

# Lesson 5

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# 1. ☒ Welcome back to R!

In lesson one, through four you learned about objects, vectors, functions, and handling missing data in R. This week we will learn how to import external data files (e.g., CSV, XLSX, SAV, OBJ). Almost every research project begins with *bringing external data into* R. Today you will learn four common import workflows using RStudio's graphical **Import Dataset** helpers and their code equivalents. Mastering these steps ensures that you can work with spreadsheets, SPSS files, and even 3D objects.

To begin Lesson 5, follow these steps:

1. Open your course project for RStudio
2. Create a new file. Open another ☐ “R Notebook” (File > New File > R Notebook).
3. Type in the code provided in this document as you follow along with the video. Pause the video at anytime to answer assignment questions, dig deeper or add memo notes.

## Lesson Overview

By the end of Lesson 5 you will be able to:

1. ☐ Remember – Recall which R function reads CSV, XLSX, SAV, and OBJ.
2. ☐ Understand – Explain how RStudio's Import Dataset dialog writes code you can reuse.
3. ☐ Apply – Import four file types using both GUI and script
4. ☐ Analyze – Verify that objects arrived with expected rows/columns and classes.
5. ☐ Evaluate –Decide when manual Files☐ pane navigation is faster than typing a path.

Keep these goals in mind as you move through each section.

## 2. Quick Warmup

It is helpful to have the file to be uploading in your working directory. This is one of the stickiest points to importing data.

```
getwd() # shows current project folder
```

Are your data files located *inside* this folder? If not, move them or `setwd("path/to/folder")`.

### 3. 📦 Packages

So far, we have used functions that are built into R. In this lesson, we will use functions from packages. A package is a collection of functions, data, and documentation that extends the capabilities of R. Packages are used to perform specific tasks or analyses, such as data manipulation, statistical modeling, or visualization.

You need to download the package before you can use it. You only need to install the package once. Packages will need to be updated from time to time. In the files pane, you will see a tab called “Packages.” This is where RStudio lists the packages you have installed.

You will use the function `install.packages()` to install a package. In this lesson, you will install the `readr`, `readxl`, `haven` and `rgl` package, which provides functions for reading and writing data files. Type the following code in a new code chunk and run.

```
install.packages(c("readr", "readxl", "haven", "rgl"))
```

This code installs the `readr`, `readxl`, `haven`, and `rgl` packages. The `c()` function combines the package names into a vector, allowing you to install multiple packages at once.

□ Explore and Play: What are other ways you can install packages? Create a memo note, demonstrate learning skill(s) used.

After installing the package, you need to load it into your R session using the `library()` function. This makes the functions in the package available for use. Type the following code in a new code chunk and run.

```
library(readr) # For reading CSV files
library(readxl) # For reading Excel files
library(haven) # For reading SPSS, SAS, and Stata files
library(rgl) # For reading 3D object files
```

## 4. Importing a CSV

□ GUI path is recommended for beginners.

1. Click the *Environment* pane □ *Import Dataset* □ *From Text (readr)*.
2. Browse to **Sex Ratio MalesFemales10.csv** and click *Open*.
3. Inspect preview □ click *Import*.
4. RStudio inserts code like: `Sex_Ratio_MalesFemales10 <- read_csv("??file_path/Sex Ratio MalesFemales10.csv")` Look at your console to see the code that was generated.

## 5. ☒ Assignment: Part I

Replace the \_\_\_\_ placeholder with your code or short written answer.

### 5.1 Task 1

☐ Copy the code appears in the console-copy it into your script below so future you can reproduce the import. (e.g., `Sex_Ratio_MalesFemales10 <- read_csv("??file_path/Sex Ratio MalesFemales10.csv")`)

---

☐ NOTICE: Use `str(survey_results)` Do the column types look right? Explore this data set using the skills you developed in previous lessons. Create a memo note, demonstrate learning skill(s) used.

## 6. Importing an Excel (XLSX)

- Repeat the steps but choose *From Excel* in the dialog.

Code produced will resemble: `Album <- read_xlsx("??file_path/Album.xlsx")`



## 7. ☒ Assignment: Part II

Replace the \_\_\_\_ placeholder with your code or short written answer.

### 7.1 Task 2

☐ Copy the code appears in the console-copy it into your script below so future you can reproduce the import. (e.g., `Album <- read_xlsx("??file_path/Album.xlsx")`)

---

☐ NOTICE: Explore this data set using the skills you developed in previous lessons. Create a memo note, demonstrate learning skill(s) used.

☐ Look deeper: What are the differences between a CSV and XLSX files? Create a memo note, demonstrate learning skill(s) used.

## 8. Importing an SPSS (SAV) File

Use *Import Dataset* ☐ *From SPSS*.

Generated code example: `Cats <- read_sav("??file_path/Cats.sav")`

## 9. ☒ Assignment: Part III

Replace the \_\_\_\_ placeholder with your code or short written answer.

### 9.1 Task 3

☐ Copy the code appears in the console-copy it into your script below so future you can reproduce the import. (e.g., `Cats <- read_sav("??file_path/Cats.sav")`)

---

☐ Check☐ in: Are labelled variables imported as factors? What functions can you use to check the variable types? Create a memo note, demonstrate learning skill(s) used.

## 10. Loading a 3D OBJ File

OBJ files store 3D meshes. The `rgl` package's `readOBJ()` needs the *full file path*. `human_skull <- readOBJ("??file_path/human_skull.obj")`

Here are two easy ways to capture that path:

□ Method one: **Files** □ **pane click** □ **copy**

1. In the bottom □ right Files pane, navigate to *human\_skull.obj*.
2. Click the triangle □ *Copy Path* □ *Absolute path*.
3. Paste between the quotes below.

**Direct code example (replace path with your path):**

```
human_skull <- readOBJ("Paste between the quotes/human_skull.obj")
```

□ Method two: **file.choose()** helper

```
# file.choose() opens a file dialog to select the file interactively  
human_skull_path <- file.choose() # interactively pick file
```

## 11. ☒ Assignment: Part IV

Replace the \_\_\_\_ placeholder with your code or short written answer.

### 11.1 Task 4

☐ Copy the code appears in the console-copy it into your script below so future you can reproduce the import. (e.g., `human_skull <- readOBJ("Paste between the quotes/human_skull.obj")`)

---

☐ Explore and Play: Render quick preview (optional heavy graphics)

```
open3d(); shade3d(human_skull, col = "white"); bg3d("black")
```

☐ Check☐ in: Can you rotate the image?

☐ Comment: The `rgl` package is powerful for 3D visualization, but it can be resource-intensive. If you encounter performance issues, consider using a smaller or simpler 3D model.

```
options(warn = -1)
layout3d(matrix(c(1:1),ncol=1))
bg3d("black")
shade3d(human_skull, col="white")
```

## 12. Save and Upload

1. You will be submitting **both** the Quarto Document and the workspace file. The workspace file saves all the objects in your environment that you created in this lesson. You can save the workspace by running the following command in a code chunk of the R Notebook Document document:

```
save.image("Assignment5_Workspace.RData")
```

Or you can click the “Save Workspace” button in the Environment pane.

□ **Always save the R documents before closing.**

2. Find the assignment in this week’s module in Canvas and upload **both** the RMD and the workspace file.

## 13. Today you practiced:

- Imported CSV via `readr::read_csv()` or GUI helper.
- Imported Excel via `readxl::read_excel()`.
- Imported SPSS via `haven::read_sav()`.
- Loaded an OBJ mesh with `rgl::readOBJ()` and rendered it.
- Compared GUI vs code-only workflows and verified structure.

□ Great job! Uploading data files is a crucial skill for data analysis. In our next lesson, we'll learn about subsetting, extraction, and insertion in data frames.