Introduction to R, Rstudio & Project Management

Berry Boessenkool, uni-potsdam.de, May 2017

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github.com/brry

swc-bb.github.io/2017-05-17-r-workshop

Presentation template generated with `berryFunctions::createPres`

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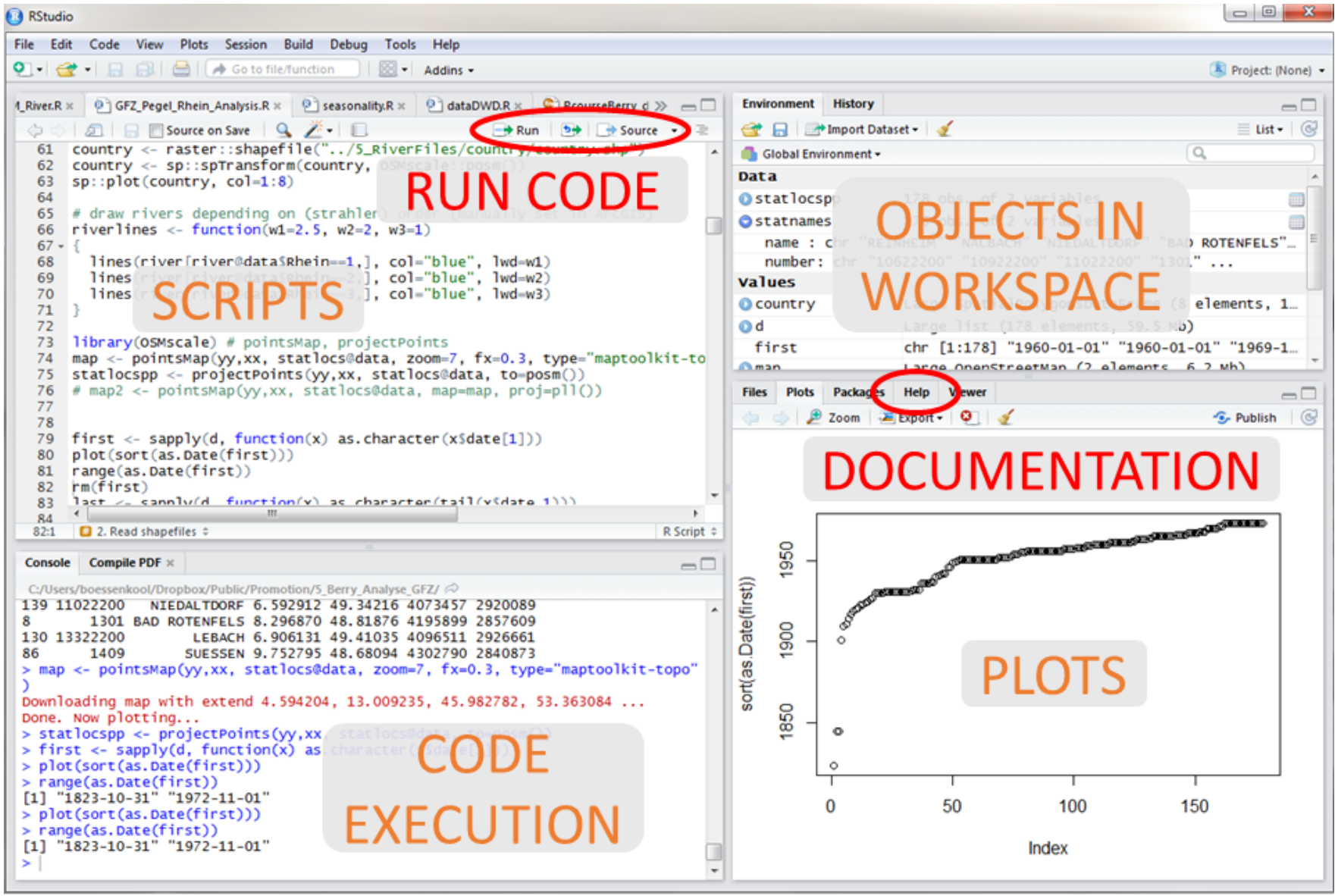
Survey

knowledge survey to determine focus for this session

bit.ly/knowR

RStudio


RUN CODE
SCRIPTS
OBJECTS IN WORKSPACE
DOCUMENTATION
PLOTS
CODE EXECUTION
sort(as.Date(first))
Index

RStudio configuration

keyboard shortcuts (ALT+SHIFT+K)

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Recommended settings for reproducible research under
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Tools - Global Options - Code - Display
ON: Show margin (Margin column:80) *People hate horizontal scrolling!*

Tools - Global Options - Code - Saving
Line ending conversion: **Windows (CR/LF)**

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- comments: `# everything after a hashtag is not executed.`

Exercise

- Open Rstudio, start new script. Write comments about what you do, save the file in a useful place.
- Calculate `21+21` , `7*6` and $\frac{0,3}{4} * \sqrt{313600}$
- Is `0.5 - 0.2` equal to `0.3`? Is `0.4 - 0.1` equal to `0.3`?
- With the `c` command, create a vector with body sizes of people around you. You can also use the values 1.75, 1.76, 1.83, 1.84, 1.77, 1.76, 1.77, 1.66, 1.86, 1.76
- What does `3:6` create? What does `YourObject[3:6]` do?
- What does `YourObject[-4]` do?
- BONUS (for fast people): Analyze the descriptive statistics: `mean(YourObject)`, `median`, `min`, `max`, `range`, `quantile`
- BONUS 2: Generate 150 random numbers from a normal distribution with $\mu = 170cm$ and $\sigma = 8cm$. Perform a Kolmogorov-Smirnov test for normality of that sample.

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treesize <- read.table(file="treesize.txt", header=TRUE)
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- To make sure your script is reproducible (you may rename objects, for example, and miss one occurrence):
  restart R (`CTRL` + `SHIFT` + `F10`) every once in a while (Make sure Rstudio settings are reproducible as shown on slide 4).

Overview: data types

In order of coercion (if mixed, TRUE is converted to 1, 3.14 to "3.14" etc)

Description	example	`typeof`	`class`
empty set	NULL	NULL	NULL
not available	NA	logical	logical
logical	c(T, F, FALSE, TRUE)	logical	logical
category	factor("left")	integer	**factor**
integer number	4:6	integer	integer
decimal	8.7	double	**numeric**
complex	5+3i	complex	complex
character string	"homer rocks"	character	character
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adv-r.had.co.nz/Data-structures.

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Object	example	`typeof`	`class`
vector	*see data types*	...	...
matrix	matrix(9:15, ncol=2)	...	matrix
array	array(letters[1:24], dim=c(2,6,4))	...	array
data.frame	data.frame(C1=4:5, C2=c("a","b"))	list	data.frame
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`as.matrix(Object)` converts the class of an object by force.

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- Rarely needed: `remove.packages("packagename")`

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- Briefly explain the `summary` of the linear model.

More things

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- Plotting

Objects: data.frames

- For tables with different data types (numbers, characters, categories, integers), R has the object type data.frame:
  `data.frame(count=c(2,6,5), type=c("a","k","k"))`
- `read.table` also returns a data.frame
- If we have the object `df`, we can subset with `df[rows,columns]`
- `df[1,2:4]; df[2, ]; df[ ,"name"]; df$name`
- Logical values: `vect[c(TRUE,TRUE,FALSE,FALSE,TRUE,FALSE)]`

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From the dataset `treesize` from the previous exercise, obtain:

- The first 5 values in column 2
- The maximum "Height" (the maximum of the values in that column)
- For each entry: is the measurement equal to (==) A?
- BONUS 1: The height entries for trees older than 23.5 years
- BONUS 2: All rows, excluding rows 3, 7,8,9,...,20