



Working with RStudio

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<http://euclid.psych.yorku.ca/www/psy6135/>

Getting started: Tools

- To profit best, you need to install both R and R Studio on your computer



The basic R system: R console (GUI) & packages
 Download: <http://cran.us.r-project.org/>
 Add my recommended packages:
 source("http://friendly.apps01.yorku.ca/psy6140/R/install-hebb-pkgs.R")



The R Studio IDE: analyze, write, publish
 Download:
<https://www.rstudio.com/products/rstudio/download/>
 Add: R Studio-related packages, as useful



R package tools



Data prep: Tidy data makes analysis and graphing much easier.
 Packages: [tidyverse](#), comprised of: [tidyr](#), [dplyr](#), [lubridate](#), ...



R graphics: general frameworks for making standard and custom graphics
 Graphics frameworks: [base graphics](#), [lattice](#), [ggplot2](#), [rgl](#) (3D)
 Application packages: [car](#) (linear models), [vcd](#) (categorical data analysis), [heplots](#) (multivariate linear models)

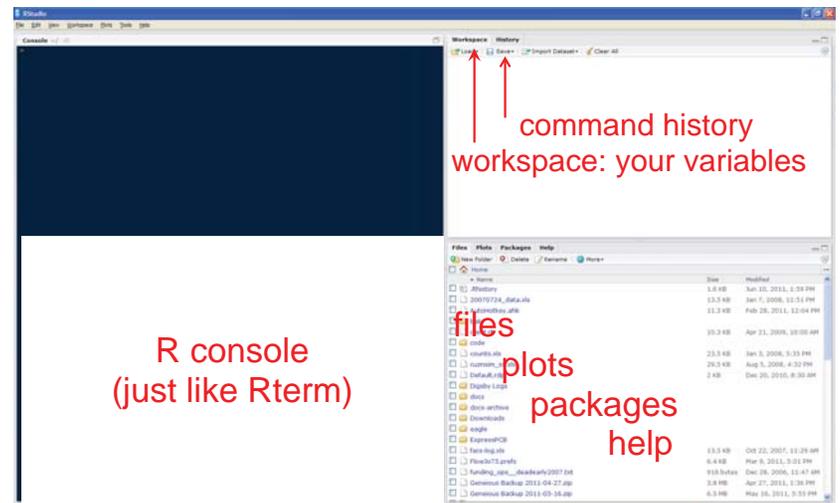


Publish: A variety of R packages make it easy to write and publish research reports and slide presentations in various formats (HTML, Word, LaTeX, ...), all within R Studio



Web apps: R now has several powerful connections to preparing dynamic, web-based data display and analysis applications.

Getting started: R Studio



R Studio navigation

R folder navigation commands:

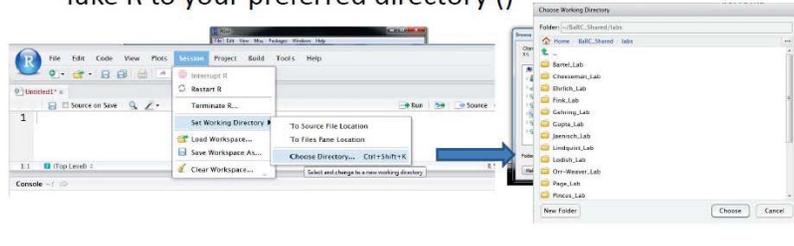
- Where am I?

```
> getwd()
[1] "C:/Dropbox/Documents/6135"
```
- Go somewhere:

```
> setwd("C:/Dropbox")
> setwd(file.choose())
```

R Studio GUI

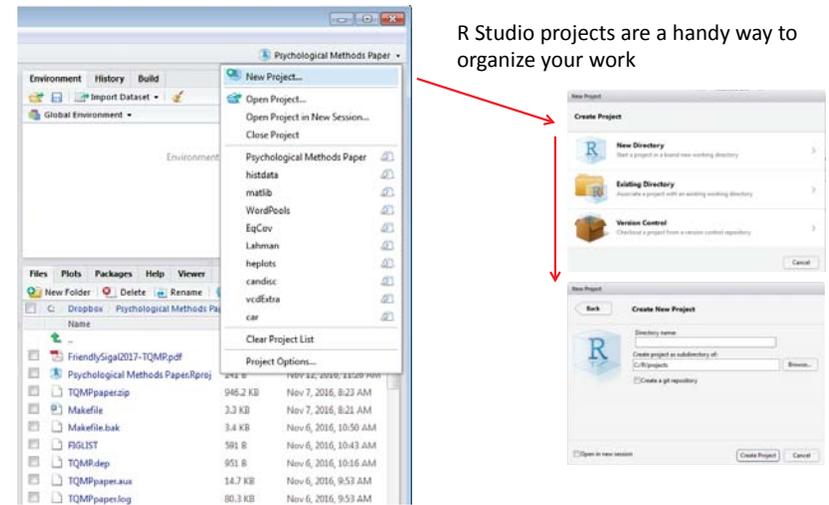
- Take R to your preferred directory ()



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R Studio projects

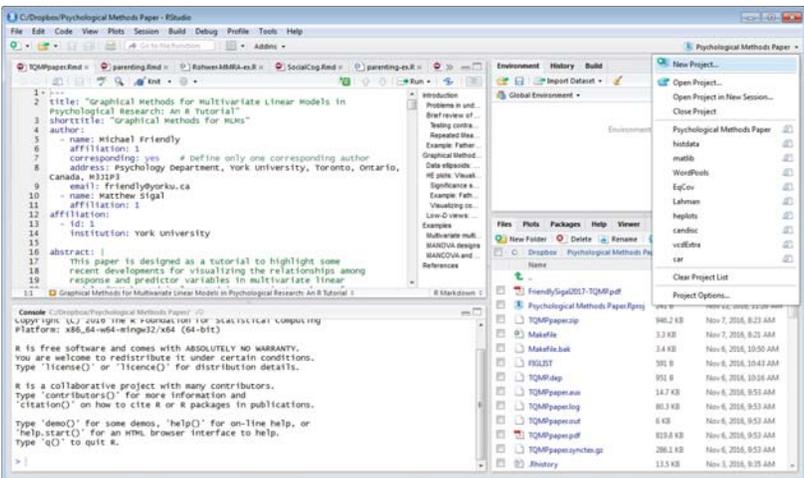
R Studio projects are a handy way to organize your work



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R Studio projects

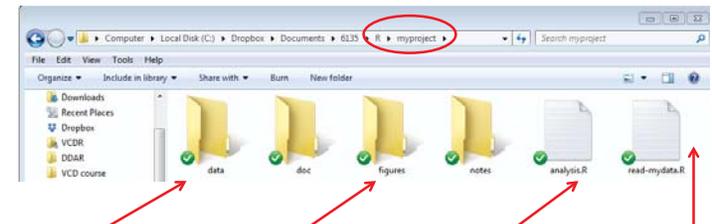
An R Studio project for a **research paper**: R files (scripts), Rmd files (text, R "chunks")



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Organizing an R project

- Use a separate folder for each project
- Use sub-folders for various parts



- data files:
 - raw data (.csv)
 - saved R data (.Rdata)
- figures:
 - diagrams
 - analysis plots
- R files:
 - data import
 - analysis

Write up files will go here (.Rmd, .docx, .pdf)

This project, saved in a **Dropbox** folder automatically syncs with all my computers & collaborators. I use **Git & GitHub** for more serious work.

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Organizing an R project

- Use separate R files for different steps:
 - Data import, data cleaning, ... → save as an RData file
 - Analysis: load RData, ...

read-mydata.R

```
# read the data; better yet: use RStudio File -> Import Dataset ...
mydata <- read.csv("data/mydata.csv")

# data cleaning:
#   filter missing, make factors, transform variables, ....

# save the current state
save("data/mydata.RData")
```

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Organizing an R project

- Use separate R files for different steps:
 - Data import, data cleaning, ... → save as an RData file
 - Analysis: load RData, ...

analyse.R

```
## load the data
load("data/mydata.RData")

## do the analysis – exploratory plots
plot(mydata)

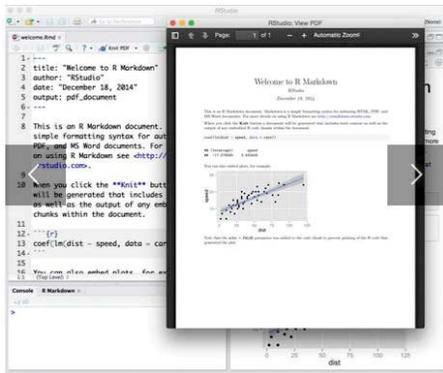
## fit models
mymod.1 <- lm(y ~ X1 + X2 + X3, data=mydata)

## plot models, extract model summaries
plot(mymod.1)
summary(mymod.1)
```

NB: `##` is a special R comment for a H2 heading in an R “notebook” script

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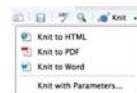
Reproducible analysis & reporting



R Studio, together with the knitr and rmarkdown packages provide an easy way to combine writing, analysis, and R output into complete documents

.Rmd files are just text files, using rmarkdown markup and knitr to run R on “code chunks”

A given document can be rendered in different output formats:



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Output formats and templates



The integration of R, R Studio, knitr, rmarkdown and other tools is now highly advanced.



My last book was written entirely in R Studio, using .Rnw syntax → LaTeX → PDF → camera ready copy



The ggplot2 book was written using .Rmd format.

The [bookdown](#) package makes it easier to manage a book-length project – TOC, fig/table #s, cross-references, etc.

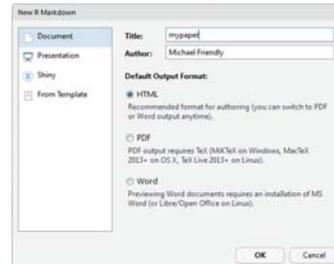
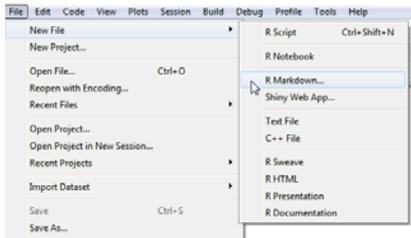
Also: [blogdown](#), [posterdown](#), ...

Templates are available for APA papers, slides, handouts, entire web sites, etc.

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Writing it up

- In R Studio, create a .Rmd file to use R Markdown for your write-up
 - lots of options: HTML, Word, PDF (needs LaTeX)



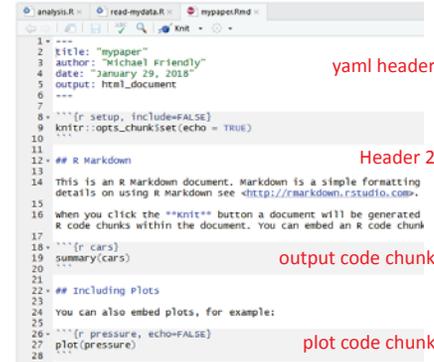
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Writing it up

- Use simple Markdown to write text
- Include code chunks for analysis & graphs

mypaper.Rmd, created from a template

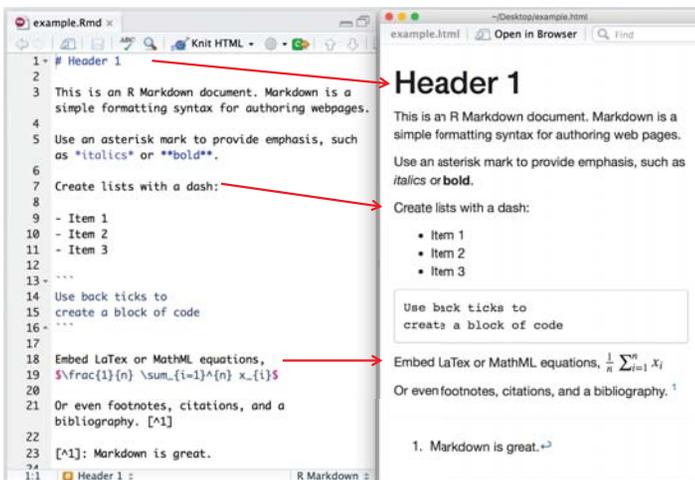
Help -> Markdown quick reference



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rmarkdown basics

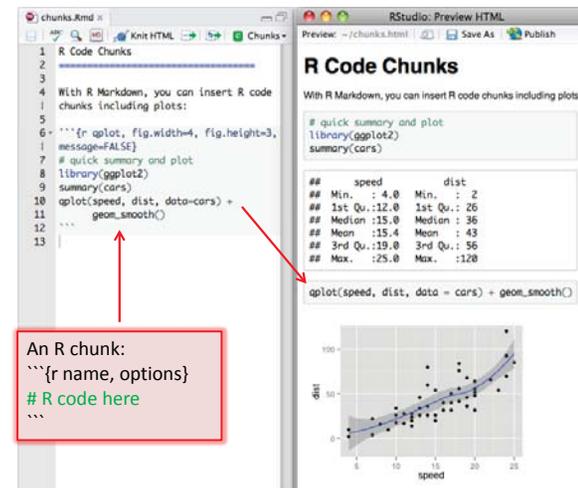
rmarkdown uses simple formatting for all standard document elements



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R code chunks

R code chunks are run by knitr, and the results are inserted in the output document



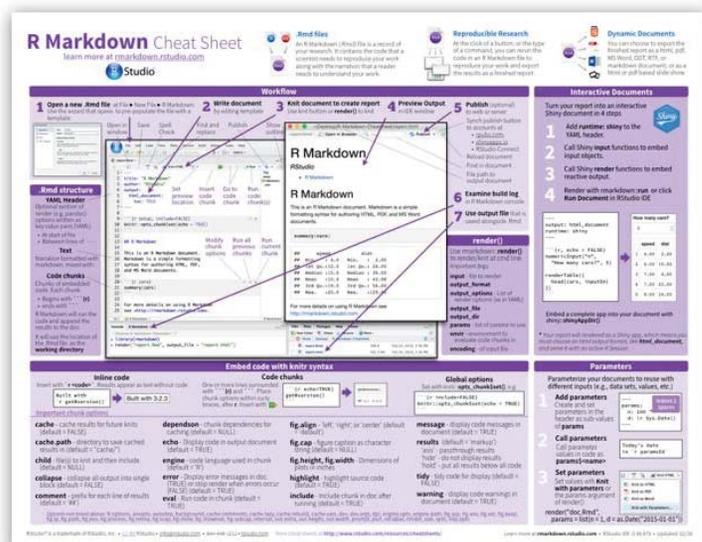
There are many options for controlling the details of chunk output – numbers, tables, graphs

Choose the output format:



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The R Markdown Cheat Sheet provides most of the details
<https://www.rstudio.com/wp-content/uploads/2016/03/rmarkdown-cheatsheet-2.0.pdf>



R notebooks

Often, you just want to “compile” an R script, and get the output embedded in the result, in HTML, Word, or PDF. Just type Ctrl-Shift-K or tap the **Compile Report** button

