

Exercises:

R Notebooks

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## Exercise 1: Setting up a notebook

* Start a new RStudio project in the Notebook\_data folder
* Create a new R Notebook and save it under the name “Plant\_uptake.Rmd”
* Edit the default template so that you have
	+ A title (set in the header) of “Plant CO2 uptake”
	+ A small introductory piece of text saying what you’re going to do
	+ A code block which loads the tidyverse package
	+ A code block which reads in the plant\_co2.csv file, saves it to a variable and then displays it
	+ A piece of text saying you’re going to modify the Treatment variable
	+ A block where you use mutate and factor to change the Treatment column to be a factor where “nonchilled” comes before “chilled”
	+ A piece of text saying you’re going to draw a graph
	+ A scatterplot of conc vs uptake coloured by Treatment
* Knit the document to an HTML file and see how it looks.

### If you have time

* In the graph modify the point shape by Type
* Add a geom\_line layer and add and aesthetic mapping for group=Plant so that the lines join points from the same plant
* Modify the colours to use the colourbrewer Set 1 palette using scale\_colour\_brewer

## Exercise 2: Using Markdown

* Add Level 1 titles saying “**Introduction**”, “**Data Preparation**” and “**Visualisation**” at appropriate points in your document
* In the introduction say that this experiment was performed on grass plants of the Echinochloa crus-galli species. Make sure the latin name is written in italics.
* In the introduction add some text which describes the experimental factors in the design, these should be presented in a bulleted list. The name of the factor should be in bold. The factors are:
	+ Plant: The physical plant from which measurements were made
	+ Type: The species of the plant
	+ Treatment: Whether the plant was chilled or not
* Also add a separate list for the measures. These are:
	+ conc: The CO2 concentration
	+ uptake: The amount of carbon taken up
* Recompile the document to see the changes in the final version
* Add a new graph. This should take only the data where conc is 250 or more and plot a strip chart of the uptake for nonchilled and chilled. You should use a facet to separate the data for the two plant Types (Mississippi and Quebec)
* Write some text saying what you conclude from the data presented in the stripchart

### If you have time

Try adding the details of the experimental factors as a table instead of a list.

Use stat\_summary to add a mean line to the stripchart

## Exercise 3: Code Blocks

* Split up any existing code blocks which generate more than one piece of output
* Give all of your code blocks a name and check that you can see both the code block name and the document titles in the navigation section at the bottom of the document
* When printing your tibble use the head function to only show the first 10 lines so that your output file doesn’t get too big.
* Remove any unwanted messages (eg tidyverse loading or read\_csv structure information)
* Change the first graph to be printed in SVG (dev="svg”) format and have a height of 4 and a width of 9
* Keep the second graph in PNG format, but center it in the document (remember this won’t affect the interactive notebook, only the compiled document)
* Add a legend to the figures
* Recompile the document to see the effect of the changes

### If you have time

Use summarise to calculate the mean and sd of the uptake for the different types and treatments for concentrations over 250. Print these results both as a table and a barchart. Suppress any unwanted warnings.

## Exercise 4: Document appearance

* Add a table of contents to the document and recompile to see how it works
* Change the theme used for both the main text and the syntax highlighting
* After recompiling the document find the HTML file created and open it directly in a browser
* Try compiling to other formats (Word or PDF) and see how they look. [Note: PDF creation currently fails for me if graphs use SVG format. This looks like a bug so it might be fixed when you try it, but if not then just change the graph type back to PNG and try again]

### If you have time

Try changing the appearance of the tibbles within the document and see what effect this has.

Try creating a parameter for the day the document was rendered and add that to the output.

Make a parameter for the file to process and then change this at runtime to automatically render the document.