



## R Seminar Lincoln University Session 5: Basic plotting

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### Aims:

- Get to know the syntax for programming in R
- Be able to create different plots (histograms, bar plots, boxplots, scatterplots)
- Explore different ways to modify a default plot
- Export the plots

### 1. Plot ()

It plots different types of plots (scatterplot, boxplot, bar plots or histograms) depending on the class of the object being plotted.

Three options for the syntax:

```
##x, y form (default)
plot(iris$Sepal.Length, iris$Sepal.Width)

##Model from (response ~ dependant)
plot(iris$Sepal.Length ~ iris$Sepal.Width)

##Model from with separate data parameter
plot(Sepal.Length ~ Petal.Width, data=iris)
```

#### ***Modify the default plot***

***Example 1: Change the symbols, their colour and their background colour.***

```
plot(Sepal.Length ~ Petal.Width, data=iris, pch=19, bg=11)
plot(Sepal.Length ~ Sepal.Width, data=iris, col="red", pch=24, bg="blue")
```

***Example 2: Add labels to the plot.***

```
plot(Sepal.Length ~ Sepal.Width, data=iris, col="red", pch=11, bg=11,
main= "Sepal length vs width", xlab="Sepal width (cm)", ylab="Sepal length (cm)")
```

***Example 3: Change the size of the text and the symbols of the plot.***

```
plot(Sepal.Length ~ Sepal.Width, data=iris, col="red", pch=21, bg=11,
main= "Sepal length vs width", xlab="Sepal width (cm)", ylab="Sepal length (cm)", cex = 0.5)
```

***Example 4: Add a 3<sup>rd</sup> dimension to the plot.***

```
plot(Sepal.Length ~ Sepal.Width, data=iris, col=as.numeric(Species), pch=as.numeric(Species)*21,
bg=11, main= "Sepal length vs width", xlab="Sepal width (cm)", ylab="Sepal length (cm)")
```

Try

- ✓ To make the symbol bigger.
- ✓ To apply a different symbol and colour.
- ✓ Plot the width and length of the petal.
- ✓ Change the labels of the new plot.

## 2. Add a legend

Will help us to better understand the plot.

**Example 4: Define the position of the legend.**

```
locator(1)

$x
[1] 3.85448

$y
[1] 7.106233

legend(3.8, 7.1, legend = unique(iris$Species),
col=as.numeric(unique(iris$Species)), pch=as.numeric(unique(iris$Species))*21)
```

Try

- ✓ To define the position using 'bottomright' 'bottom' 'bottomleft' 'left' 'topleft' 'top' 'topright' 'right' or 'center'. And adjust the distance to the margins with 'inset' parameter.

## 3. Add a regression line

Add a regression line ( $y \sim x$ ) → `abline(lm(y~x), col =)`

**Example 5: Add a regression line**

```
?abline
abline(lm(Sepal.Length ~ Petal.Width, data = iris), lty = 5, lwd = 2, col = "grey")
```

## 4. hist()

To make density plots (histograms).

```
?hist
hist(iris$Sepal.Length)
```

**Example 6: Determine the breaks for the histogram.**

```
hist(iris$Sepal.Length, breaks=5)
```

**Example 7: Modify the axis of the plot.**

```
axis(1, at = seq(4, 8, by = 0.5), labels = seq(4, 8, by = 0.5))
```

## 5. barplot()

```
barplot(iris$Sepal.Width)
```

**Example 8: Change the bars' orientation.**

```
barplot(iris$Sepal.Width, horiz=TRUE)
```

**Example 9: Incorporate another variable to the plot.**

To incorporate another variable we need to create a table inside the barplot function (see ?barplot).

```
barplot(table(iris$Sepal.Width, iris$Species))
```

We can also create categories inside of the variables to make the plot more informative.

```
barplot(table(iris$Sepal.Width>3, iris$Species))
```

**Example 10: Change the stacked bar plot to a grouped bar plot.**

The new plot will show a different column for each width category.

```
barplot(table(iris$Sepal.Width>3, iris$Species), beside=TRUE)
```

## 6. boxplot()

This type of plot underlay the statistical distribution of numerical data through their quartiles.

```
boxplot(iris$Sepal.Length)
```

**Example 11: Split the values of the numeric vector according to a categorical variable.**

```
boxplot(iris$Sepal.Length ~ iris$Species)
```

```
boxplot(iris$Sepal.Length, iris$Sepal.Width, iris$Petal.Width)
```

## 7. Multiple plots

We can plot multiple plots on the same screen.

```
m <- matrix(c(1:3), ncol = 1, byrow = TRUE)
layout(m)
hist(iris$Sepal.Length, breaks=5)
axis(1, at = seq(4, 8, by = 0.5), labels = seq(4, 8, by = 0.5))
barplot(table(iris$Sepal.Width>3, iris$Species), beside=TRUE)
boxplot(iris$Sepal.Length)
```

Try

- ✓ To have a 4 plots matrix on the screen with 2 columns and 2 rows of plots.

## 8. Export the plot

We can export the plot on different formats such as pdf, png, jpeg, etc. You need:

**Example 12: Export the plot as pdf.**

```
pdf(file="Iris.pdf")
plot(Sepal.Length ~ Sepal.Width, data=iris, col=as.numeric(Species), pch=as.numeric(Species)*21,
bg=11, main= "Sepal length vs width", xlab="Sepal width (cm)", ylab="Sepal length (cm)")
abline(lm(Sepal.Length ~ Petal.Width, data = iris), lty = 5, lwd = 2, col = "grey")
legend('topright', inset=.05, legend=unique(iris$Species), col=as.numeric(unique(iris$Species)),
pch=as.numeric(unique(iris$Species))*21)
dev.off()
```

Try

- ✓ To export the plot as png format (use `?png` for help).

## 9. Exercise

Create a pdf containing the same plots that the file `aa_Seminar5_plot_examples.pdf` using what you have learned today.