
```

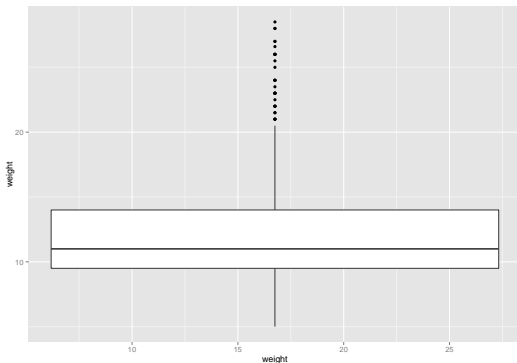


- call `library(ggplot2)`
- `ggplot(data = maltreat)`
- `ggplot(data = maltreat , aes(weight))`

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

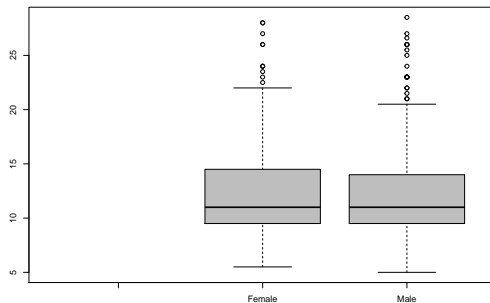
- `ggplot(data = maltreat , aes(weight)) + geom_boxplot()`

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



# Boxplot of weight and sex

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

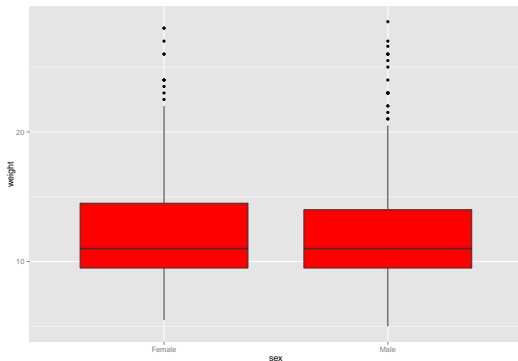


- Prepare in ggplot2

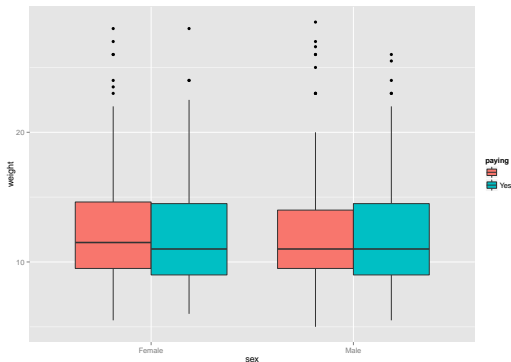
- This is it

```
})
```

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

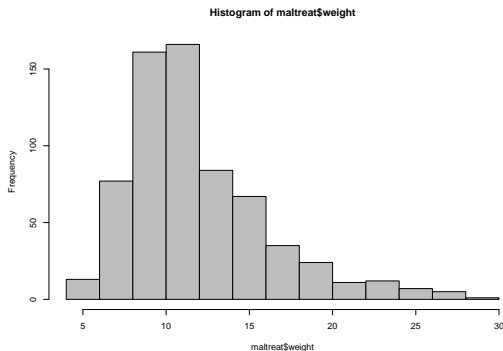


```
library(ggplot2)
ggplot(data = maltreat , aes(x=sex ,
                             y=weight ,fill=paying)) +
  geom_boxplot()
```



# Histogram of weight

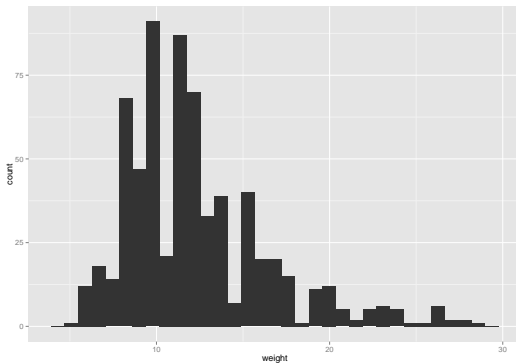
```
hist(maltreat$weight, col="grey")
```



- Prepare in ggplot2

- This is the Histogram

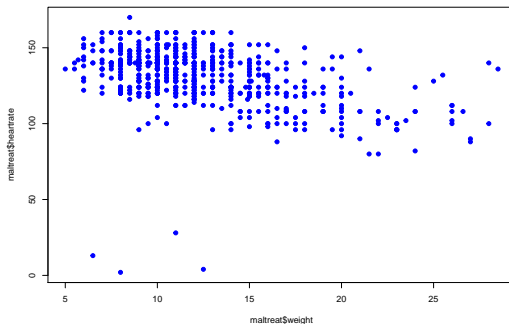
```
library(ggplot2)
ggplot(data = maltreat , aes(weight)) + geom_histogram()
```





# Scatter of weight vs heartrate

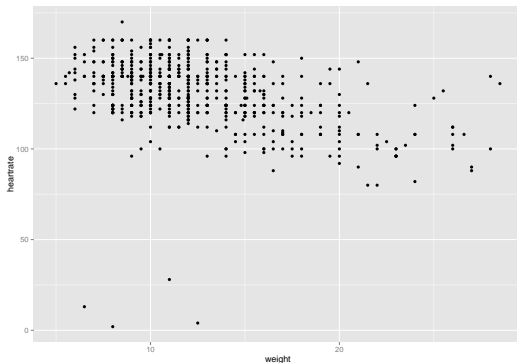
```
plot(maltreat$weight,maltreat$heartrate, pch=19,col="blue")
```



- Prepare in ggplot2

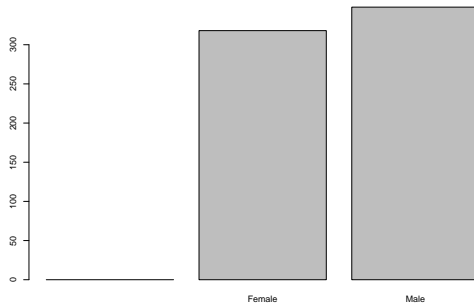
- This is the scatter

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



# Bar plot of sex

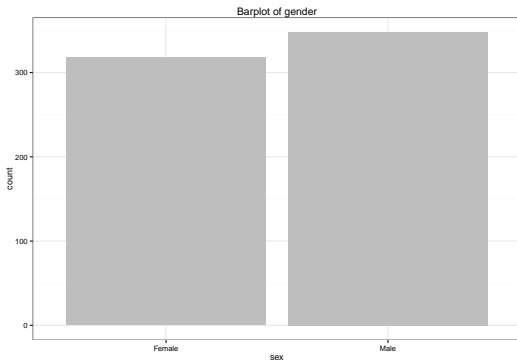
```
barplot(table(maltreat$sex))
```



- Prepare in ggplot2

- This is the barplot \o/

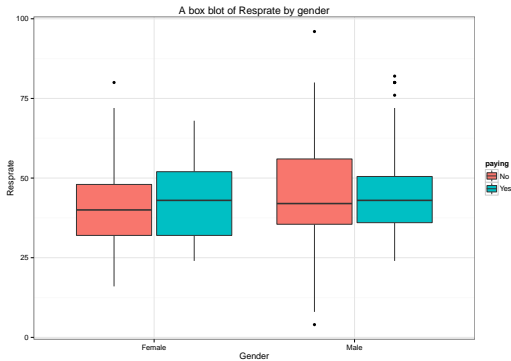
```
library(ggplot2)
ggplot(data = maltreat , aes(sex)) + geom_bar(fill='grey') +
  theme_bw() + ggtitle("Barplot of gender")
```



# A detailed boxplot

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

## Like This



```
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()
```

