Welcome!

```
# Wifi:

# This is the room for the tidy tools course.
# Please get set up using the instructions at:
# https://github.com/hadley/tidy-tools
```

Your turn

This course is hands-on and, while we're here to help, the best resource may be the person sitting next to you.

This means that you have to work!

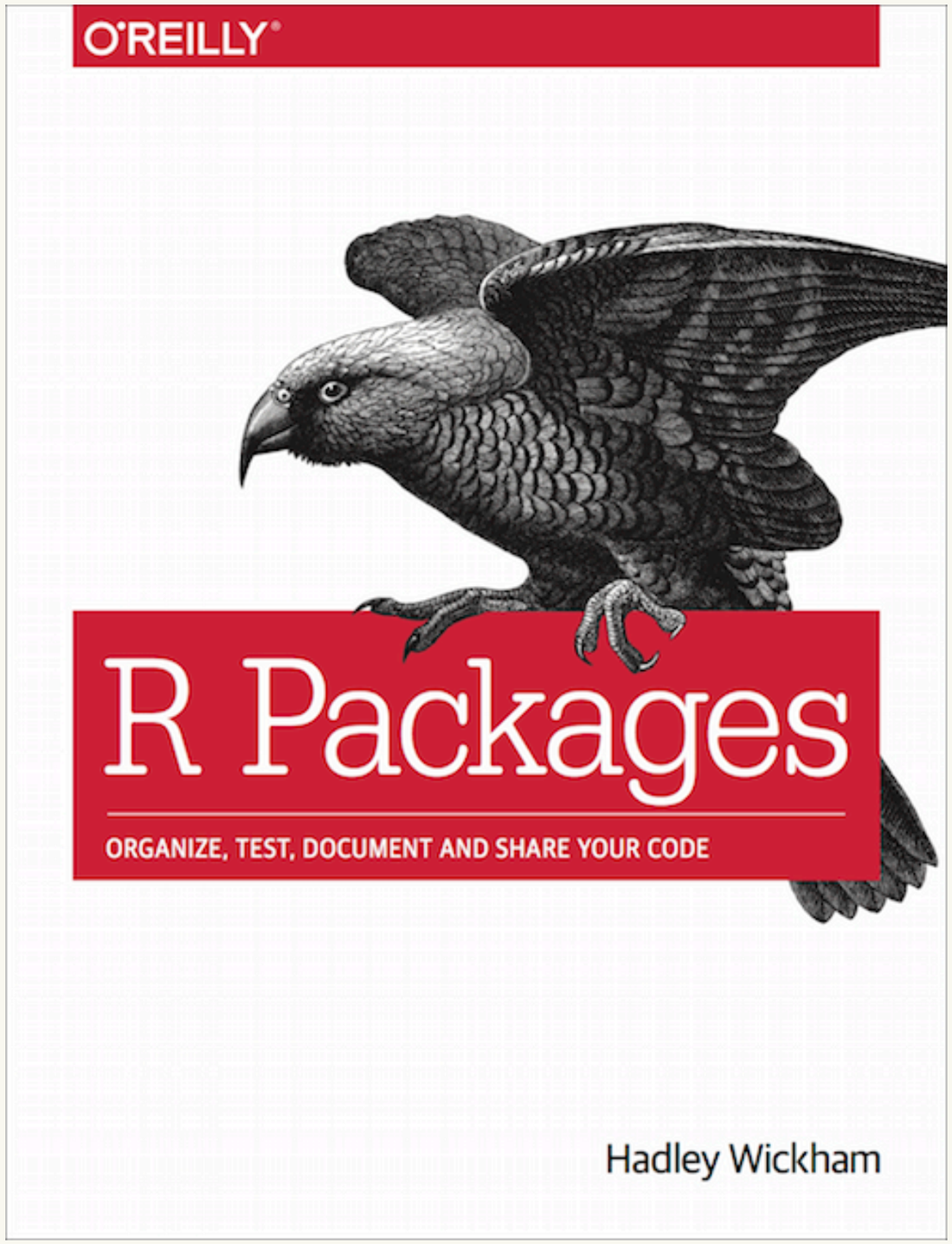
Introduce yourself to your neighbours. Who are you and what are you using R for?

https://github.com/hadley/tidy-tools

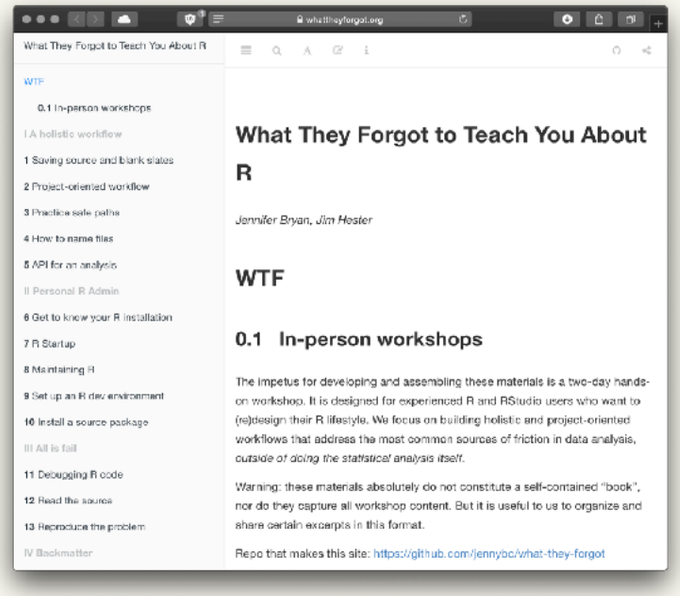
My outline for today

1. Intros & warmups
2. "The whole game"
3. Testing
4. Documentation
5. Sharing
6. Dependencies
7. Tidyverse + packages

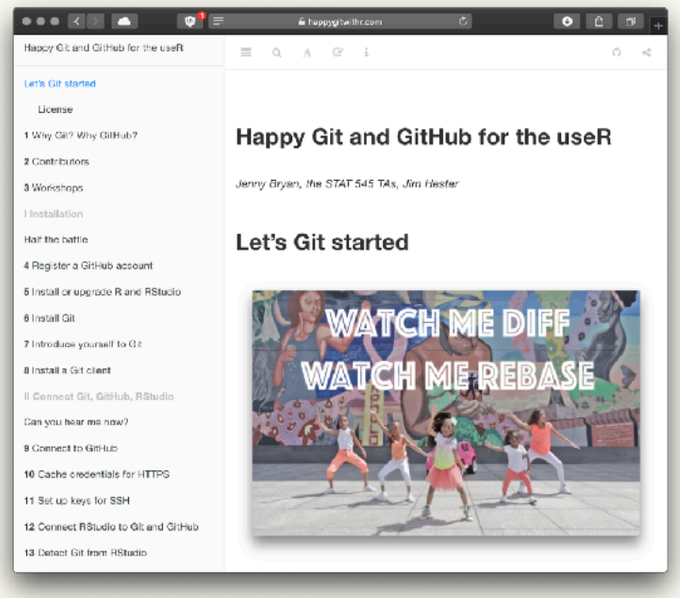
https://github.com/hadley/tidy-tools



https://r-pkgs.org/



https://whattheyforgot.org



https://happygitwithr.com

https://github.com/hadley/tidy-tools

What do you want to learn?

This class is very small so we can customise to what you want to learn more about.

This morning is fairly scripted (because I have slides) but the rest of the time is live coding, so I can be pretty flexible.

I can talk about pretty much anything related to R programming, as long as you don't mind raw explanations.

Warmup

Getting to know your R installation!

https://github.com/hadley/tidy-tools

Your turn 

```
# How do you install a package from CRAN?
```

```
# How do you install a package from GitHub?
```

https://github.com/hadley/tidy-tools

Handful of ways of installing packages

```
install.packages("devtools")
pak::pkg_install("devtools")

devtools::install_github("r-lib/itdepends")
remotes::install_github("r-lib/itdepends")
pak::pkg_install("r-lib/itdepends")

# What's the difference between devtools
# and remotes?
```

https://github.com/hadley/tidy-tools

Your turn 

```
# How does installing a package change your
# computer?
# What is a library? How many libraries do you
# have? Which is the default?


.Library
.libPaths()
```

https://github.com/hadley/tidy-tools

Library = directory of R packages

base R =

14 **base** packages+

29 **recommended** (also on CRAN) packages

Automatically installed with R.

https://github.com/hadley/tidy-tools

Your turn

```
# How does running library(dplyr) affect your
# computer? How is it connected to your
# libraries?

# Hint: try comparing this code before and
# after
data.frame(
  env = search(),
  path = searchpaths()
)
```

https://github.com/hadley/tidy-tools

library(pkg) **attaches** a package

7 base packages are always attached

Use R --vanilla to check

https://github.com/hadley/tidy-tools

The whole game

https://github.com/hadley/tidy-tools

What follows is adapted from

The Whole Game

chapter in the revised version of R Packages.

https://r-pkgs.org/whole-game.html

A proper package for the care and feeding of factors:

forcats

https://forcats.tidyverse.org

A package is a set of conventions that (with the right tools) makes your life easier

usethis::create_package()

What does create_package() do?

```
✔ Creating '/Users/jenny/tmp/foofactors2/'
✔ Setting active project to '/Users/jenny/tmp/foofactors2'
✔ Creating 'R/'
✔ Writing 'DESCRIPTION'
Package: foofactors2
Title: What the Package Does (One Line, Title Case)
Version: 0.0.0.9000
Authors@R (parsed):
    * Jennifer Bryan <jenny@rstudio.com> [aut, cre]
Description: What the package does (one paragraph).
License: MIT + file LICENSE
Encoding: UTF-8
LazyData: true
✔ Writing 'NAMESPACE'
✔ Writing 'foofactors2.Rproj'
✔ Adding '.Rproj.user' to '.gitignore'
✔ Adding '^foofactors2\\.Rproj$', '^\\.Rproj\\.user$' to '.Rbuildignore'
✔ Opening '/Users/jenny/tmp/foofactors2/' in new RStudio session
✔ Setting active project to '<no active project>'
```

use_git()

Not going to teach it,
but diffs are helpful

use_r()

Factors can be vexing

```
(a <- factor(c("character", "in", "the", "streets")))
#> [1] character in        the       streets
#> Levels: character in streets the
(b <- factor(c("integer", "in", "the", "sheets")))
#> [1] integer in      the     sheets
#> Levels: in integer sheets the

c(a, b)
#> [1] 1 2 4 3 2 1 4 3
```

Factors can be vexing

```
factor(c(as.character(a), as.character(b)))
#> [1] character in        the       streets   integer   in
#> [7] the       sheets
#> Levels: character in integer sheets streets the
```

Let's turn this into our first function: `fbind()`

Where do we define functions?

Beautiful pairing:
use_r() & use_test()

```
# There's a usethis helper for that too!
usethis::use_r("file-name")
```

```
# Organise files so that related code
# lives together. If you can give a file
# a concise and informative name, it's
# probably about right
```

Now what?

```
source("R/fbind.R")
```

Use IDE tricks to send definition of fbind() to the R Console

Now what?

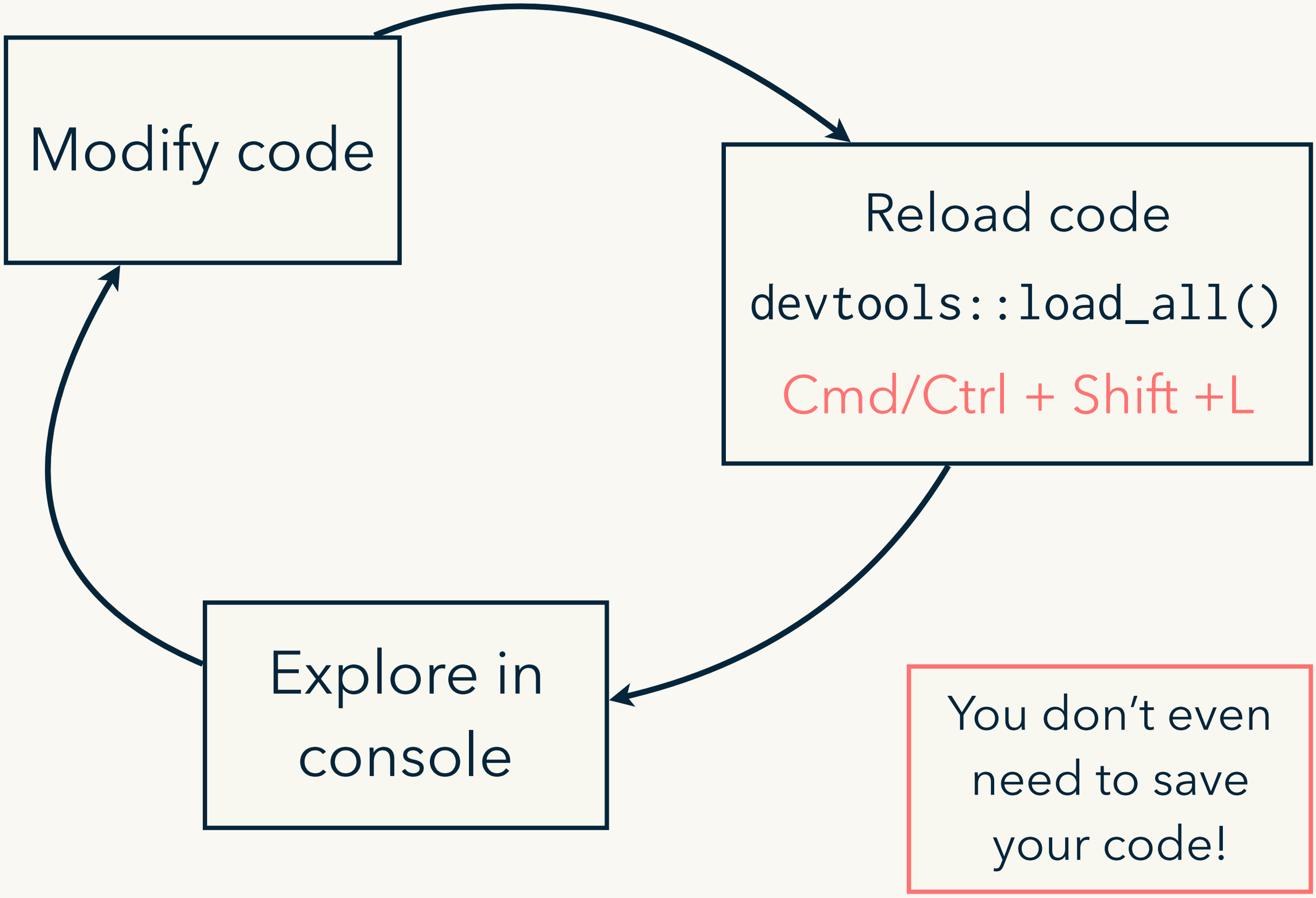
~~`source("R/fbind.R")`~~

~~Use IDE tricks to send definition of fbind() to the R Console~~

```
devtools::load_all()
```

devtools::load_all()

Why do we love devtools? Workflow!



source	bundle	binary
DESCRIPTION	DESCRIPTION	DESCRIPTION
NAMESPACE	NAMESPACE	NAMESPACE
README.md	README.md	README.md
		Meta/
man/	man/	html/
		help/
R		
s		
te		
vi		
inst/templates/	inst/templates/	templates/
cran-comments.md		
devtools.Rproj		
NEWS.md		

Important metadata files exist in all versions

In binary versions, documentation is compiled into multiple versions. A parsed version of DESCRIPTION is cached for performance.

In binary versions, `R/` no longer contains `.R` files, but instead contains binary `.Rdata` files

Compilation results are saved in `libs/`

By default, tests are dropped in binary packages

Source vignettes are build into html or pdf in `inst/doc`, then installed into `doc/`

The contents of `inst/` are moved into the top-level directory

Files used only for development are listed in `.Rbuildignore`, and only exist in source package

devtools::load_all()

≈

install.packages() + library()

devtools::check()

`check()` ≈ `R CMD check`

Checks package for technical validity

Do from R (or RStudio Ctrl/cmd + shift + e)

check() early, check() often

Get it working, keep it working

Necessary (but not sufficient) for CRAN

Excellent way to run your tests (and more)

devtools::document()

roxygen2 turns comments into help

```
#' Bind two factors
#'
#' Create a new factor from two existing factors, where the new
#' factor's levels are the union of the levels of the input
#' factors.
#'
#' @param a factor
#' @param b factor
#'
#' @return factor
#' @export
#' @examples
#' fbind(factor(letters[1:3]), factor(letters[26:24]))
fbind <- function(a, b) {
  factor(c(as.character(a), as.character(b)))
}
```

RStudio helper:

Code > Insert roxygen skeleton

devtools::check()

devtools::install()

install() ≈ R CMD install

- Makes an *installed* pkg from your *source* pkg
- Do from R (or RStudio *Install and Restart*)
- install() less often than you load_all() or check()
- Marks transition from **developing** your package to **using** your package

Your turn

R/RStudio setup

Workflow setup: your .Rprofile

```
# Setup code that is run at R startup:
# usethis::edit_r_profile()

# Helper to add devtools specifically:
# usethis::use_devtools()

if (interactive()) {
  suppressMessages(require(devtools))
  suppressMessages(require(testthat))
}
```

devtools makes usethis available too!

Never include analysis packages here

```
if (interactive()) {
  suppressMessages(require(ggplot2))
  suppressMessages(require(dplyr))
}
```

While you're in there, also add:

```
# Helper to add devtools specifically:
# usethis::use_partial_warnings()

options(
  warnPartialMatchArgs = TRUE,
  warnPartialMatchDollar = TRUE,
  warnPartialMatchAttr = TRUE
)
```

Tell usethis about yourself

```
options(
  usethis.full_name = "Hadley Wickham",
  usethis.description = list(
    `Authors@R` = 'person(
      "Hadley", "Wickham",
      email = "hadley@rstudio.com",
      role = c("aut", "cre"),
      comment = c(ORCID = "YOUR-ORCID-ID")
    )'
  )
)
```

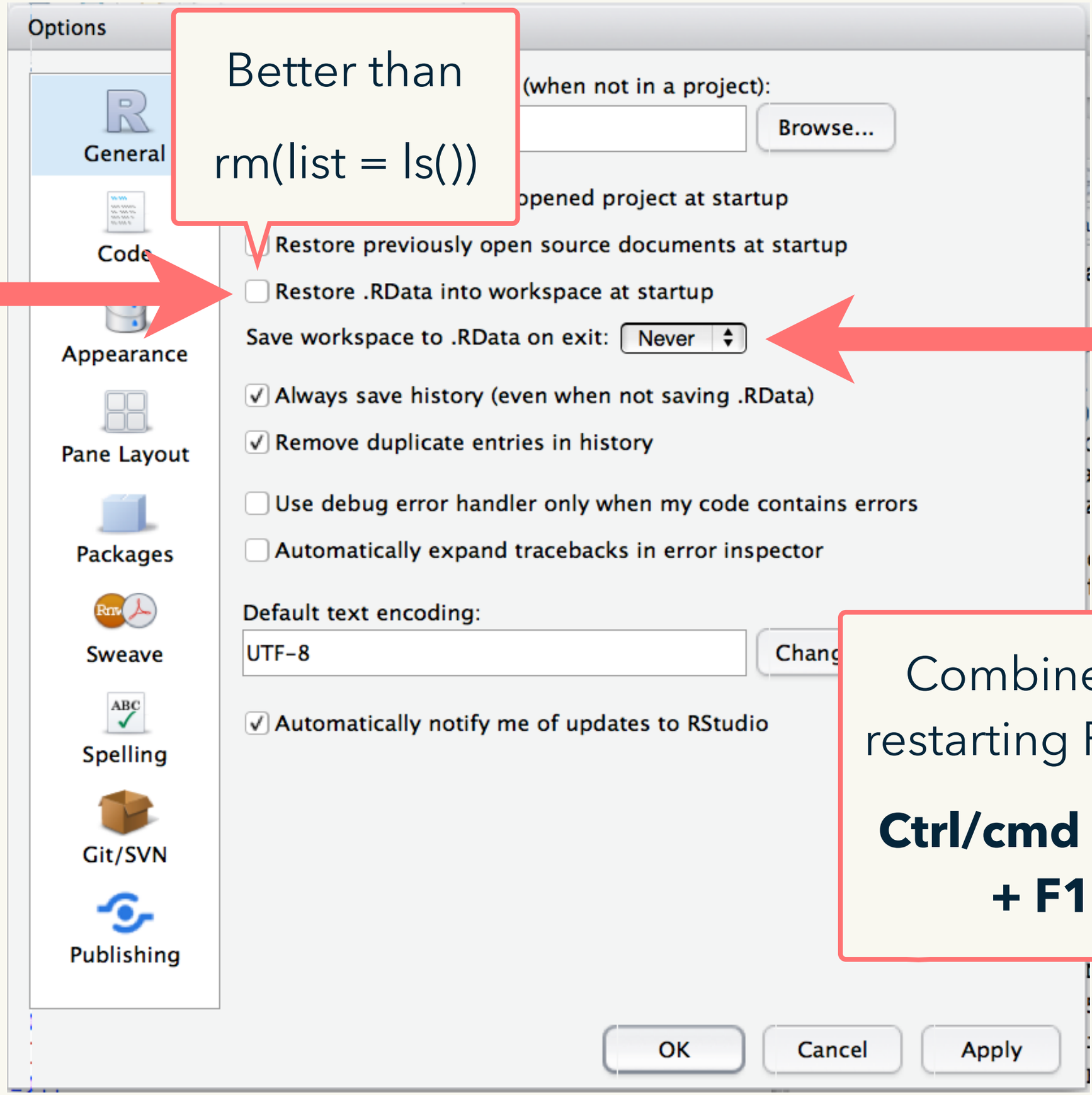
Your first and last names

Your email

Leave as is

Delete this line if you don't have an ORCID

https://usethis.r-lib.org/articles/articles/usethis-setup.html



Better than

rm(list = ls())

Combine with restarting R often!

Ctrl/cmd + shift + F10

Make a package!

https://r-pkgs.org/whole-game.html

Beware!

You're probably used to maintaining a .R file containing snippets of code that you use to automate various bits of your workflow.

Don't save this in R/!

What happens if you have load_all() inside a file inside of R/? What happens if you have usethis::edit_r_profile()?

Where should you save it? 🤷 I use Untitled 😶

Your turn

Substitute your preferred location.

```
# Create a package with:
usethis::create_package("~/Desktop/foofactors")

# Notice that you're now in a new RStudio
# instance.

# Continue on through the next slides to
# repeat the actions I showed you.

# Stuck? Raise a pink post it
```

Your turn

Use `usethis::use_r("fbind")` to create a new file

In it, define a function named "fbind" that combines its inputs (presumably factors) like so:

- coerce each input to character
- combine inputs
- make output a factor

```
factor(c(as.character(a), as.character(b)))
```

Check that you can devtools::load_all()

Your turn

Add docs for fbind() as a roxygen comment

- RStudio helper: *Code* > *Insert roxygen skeleton*
- Lines MUST start with #'

document()

Makes an .Rd file from the comment

Preview with ?fbind

check() again and ... rejoice!

Problems? Raise a **pink** post-it

Your turn

Setup R and RStudio

Edit DESCRIPTION (optional)

- Make yourself the author
- Update Title and Description

Nice to do, but skippable.

use_mit_license("Your Name")

Fixes 1 of our 2 warnings.

check() again, if you wish

Confused? Hoist your **pink** post-it

Your turn

Install your foofactors package

- Call install() in R
- RStudio *Build & Restart*
- Shell: R CMD build + R CMD install

Restart R

Attach like a "regular" package with library()

Call fbind()

Revel in your success by raising your **green** post-it

```
usethis::create_package()
usethis::use_r()
devtools::load_all()
devtools::check()
usethis::use_mit_license()
devtools::document()
usethis::use_test()
devtools::test()
devtools::install()
```

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