R

D	New Directory	
Л	Start a project in a brand new working directory	
	Existing Directory	
K	Associate a project with an existing working directory	
R	Version Control	
R	Version Control Checkout a project from a version control repository	



# Working with RStudio

Michael Friendly Psych 6136 http://friendly.github.io/psy6136

# 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: <u>http://cran.us.r-project.org/</u> Add my recommended packages: source("http://euclid.psych.yorku.ca/www/psy6135/R/install-pkgs.R ")



The R Studio IDE: analyze, write, publish Download: <u>https://www.rstudio.com/products/rstudio/download/</u> 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, ...





ggplot2 R g

**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)



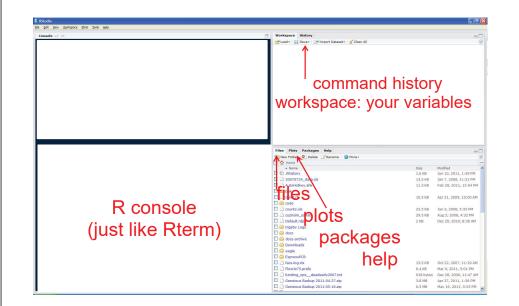
**Publish**: A variety of R packages make it easy to write and publish research reports and slide presentations in various formats (HTML, Word, LaTeX, ...), all within R





**Web apps**: R now has several powerful connections to preparing dynamic, webbased 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"

Better yet: create an R project!

Go somewhere:

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

### R Studio GUI

• Take R to your preferred directory ()



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R Studio projects are a handy way to organize your work



# R Studio projects

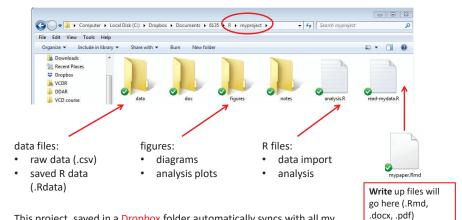
An R Studio project for a research paper: R files (scripts), Rmd files (text, R "chunks")

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# Organizing an R project

R Studio projects

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



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

# Organizing an R project

- Use separate R files for different steps:
  - Data import, data cleaning,  $\dots \rightarrow$  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")</pre>

#### # data cleaning:

filter missing, make factors, transform variables, ....

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

# Organizing an R project

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

#### analyse.R

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

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

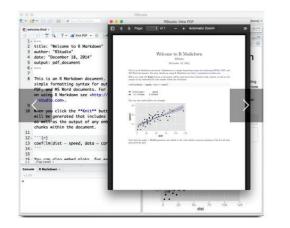
#' ## fit models
mymod.1 <- Im(y ~ X1 + X2 + X3, data=mydata)</pre>

#' ## 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

#### 10

# 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:



# Output formats and templates



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

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  $\rightarrow$  LaTeX  $\rightarrow$  PDF  $\rightarrow$  camera ready copy

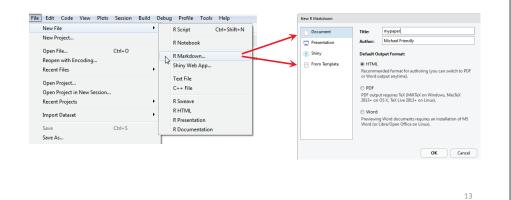
The ggplot2 book was written using .Rmd format.

The bookdown package makes it easier to manage a booklength project – TOC, fig/table #s, cross-references, etc. Also: blogdown, posterdown, ...

9

## Writing it up

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



## Writing it up

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

mypaper.Rmd, created from a template

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2 3 4 5	title: "mypaper" author: "Michael Friendly" date: "January 29, 2018"	yaml header			
8 - 9 10	<pre>include=FALSE} knitr::opts_chunk\$set(echo = TRUE)</pre>				
11 12 - 13	## R Markdown	Header 2			
13 14 15	This is an R Markdown document. Markdown is a simple formatting details on using R Markdown see < <u>http://rmarkdown.rstudio.com</u> >.				
16	When you click the <b>**Knit**</b> button R code chunks within the document.				
19 20	<pre>summary(cars)</pre>	output code chunk			
21 22 - 23	## Including Plots				
	You can also embed plots, for exam	ple:			
26 <del>-</del> 27	<pre>if pressure, echo=FALSE} plot(pressure)</pre>	plot code chunk			

Help -> Markdown quick reference

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# rmarkdown basics

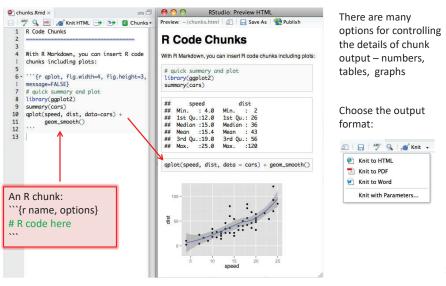
rmarkdown uses simple formatting for all standard document elements

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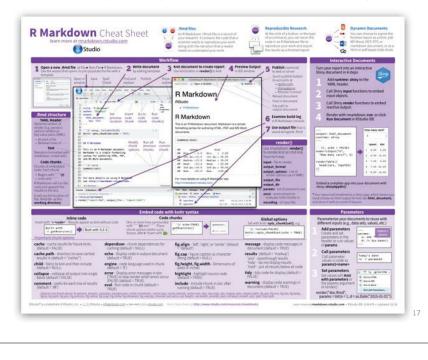
### R code chunks

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



#### 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

