

Data Input

R Projects

R Projects are a feature of RStudio that can help you stay organized. They are pretty straightforward to set up, but are not required. You can learn more about R Projects here:

https://jhudatascience.org/intro_to_r/resources/R_Projects.html

Getting data into R (manual/point
and click)

Data Input

- 'Reading in' data is the first step of any real project/analysis
- R can read almost any file format, especially via add-on packages
- We are going to focus on simple delimited files first
 - comma separated (e.g. '.csv')
 - tab delimited (e.g. '.txt')
 - Microsoft Excel (e.g. '.xlsx')

Data Input

Youth Tobacco Survey (YTS) dataset:

“The YTS was developed to provide states with comprehensive data on both middle school and high school students regarding tobacco use, exposure to environmental tobacco smoke, smoking cessation, school curriculum, minors’ ability to purchase or otherwise obtain tobacco products, knowledge and attitudes about tobacco, and familiarity with pro-tobacco and anti-tobacco media messages.”

- Check out the data at: <https://catalog.data.gov/dataset/youth-tobacco-survey-yts-data>

Import Dataset

- > File
- > Import Dataset
- > From Text (readr)
- > paste the url
(http://jhudatascience.org/intro_to_r/data/Youth_Tobacco_Survey_YTS_Data.csv)
- > click “Update” and “Import”

What Just Happened?

You see a preview of the data on the top left pane.

The screenshot shows the RStudio interface with a data preview table highlighted by a pink rectangle. The table has 31 columns and 9,794 rows. The columns are: YEAR, LocationAbbr, LocationDesc, TopicType, TopicDesc, and MeasureDesc. The rows show data for the year 2015 in Arizona, categorized by tobacco use and cessation topics.

	YEAR	LocationAbbr	LocationDesc	TopicType	TopicDesc	MeasureDesc
1	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Percent of Curr
2	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Percent of Curr
3	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Percent of Curr
4	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Quit Attempt in
5	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Quit Attempt in
6	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Quit Attempt in
7	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
8	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
9	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
10	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
11	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
12	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
13	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
14	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
15	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
16	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
17	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
18	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
19	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
20	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
21	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
22	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status

Showing 1 to 22 of 9,794 entries, 31 total columns

The RStudio console shows the R version 4.2.2 (2022-10-31) and the platform aarch64-apple-darwin20 (64-bit).

What Just Happened?

You see a new object called `Youth_Tobacco_Survey_YTS_Data` in your environment pane (top right). The table button opens the data for you to view.

The screenshot shows the RStudio interface. The top-left pane displays a table of data for the object `Youth_Tobacco_Survey_YTS_Data`. The table has columns: `YEAR`, `LocationAbbr`, `LocationDesc`, `TopicType`, `TopicDesc`, and `MeasureDesc`. The data shows 22 rows of survey data for the year 2015 in Arizona, covering various tobacco and smokeless tobacco topics. The bottom-left pane shows the R console with the R version 4.2.2 (2022-10-31) and copyright information. The top-right pane shows the Environment pane with the object `Youth_Tobacco_Survey_YTS_Data` listed, indicating it has 9794 observations and 31 variables. The bottom-right pane shows the Files pane with the project structure.

	YEAR	LocationAbbr	LocationDesc	TopicType	TopicDesc	MeasureDesc
1	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Percent of Curr
2	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Percent of Curr
3	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Percent of Curr
4	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Quit Attempt in
5	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Quit Attempt in
6	2015	AZ	Arizona	Tobacco Use - Survey Data	Cessation (Youth)	Quit Attempt in
7	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
8	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
9	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
10	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
11	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
12	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
13	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
14	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
15	2015	AZ	Arizona	Tobacco Use - Survey Data	Cigarette Use (Youth)	Smoking Status
16	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
17	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
18	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
19	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
20	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
21	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status
22	2015	AZ	Arizona	Tobacco Use - Survey Data	Smokeless Tobacco Use (Youth)	User Status

What Just Happened?

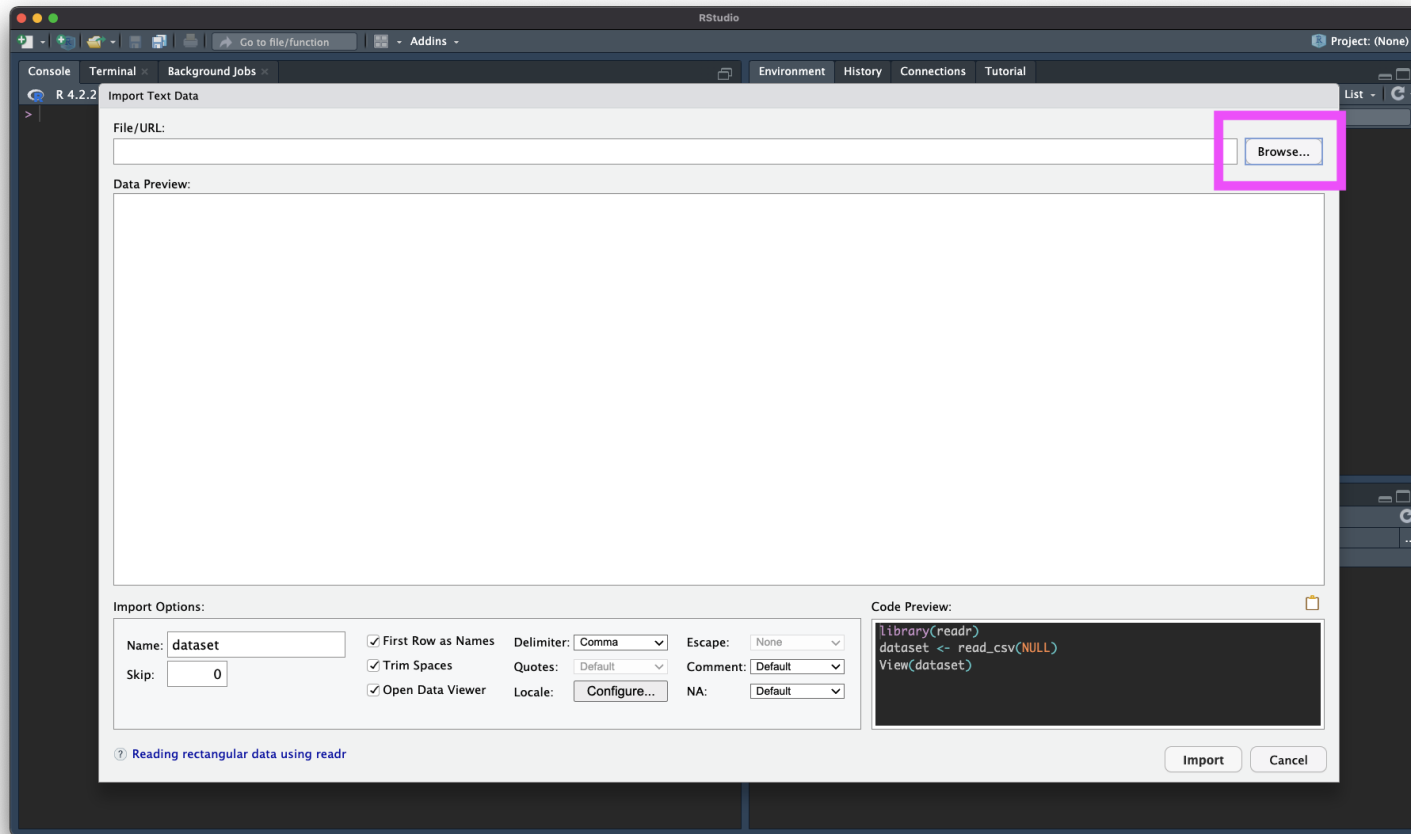
R ran some code in the console (bottom left).

The screenshot shows the RStudio interface. The top-left pane displays a data table with columns: YEAR, LocationAbbr, LocationDesc, TopicType, TopicDesc, and MeasureDesc. The table shows 17 rows of data for the year 2015 in Arizona, covering tobacco use and cessation topics. The top-right pane shows the Environment pane with 'Youth_Tobacco_Survey_Y...' listed as a data object with 9794 observations and 31 variables. The bottom-left pane shows the console with the following R code and output:

```
R 4.2.2 ~ /  
> library(readr)  
> Youth_Tobacco_Survey_YTS_Data <- read_csv("http://jhubdatascience.org/intro_to_r/data/Youth_Tobacco  
_Survey_YTS_Data.csv")  
Rows: 9794 Columns: 31  
— Column specification —  
Delimiter: ","  
chr (24): LocationAbbr, LocationDesc, TopicType, TopicDesc, MeasureDesc, DataSource, Respo...  
dbl (7): YEAR, Data_Value, Data_Value_Std_Err, Low_Confidence_Limit, High_Confidence_Limi...  
  
! Use `spec()` to retrieve the full column specification for this data.  
! Specify the column types or set `show_col_types = FALSE` to quiet this message.  
> View(Youth_Tobacco_Survey_YTS_Data)  
> |
```

The bottom-right pane shows the Files pane with a file explorer view of the Desktop directory.

Browsing for Data on Your Machine



Import Dataset

The screenshot shows the RStudio application window. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Window, and Help. The top toolbar contains icons for file operations and a search bar. The main workspace is divided into four panes: Console, Environment, Files, and Plots. The Console pane shows the R prompt >. The Environment pane shows the Global Environment with the message 'Environment is empty'. The Files pane shows the current directory structure. The Plots pane is empty. The bottom pane displays the documentation for the `read_delim` function, which is part of the `readr` package. The documentation includes the function signature `read_delim {readr}` and a description of the function's purpose and usage.

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Window Help

Go to file/function

Project: (None)

Console Terminal Jobs

R 4.1.2 · ~/

Environment History Connections Tutorial

Import Dataset 549 MiB

R Global Environment

Environment is empty

Files Plots Packages Help Viewer

R: Read a delimited file (including csv & tsv) into a tibble

Find in Topic

`read_delim {readr}` R Documentation

Read a delimited file (including csv & tsv) into a tibble

Description

`read_csv()` and `read_tsv()` are special cases of the general `read_delim()`. They're useful for reading the most common types of flat file data, comma separated values and tab separated values, respectively. `read_csv2()` uses ; for the field separator and , for the decimal point. This is common in some European countries.

Manual Import: Pros and Cons

Pros: easy!!

Cons: obscures some of what's happening, others will have difficulty running your code

Getting data into R (directly)

Data Input: Read in Directly

```
# load library `readr` that contains function `read_csv`
library(readr)
dat <- read_csv(
  file = "http://jhudatascience.org/intro_to_r/data/Youth_Tobacco_Survey_YTS_Data.csv"
)
```

```
# `head` displays first few rows of a data frame. `tail()` works the same way.
head(dat, n = 5)
```

```
# A tibble: 5 × 31
```

	YEAR	LocationAbbr	LocationDesc	TopicType	TopicDesc	MeasureDesc	DataSource
	<dbl>	<chr>	<chr>	<chr>	<chr>	<chr>	<chr>
1	2015	AZ	Arizona	Tobacco Use ...	Cessatio...	Percent of...	YTS
2	2015	AZ	Arizona	Tobacco Use ...	Cessatio...	Percent of...	YTS
3	2015	AZ	Arizona	Tobacco Use ...	Cessatio...	Percent of...	YTS
4	2015	AZ	Arizona	Tobacco Use ...	Cessatio...	Quit Attem...	YTS
5	2015	AZ	Arizona	Tobacco Use ...	Cessatio...	Quit Attem...	YTS

```
# 24 more variables: Response <chr>, Data_Value_Unit <chr>,
# Data_Value_Type <chr>, Data_Value <dbl>, Data_Value_Footnote_Symbol <chr>,
# Data_Value_Footnote <chr>, Data_Value_Std_Err <dbl>,
# Low_Confidence_Limit <dbl>, High_Confidence_Limit <dbl>, Sample_Size <dbl>,
# Gender <chr>, Race <chr>, Age <chr>, Education <chr>, GeoLocation <chr>,
# TopicTypeId <chr>, TopicId <chr>, MeasureId <chr>, StratificationID1 <chr>,
# StratificationID2 <chr>, StratificationID3 <chr>, ...
```

Data Input: Declaring Arguments

```
dat <- read_csv(  
  file = "http://jhudatascience.org/intro_to_r/data/Youth_Tobacco_Survey_YTS_Data.csv"  
)  
# EQUIVALENT TO  
dat <- read_csv(  
  "http://jhudatascience.org/intro_to_r/data/Youth_Tobacco_Survey_YTS_Data.csv"  
)
```

Data Input: Read in Directly

`read_csv()` needs an argument `file` =.

- `file` is the path to your file, **in quotation marks**
- can be path to a file on a website (URL)
- can be **path** in your local computer – absolute file path or relative file path

Examples

```
dat <- read_csv(file = "www.someurl.com/table1.csv")
```

```
dat <- read_csv(file = "/Users/avahoffman/Downloads/Youth_Tobacco_Survey_YTS_Data.csv")
```

```
dat <- read_csv(file = "Youth_Tobacco_Survey_YTS_Data.csv")
```


Data Input: File paths

What is a file path ????

PC: *autosaves file*

Me: Cool, so where did the
file save?

PC:



The working directory

When we work in R, we automatically have a **working directory**.

Working directory is a folder (directory) that RStudio assumes “you are working in”.

It's where R looks for files.



Getting the working directory

Run the `getwd()` function to determine your working directory.

```
# Get the working directory  
getwd()
```

Relative path

Let's say my data is in a folder called "data" in my working directory.

`data/my_data.csv` would be the **relative path**. It's relative to the working directory.

The whole address, for example

`/Users/avahoffman/Downloads/data/my_data.csv` is the **absolute path**.

Setting the working directory

You can set the working directory manually with the `setwd()` function:

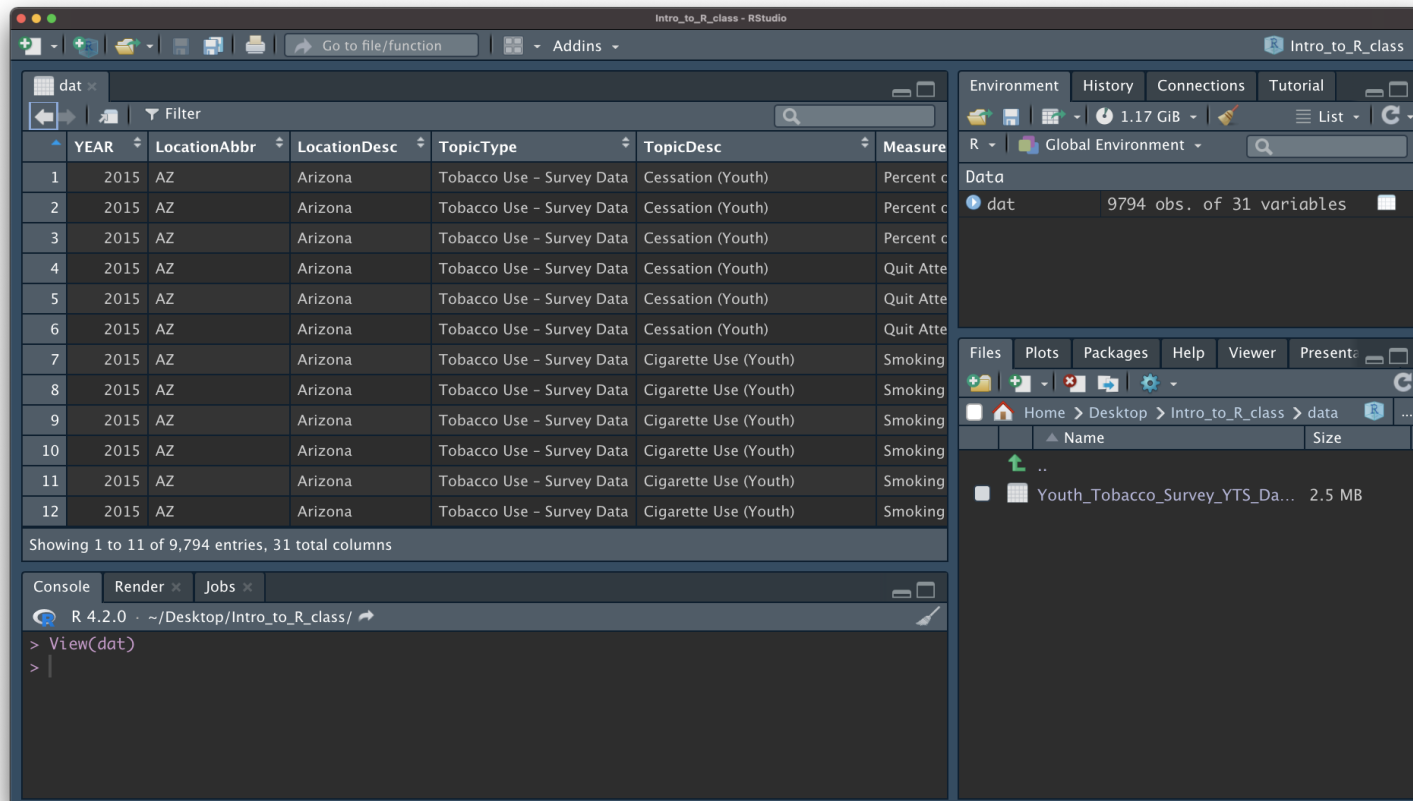
```
# set the working directory  
setwd("/Users/avahoffman/Desktop")
```

Now what? Checking data & Other
formats

Data Input: Checking the data

- the `View()` function shows your data in a new tab, in spreadsheet format
- be careful if your data is big!

`View(dat)`



Data Input: Other delimiters with `read_delim()`

`read_csv()` is a special case of `read_delim()` – a general function to read a delimited file into a data frame

`read_delim()` needs path to your file and **file's delimiter**, will return a tibble

- `file` is the path to your file, in quotes
- `delim` is what separates the fields within a record

Examples

```
dat <- read_delim(file = "www.someurl.com/table1.tsv", delim = "\t")
```

```
dat <- read_delim(file = "data.txt", delim = "|")
```


Data Input: Excel files

- You **cannot** read in an excel file from a URL.
- Need to load the `readxl` package with `library()`.
- The argument is `path` (not `file`).

```
library(readxl)
```

```
read_excel(path = "asthma.xlsx")
```

Data input: other file types

- haven package has functions to read SAS, SPSS, Stata formats
- There are also resources for REDCap : [REDCapR](#)

WARNING! `read.csv` is *base R*

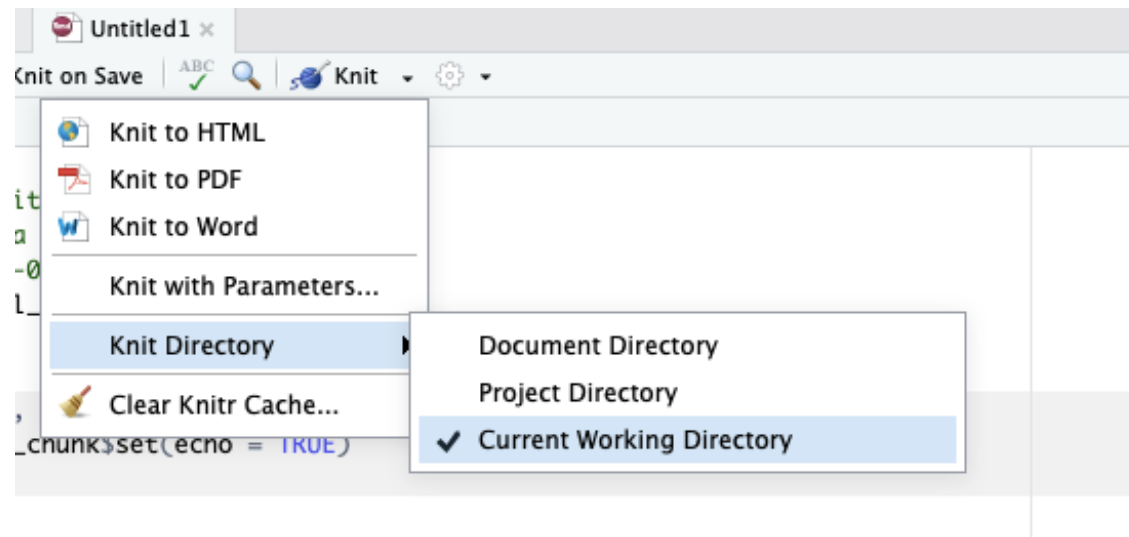
There are also data importing functions provided in base R (rather than the `readr` package), like `read.delim()` and `read.csv()`.

These functions have slightly different syntax for reading in data (e.g. `header` argument).

However, while many online resources use the base R tools, the latest version of RStudio switched to use these new `readr` data import tools, so we will use them in the class for slides. They are also up to two times faster for reading in large datasets, and have a progress bar which is nice.

TROUBLESHOOTING: Setting the working directory

If you are trying to knit your work, it might help to set the knit directory to the “Current Working Directory”:



Other Useful Functions

- The `str()` function can tell you about data/objects.
- We will also discuss the `glimpse()` function later, which does something very similar.
- `head()` shows first few rows
- `tail()` shows the last few rows

Summary

R Projects can make it easier to find files. Check out [this resource](#).

Importing data manually:

- File > Import Dataset > From Text (readr)
- Paste the url
(http://jhudatascience.org/intro_to_r/data/Youth_Tobacco_Survey_YTS_Data.csv)
- Click “Update” and “Import”
- Review the process: <https://youtu.be/LEkNfJgpunQ>

Importing data programmatically:

- `read_csv()` function from readr package
- Use `getwd()` to check your working directory, where R looks for your data files

Summary - Part 2

Look at your data!

- Check the environment for a data object
- `View()` gives you a preview of the data in a new tab

Other file types

- `readr` package: `read_delim()` for general delimited files
- `readxl` package: `read_excel()` for Excel files

Don't forget to use `<-` to assign your data to an object!

Lab

- ▮ [Class Website](#)
- ▮ [Data Input Lab](#)



Image by [Gerd Altmann](#) from [Pixabay](#)