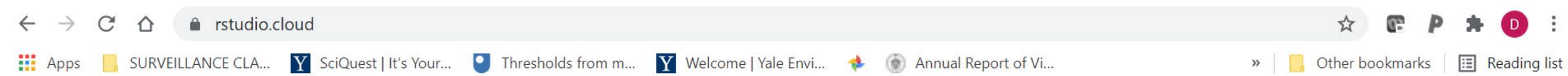


# Getting started: Workshop on Vaccine Evaluation

- 1) Create a free account on the Rstudio Cloud: <https://rstudio.cloud/>  
\*\* Please do this even if you already have Rstudio installed on your computer!
- 2) Join the Workspace titled “Vaccine Evaluation Workshop” (by invitation)
- 3) Open the folder “Session 0 Intro to R”
- 4) Double click on the .rproj file
- 4) Open the “Intro to R English.Rmd” or “Intro to R Spanish.Rmd” file
- 5) Click the “Run document” button near the top of the screen
- 6) Follow the tutorial

# 1) Step 1: Create a free account on the Rstudio Cloud:

<https://rstudio.cloud/>



Log In Sign Up

## RStudio Cloud

Do, share, teach and learn data science

GET STARTED FOR FREE

ALREADY A USER? LOG IN

## 2) Join the Workspace titled “Vaccine Evaluation Workshop”

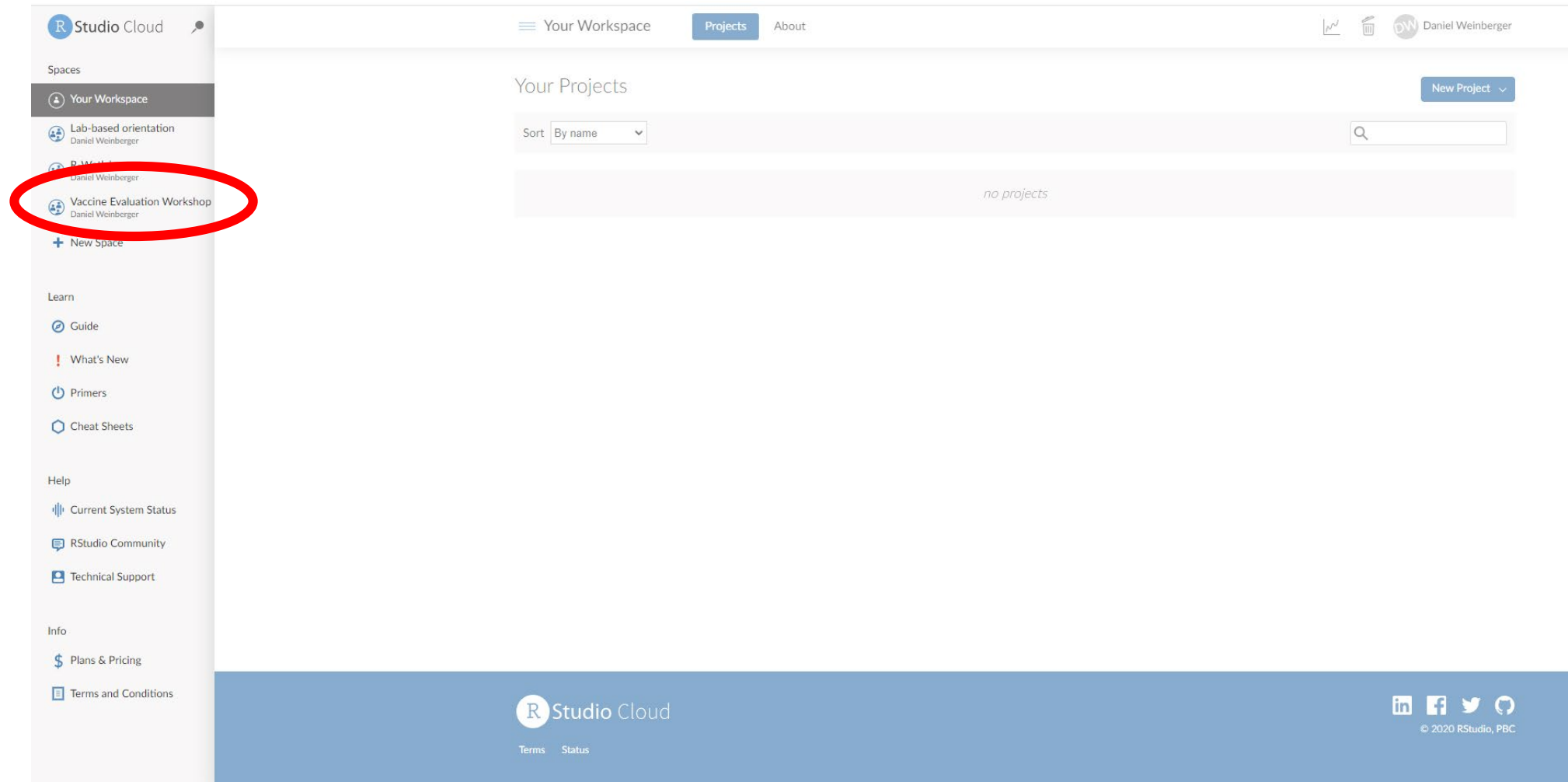
- Click this link to join the work space:

[https://rstudio.cloud/spaces/154746/join?access\\_code=5dTVayuwfwSP1FV2N1iISxhL9smlamBtZhHqq%2BX4](https://rstudio.cloud/spaces/154746/join?access_code=5dTVayuwfwSP1FV2N1iISxhL9smlamBtZhHqq%2BX4)

### 3) Access the space



### 3) Access the space



The screenshot displays the RStudio Cloud web interface. On the left sidebar, under the 'Spaces' section, the 'Vaccine Evaluation Workshop' space is highlighted with a red circle. The main content area shows 'Your Projects' with a 'New Project' button and a search bar. The footer contains the RStudio Cloud logo, navigation links for 'Terms' and 'Status', and social media icons for LinkedIn, Facebook, Twitter, and GitHub, along with the copyright notice '© 2020 RStudio, PBC'.

Studio Cloud

Your Workspace Projects About

Spaces

- Your Workspace
- Lab-based orientation Daniel Weinberger
- RAM-UI Daniel Weinberger
- Vaccine Evaluation Workshop Daniel Weinberger**
- + New Space

Learn

- Guide
- What's New
- Primers
- Cheat Sheets

Help

- Current System Status
- RStudio Community
- Technical Support

Info

- Plans & Pricing
- Terms and Conditions

Your Projects

Sort By name

New Project

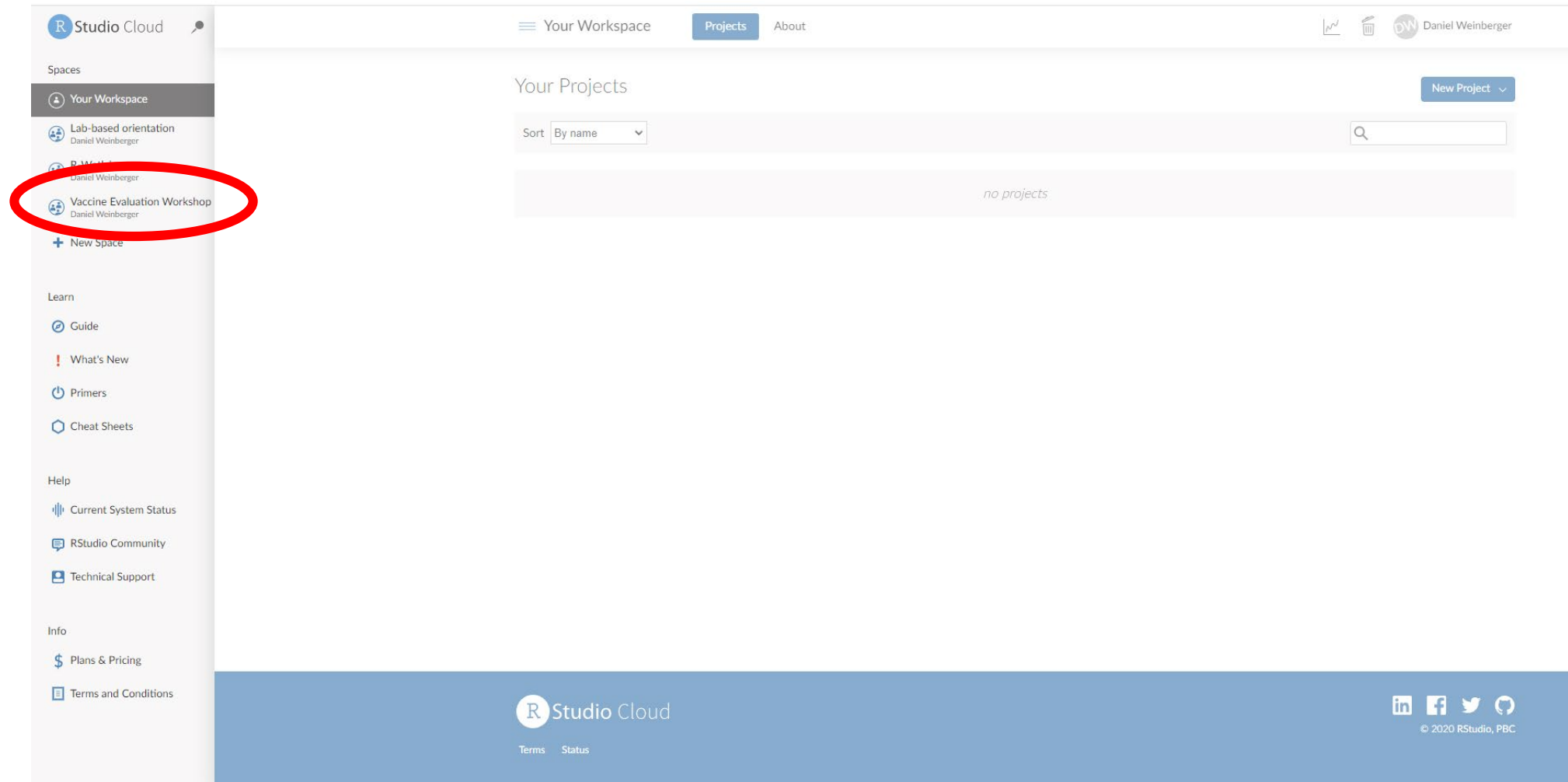
no projects

Studio Cloud

Terms Status

© 2020 RStudio, PBC

### 3) Access the space



The screenshot displays the RStudio Cloud web interface. On the left sidebar, under the 'Spaces' section, the 'Vaccine Evaluation Workshop' space is highlighted with a red circle. The main content area shows 'Your Projects' with a 'New Project' button and a search bar. The footer contains the RStudio Cloud logo, navigation links for 'Terms' and 'Status', and social media icons for LinkedIn, Facebook, Twitter, and GitHub, along with the copyright notice '© 2020 RStudio, PBC'.

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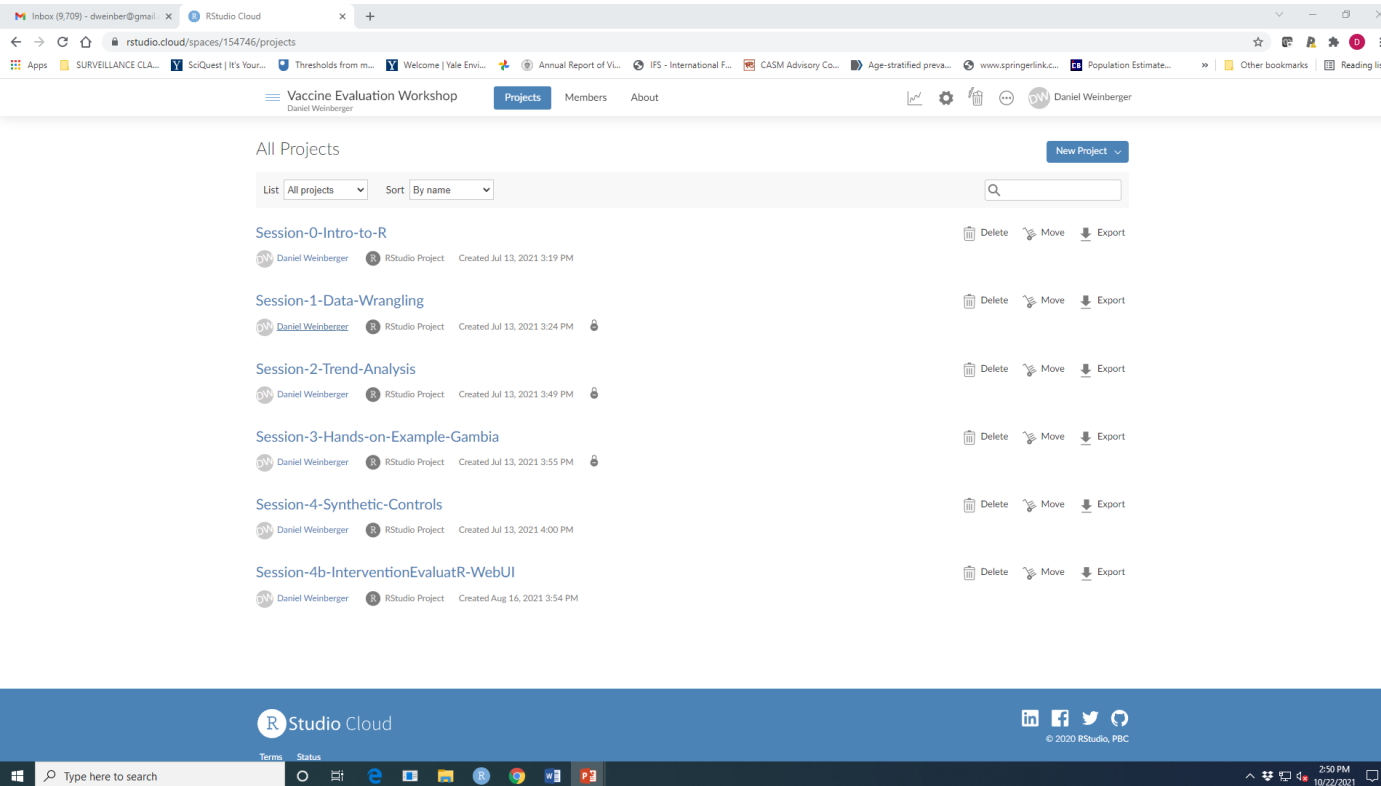
no projects

Studio Cloud

Terms Status

© 2020 RStudio, PBC

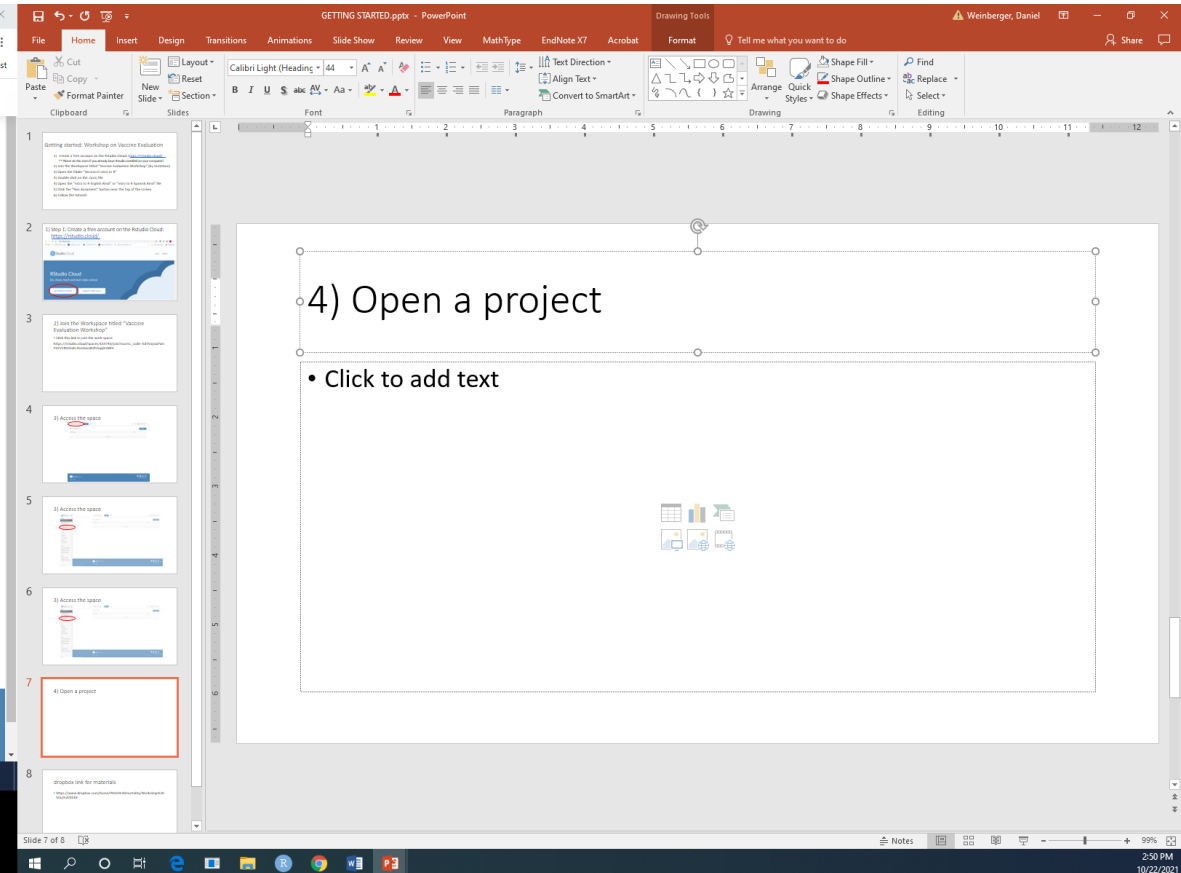
# 4) Open a project



The screenshot shows the RStudio Cloud web interface. At the top, there's a navigation bar with 'Projects', 'Members', and 'About' tabs. Below this, the 'All Projects' section is visible, featuring a search bar and a list of projects. The projects listed are:

- Session-0-Intro-to-R
- Session-1-Data-Wrangling
- Session-2-Trend-Analysis
- Session-3-Hands-on-Example-Gambia
- Session-4-Synthetic-Controls
- Session-4b-InterventionEvaluatR-WebUI

Each project entry includes the user 'Daniel Weinberger', the project name, and the creation date. To the right of each project name are icons for 'Delete', 'Move', and 'Export'. At the bottom of the interface, there's a blue footer with the 'RStudio Cloud' logo and social media links.



The screenshot shows a PowerPoint presentation titled 'GETTING STARTED.pptx'. The slide is titled '4) Open a project' and contains a bullet point: 'Click to add text'. The presentation is displayed in a window titled 'Weinberger, Daniel'. The slide is part of a larger presentation, as indicated by the slide number '4' in the bottom left corner. The presentation is shown in a window titled 'GETTING STARTED.pptx - PowerPoint'.

# 4) Open the project 'Session-0-Intro-to-R'

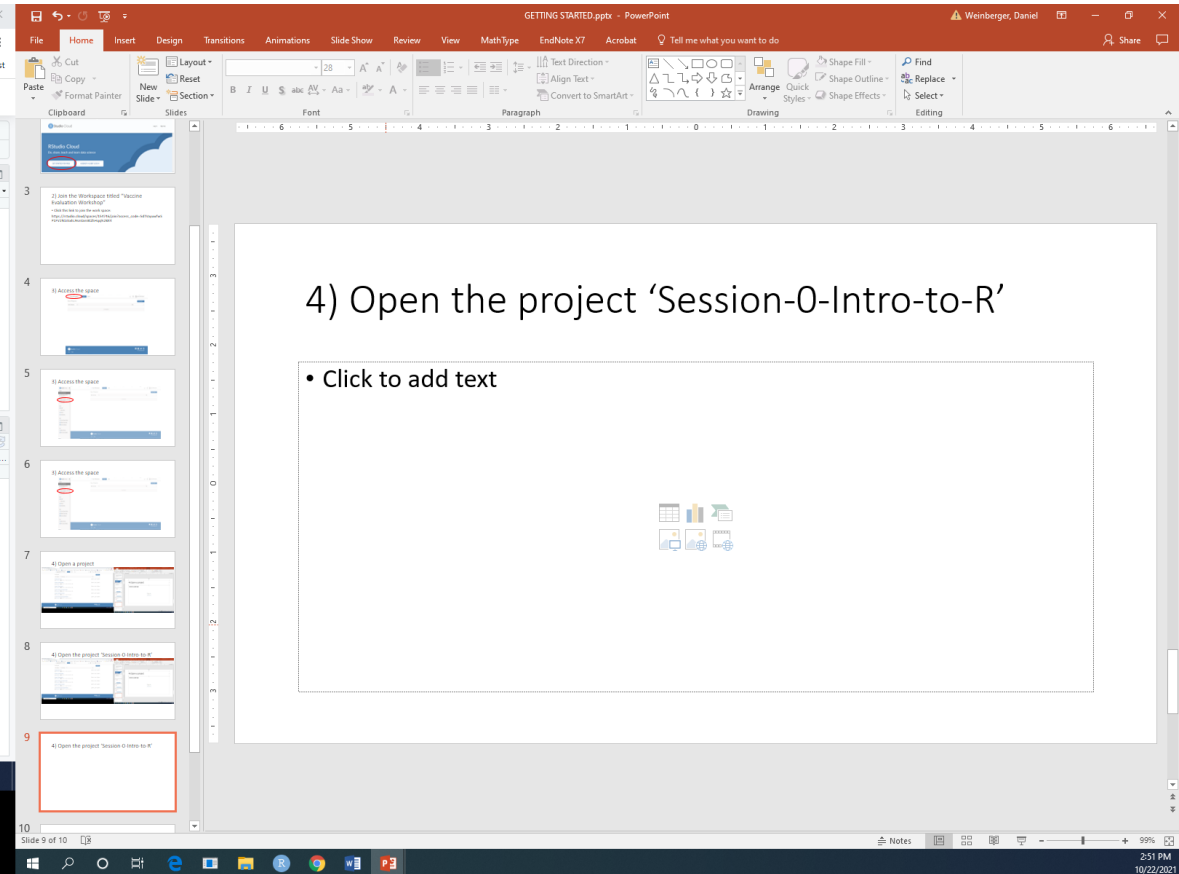
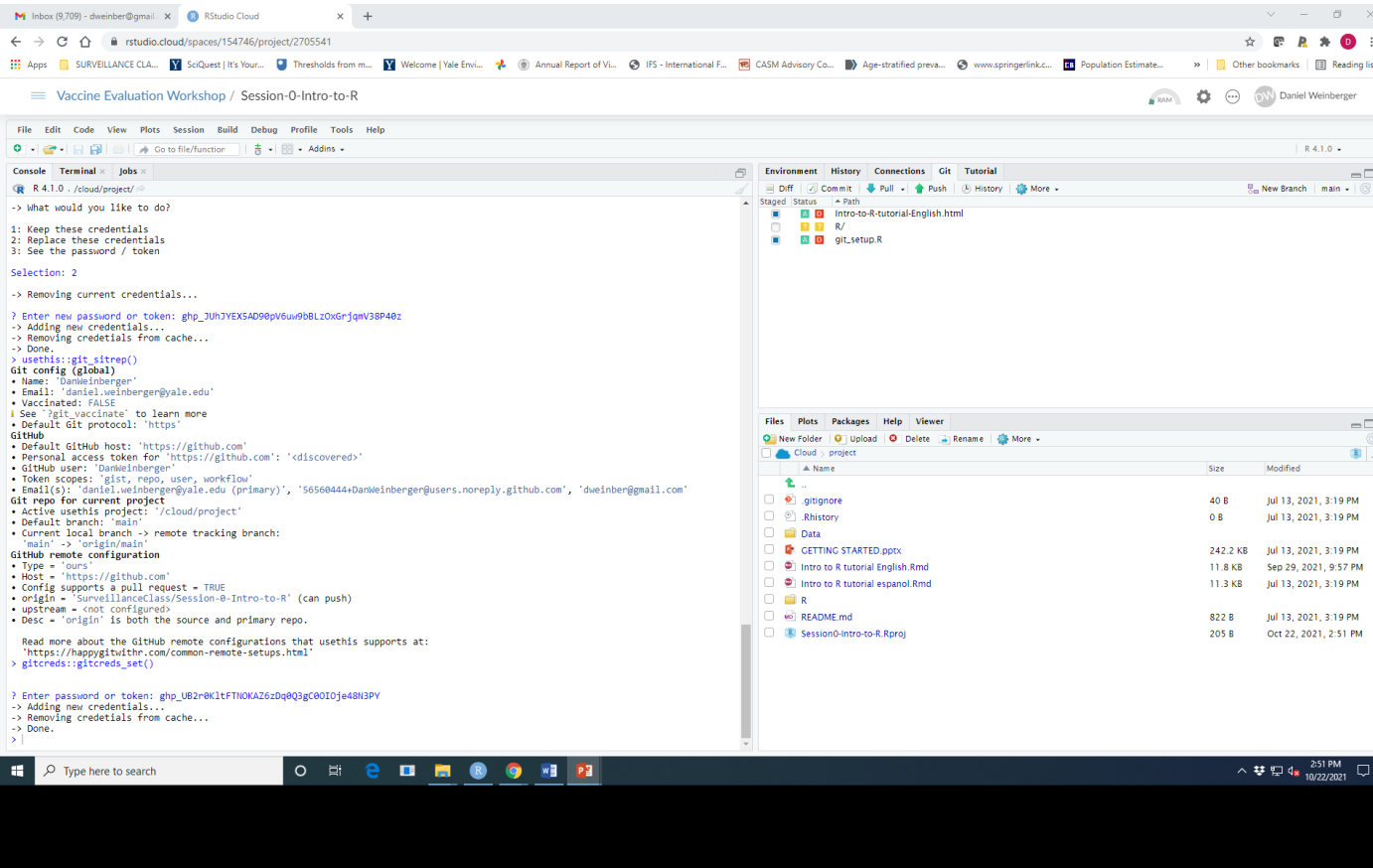
The image shows a screenshot of a computer screen with two main windows. The left window is the RStudio Cloud interface, displaying a list of projects under the heading 'All Projects'. The projects listed are:

- Session-0-Intro-to-R (Created Jul 13, 2021 3:19 PM)
- Session-1-Data-Wrangling (Created Jul 13, 2021 3:24 PM)
- Session-2-Trend-Analysis (Created Jul 13, 2021 3:49 PM)
- Session-3-Hands-on-Example-Gambia (Created Jul 13, 2021 3:55 PM)
- Session-4-Synthetic-Controls (Created Jul 13, 2021 4:00 PM)
- Session-4b-InterventionEvaluatR-WebUI (Created Aug 16, 2021 3:54 PM)

The right window is a PowerPoint presentation titled 'GETTING STARTED.pptx'. The current slide is titled '4) Open a project' and contains a bullet point: 'Click to add text'. The presentation is in the 'Slide Show' view, and the slide number '4' is visible in the bottom left corner of the slide area.



# 4) Open the file Intro to R tutorial English.Rmd or Intro to R tutorial Spanish.Rmd



# 4) Click Run document

The screenshot displays the RStudio Cloud web interface. At the top, the browser address bar shows the URL `rstudio.cloud/spaces/154746/project/2705541`. The main workspace is titled "Intro to R tutorial English.Rmd". A red circle highlights the "Run Document" button in the top-left toolbar. The code editor shows R code for defining a function `my.fun1` and calling it with `a=1, b=1`. The console output shows the function execution results: `[1] 2`. The bottom panel shows the "Files" view with a list of files and folders, including `Intro to R tutorial English.Rmd` and `Intro to R tutorial espanol.Rmd`. The right sidebar shows the "Environment" pane with a list of objects: `Intro-to-R-tutorial-English.html`, `R/`, and `git_setup.R`.

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

Intro to R tutorial English.Rmd

```
328 ~~~
329
330 Now run the function. Change the input values of a and b and see what happens
331 ~~~{r fun2,exercise=T, exercise.eval=FALSE}
332 #Define the function
333 my.fun1 <- function(a,b){
334   z <- a + b
335   return(z)
336 ~}
337
338 #Call the function
339 res1 <- my.fun1(a=1, b=1)
340 print(res1)
341 ~~~
```

[1] 2

```
342
343 Now try to add two vectors together (same function, but input vectors instead of single numbers (scalars))
344 ~~~{r fun3,exercise=TRUE, exercise.eval=FALSE}
345 #Define the function
346 my.fun1 <- function(a,b){
347   z <- a + b
348 ~}
```

331-22 Chunk 33: fun2

Console Terminal R Markdown Jobs

.../project/Intro to R tutorial English.Rmd

```
List of 2
 $ exercise      : logi TRUE
 $ exercise.eval : logi FALSE
```

|.....| 100%  
ordinary text without R code

output file: Intro-to-R-tutorial-English.knit.md

```
/usr/lib/rstudio-server/bin/pandoc +RTS -K512m -RTS Intro-to-R-tutorial-English.knit.md --to html4 --from markdown+autolink_bare_uris+tex_math_single_backslash --output Intro-to-R-tutorial-English.html --lua-filter /home/rstudio-user/R/x86_64-pc-linux-gnu-library/4.1/rmarkdown/rmarkdown/latex-div.lua --lua-filter /home/rstudio-user/R/x86_64-pc-linux-gnu-library/4.1/rmarkdown/rmarkdown/latex-div.lua --variable bs3=TRUE --standalone --section-divs --template /home/rstudio-user/R/x86_64-pc-linux-gnu-library/4.1/learnr/rmarkdown/templates/tutorial/resources/tutorial-format.htm --no-highlight --variable highlightjs=1 --variable progressive=true --variable allow-skip=false --id-prefix section- --variable theme=cerulean --variable 'mathjax-url=https://mathjax.rstudio.com/latest/MathJax.js?config=TeX-AMS-MML_HTMLorMML' --variable shiny-pre-rendered
```

Output created: Intro-to-R-tutorial-English.html

Listening on http://127.0.0.1:6105

Environment History Connections Git Tutorial

Diff Commit Pull Push History More

Staged Status Path

- Intro-to-R-tutorial-English.html
- R/
- git\_setup.R

Files Plots Packages Help Viewer

New Folder Upload Delete Rename More

Cloud project

Name	Size	Modified
..		
.gitignore	40 B	Jul 13, 2021, 3:19 PM
.Rhistory	0 B	Jul 13, 2021, 3:19 PM
Data		
GETTING STARTED.pptx	242.2 KB	Jul 13, 2021, 3:19 PM
Intro to R tutorial English.Rmd	11.8 KB	Sep 29, 2021, 9:57 PM
Intro to R tutorial espanol.Rmd	11.3 KB	Jul 13, 2021, 3:19 PM
R		
README.md	822 B	Jul 13, 2021, 3:19 PM
Session0-Intro-to-R.Rproj	205 B	Oct 22, 2021, 2:51 PM
Intro-to-R-tutorial-English.html	110.2 KB	Oct 22, 2021, 2:52 PM

# 4) Follow along with the tutorial, and watch the associated video

## Introduction to R

Let's start by looking at some real data

Working with vectors and matrices

Make and manipulate matrices

Arithmetic in R

Working with dates in R

Making useful plots

Writing Functions

RStudio

Start Over

## Introduction to R

In this tutorial, we will learn how to manipulate and plot data in R.

### Working with vectors and matrices

In R you can work with individual numbers (ie calculate value of 1+1) with vectors of numbers (ie a variable), or with matrices. Data can also be stored in 'data frames' which is like a matrix but that can store a mix of numeric variables and character variables.

First, let's extract one of the columns from the Brazil pneumonia data, create a time index variable, and join them together into a new matrix.

```
Code Start Over Run Code
1 state31 <- ds3[, 'state31'] # Creates vector named 'state31'
2 length.state31 <- length(state31)
3 length.state31
```

```
Code Start Over Run Code
1 time.index <- 1:length.state31 # Create an index 1,2,3... that has same length as state31
2
3 state31[1:50] # Print first 50 observations
4 time.index[1:50] # Print first 50 observations
```

Vectors (variables) can be combined together into a matrix or a dataframe. (Data frames have the advantage that they can include both numeric and character variables).

Try to change the code so that you print first 20 rows of data instead of first 10.

```
Code Start Over Run Code
1 time.index <- 1:length.state31 # Create an index 1,2,3... that has same length as state31
2 mat1<-cbind(time.index, state31) # Combine into matrix
3 mat1[1:10,] # Print mat1, first 10 rows
```

```
Code Start Over Run Code
1 # Print the variable names
2 dimnames(mat1)
3
```

```
Code Start Over Run Code
1 # Get number of rows and columns of mat1
2 nrow(mat1)
3
```

```
Code Start Over Run Code
1 hcol(mat1)
2
3
```