

# Introduction to RStudio

(v 3.6)

***Oscar Torres-Reyna***

*otorres@princeton.edu*

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<http://www.princeton.edu/~otorres/>

# Installing RStudio

1. Download and install R, see here:  
<https://cran.r-project.org/>
2. Download and install RStudio Desktop (free version), see here:  
<https://posit.co/download/rstudio-desktop/>

If RStudio does not recognized the latest installed version of R, see here:  
<https://support.posit.co/hc/en-us/articles/200486138-Using-Different-Versions-of-R>

# RStudio screen (first time)

The screenshot displays the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for file operations and a search bar. The main workspace is divided into several panes:

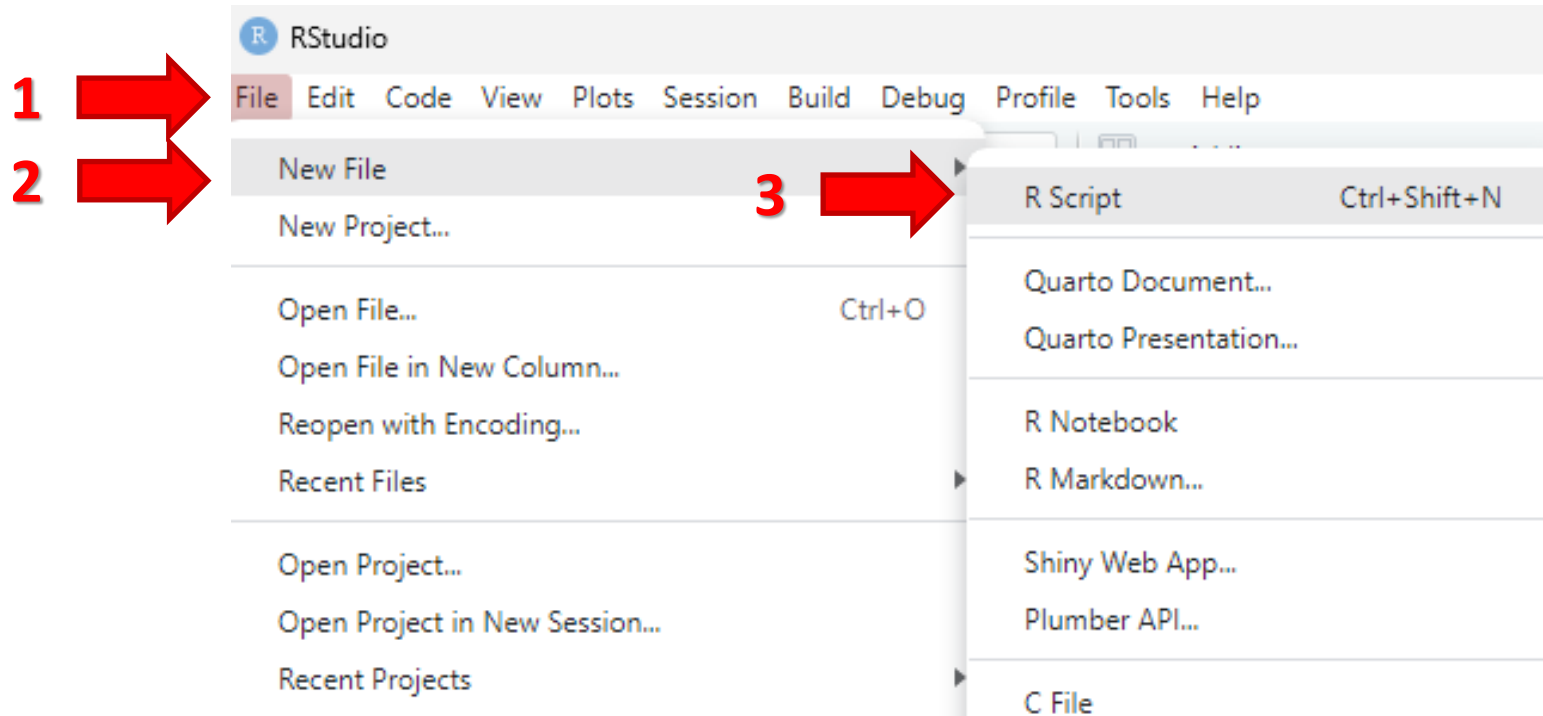
- Source:** Shows the R script being edited.
- Console:** Displays the R version (4.3.0), copyright information, and the output of the command `3 + 6`, which is `[1] 9`.
- Environment:** Shows the current environment is empty.
- History:** Shows a list of commands used in the session.
- Files:** Shows the files and folders in the default workspace.
- Plots:** Shows all graphs.
- Packages:** Lists the packages available and allows for installation.
- Help:** Provides documentation for the current object or function.
- Viewer:** Displays the output of the current command.
- Presentation:** Provides a presentation view of the code.

The **console** is where you can type commands and see output.

The **environment** tab shows all the active objects (see next slide). The **history** tab shows a list of commands used in the session.

The **files** tab shows all the files and folders in your default workspace as if you were on a PC/Mac window. The **plots** tab will show all your graphs. The **packages** tab list the packages available, can install packages.

# Open an R Script window



[See next slide]

# RStudio screen (w/R Script)

The screenshot displays the RStudio environment. At the top, the menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for saving, running, and other functions. The main editor window shows a single line of code with a cursor at the end. A red arrow points to the 'Run' button in the toolbar. To the right, the Environment pane shows 'Global Environment' and 'Environment is empty'. Below that, the Files pane is visible. At the bottom, the Console pane shows the R startup message and help text.

Here you can type R commands and run them. Just leave the cursor anywhere on the line where the command is and press Ctrl-R or click on the 'Run' icon above.

Output will appear in the console below.

The **environment** tab shows all the active objects (see next slide). The **history** tab shows a list of commands used in the session

The **files** tab shows all the files and folders in your default workspace as if you were on a PC/Mac window. The **plots** tab will show all your graphs. The **packages** tab list the packages available, can install packages.

The **console** is where you can type commands and see output

# Set working directory

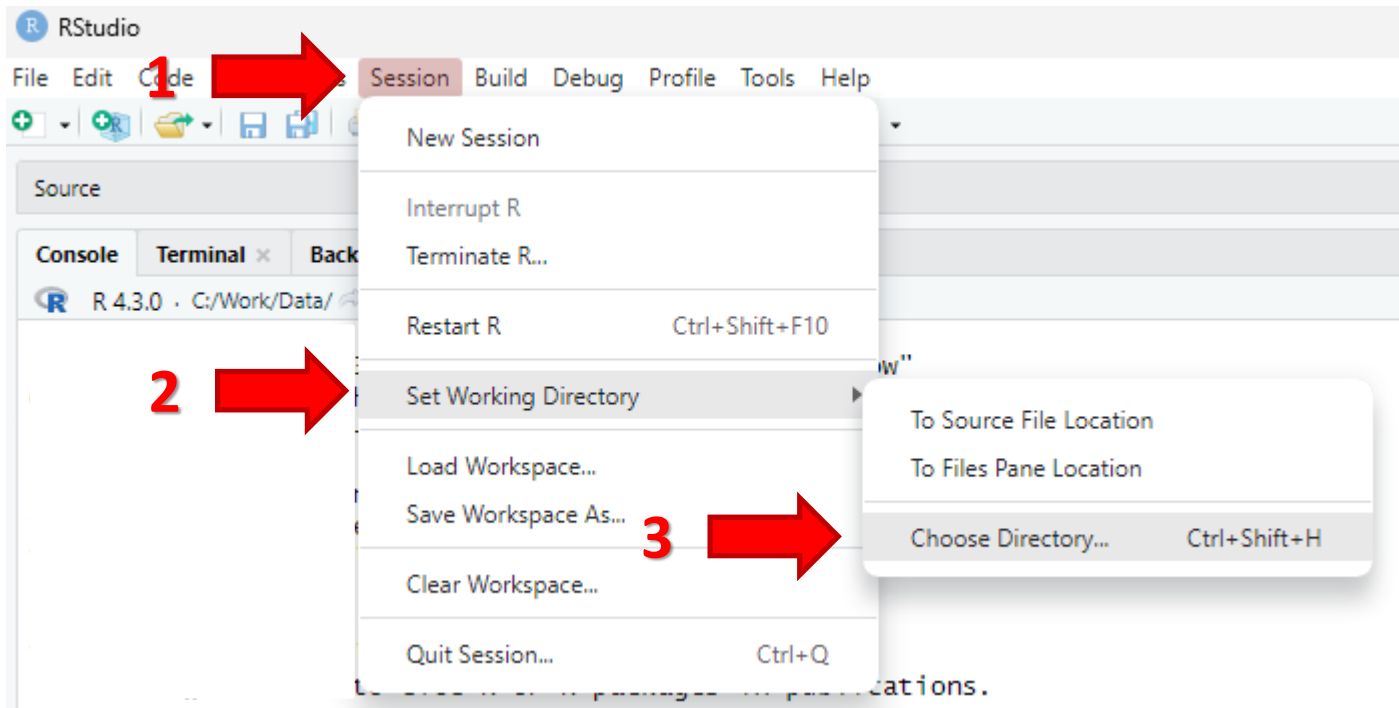
The working directory is the folder where your files are saved and where RStudio will export files. You can check the current working directory by typing the following:

```
getwd()
```

You can change the working directory by typing (if using Windows):

```
setwd("C:/myfolder/data")
```

Or you can use the menu:



# Import files into RStudio (1)

The image shows the RStudio File menu with three red arrows and numbers indicating the steps to import a dataset:

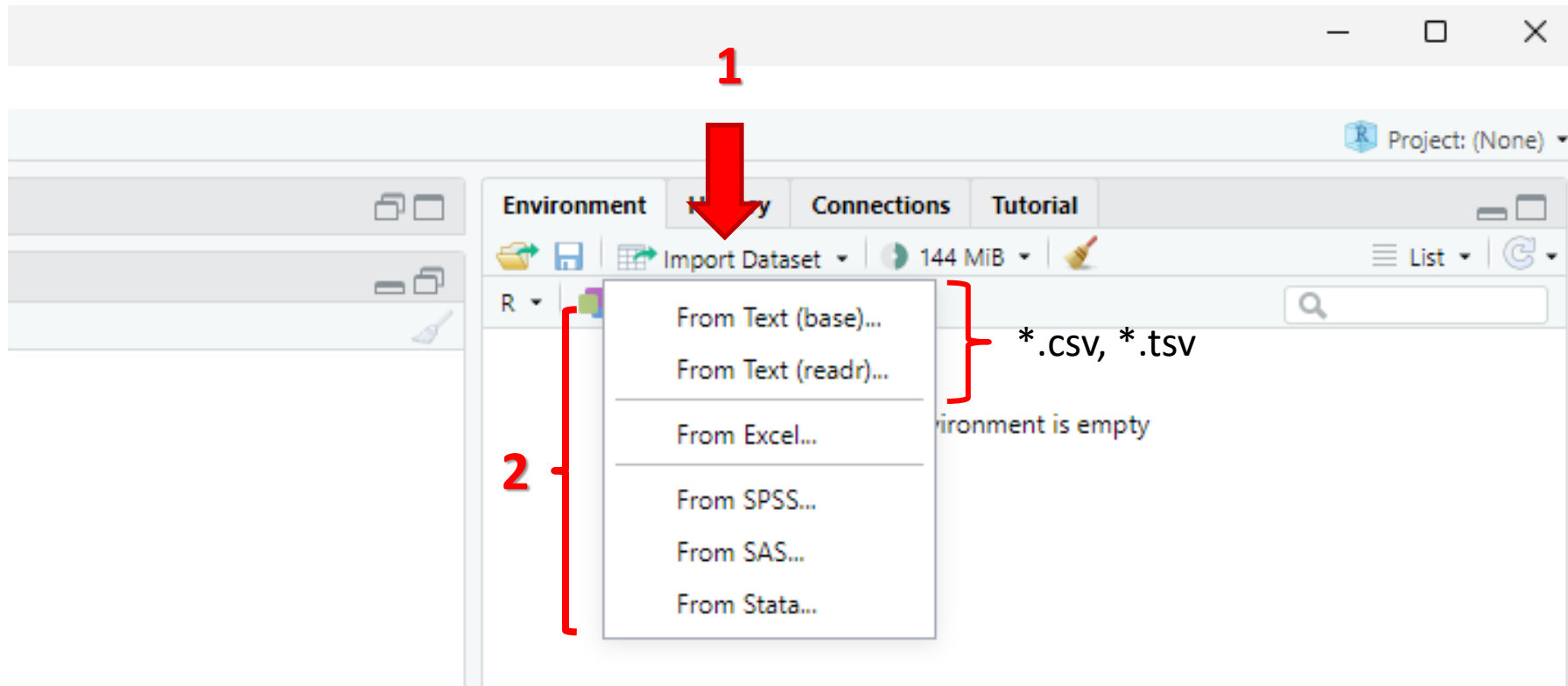
- 1**: A red arrow points to the **File** menu.
- 2**: A red arrow points to the **Import Dataset** option.
- 3**: A red arrow points to the **From Text (base)...** option in the sub-menu.

The sub-menu for **Import Dataset** includes the following options:

- From Text (base)...
- From Text (readr)...
- From Excel...
- From SPSS...
- From SAS...
- From Stata...

A red bracket on the right side of the sub-menu groups the **From Text (base)...** and **From Text (readr)...** options, with the text **\*.csv, \*.tsv** next to it.

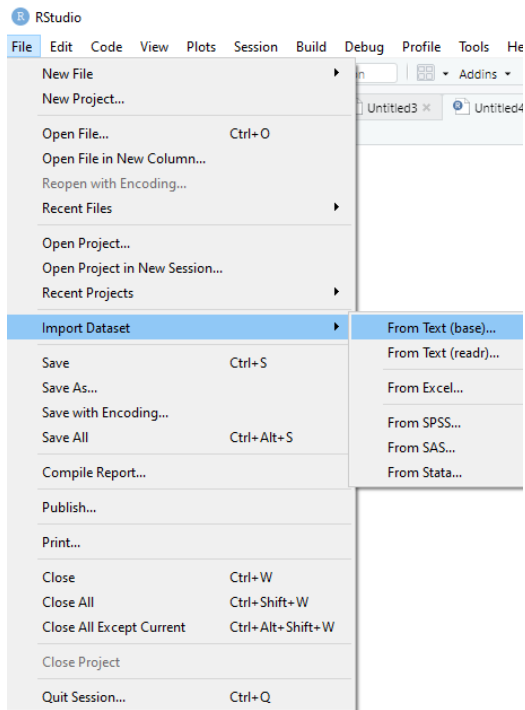
# Import files into RStudio (2)



**NOTE:** When importing files from Excel or ASCII format (\*.csv, \*.tsv) make sure the data is in the format shown in slides 2 and/or 3 in this document:

<https://www.princeton.edu/~otorres/DataPrep101.pdf>





After loading the data, change name to something short here

If your data has column titles, check 'Yes' here

A screenshot of the 'Import Dataset' dialog box in RStudio. The 'Name' field contains 'mydata'. The 'Heading' section has the 'Yes' radio button selected. The 'Input File' field contains a file path. Below the dialog, a 'Data Frame' preview shows a table with columns 'Country', 'x1995', 'x1996', 'x1997', 'x1998', and 'x1999'. At the bottom, there are 'Import' and 'Cancel' buttons. A red box highlights the 'Import' button with the text 'Click here to import the data' and a red arrow pointing to it.

mydata

Encoding: Automatic

Heading:  Yes  No

Row names: Automatic

Separator: Comma

Decimal: Period

Quote: Double quote (")

Comment: None

na.strings: NA

Strings as factors

Country, x1995, x1996, x1997, x1998, x1999, x2000, x2001, x2002, x2003  
A, , 8000.01, 8212.90, 7847.36, 7702.89, 7288.48, 6430.98, 6932.45, 7  
B, 18268.01, 18738.99, 19360.46, 20151.42, 20715.54, 20866.90, 21364  
C, 21088.14, 21608.14, 21988.64, 22739.28, 23436.61, 24194.85, 24300  
D, 313.74, 321.36, 331.76, 342.12, 351.70, 365.33, 377.15, 386.26, 398  
E, 21123.66, 21659.55, 22299.13, 22972.31, 23613.87, 24150.86, 24788  
F, 29941.64, 30703.73, 31716.04, 32671.27, 33748.21, 34599.47, 34483  
G, 4891.60, 5063.81, 5328.88, 5512.59, 5647.06, 5934.98, 5864.12, 585

Country	x1995	x1996	x1997	x1998	x1999
A	NA	NA	8000.01	8212.90	7847.36
B	18268.01	18738.99	19360.46	20151.42	20715.54
C	21088.14	21608.14	21988.64	22739.28	23436.61
D	313.74	321.36	331.76	342.12	351.70
E	21123.66	21659.55	22299.13	22972.31	23613.87
F	29941.64	30703.73	31716.04	32671.27	33748.21
G	4891.60	5063.81	5328.88	5512.59	5647.06

Click here to import the data

Import Cancel

# Using import data From Text (base)

After importing, copy the code to the R script

# Using import data From Text (readr)

New File  
 New Project...  
 Open File... Ctrl+O  
 Open File in New Column...  
 Reopen with Encoding...  
 Recent Files  
 Open Project...  
 Open Project in New Session...  
 Recent Projects  
**Import Dataset**  
 Save Ctrl+S  
 Save As...  
 Save with Encoding...  
 Save All Ctrl+Alt+S  
 Compile Report...  
 Publish...  
 Print...  
 Close Ctrl+W  
 Close All Ctrl+Shift+W  
 Close All Except Current Ctrl+Alt+Shift+W  
 Close Project  
 Quit Session... Ctrl+Q

From Text (base)...  
**From Text (readr)...**  
 From Excel...  
 From SPSS...  
 From SAS...  
 From Stata...

Click here to find the file

Import Text Data

File/URL: ~/GDP\_OneVar.csv

Data Preview:

Country (character)	x1995 (double)	x1996 (double)	x1997 (double)	x1998 (double)	x1999 (double)	x2000 (double)	x2001 (double)	x2002 (double)	x2003 (double)	x2004 (double)	x2005 (double)
A	NA	NA	8000.01	8212.90	7847.36	7702.89	7288.48	6430.98	6932.45	7486.24	8094.17
B	18268.01	18738.99	19360.46	20151.42	20715.54	20866.90	21364.02	21801.41	22404.59	22676.26	23039.43
C	21088.14	21608.14	21988.64	22739.28	23436.61	24194.85	24300.57	24411.48	24650.02	25076.01	25346.01
D	313.74	321.36	331.76	342.12	351.70	363.33	377.15	386.26	398.86	415.96	432.63
E	21123.66	21659.55	22299.13	22972.31	23613.87	24150.86	24788.69	25368.87	25885.48	26582.19	26890.73
F	29941.64	30703.73	31716.04	32671.27	33748.21	34599.47	34483.89	34669.47	35312.75	36450.55	37267.33
G	4891.60	5063.81	5328.88	5512.59	5647.06	5934.98	5864.12	5852.99	5872.29	6055.92	6162.84

Previewing first 50 entries.

Import Options:

Name:   First Row as Names  
 Skip:   Trim Spaces  
 Open Data Viewer

Delimiter:  Escape:   
 Quotes:  Comment:   
 Locale:  NA:

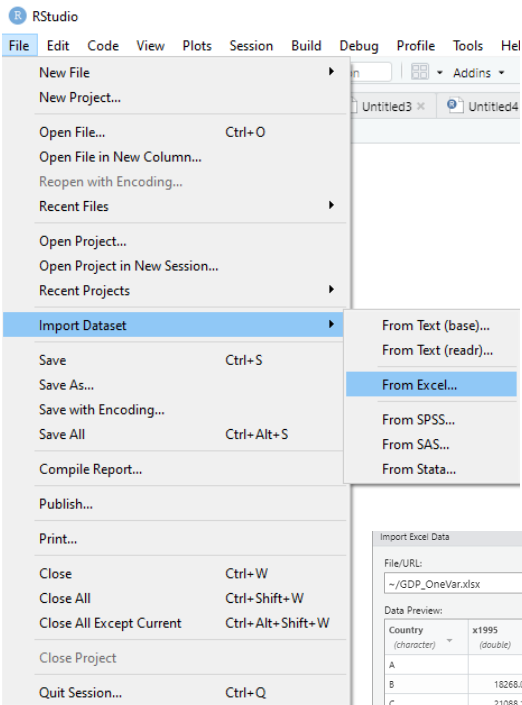
Code Preview:

```
library(readr)
mydata <- read_csv("~/GDP_OneVar.csv")
view(mydata)
```

Change the name to something short here

R code shown here (copy it to the R script after importing)

Click here to import the data



# Using import data From Excel

Click here to find the file

The 'Import Excel Data' dialog box is shown. The 'File/URL' field contains '~\GDP\_OneVar.xlsx'. The 'Data Preview' section displays a table with columns for years from 1995 to 2005 and rows for countries A through G. The 'Import Options' section at the bottom has 'Name' set to 'mydata', 'Sheet' set to 'Default', and 'Range' set to 'A1:D10'. The 'Code Preview' section shows the following R code:

```
library(readxl)
mydata <- read_excel("~/GDP_OneVar.xlsx")
view(mydata)
```

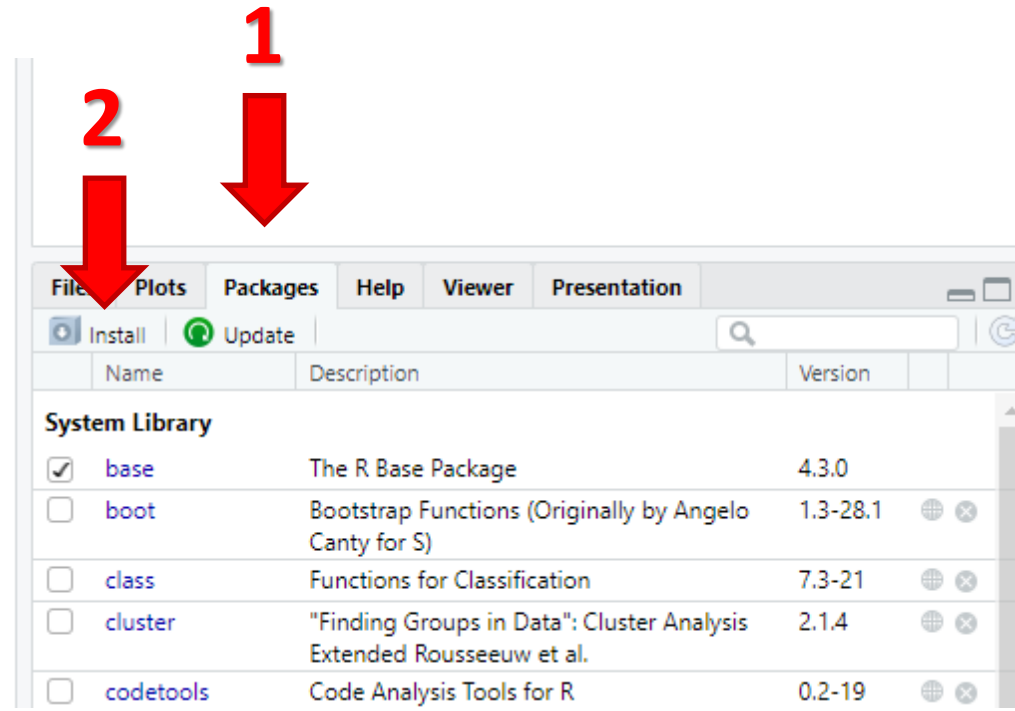
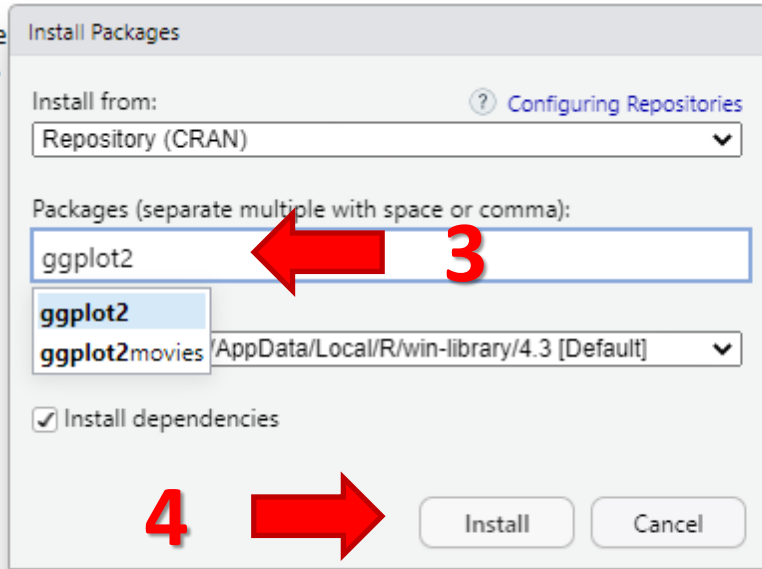
If the file has more than one sheet, select the one you need here...

Change the name to something short here

R code shown here (copy it to the R script after importing)

Click here to import the data

# Installing a package



Once a package is installed, no need to install it again until a new version of R is installed.

To activate a package type

```
library(name_of_package)
```

# Data visualization

The image shows the RStudio interface. The top-left pane contains R code for data visualization. A red arrow points to line 7, which is the command to run the scatterplot. The top-right pane shows the Environment window, which is currently empty. The bottom-right pane shows a scatter plot of prestige versus income, with a zoomed-in view of the data points and a blue shaded confidence interval. A red arrow points to the Zoom button in the Plots menu. The bottom-left pane shows the Console window with the output of the scatterplot command.

```
1  
2 library(car) # By John Fox and Sanford Weisberg  
3 library(rgl) # By Daniel Adler and Duncan Murdoch  
4  
5 # scatterplot  
6  
7 scatterplot(prestige ~ income, data=Prestige) ← 1 Run  
8  
9 # scatterplot per group  
10  
11 scatterplot(prestige ~ incometype, data=Prestige)  
12  
13 # scatterplots in matrix form  
14  
15 scatterplotMatrix(~ prestige + income + education, span=0.7, data=Prestige)  
16  
17 # 3D graph, scatter3d is from the --car package. It will open in the viewer window  
18  
19 scatter3d(prestige ~ income + education, id.n=3, data=Duncan)  
20 rglwidget()
```

Environment History Connections Tutorial  
R Global Environment

Files Plots Pages Help Viewer Presentation  
Zoom Export

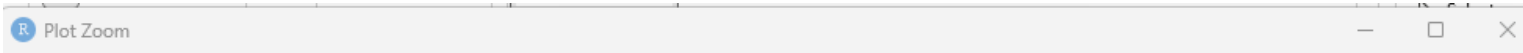
prestige  
income

[See next slide]

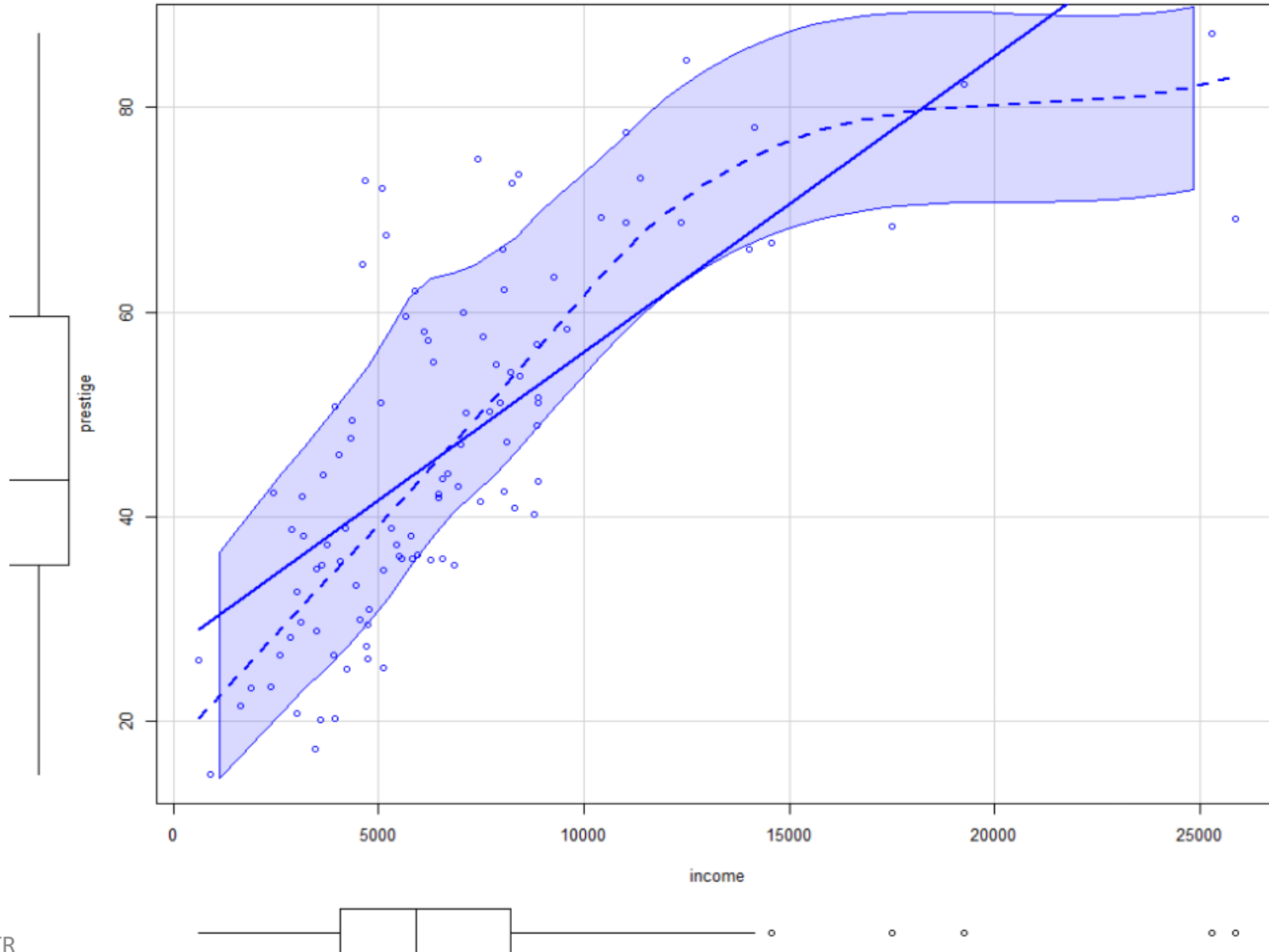
OTR

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# Data visualization



Right-click to save or copy the plot



# Data visualization

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function

```
1  
2 library(car) # By John Fox and Sanford Weisberg  
3 library(rgl) # By Daniel Adler and Duncan Murdoch  
4  
5 # scatterplot  
6  
7 scatterplot(prestige ~ income, data=Prestige) ← 1 Run  
8  
9 # scatterplot per group  
10 scatterplot(prestige ~ income|type, data=Prestige)  
11  
12 # scatterplots in matrix form  
13  
14 scatterplotMatrix(~ prestige + income + education, span=0.7, data=Prestige)  
15  
16 # 3D graph, scatter3d is from the --car package. It will open in the viewer window  
17  
18 scatter3d(prestige ~ income + education, id.n=3, data=Duncan)  
19  
20 rglwidget()
```

7:1 (Top Level) R Script

Console Terminal Background Jobs

```
R 4.3.0 · C:/Work/Data/  
> scatterplot(prestige ~ income, data=Prestige)  
> |
```

[See next slide]

OTR

Environment History Connections Tutorial

Import Dataset 333 MIB

R Global Environment

Environment is empty

2 click on Export to save or copy the plot.

Files Plots Packages Viewer Presentation

Zoom Export

prestige

income

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# Data visualization (3D graphics)

The image shows the RStudio interface with the following components:

- Source Editor:** Contains R code for creating a 3D scatter plot. Line 19 is highlighted in blue, with a red arrow pointing to it and the text "1 Run".
- Environment:** Shows "Environment is empty". A red arrow points to the "Zoom" button in the viewer window toolbar with the text "2 click on Zoom".
- Viewer Window:** Displays a 3D scatter plot with axes labeled "prestige", "income", and "education".
- Console:** Shows the execution of the R code.

```
1 library(car) # By John Fox and Sanford Weisberg
2 library(rgl) # By Daniel Adler and Duncan Murdoch
3
4 # scatterplot
5 scatterplot(prestige ~ income, data=Prestige)
6
7 # scatterplot per group
8 scatterplot(prestige ~ income|type, data=Prestige)
9
10 # scatterplots in matrix form
11 scatterplotMatrix(~ prestige + income + education, span=0.7,data=Prestige)
12
13 # 3D graph, scatter3d is from the --car package. It will open in the viewer window
14
15 scatter3d(prestige ~ income + education, id.n=3, data=Duncan)
16 rglwidget()
```

[See next slide]

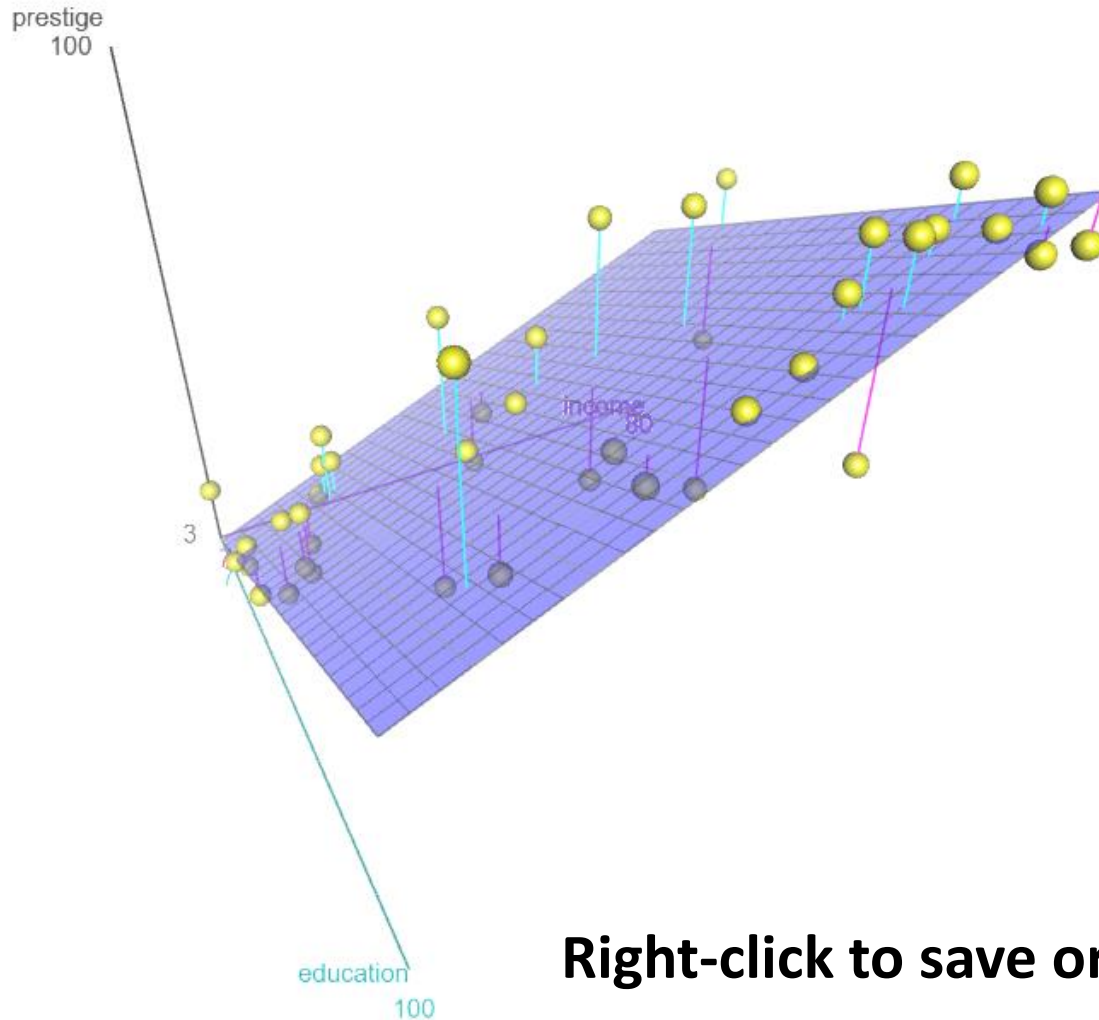
OTR

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# Data visualization (3D graphics)

Use the cursor to move the graph around



Right-click to save or copy the plot