

Basics of R: Packages

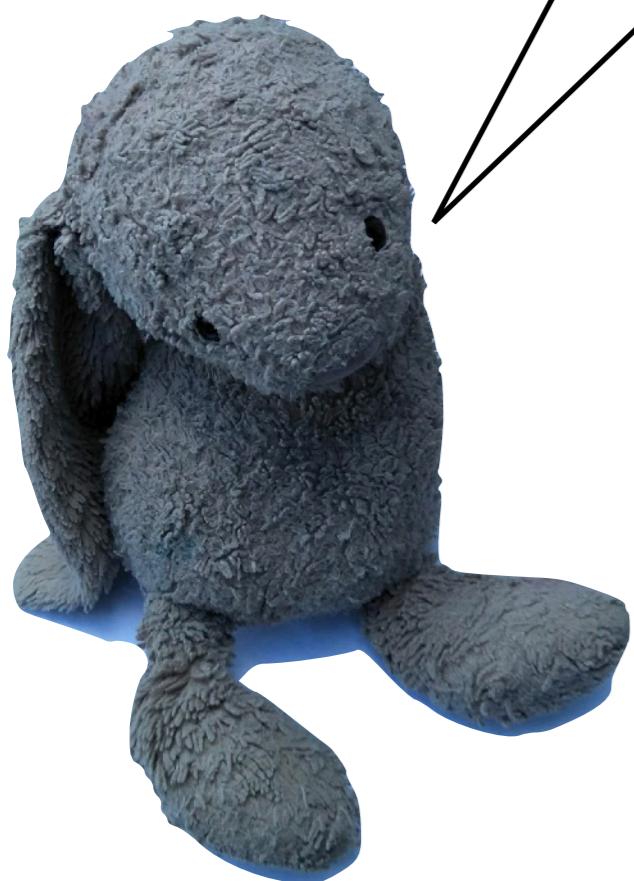
Research Methods for Human Inquiry
Andrew Perfors

Warning: this video and installing packages might be *super annoying and stressful*. It is probably going to be the most annoying and stressful part of the entire subject. I wish it did not have to occur first thing, but packages are so essential that it does.

The reason it is so stressful is that package installation is subtly different on subtly different operating systems and computers. Since I don't have all of them I can't anticipate all of the problems ahead of time. So I will explain here the basics that should work 90% of the time.

If you have a weird system or setup for whatever, reason, you might get an error. Don't freak out!! There is a pdf with common problems linked on Canvas. If that doesn't help, screenshot your error and what you did and ask about it on the discussion board — and see what other people ask. There are only a few common errors and once we sort it out things will be fine but what I don't want you to do is conclude from the error either that (a) you suck and can't do this; or (b) that R sucks and is terrible. *This part of R is no fun* but it gets less bumpy from here. So let's just help each other over this okay?

Today's story...



It's very hard
because Shadow is not
very materialistic

Their friend
Shadow's birthday
is at the end of the
week, so Bunny
and Gladly are
trying to plan a
present for her

Today's story...

Shadow is very quiet
and thoughtful and
likes making things.
She is very particular
about what she
wears and believes
and loves math and
data and patterns.



Packages

Packages are like presents, right? We can get Shadow one of those?



Packages

- What is a package?
 - A collection of R functions and data sets added to the R “ecosystem”
 - They extend the functionality of R: there’s 5000+ packages out there
 - You can download them from the internet (easiest way: via RStudio)
 - (It accesses the R archive network called CRAN but you really don’t need to care about this)

Terminology

- **Installed** means...
 - That the package files are stored on your computer
 - Your version of R is able to load the package
- **Loaded** means...
 - That R has opened the package, and “knows” what it contains
 - You can use the functions / data stored in the package
- As a result:
 - A package must be **installed** before you can **load it**
 - A package must be **loaded** before you can **use it**

Why does it work like that???

- R is big
 - 5000+ packages means can cause confusion
 - Different authors will use the same name to refer to different functions!
 - e.g., there are multiple packages that define a logit() function.
- Separating install from load avoids inconsistency:
 - R only has to resolve the names of things in the loaded packages!
 - **Install** everything you might want to use sometime
 - **Load** only those things you need to use now!

The Rstudio “packages” panel

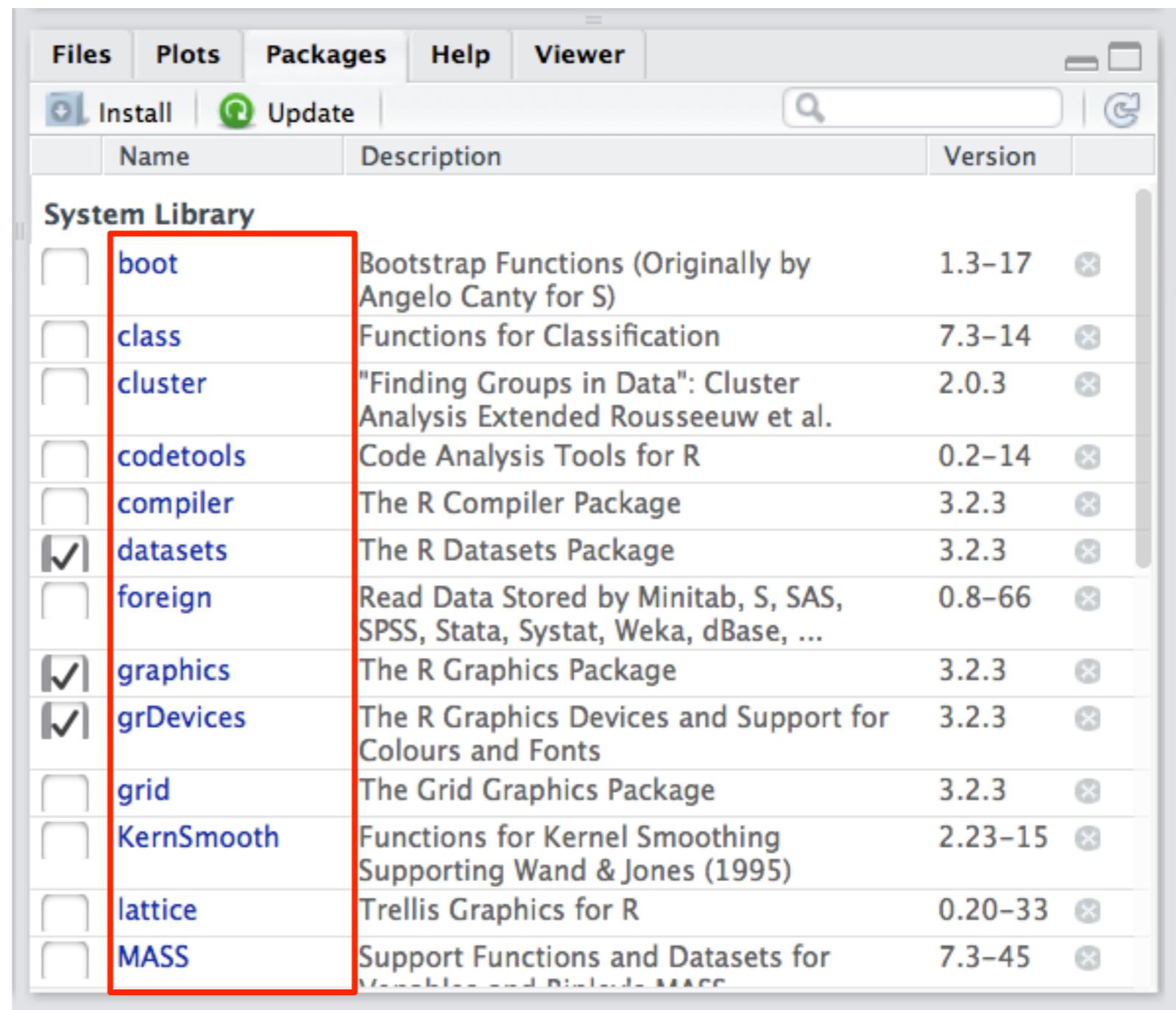
(lower right part
of RStudio)

The screenshot shows the RStudio interface with the 'Packages' tab selected, highlighted by a red box. Below the tabs, there are two buttons: 'Install' and 'Update'. A search bar and a refresh icon are also present. The main area is titled 'System Library' and displays a list of R packages. Each package entry includes the name, description, version, and a remove icon. Several packages have checkmarks next to their names, indicating they are selected or installed.

Name	Description	Version
boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17
class	Functions for Classification	7.3-14
cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3
codetools	Code Analysis Tools for R	0.2-14
compiler	The R Compiler Package	3.2.3
<input checked="" type="checkbox"/> datasets	The R Datasets Package	3.2.3
foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66
<input checked="" type="checkbox"/> graphics	The R Graphics Package	3.2.3
<input checked="" type="checkbox"/> grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3
grid	The Grid Graphics Package	3.2.3
KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15
lattice	Trellis Graphics for R	0.20-33
MASS	Support Functions and Datasets for Venables and Ripley's MASS	7.3-45

The Rstudio “packages” panel

These are the names of the packages that are installed



The screenshot shows the RStudio interface with the "Packages" tab selected in the top navigation bar. Below the tabs, there are two buttons: "Install" and "Update". A search bar and a refresh icon are also present. The main area is titled "System Library" and displays a table of installed packages. The table has columns for Name, Description, and Version. The "Name" column lists the package names, which are highlighted with a red border. Some packages have a checked checkbox next to them. The "Description" column provides a brief overview of each package's purpose, and the "Version" column shows the current version number.

	Name	Description	Version	
System Library				
<input type="checkbox"/>	boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17	
<input type="checkbox"/>	class	Functions for Classification	7.3-14	
<input type="checkbox"/>	cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3	
<input type="checkbox"/>	codetools	Code Analysis Tools for R	0.2-14	
<input type="checkbox"/>	compiler	The R Compiler Package	3.2.3	
<input checked="" type="checkbox"/>	datasets	The R Datasets Package	3.2.3	
<input type="checkbox"/>	foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66	
<input checked="" type="checkbox"/>	graphics	The R Graphics Package	3.2.3	
<input checked="" type="checkbox"/>	grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3	
<input type="checkbox"/>	grid	The Grid Graphics Package	3.2.3	
<input type="checkbox"/>	KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15	
<input type="checkbox"/>	lattice	Trellis Graphics for R	0.20-33	
<input type="checkbox"/>	MASS	Support Functions and Datasets for MASS	7.3-45	

The Rstudio “packages” panel

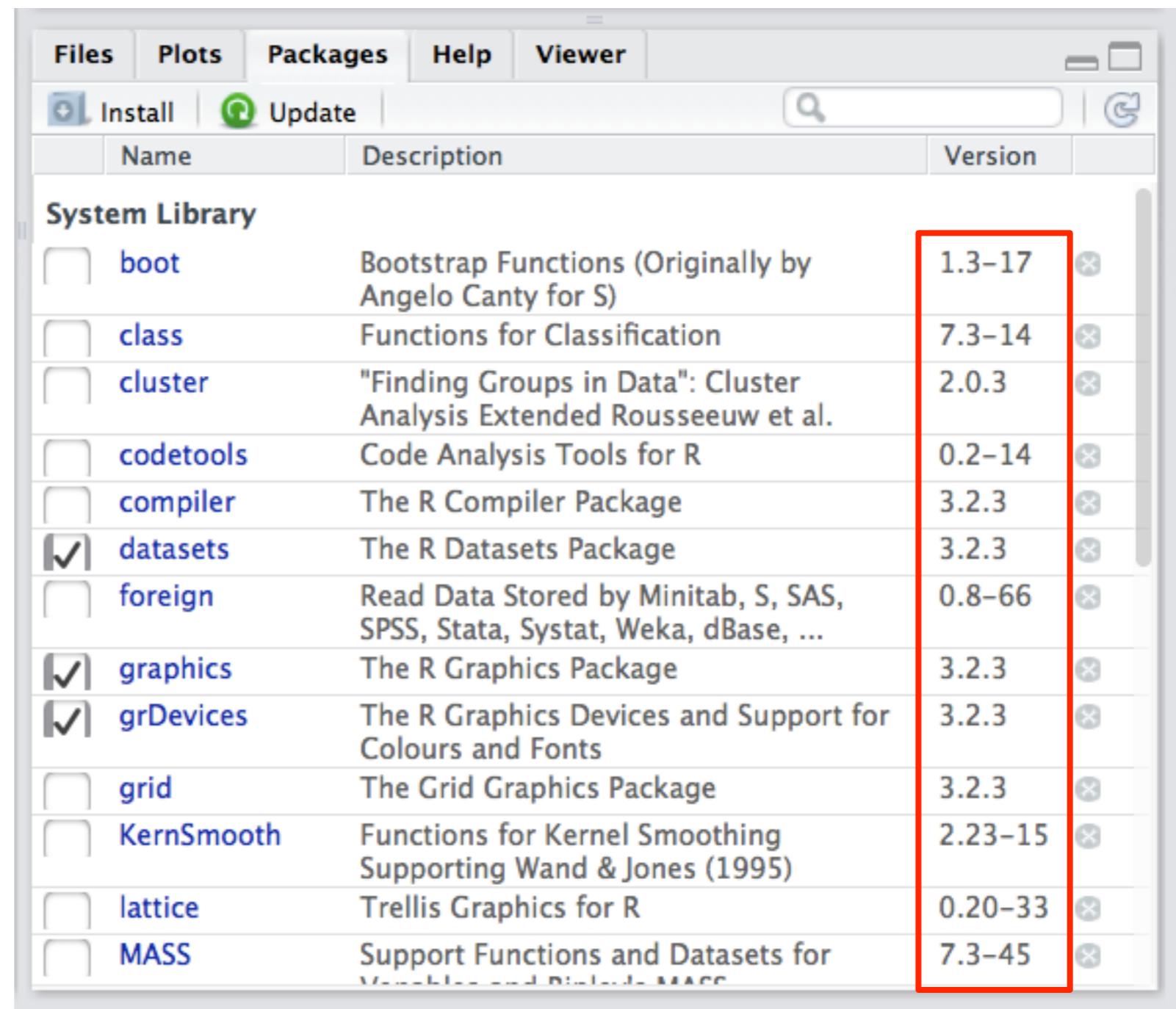
This describes what the package does

The screenshot shows the RStudio interface with the "Packages" tab selected in the top menu bar. Below the menu, there are two buttons: "Install" and "Update". A search bar and a refresh icon are also present. The main area is titled "System Library" and displays a list of R packages. The "datasets" package is selected, indicated by a checked checkbox icon to its left. Its details are highlighted with a red box, showing the following information:

Name	Description	Version
boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17
class	Functions for Classification	7.3-14
cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3
codetools	Code Analysis Tools for R	0.2-14
compiler	The R Compiler Package	3.2.3
<input checked="" type="checkbox"/> datasets	The R Datasets Package	3.2.3
foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66
<input checked="" type="checkbox"/> graphics	The R Graphics Package	3.2.3
<input checked="" type="checkbox"/> grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3
grid	The Grid Graphics Package	3.2.3
KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15
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MASS	Support Functions and Datasets for MASS	7.3-45

The Rstudio “packages” panel

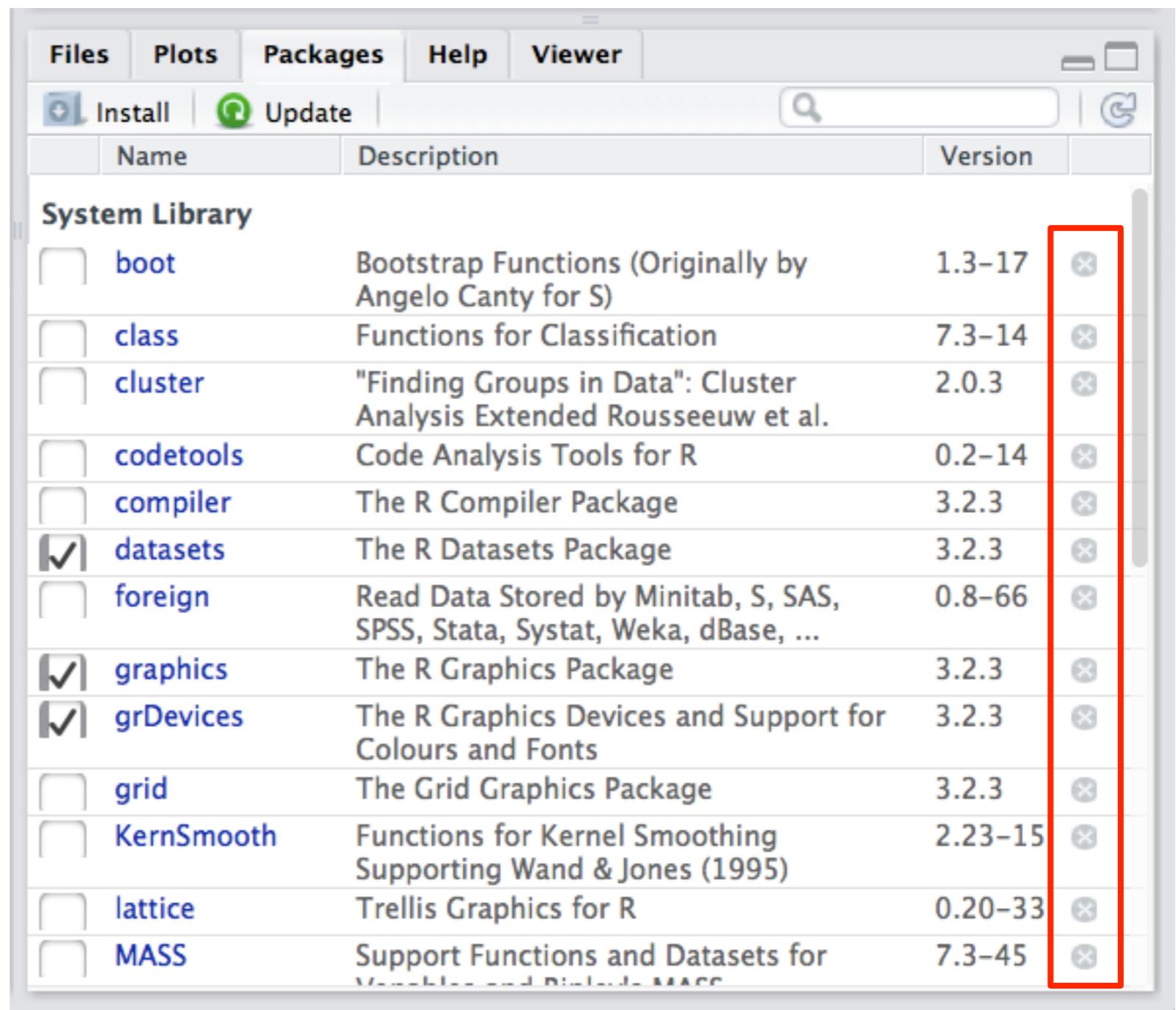
This tells you what version you have



	Name	Description	Version
System Library			
<input type="checkbox"/>	boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17
<input type="checkbox"/>	class	Functions for Classification	7.3-14
<input type="checkbox"/>	cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3
<input type="checkbox"/>	codetools	Code Analysis Tools for R	0.2-14
<input type="checkbox"/>	compiler	The R Compiler Package	3.2.3
<input checked="" type="checkbox"/>	datasets	The R Datasets Package	3.2.3
<input type="checkbox"/>	foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66
<input checked="" type="checkbox"/>	graphics	The R Graphics Package	3.2.3
<input checked="" type="checkbox"/>	grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3
<input type="checkbox"/>	grid	The Grid Graphics Package	3.2.3
<input type="checkbox"/>	KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15
<input type="checkbox"/>	lattice	Trellis Graphics for R	0.20-33
<input type="checkbox"/>	MASS	Support Functions and Datasets for Venables and Ripley's MASS	7.3-45

The Rstudio “packages” panel

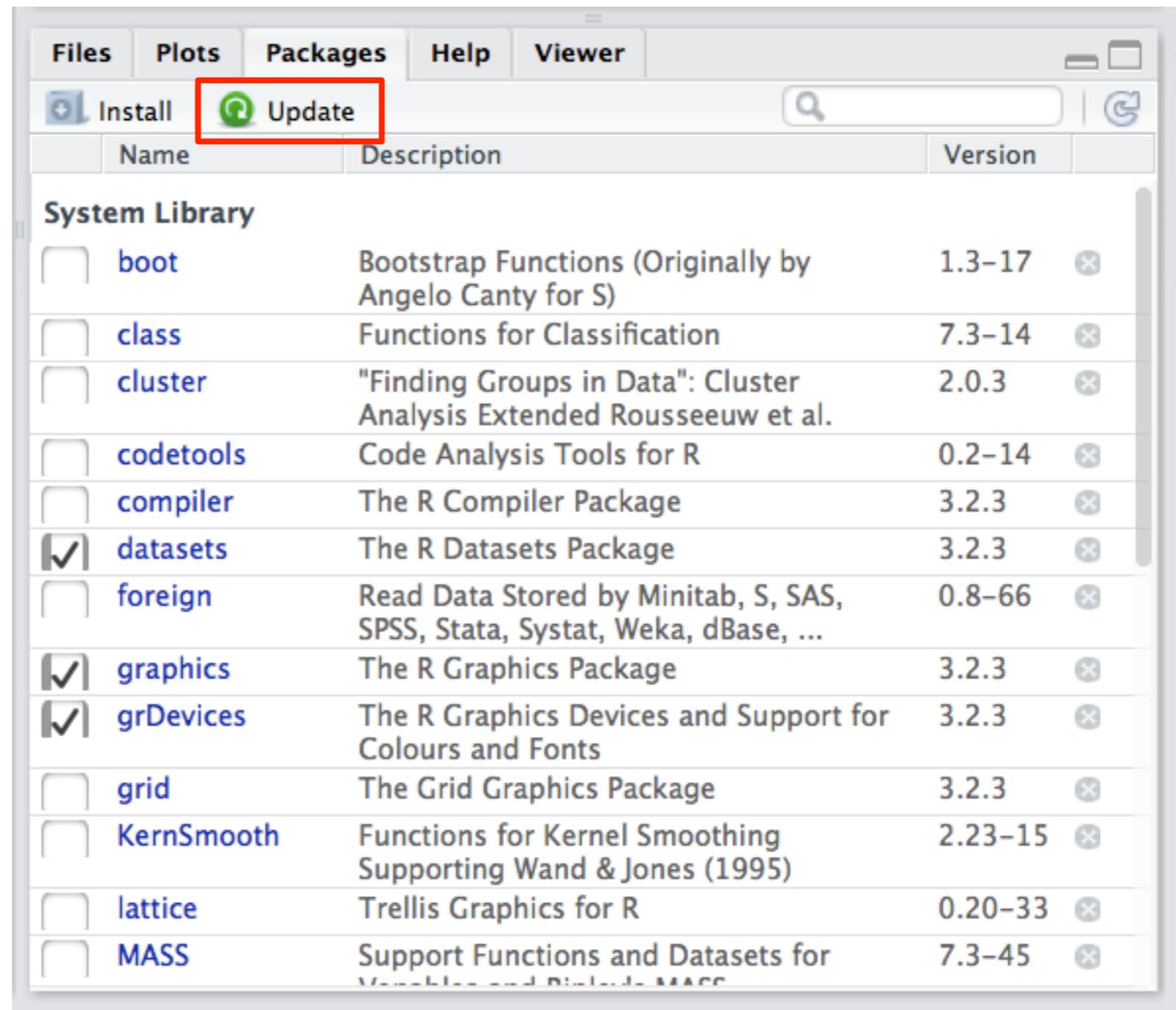
Clicking this will
uninstall the
package



	Name	Description	Version	
System Library				
<input type="checkbox"/>	boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17	
<input type="checkbox"/>	class	Functions for Classification	7.3-14	
<input type="checkbox"/>	cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3	
<input type="checkbox"/>	codetools	Code Analysis Tools for R	0.2-14	
<input type="checkbox"/>	compiler	The R Compiler Package	3.2.3	
<input checked="" type="checkbox"/>	datasets	The R Datasets Package	3.2.3	
<input type="checkbox"/>	foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66	
<input checked="" type="checkbox"/>	graphics	The R Graphics Package	3.2.3	
<input checked="" type="checkbox"/>	grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3	
<input type="checkbox"/>	grid	The Grid Graphics Package	3.2.3	
<input type="checkbox"/>	KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15	
<input type="checkbox"/>	lattice	Trellis Graphics for R	0.20-33	
<input type="checkbox"/>	MASS	Support Functions and Datasets for Venables and Ripley's MASS	7.3-45	

The Rstudio “packages” panel

This will check whether any new versions of the package are available

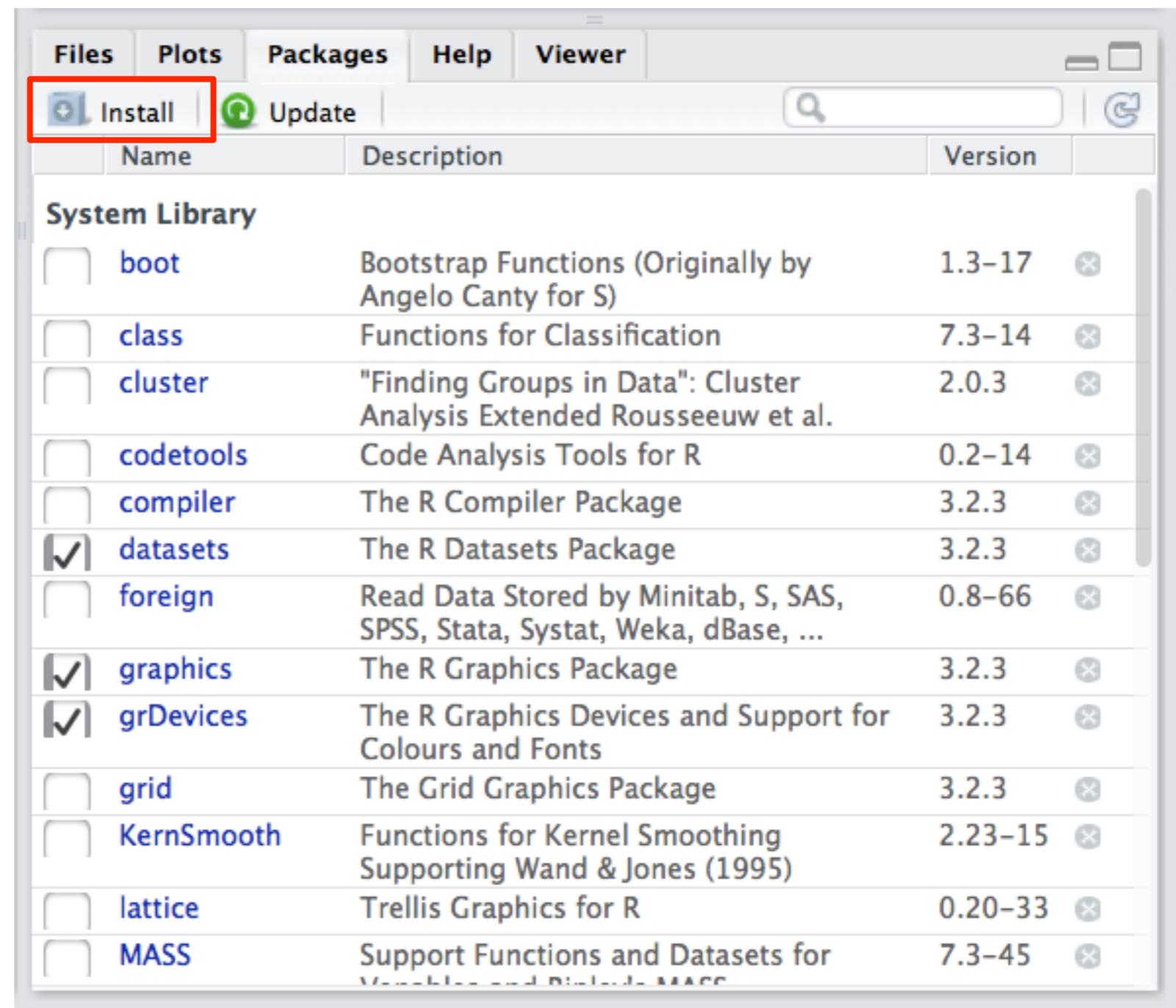


The screenshot shows the RStudio interface with the "Packages" tab selected in the top navigation bar. A red box highlights the "Update" button in the toolbar below the tabs. The main area displays a table titled "System Library" with columns for Name, Description, and Version. Several packages are listed, including "boot", "class", "cluster", "codetools", "compiler", "datasets", "foreign", "graphics", "grDevices", "grid", "KernSmooth", "lattice", and "MASS". The "graphics", "grDevices", and "grid" packages are checked, indicating they have updates available. The "datasets" package is also checked but appears to be up-to-date.

Name	Description	Version
boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17
class	Functions for Classification	7.3-14
cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3
codetools	Code Analysis Tools for R	0.2-14
compiler	The R Compiler Package	3.2.3
<input checked="" type="checkbox"/> datasets	The R Datasets Package	3.2.3
foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66
<input checked="" type="checkbox"/> graphics	The R Graphics Package	3.2.3
<input checked="" type="checkbox"/> grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3
<input type="checkbox"/> grid	The Grid Graphics Package	3.2.3
KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15
<input type="checkbox"/> lattice	Trellis Graphics for R	0.20-33
<input type="checkbox"/> MASS	Support Functions and Datasets for Mixture and Multimodal Distributions MASS	7.3-45

The Rstudio “packages” panel

This is how you
install new
packages, but you
can also do it with
a command, which
I will show you



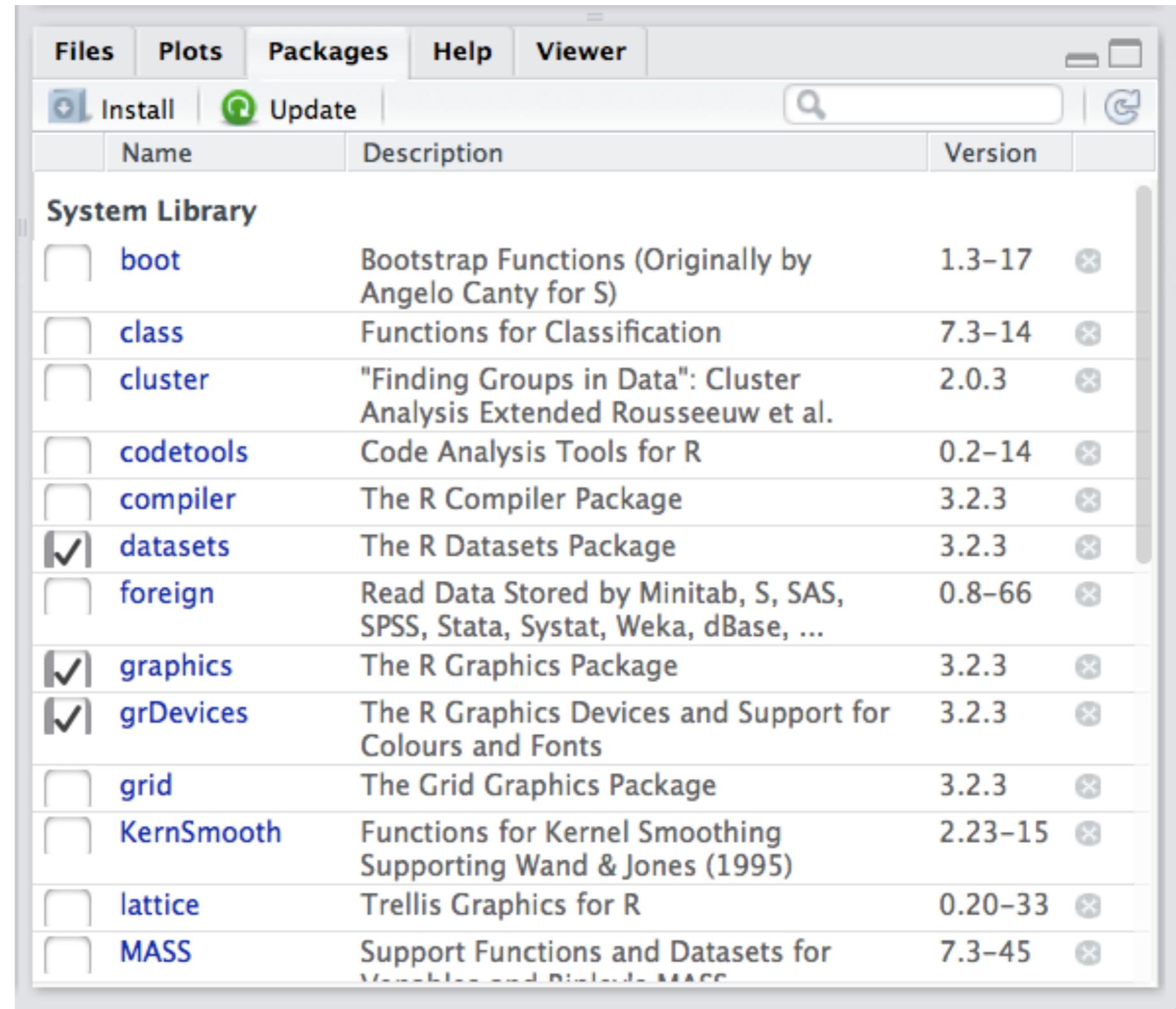
The screenshot shows the RStudio interface with the "Packages" tab selected in the top navigation bar. Below the navigation bar, there are two buttons: "Install" (highlighted with a red box) and "Update". A search bar and a refresh icon are also present. The main area is titled "System Library" and displays a list of R packages. The packages listed are:

Name	Description	Version
boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17
class	Functions for Classification	7.3-14
cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3
codetools	Code Analysis Tools for R	0.2-14
compiler	The R Compiler Package	3.2.3
<input checked="" type="checkbox"/> datasets	The R Datasets Package	3.2.3
<input type="checkbox"/> foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66
<input checked="" type="checkbox"/> graphics	The R Graphics Package	3.2.3
<input checked="" type="checkbox"/> grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3
<input type="checkbox"/> grid	The Grid Graphics Package	3.2.3
<input type="checkbox"/> KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15
<input type="checkbox"/> lattice	Trellis Graphics for R	0.20-33
<input type="checkbox"/> MASS	Support Functions and Datasets for Venables and Ripley's MASS	7.3-45

Installing packages

You'll note that this list doesn't have 5000 packages in it

What if you want one that isn't in it?



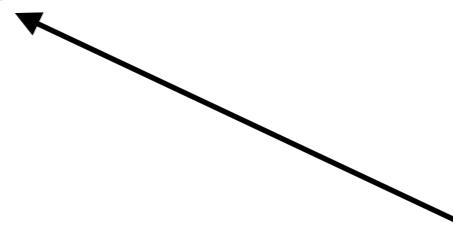
The screenshot shows the RGui interface with the 'Packages' tab selected. The window title is 'RGui'. Below the title bar are buttons for 'Install' and 'Update', and a search bar. The main area is titled 'System Library' and lists various R packages with their descriptions and versions. Some packages like 'datasets', 'graphics', and 'grDevices' have checkmarks next to them.

Name	Description	Version	
System Library			
<input type="checkbox"/> boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-17	
<input type="checkbox"/> class	Functions for Classification	7.3-14	
<input type="checkbox"/> cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.0.3	
<input type="checkbox"/> codetools	Code Analysis Tools for R	0.2-14	
<input type="checkbox"/> compiler	The R Compiler Package	3.2.3	
<input checked="" type="checkbox"/> datasets	The R Datasets Package	3.2.3	
<input type="checkbox"/> foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, Weka, dBase, ...	0.8-66	
<input checked="" type="checkbox"/> graphics	The R Graphics Package	3.2.3	
<input checked="" type="checkbox"/> grDevices	The R Graphics Devices and Support for Colours and Fonts	3.2.3	
<input type="checkbox"/> grid	The Grid Graphics Package	3.2.3	
<input type="checkbox"/> KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-15	
<input type="checkbox"/> lattice	Trellis Graphics for R	0.20-33	
<input type="checkbox"/> MASS	Support Functions and Datasets for Venables and Ripley's MASS	7.3-45	

Installing packages

The function you want is called `install.packages()` and you put the name of the package inside it, like this:

```
> install.packages("here")
```



This will load a package called “here” (I’ll explain what it does later). For now, notice that the package name has to be in quotes

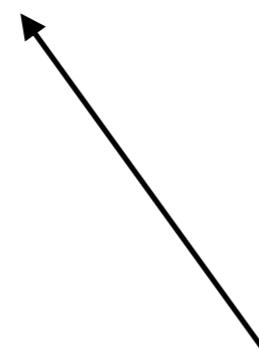
Installing packages

The function you want is called `install.packages()` and you put the name of the package inside it, like this:

```
> install.packages("here")
also installing the dependency 'rprojroot'

trying URL 'https://cran.rstudio.com/bin/macosx/big-sur-arm64/contrib/4.3/rprojroot_2.0.4.tgz'
Content type 'application/x-gzip' length 105509 bytes (103 KB)
=====
downloaded 103 KB

trying URL 'https://cran.rstudio.com/bin/macosx/big-sur-arm64/contrib/4.3/here_1.0.1.tgz'
Content type 'application/x-gzip' length 51031 bytes (49 KB)
=====
downloaded 49 KB
```



This says it's successfully downloading. Might take a little while. Just let it do its thing and don't interrupt!

Installing packages

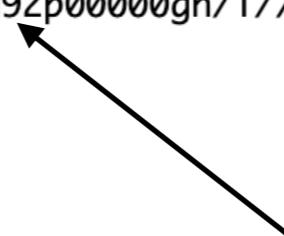
The function you want is called `install.packages()` and you put the name of the package inside it, like this:

```
> install.packages("here")
also installing the dependency 'rprojroot'

trying URL 'https://cran.rstudio.com/bin/macosx/big-sur-arm64/contrib/4.3/rprojroot_2.0.4.tgz'
Content type 'application/x-gzip' length 105509 bytes (103 KB)
=====
downloaded 103 KB

trying URL 'https://cran.rstudio.com/bin/macosx/big-sur-arm64/contrib/4.3/here_1.0.1.tgz'
Content type 'application/x-gzip' length 51031 bytes (49 KB)
=====
downloaded 49 KB

The downloaded binary packages are in
  /var/folders/ql/fqxfdv154s3ys_f2b2d92p0000gn/T//Rtmpfh8gl5D downloaded_packages
> |
```



This says where it's put the package. You don't care about this; R is smart enough to find it

Installing packages

The function you want is called `install.packages()` and you put the name of the package inside it, like this:

```
> install.packages("here")
also installing the dependency 'rprojroot'

trying URL 'https://cran.rstudio.com/bin/macosx/big-sur-arm64/contrib/4.3/rprojroot_2.0.4.tgz'
Content type 'application/x-gzip' length 105509 bytes (103 KB)
=====
downloaded 103 KB

trying URL 'https://cran.rstudio.com/bin/macosx/big-sur-arm64/contrib/4.3/here_1.0.1.tgz'
Content type 'application/x-gzip' length 51031 bytes (49 KB)
=====
downloaded 49 KB

The downloaded binary packages are in
  /var/folders/ql/fqxfdv154s3ys_f2b2d92p0000gn/T//Rtmpfh8gl5D downloaded_packages
```

> |

All you should care about is that you end up with something like this, and a cursor. Means you've got it successfully!

A common problem...

```
> install.packages("here")
trying URL 'https://cran.rstudio.com/bin/macosx/contrib/4.0/here_1.0.1.tgz'
Warning in install.packages :
  URL 'https://cran.rstudio.com/bin/macosx/contrib/4.0/here_1.0.1.tgz': status was 'Couldn't resolve host name'
Error in download.file(url, destfile, method, mode = "wb", ...) :
  cannot open URL 'https://cran.rstudio.com/bin/macosx/contrib/4.0/here_1.0.1.tgz'
Warning in install.packages :
  download of package 'here' failed
> |
```

This means that R can't access the internet. The most common reasons are (a) your internet connection isn't on! (b) your firewall or antivirus software is blocking R.

Success?

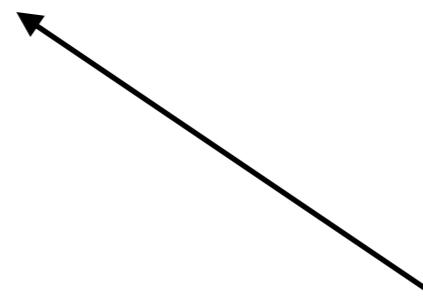
You can tell if you've been successful if the package you installed shows up in the list

	Name	Description	Version		
Based on httruv					
<input type="checkbox"/>	generics	Common S3 Generics not Provided by Base R Methods Related to Model Fitting	0.1.0		
<input type="checkbox"/>	ggplot2	Create Elegant Data Visualisations Using the Grammar of Graphics	3.3.3		
<input type="checkbox"/>	glue	Interpreted String Literals	1.4.2		
<input checked="" type="checkbox"/>	graphics	The R Graphics Package	4.0.4		
<input checked="" type="checkbox"/>	grDevices	The R Graphics Devices and Support for Colours and Fonts	4.0.4		
<input type="checkbox"/>	grid	The Grid Graphics Package	4.0.4		
<input type="checkbox"/>	gttable	Arrange 'Grobs' in Tables	0.3.0		
<input type="checkbox"/>	haven	Import and Export 'SPSS', 'Stata' and 'SAS' Files	2.3.1		
<input type="checkbox"/>	here	A Simpler Way to Find Your Files	1.0.1		
<input type="checkbox"/>	highr	Syntax Highlighting for R Source Code	0.8		
<input type="checkbox"/>	hms	Pretty Time of Day	1.0.0		
<input type="checkbox"/>	htmltools	Tools for HTML	0.5.1.1		
<input type="checkbox"/>	httruv	HTTP and WebSocket Server Library	1.5.5		
<input type="checkbox"/>	httr	Tools for Working with URLs and HTTP	1.4.2		
<input type="checkbox"/>	isoband	Generate Isolines and Isobands from Regularly Spaced Elevation Grids	0.2.3		
<input type="checkbox"/>	jsonlite	A Simple and Robust JSON Parser and	1.7.2		

Another package

This time install one called “tidyverse” (we’ll be using a lot)

```
> install.packages("tidyverse")
also installing the dependencies 'tidyselect', 'dbplyr', 'dplyr', 'ggplot2', 'lubridate', 'magrittr',
'stringr', 'tibble', 'tidyrr'
```



Sometimes a package depends on other packages (e.g., package A uses functions in package B). So if you install package A, it will automatically install package B too. These are dependencies (you'll probably see a slightly different list than this depending on your setup).

Another package

This time install one called “tidyverse” (we’ll be using a lot)

```
There are binary versions available but the source versions are later:
```

	binary	source	needs_compilation
farver	2.0.1	2.0.2	TRUE
prettyunits	1.0.2	1.1.0	FALSE
fansi	0.4.0	0.4.1	TRUE
cli	2.0.0	2.0.1	FALSE
hms	0.5.2	0.5.3	FALSE

```
Do you want to install from sources the packages which need compilation? (Yes/no/cancel) |
```

You might be asked something like this. The answer is Yes!

Another package

This time install one called “tidyverse” (we’ll be using a lot)

```
trying URL 'https://cran.rstudio.com/bin/macosx/contrib/4.0/tidyr_1.1.2.tgz'  
Content type 'application/x-gzip' length 936440 bytes (914 KB)  
=====
```

downloaded 914 KB

```
trying URL 'https://cran.rstudio.com/bin/macosx/contrib/4.0/tidyverse_1.3.0.tgz'  
Content type 'application/x-gzip' length 433049 bytes (422 KB)  
=====
```

downloaded 422 KB

```
The downloaded binary packages are in  
/var/folders/wj/4y3l7vrx3w7__c6qzr4psrs80000gn/T//RtmpckqoDT/downloaded_packages  
>
```

Eventual success! If you do not have success, go to the Discussion board with your error message. Ask about it if somebody hasn’t already had the same message.

Note that the rest of this video does not require tidyverse so even if you didn’t have success, you can continue for now.

So far you've just **installed** the packages
(they're on your computer but R is not currently
using them)

Now you have to **load** them

Loading packages

The function you want is called `library()` and you put the name of the package inside it (note that you don't need quotes this time). You need to load your packages again every time you start a new R session, so you're only using the ones you need.

```
> library(here)
here() starts at /Users/andyperfors/Documents/teaching/rmhi/
lectures/week2
```

Success for this one! (Don't worry about why it gives the message in red, I'll explain that later)

Loading packages

The function you want is called `library()` and you put the name of the package inside it (note that you don't need quotes this time). You need to load your packages again every time you start a new R session, so you're only using the ones you need.

```
> library(tidyverse)
— Attaching packages ————— tidyverse 1.3.0 —
✓ ggplot2 3.3.3    ✓ purrr   0.3.4
✓ tibble  3.1.0    ✓ dplyr   1.0.4
✓ tidyr   1.1.2    ✓ stringr 1.4.0
✓ readr   1.4.0    ✓ forcats 0.5.1
```

Tidyverse actually contains multiple packages, including dependencies, so it's listing all of them

Loading packages

The function you want is called `library()` and you put the name of the package inside it (note that you don't need quotes this time). You need to load your packages again every time you start a new R session, so you're only using the ones you need.

```
> library(tidyverse)
— Attaching packages — tidyverse 1.3.0 —
✓ ggplot2 3.3.3    ✓ purrr   0.3.4
✓ tibble  3.1.0    ✓ dplyr   1.0.4
✓ tidyr   1.1.2    ✓ stringr 1.4.0
✓ readr   1.4.0    ✓ forcats 0.5.1
— Conflicts — tidyverse_conflicts() —
✖ dplyr::filter() masks stats::filter()
✖ dplyr::lag()    masks stats::lag()
```

Conflicts occur when multiple packages include the same function. This isn't usually an issue (and won't be in this class) but is something to be aware of to check if you want to use new packages. It's just listing them for you so you know. Ignore it for now.

Loading packages

NOTE: You might get an error that says something like
“package or namespace load failed for ‘stringi’”

That means it didn't install a dependency (in this case a package called stringi but it could be anything), and you have two main solutions.

1. Install the missing package yourself (you might have to do this with multiple different packages, just keep at it)

```
> install.packages("stringi")
```

2. Try adding an argument forcing it to install all of the dependencies

```
> install.packages("tidyverse", dependencies=TRUE)
```

If neither of these works, check out the troubleshooting document or ask on the discussion board!

The R workspace
(global environment)

The Rstudio “environment” panel

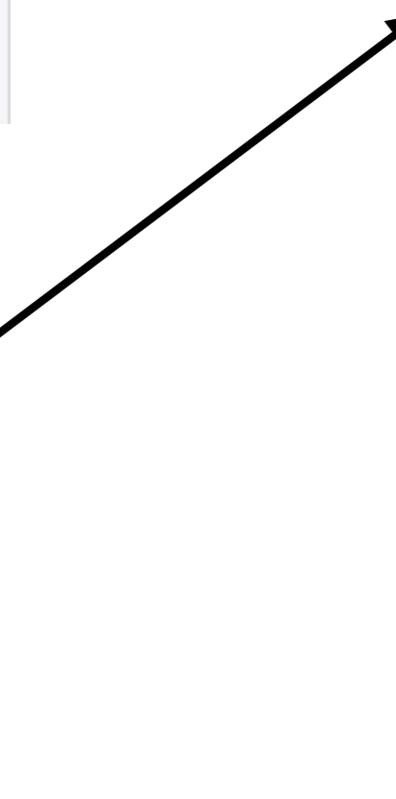
The Rstudio environment panel lists information about the variables that you've created (or loaded)

The screenshot shows the RStudio interface with the "Environment" tab selected. A red box highlights the "Values" section of the panel, which displays two variables: "ages" and "animal". The "ages" variable is of type "num [1:3]" with values 6, 7, 1. The "animal" variable is of type "character" with the value "bunny".

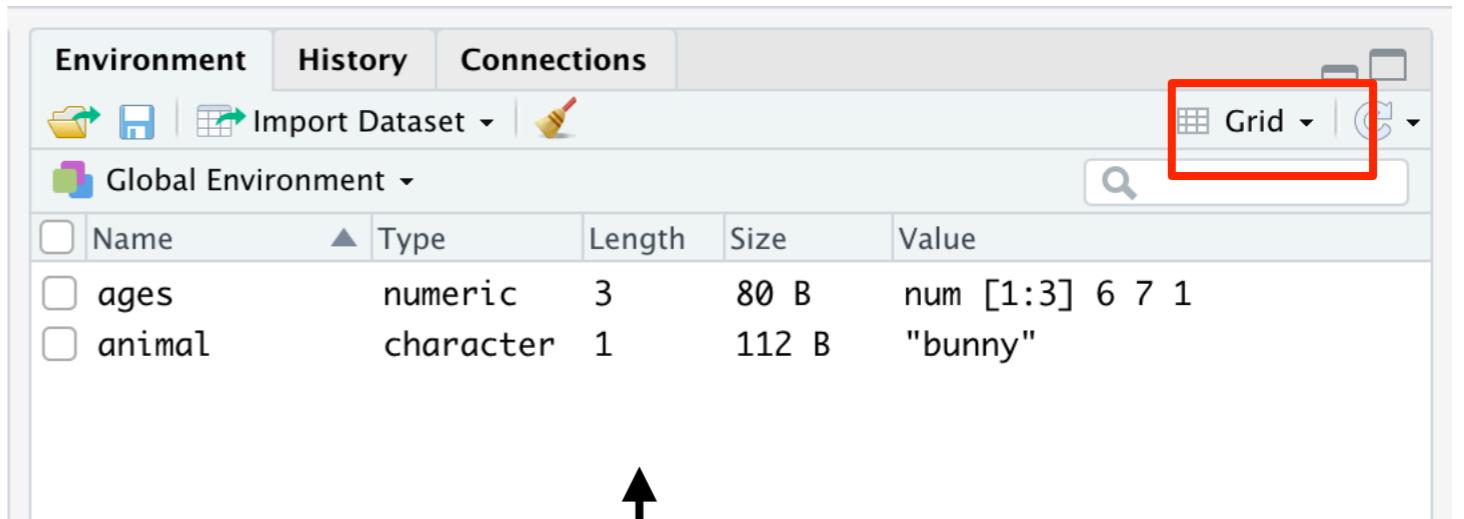
Values	
ages	num [1:3] 6 7 1
animal	"bunny"

```
> animal <- "bunny"  
> ages <- c(6,7,1)
```

When I create variables,
they appear in the
environment panel



The Rstudio “environment” panel



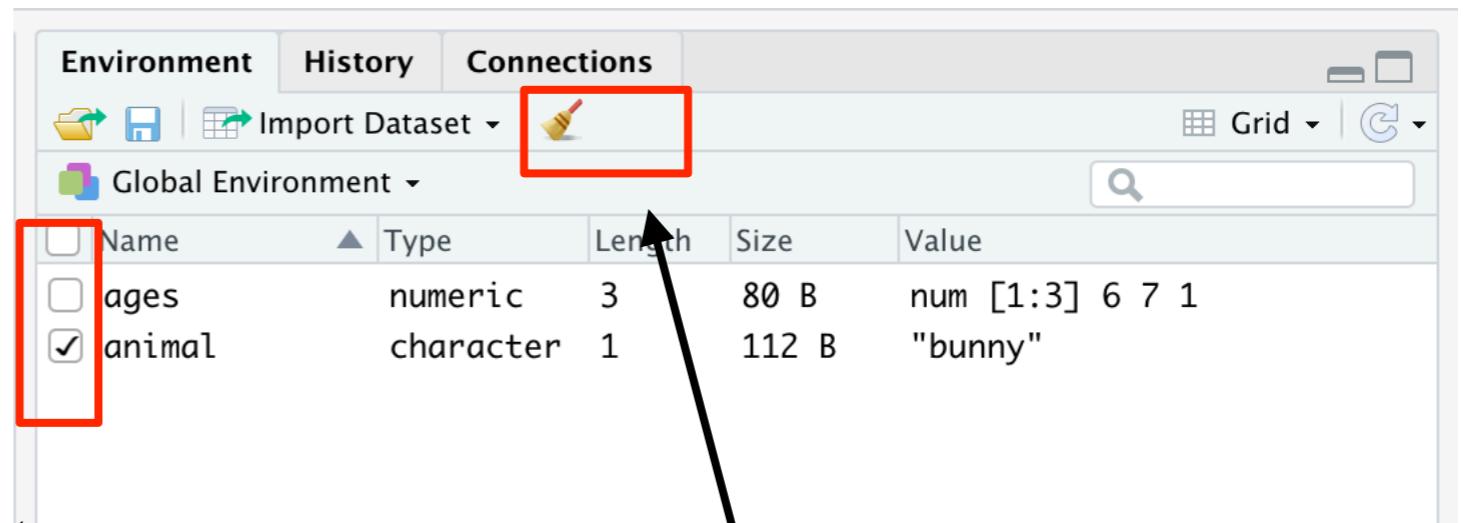
A screenshot of the RStudio Environment panel. The top navigation bar has tabs for "Environment", "History", and "Connections". Below the tabs are icons for "Import Dataset" and "Global Environment". On the right side, there is a dropdown menu labeled "Grid" with a red box around it, and other options like "Text" and "Plot". The main area shows the "Global Environment" with a table:

	Name	Type	Length	Size	Value
ages	numeric	3	80 B	num [1:3]	6 7 1
animal	character	1	112 B		"bunny"



When I switch to “grid”
view I see more
information

Getting rid of variables?



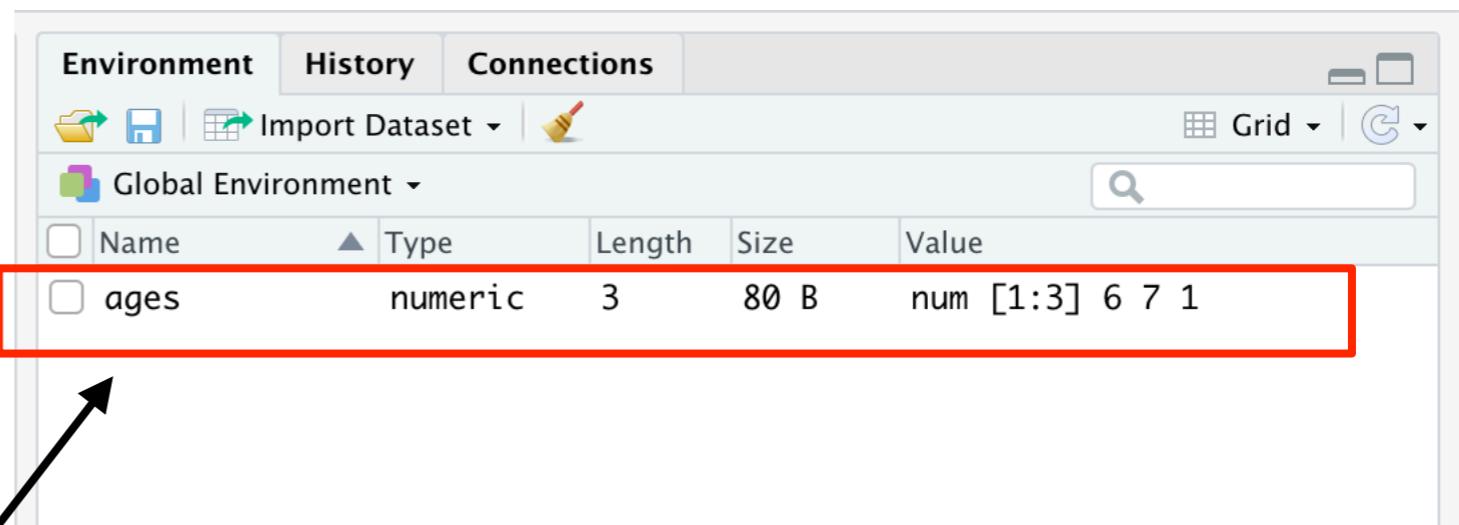
Name	Type	Length	Size	Value
ages	numeric	3	80 B	num [1:3] 6 7 1
<input checked="" type="checkbox"/> animal	character	1	112 B	"bunny"

Click here to
select variables

Now click here to delete
the selected variable(s)

If you don't select any and press the broom, it will delete all!

Getting rid of variables?



A screenshot of the RStudio interface showing the 'Environment' tab. The 'Global Environment' list contains one item: 'ages' (numeric, 3 elements, 80 B, num [1:3] 6 7 1). The row for 'ages' is highlighted with a red box. A black arrow points from the text above to this red box.

Name	Type	Length	Size	Value
ages	numeric	3	80 B	num [1:3] 6 7 1

The selected variable(s)
are now gone. Unless
you've got them saved
somewhere, you can't get
them back!

Exercises

1. Make a variable called `myFavourite` with the name of your favourite food, and another called `ugh` with one of your least favourites. Check in the environment panel to make sure they are in your workspace, and then remove `ugh`.
2. Install and load the package called `lsr`. Use the `who()` function in it to figure out what's in your environment. Try to figure out how to use the `rm()` function to delete the variable `myFavourite`. (hint: remember to try the `help()` function when you don't know what to do!)