R Programming Part of "Introduction to Positron" workshop

Posit Software, PBC









An R session in the Console

R interpreter sessions

- Positron readily discovers and offers multiple versions of R
- - a mix of different R versions
 - a mix of R and Python sessions
 - multiple instances of a single R version

• Positron can have multiple, concurrent interpreter sessions, that can be

			Selec
🕀 Ne	w 🔻 🗁 Open 💌 😓 🗐		
Ŋ		create.R	R 4.4.2 Currently Selected /Library/Frameworks/R.framework/Vers
\cap	X @ create R R		New Interpreter Session
			Create a package or project
0	> aithub	1 # 2 #'	Create a package or project
		3 #'	adescription
		4 #'	These functions create an R proje
		5 #'	<pre>* `create_package()` creates an</pre>
~	> docs	6 #'	<pre>* `create_project()` creates a</pre>
	> inst	/ #' 8 #'	project
09	> man	9 #'	Both functions can be called on a
-0	> pkgdown	10 #'	any existing files are changed.
Ľ⊟ –	\sim R	11 #'	
	R addin.R	12 #'	<pre>@inheritParams use_description</pre>
Ä		13 #'	<pre>@param fields A named list of fie</pre>
	author.R	CONSOLE	TERMINAL PROBLEMS OUTPUT
ð	👁 badge.R		
	👁 block.R	└── ~/rrr/uset	nis
\bigcirc	<pre> browse.R </pre>	R is free	software and comes with ABSOLUTELY
٦٢-	🗬 ci.R	You are we	lcome to redistribute it under cer
	👁 citation.R	Type 'lice	nse()' or 'licence()' for distribu
	code-of-conduct.R		
	< course.R	Natural	language support but running in an
	coverage.R	R is a col	laborative project with many contr
	cpp11.R	Type 'cont	ributors()' for more information a
	🗬 cran.R	'citation()' on how to cite R or R packages
	👁 create.R		
	👁 data-table.R	Type 'demo	()' for some demos, 'help()' for o t()' for an HTML browser interface
	👁 data.R	Type 'q()'	to quit R.
(Q)	description.R		
	directory.R	> devtools	<pre>::load_all()</pre>
573	> OUTLINE	i Loading	usethis
کرک	> TIMELINE	>	
× 8	ר מוח∗ זייר ⊗ 0 ₪ 0 🖻 פ	usethis Quart	o: 1.7.31

ct Interpreter Session				08 🔳		
		9	R 4.4.2	🖻 us	sethis	\sim
Active Interpreter Sessions ions/4.4-arm64/Resource	3	SESSION	HELP			×
	••••		2			
						Q
ct: R package non-package project, i.e. a data analysis						
n existing project; you will be asked before						
lds to add to `DESCRIPTION`, potentially						
PORTS DEBUG CONSOLE $+ \vee - \Box$	× 🗆					
C i i c↓	A X					
NO WARRANTY. tain conditions. tion details. English locale						
ibutors. nd in publications.						
n-line help, or to help.						
	Ln 1, Col	1 Spaces: 2	UTF-8	LF R	(<u>)</u>	Q

EXPLORER Image: Construct of the second se				Start N
EXPLORER Image: constraint of the second				
✓ OPEN EDITORS ~/.pyenv/versions/3.11.11/bin/python ✓ USETHIS 1 > .github 1 > .github 2 > .groj.user 3 > .vscode 4 > .docs 6 > inst 7 > man 8 > pkgdown 9 ✓ R 11 @ addin.R 12 @ addin.R 12 @ addin.R 12 @ addin.R 12 @ bock.R 13 /Library/Frameworks/R.framework/Ve 12 @ bock.R 13 /Library/Frameworks/R.framework/Ve 12 @ author.R 14 @ bock.R 15 # ' oparam path A path. If it e @ browse.R 18 @ citation.R 20 @ citation.R 20 @ code-of-conduct.R 22 # ' Project](https://r-pkgs.o	ζη	EXPLORER ····	cre	Python 3.11.11 (Pyenv)
× @ create.R R R > ✓ USETHIS 1 > .github 2 > .github 2 > .github 3 > .github 2 > .github 3 > .sproj.user 3 > docs 6 > docs 6 > inst 7 > man 8 > pkgdown 9 ● R 10 /Library/Frameworks/R.framework/Ve • R 4.4.2 /Library/Frameworks/R.framework/Ve • R 4.5.0 /Library/Frameworks/R.framework/Ve • R 4.3.3 /Library/Frameworks/R.framework/Ve • R 4.3.3 /Library/Frameworks/R.framework/Ve • Personalized defaults usi ● badge.R 16 ● bock.R 15 ● bock.R 16 ● borowse.R 18 ● ci.R 19 ● ci.R 20 ● ci.ation.R 20 ● ci.ation.R 20 ● citation.R 21 ● code-of-conduct.R 22 ● ' opject into an [RStudio <		\sim OPEN EDITORS		~/.pyenv/versions/3.11.11/bin/python
✓ USETHIS -/.pyenv/versions/3.10.16/bin/python	Q	× 🧟 create.R R	R > <	Python 3.10.16 (Pyenv)
 J. github J. Rproj.user J. Nscode J. Vscode J. J. Vscode J		\vee USETHIS	1	~/.pyenv/versions/3.10.16/bin/python
○ >.Rproj.user 3 /opt/homebrew/bin/python3 ◇ >.vscode > > docs > Python 3.9.6 (Global) > inst 7 R 4.4.2 > man % R 4.4.2 > pkgdown 9 R 4.5.0 ✓ R 10 /Library/Frameworks/R.framework/Ve ✓ R addin.R 12 ✓ air.R 13 /Library/Frameworks/R.framework/Ve ✓ author.R 14 * overriding detault values ✓ badge.R 15 # personalized defaults usi ✓ Øblock.R 17 * created, provided that th ✓ Gridtion.R 19 # 'aparam roxygen Do you plan ✓ @ citation.R 20 # ' project into an [RStudio Ø @ code-of-conduct.R 22 # ' If `FALSE` and a non-pac	م	> .github	2	🥐 Python 3.13.3 (Global)
 > .vscode > docs > inst > man > pkgdown > pkgdown > man > addin.R @ air.R @ air.R @ aithor.R @ badge.R @ bock.R @ bock.R @ browse.R # ' aparam roxygen Do you plan @ citation.R @ citation.R @ citation.R @ code-of-conduct.R W ' project into an [RStudio 2 # ' If `FALSE` and a non-pace 	0	> .Rproj.user	3	/opt/homebrew/bin/python3
 > docs > inst > man > pkgdown > pkgdown R R 4.4.2 /Library/Frameworks/R.framework/Ve R R A addin.R R R R 4.3.3 /Library/Frameworks/R.framework/Ve R 4.3.3 /Library/Frameworks/R.framework/Ve R 4.3.3 /Library/Frameworks/R.framework/Ve R 4.3.3 /Library/Frameworks/R.framework/Ve R 4.3.3 Project into an [RStudio R citation.R Collection 		> .vscode	4	Python 3.9.6 (Global)
 inst man pkgdown pkgdown R addin.R addin.R air.R author.R badge.R block.R ci.R block.R ci.R ci.R ci.a fi.a <li< td=""><td>æ^</td><td>> docs</td><td>6</td><td>/usr/bin/python3</td></li<>	æ^	> docs	6	/usr/bin/python3
> man 8 /Library/Frameworks/R.framework/Ve > pkgdown 9 R R 4.5.0 ~ R 10 /Library/Frameworks/R.framework/Ve ~ R 11 12 ~ R 11 12 ~ R addin.R 12 R 4.3.3 ~ air.R 13 /Library/Frameworks/R.framework/Ve ~ author.R 14 " overriding default values ~ author.R 14 " overriding default values ~ badge.R 15 #' personalized defaults usi ~ block.R 17 " created, provided that th ~ browse.R 18 #' oparam roxygen Do you plan ~ citation.R 20 #' project into an [RStudio ~ roject](https://r-pkgs.o 22 #' If `FALSE` and a non-pace		> inst	7	R 4.4.2
 > pkgdown R R<td>L_⊙</td><td>> man</td><td>8</td><td>/Library/Frameworks/R.framework/Versi</td>	L_⊙	> man	8	/Library/Frameworks/R.framework/Versi
Image: Relation of the second system of t		> pkgdown	10	R 4.5.0
R addin.R12Aair.R12R air.R13R author.R14" overriding detault valuesR badge.R14" overriding detault valuesB bock.R16#' oparam path A path. If it eR block.R17" created, provided that thR browse.R18#' oparam roxygen Do you planR ci.R19#' oparam rstudio If `TRUE`, cR citation.R20#' project into an [RStudioR code-of-conduct.R22#' If `FALSE` and a non-pace	Ш	\sim R	11	/Library/Frameworks/R.framework/versi
 A air.R A author.R A author.R A badge.R B badge.R B block.R C block.R C ci.R C ci.R C citation.R C code-of-conduct.R 		addin.R	12	R 4.3.3
R author.R14# overriding default valuesImage: bolock.R15#' personalized defaults usiImage: bolock.R16#' Oparam path A path. If it eImage: bolock.R17#' created, provided that thImage: bolock.R18#' Oparam roxygen Do you planImage: bolock.R19#' Oparam rstudio If `TRUE`, cImage: bolock.R20#' project into an [RStudioImage: bolock.R20#' Project](https://r-pkgs.o)Image: bolock.R22#' If `FALSE` and a non-pace	Д	🗬 air.R	13	
 A badge.R A block.R A browse.R A browse.R A ci.R A citation.R A code-of-conduct.R A badge.R A browse.R A citation.R A code-of-conduct.R A browse.R A code-of-conduct.R 		author.R	14 15	<pre># overriding default values. #' personalized defaults using</pre>
<pre></pre>	ß	👁 badge.R	16	<pre>#' @param path A path. If it exi</pre>
Image: Constraint of the systemImage: Constraint of the systemIm		<pre> block.R </pre>	17	<pre>#' created, provided that the</pre>
Image: Constraint of the second sec	()	R browse.R	18	#' @param roxygen Do you plan to
Image: Constraint of the second of the sec		ci.R	19	<pre># Oparam rstudio if IRUE, cal #' project into an [RStudio</pre>
<pre>@ code-of-conduct.R 22 #' If `FALSE` and a non-pac</pre>		citation.R	20	<pre>#' Project](https://r-pkgs.org</pre>
		code-of-conduct.R	22	#' If `FALSE` and a non-packa
© course.R 23 #' that the directory can be	ക		23	#' that the directory can be r
© © © © © © © © © © © © © © © © © © ©	<u>.</u>		24	<pre># [here](https://here.r-lib.o</pre>
Image: Console Console Terminal PROBLEMS Test		♀ cpp11.R	CONS	DLE TERMINAL PROBLEMS TEST RE
<pre></pre>		cran.R	🗁 ~/rrr	/usethis
Create.R		Create.R	~	
Q data-table.R		data-table.R	-	
		data.K		
description.k	(8)	description.R		
	000			
	2 21			
\checkmark % main $\bigcirc 0 \downarrow 1 \uparrow \otimes 0 \land 0$ \boxdot usethis Quarto: 1.7.31	~	لاً main ↔ 0↓ 1↑ ⊗ 0 ∧ 0 ا	usethis	Quarto: 1.7.31



		C
	ew 🔻 🗁 Open 💌 😓 🗐	< >
ഹ	EXPLORER ····	
ہی	\sim OPEN EDITORS	
	X 🗬 create.R R	
\sim	✓ USETHIS	R > 🗣 create.R >
0 -) aithub	2 #'
- fo		3 #' @description
		4 #' These functions create an R p
$\langle \mathbf{A} \rangle$	> .vscoue	5 #' * `create_package()` create
~		6 #' * `create_project()` create
	> inst	7 #' project
L=(>)	> man	8 #' 9 #' Both functions can be called
	> pkgdown	10 #' any existing files are change
Ш	\sim R	11 #'
	🗬 addin.R	12 #' @inheritParams use_descriptio
Д	🗬 air.R	13 #' <code>@param fields A named list of</code>
	👁 author.R	14 #' overriding default values.
ß	👁 badge.R	15 #' personalized defaults using
LP	@ block.R	16 # oparam path A path. If it exi
\sim	@ browse.R	18 #' Oparam roxygen Do you plan to
(个)	@ ci R	19 #' @param rstudio If `TRUE`, cal
		20 #' project into an [RStudio
		21 #' Project](https://r-pkgs.org
	Code-of-conduct.R	22 #' If `FALSE` and a non-packa
ക	R course.R	23 #' that the directory can be r
	coverage.R	24 #' [here](https://here.r-lib.o
	🗬 cpp11.R	CONSOLE TERMINAL PROBLEMS TEST RE
	🗬 cran.R	Pi ~/rrr/usethis
	🔍 create.R	
	🗬 data-table.R	>
	🗬 data.R	
Q	description.R	
V V	directory.R	
3	> OUTLINE	
_کم	> TIMELINE	
×	ջ main	usethis Quarto: 1.7.31

create.R — usethis		0	
Q Search ~		R A.4.2	🖻 usethis 🗸
		SESSION ···	×
		\sim VARIABIES	
			G =
		R442 ▼ filter	\bigcirc $-$
			h a an an a ta d
project: es an R package es a non-package project, i.e. a data a	nalysis	NO Variables have	been created.
on an existing project; you will be as ed.	ked before		
on f fields to add to `DESCRIPTION`, poten See <mark>[use_description()]</mark> for how you ca g package options.	tially n set		
ists, it is used. If it does not exist,	it is	\vee PLOTS	
o use roxygen2 to document your package lls [use_rstudio()] to make the new pac	? kage or	$\langle - \rangle$	
g/workflow101.html#sec-workflow101-rstu	dio-projects).		
age project, a sentinel `.here` file is recognized as a project by the org) or	placed so		
RESULTS OUTPUT PORTS ···			
C' (i) ab₂ 2 ≡x	O ඹ R 4.4.2		
	O 🗣 R 4.5.0		
	○ 😨 R 4.5.0		
	O 🗣 R 4.3.3		
	Ln 1, Col 1 Sr	paces: 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?

- work in another session
- Live comparison between, e.g., 2 different R versions or 2 different versions of an R package
- you continue casual interactive work in another session
- Do you have more use cases?

• Put a long-running task in its own session, while you continue interactive

• Develop a self-contained document, e.g., a vignette, in one session, while

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
- Updates macOS R installation so you can use lldb to debug C / C++ code
- Installs appropriate Rtools versions on Windows
- Tidies up R-related cruft in the Windows registry

Your turn Multiple R sessions (option 1 of 2)

- 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 (i) 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?

5m 00s



Your turn Multiple R versions (option 2 of 2)

- Install rig: <u>https://github.com/r-lib/rig</u>. 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.

Air formatter for R

- <u>https://posit-dev.github.io/air/</u>
- When you install Positron, you get Air "for free"
- We will look at a talk given by Lionel Henry on May 19, 2025 at the Rencontres R conference
 - <u>https://rr2025.sciencesconf.org/</u>



Air + Positron: practical suggestions

- Air extension ships with Positron and includes the Air binary. Air should just work.
- usethis::use_air()* does configuration in the active project which says "we use Air to format the R code in this project".
- Do this once: Command palette > Air: Format Workspace Folder. Inspect diffs, commit, push.
 Coince forward, "Format on Cover license the code wall formation?
- Going forward, "Format on Save" keeps the code well-formatted.
- Positron commands that may be helpful in other situations: *Format Document, Format Selection*.
- There are various ways to disable Air formatting of a specific, e.g., line or file.

* Currently requires dev version of usethis



Your turn Format some ugly R code

- R code: air-practice.R
- formatting.
- Remove the # fmt: skip file line, so that Air will format the file.
- see how Air would reformat it.
- The Git diff is a great way to see what's changed.



• The example project we downloaded earlier has a file with poorly formatted

• Open it in Positron. Alternatively, open a personal R file with questionable

• Experiment with the Format Selection and/or Format Document commands to



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*.
- <u>https://positron.posit.co/r-snippets.html</u>

Built-in snippet example: for loop

> for	
	<u>⊒</u> for
	for
	<pre>{} forcats::</pre>
	<pre>{} foreign::</pre>

helps you create code like for (variable in vector) { # code to repeat }





How to configure your own snippets

Command palette: Snippets: Configure Snippets



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

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

Your turn **Explore R snippets**

- 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
- RStudio.

$3_m OO_s$

• Optional: Configure your own snippet, e.g. bring one over that you enjoy in



Debugging

- Positron supports debugging R code via these mechanisms
 - debug()
 - debugonce()
 - browser()
- Breakpoints do not work yet, but that will happen soon.

Demo Debugging with browser(), debug(), debugonce()

- Walk through the fruit debugging example from a talk:
 - <u>https://github.com/jennybc/debugging</u>
- See fruit-debugging. R in the example project downloaded earlier