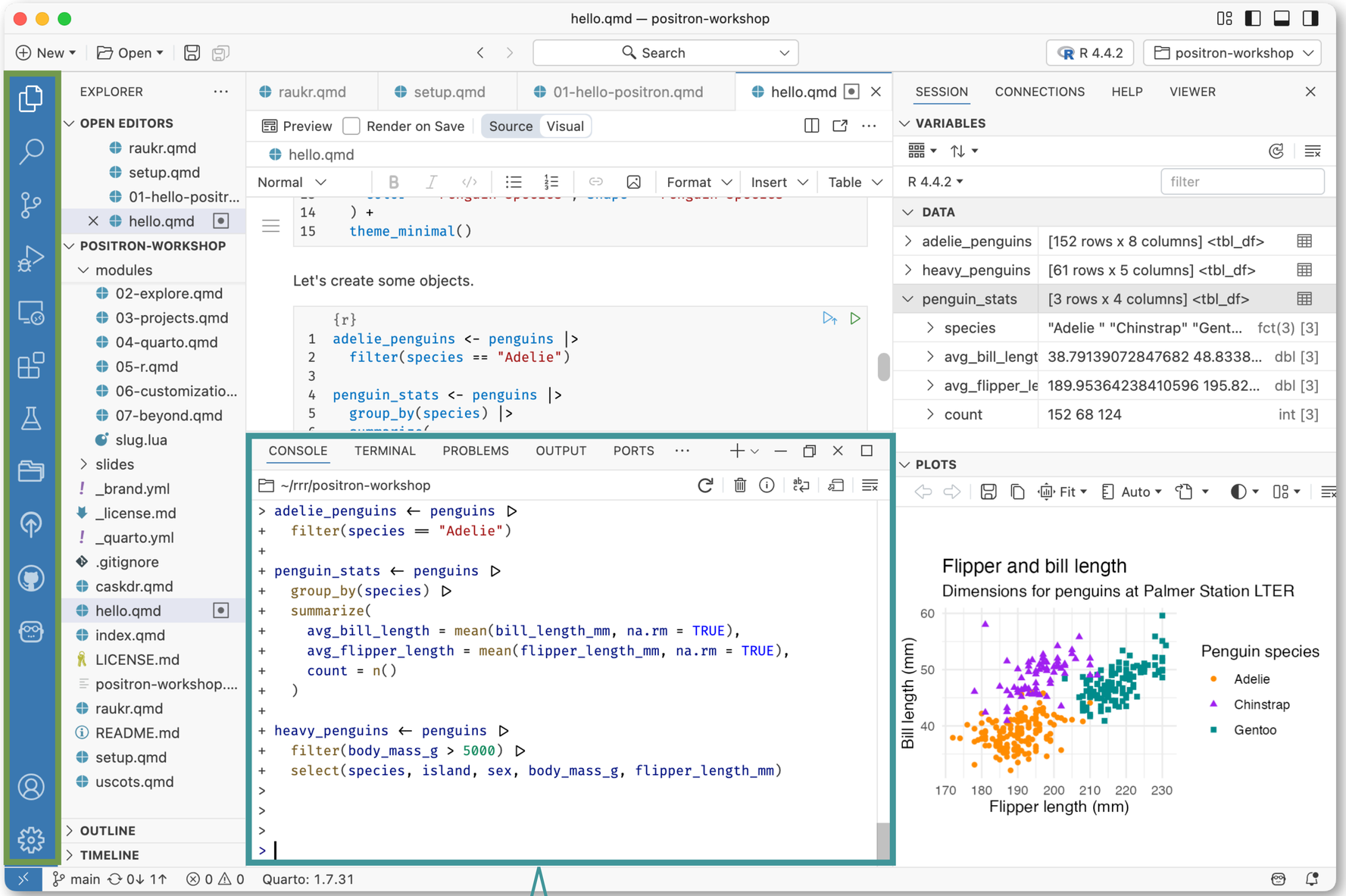
R Programming

Part of "Doing data science in Positron" workshop

Posit Software, PBC

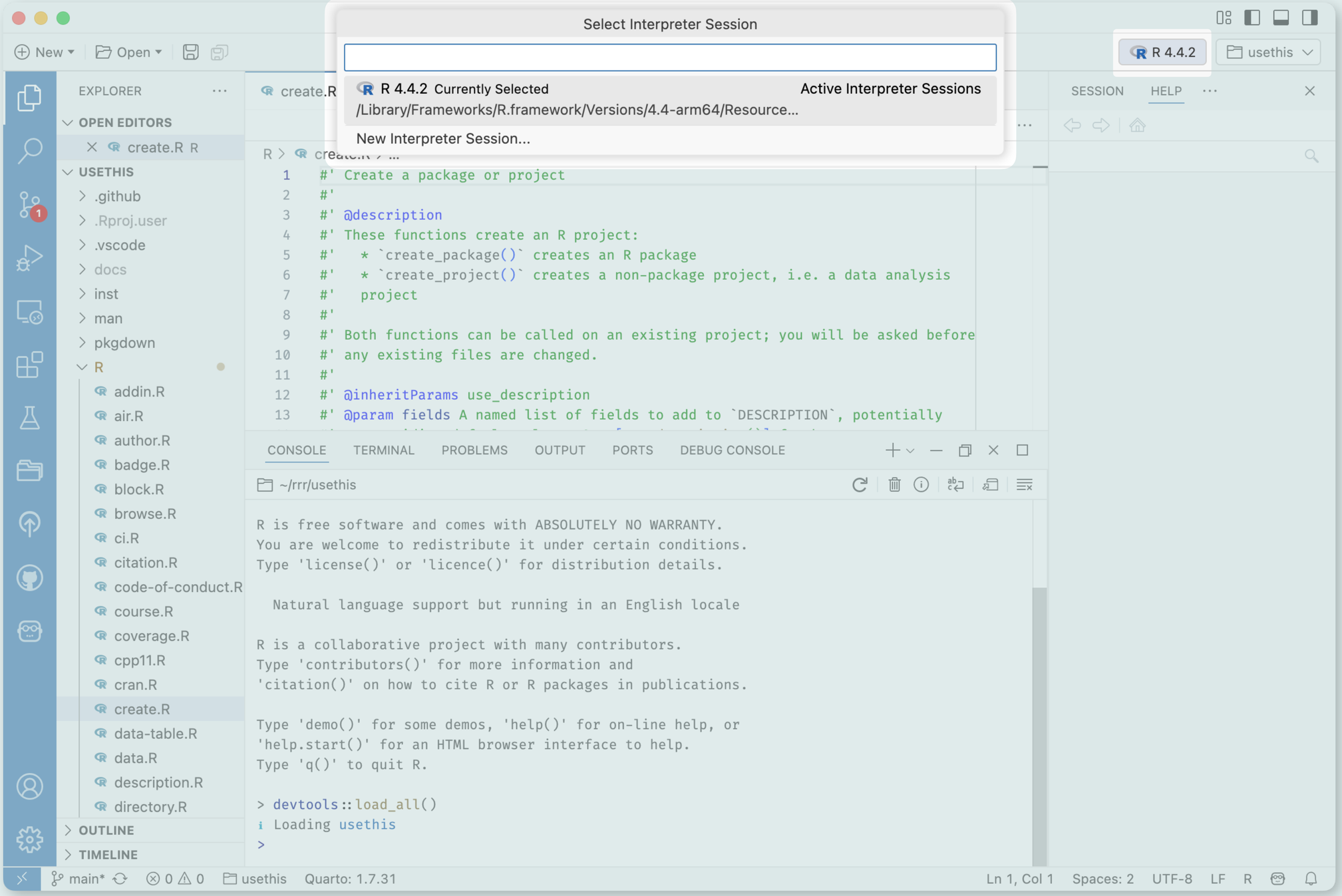


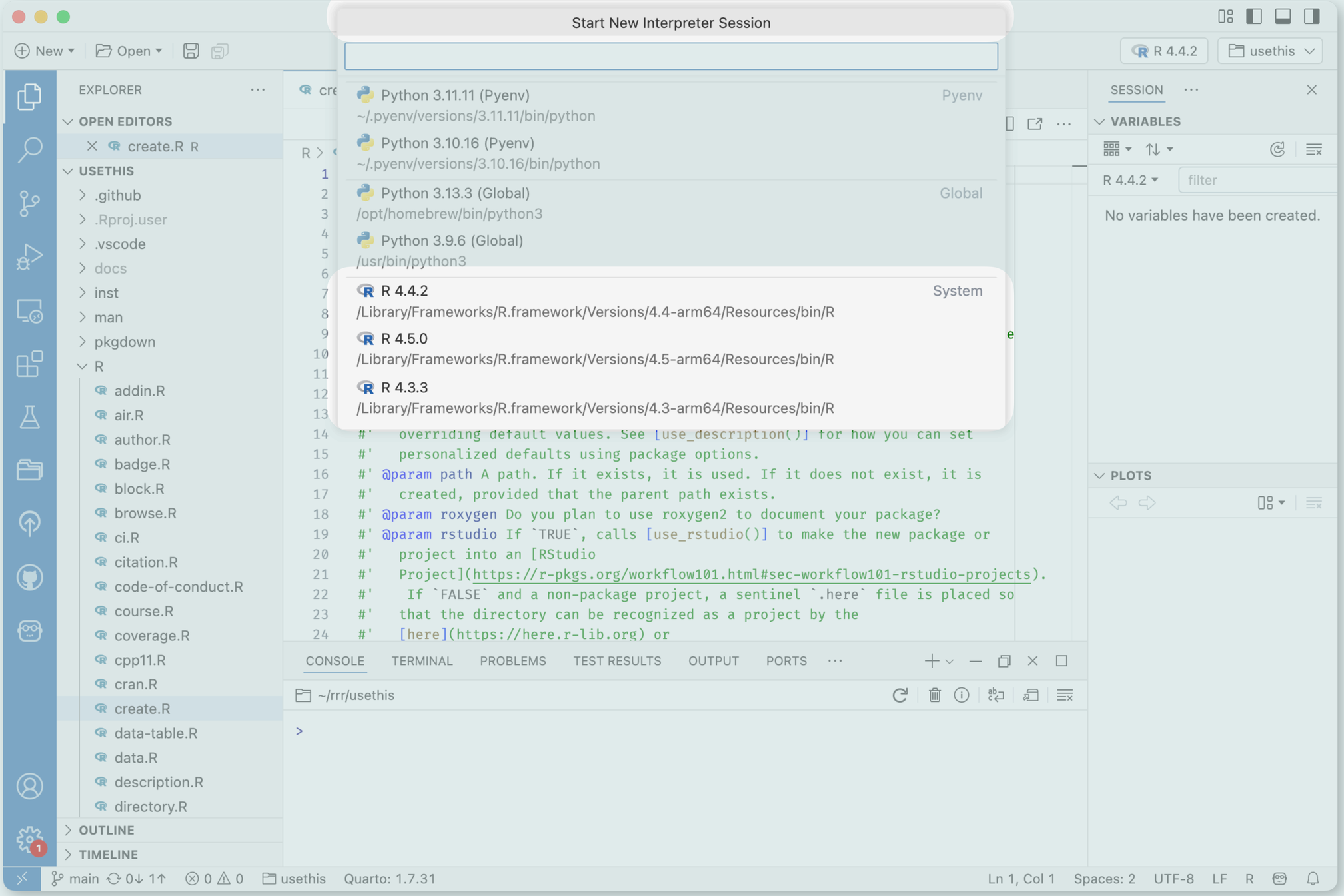
An R session in the Console

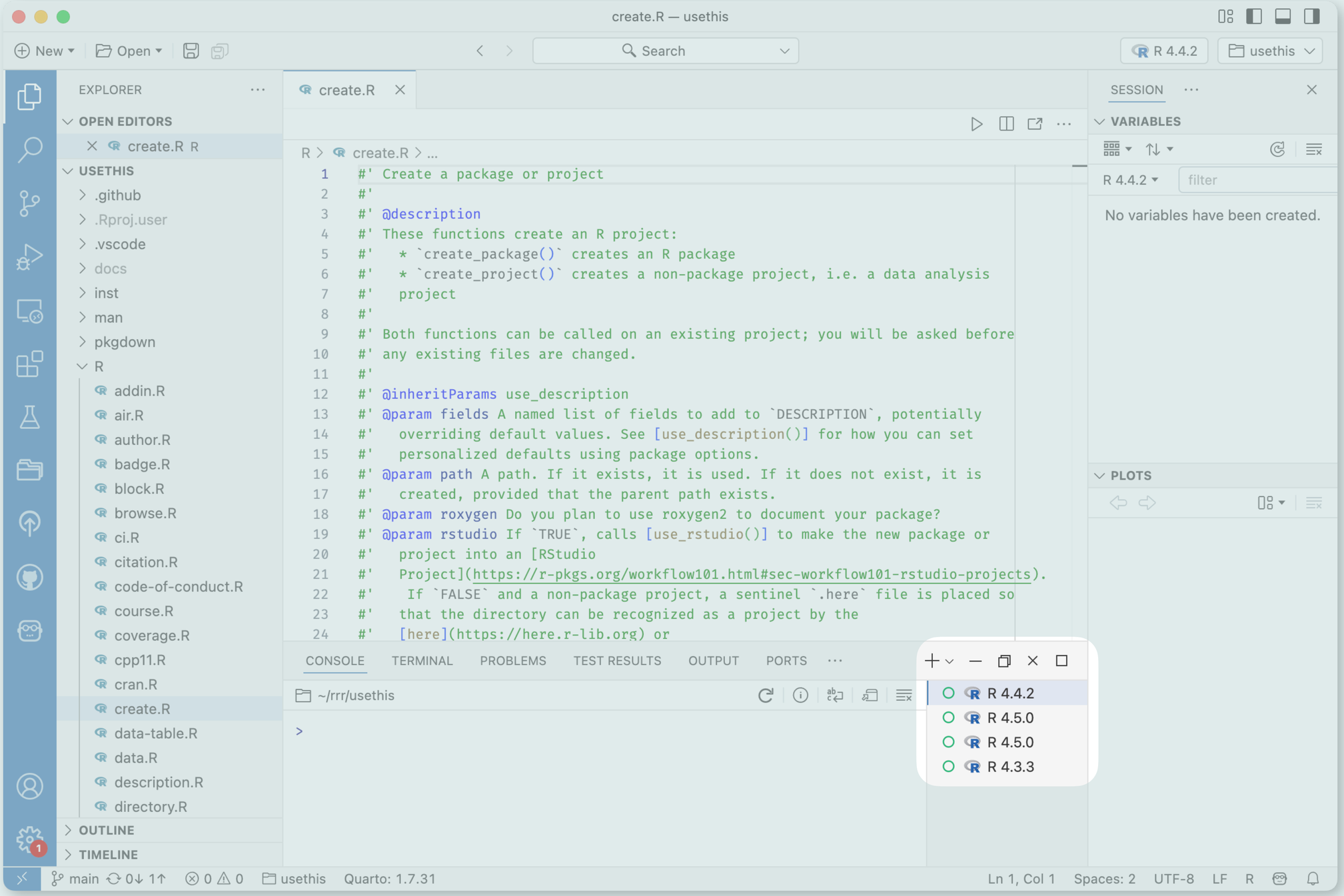
Multiple versions of R

R interpreter sessions

- Positron readily discovers and offers multiple versions of R
- Positron can have multiple, concurrent interpreter sessions, that can be
  - a mix of different R versions
  - a mix of R and Python sessions
  - multiple instances of a single R version


Select Interpreter Session
R 4.4.2 Currently Selected
Active Interpreter Sessions
/Library/Frameworks/R.framework/Versions/4.4-arm64/Resource...
New Interpreter Session...
New
Open
R 4.4.2
usethis
EXPLORER
OPEN EDITORS
create.R R
USETHIS
.github
.Rproj.user
.vscode
docs
inst
man
pkgdown
R
addin.R
air.R
author.R
badge.R
block.R
browse.R
ci.R
citation.R
code-of-conduct.R
course.R
coverage.R
cpp11.R
cran.R
create.R
data-table.R
data.R
description.R
directory.R
OUTLINE
TIMELINE
create.R
#' Create a package or project
#'
#' @description
#' These functions create an R project:
#'   * `create_package()` creates an R package
#'   * `create_project()` creates a non-package project, i.e. a data analysis
#'   project
#'
#' Both functions can be called on an existing project; you will be asked before
#' any existing files are changed.
#'
#' @inheritParams use_description
#' @param fields A named list of fields to add to `DESCRIPTION`, potentially
SESSION
HELP
CONSOLE
TERMINAL
PROBLEMS
OUTPUT
PORTS
DEBUG CONSOLE
~/rrr/usethis
R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.
Natural language support but running in an English locale
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
> devtools::load_all()
i Loading usethis
>
main*
0 0
usethis
Quarto: 1.7.31
Ln 1, Col 1
Spaces: 2
UTF-8
LF
R


Start New Interpreter Session
Python 3.11.11 (Pyenv)
Pyenv
~/.pyenv/versions/3.11.11/bin/python
Python 3.10.16 (Pyenv)
~/.pyenv/versions/3.10.16/bin/python
Python 3.13.3 (Global)
Global
/opt/homebrew/bin/python3
Python 3.9.6 (Global)
/usr/bin/python3
R 4.4.2
System
/Library/Frameworks/R.framework/Versions/4.4-arm64/Resources/bin/R
R 4.5.0
/Library/Frameworks/R.framework/Versions/4.5-arm64/Resources/bin/R
R 4.3.3
/Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/bin/R
New
Open
R 4.4.2
usethis
EXPLORER
OPEN EDITORS
create.R R
USETHIS
.github
.Rproj.user
.vscode
docs
inst
man
pkgdown
R
addin.R
air.R
author.R
badge.R
block.R
browse.R
ci.R
citation.R
code-of-conduct.R
course.R
coverage.R
cpp11.R
cran.R
create.R
data-table.R
data.R
description.R
directory.R
OUTLINE
TIMELINE
SESSION
VARIABLES
R 4.4.2
filter
No variables have been created.
PLOTS
#' overriding default values. See [use_description()] for how you can set
#' personalized defaults using package options.
#' @param path A path. If it exists, it is used. If it does not exist, it is
#' created, provided that the parent path exists.
#' @param roxygen Do you plan to use roxygen2 to document your package?
#' @param rstudio If `TRUE`, calls [use_rstudio()] to make the new package or
#' project into an [RStudio
#' Project](https://r-pkgs.org/workflow101.html#sec-workflow101-rstudio-projects).
#' If `FALSE` and a non-package project, a sentinel `.here` file is placed so
#' that the directory can be recognized as a project by the
#' [here](https://here.r-lib.org) or
CONSOLE
TERMINAL
PROBLEMS
TEST RESULTS
OUTPUT
PORTS
~/rrr/usethis
>
main
0↓ 1↑
0 0
usethis
Quarto: 1.7.31
Ln 1, Col 1
Spaces: 2
UTF-8
LF
R


create.R — usethis
New
Open
Search
R 4.4.2
usethis
EXPLORER
OPEN EDITORS
create.R R
USETHIS
.github
.Rproj.user
.vscode
docs
inst
man
pkgdown
R
addin.R
air.R
author.R
badge.R
block.R
browse.R
ci.R
citation.R
code-of-conduct.R
course.R
coverage.R
cpp11.R
cran.R
create.R
data-table.R
data.R
description.R
directory.R
OUTLINE
TIMELINE
create.R
R > create.R > ...
1 #' Create a package or project
2 #'
3 #' @description
4 #' These functions create an R project:
5 #' * `create_package()` creates an R package
6 #' * `create_project()` creates a non-package project, i.e. a data analysis
7 #' project
8 #'
9 #' Both functions can be called on an existing project; you will be asked before
10 #' any existing files are changed.
11 #'
12 #' @inheritParams use_description
13 #' @param fields A named list of fields to add to `DESCRIPTION`, potentially
14 #' overriding default values. See [use_description()] for how you can set
15 #' personalized defaults using package options.
16 #' @param path A path. If it exists, it is used. If it does not exist, it is
17 #' created, provided that the parent path exists.
18 #' @param roxygen Do you plan to use roxygen2 to document your package?
19 #' @param rstudio If `TRUE`, calls [use_rstudio()] to make the new package or
20 #' project into an [RStudio
21 #' Project](https://r-pkgs.org/workflow101.html#sec-workflow101-rstudio-projects).
22 #' If `FALSE` and a non-package project, a sentinel `.here` file is placed so
23 #' that the directory can be recognized as a project by the
24 #' [here](https://here.r-lib.org) or
CONSOLE
TERMINAL
PROBLEMS
TEST RESULTS
OUTPUT
PORTS
~/rrr/usethis
>
R 4.4.2
R 4.5.0
R 4.5.0
R 4.3.3
SESSION
VARIABLES
R 4.4.2
filter
No variables have been created.
PLOTS
main 0↓ 1↑
0 0
usethis
Quarto: 1.7.31
Ln 1, Col 1
Spaces: 2
UTF-8
LF
R

Why is it useful to have multiple R versions?

- If you are responsible for R code that must run "elsewhere" or that was developed in the past
  - You maintain a package and other users might have different R versions
  - You maintain a data product that gets deployed to a server
  - You develop code that's meant to run in some other, high performance environment
  - You need to revisit an analysis that was crafted 1-2 years ago
- Having multiple R versions locally helps you replicate and solve issues arising from interactions between your code and another R version

Why is it useful to have multiple R sessions?

- Put a long-running task in its own session, while you continue interactive work in another session
- Live comparison between, e.g., 2 different R versions or 2 different versions of an R package
- Develop a self-contained document, e.g., a vignette, in one session, while you continue casual interactive work in another session
- Do you have more use cases?

How do you end up with multiple R versions?

- **Highly** recommended tool:
  - rig: The R Installation Manager
- rig is not part of Positron, they just work well together
- rig is especially important for macOS users
  - It is almost impossible to have multiple, functional R versions on macOS if you just install R from CRAN

Other joys of rig

- Out-of-the-box set-up of default CRAN mirror
- Creates and configures user-level, R-version-specific package libraries
- Installs pak, a nifty R package for package installation
- Installs appropriate Rtools versions on Windows
- Additionally:
  - Updates macOS R installation so you can use lldb to debug C / C++ code
  - Tidies up R-related cruft in the Windows registry

Your turn

Multiple R sessions (option 1 of 2)

5m 00s

- Create 2 (or more!) concurrent R sessions of the same or different versions
- Create different objects in each session and explore how that plays out in the Variables pane
- Restart 1 session (but not the other(s)). What do you see in the Variables pane now?
- Click the ⓘ in the Console action bar to see session metadata. Can you find the R executable path?
- Can you figure out how to rename an R session?

Your turn

Multiple R versions (option 2 of 2)

- Install rig: https://github.com/r-lib/rig. Note the docs in repo's README.
- Use rig to list your existing R versions. Which one is the system default?
- Ask rig to list all available R versions.
- Install another R version. Make it the new default (or not).
- Launch Positron and see that the new R version is now also available.
- Consider going back to your previous default R version.

💡 Teaching tip

- It’s best for all students in your course to be using the same R version.
- But sometimes you might not want to update (or, more likely, downgrade) your “personal” R version to match the course version.
- Testing out your course materials with the version of R your students are using without changing your default R version can be helpful.

Air

Air formatter for R

posit-dev.github.io/air

- When you install Positron, you get Air "for free" as a pre-bundled extension.
- Air formats your R code based on some opiniated but also widely-used and agreed-upon conventions — details at posit-dev.github.io/air/formatter.html.

Air + Positron: practical suggestions

- Air extension ships with Positron and includes the Air binary so Air should just work in Positron.
- You can configure Air to be used at the
  - user level to say “I use Air to format the R code in all of my projects”: by adjusting your user setting (more on this in the next module) or
  - workspace level to say “We use Air to format the R code in this project”: by adjusting your workspace settings (more on this in the next module too) or with `usethis::use_air()`*
- You can also use Air “one-off” from the *Command palette:*
  - *Air: Format Workspace Folder*
  - *Air: Format Document*
  - *Air: Format Selection*
- The Git diff is a great way to see what has changed, so inspect it before committing and pushing!
- There are various ways to disable Air formatting of a specific file, line (or lines in a pipeline), etc.

* Currently requires dev version of usethis

Your turn

Format some ugly R code

3m 00s

- The example project we downloaded earlier has a file with poorly formatted R code: `air-practice.R`
- Open it in Positron. Alternatively, open a personal R file with questionable formatting.
- Remove the `# fmt: skip file` line, so that Air will format the file.
- Experiment with the *Format Selection* and/or *Format Document* commands to see how Air would reformat it.
- Inspect the Git diff to see what's changed.

If you ❤️ Air *(and you will ❤️ Air)*

Turn on Format on Save for R documents by opening your `settings.json`* and adding:

```
{
    "[r]": {
        "editor.formatOnSave": true,
        "editor.defaultFormatter": "Posit.air-vscode"
    }
}
```

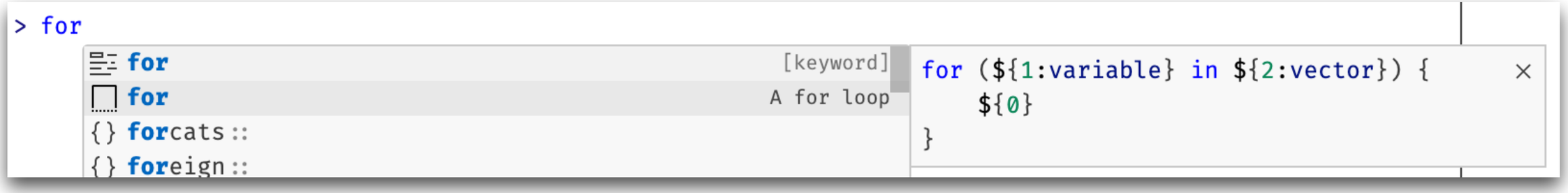
* More on settings in the next module!

Snippets

Snippets

- Positron's R support provides a few snippets related to R's reserved words.
- Positron provides fewer built-in snippets than RStudio.
- You can configure additional snippets at the user or workspace level.
- Positron uses TextMate syntax for snippets, inherited from VS Code. This is different from RStudio's snippet syntax.
- Snippets are typically inserted via the usual completions offered by IntelliSense. There's also a dedicated command: *Insert Snippet*.
- https://positron.posit.co/r-snippets.html

Built-in snippet example: for loop

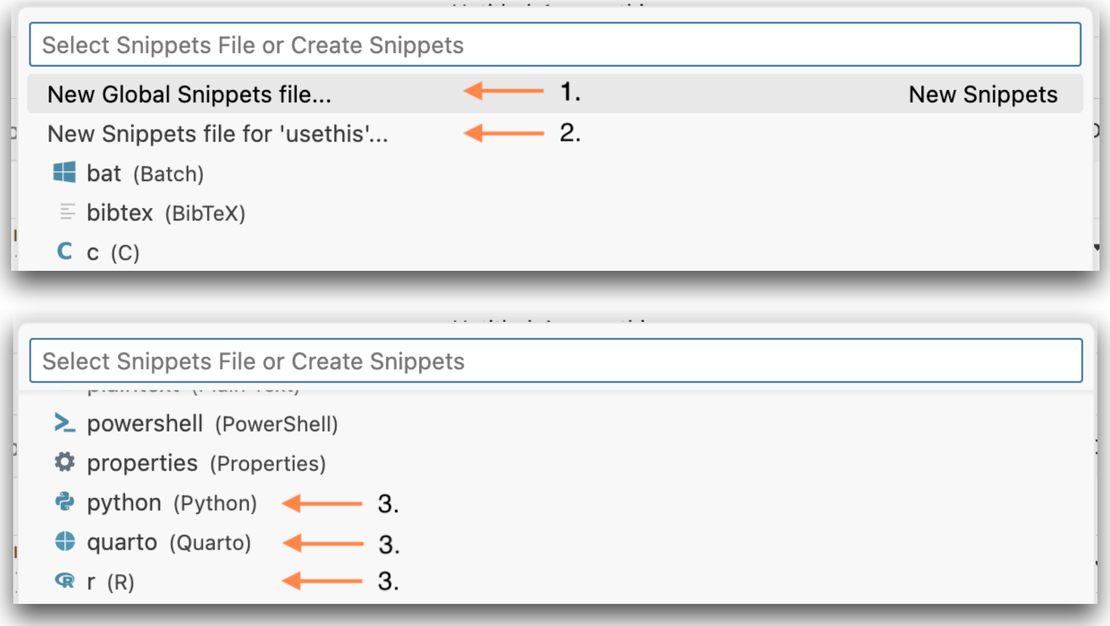


👆helps you create code like 👇

```
for (variable in vector) {
    # code to repeat
}
```

How to configure your own snippets

Command palette: *Snippets: Configure Snippets*



1. Global Snippets file: User-level. Potentially more than 1 language.
2. Workspace-specific file: Specific to 1 workspace. Potentially more than 1 language.
3. Language-specific file: User-level.

https://positron.posit.co/r-snippets.html

Your turn

Explore R snippets

3m 00s

- In a scratch R file, insert a few of the built-in snippets. Inspiration:
  - Write a for loop
  - Write an if or if-else construction
  - Define a function
- Optional: Configure your own snippet, e.g. bring one over that you enjoy in RStudio.