

PSC 253 Minimal Manual

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Preface

This book is a supplement to the book, *Quantitative Social Science: An Introduction*, by Kosuke Imai. It also relies heavily on the work of Jeffrey Arnold, who translated the Imai code into tidyverse code.

I aspire for this text to act as a minimal manual for the course PSC 253 Scope and Methods in Political Science taught at Morehouse College. It is intended to cover all of the main analytical tasks that the course requires.

Chapter 1

R Basics

At its most basic functionality, R is a calculator.

1.1 Use R as a Calculator

1.1.1 Problem

You want to add, subtract, multiply, divide, use exponents, and take square roots

1.1.2 Solution

Use + for addition, - for subtraction, * for multiplication and / for division.

```
# addition  
43 + 5
```

```
## [1] 48
```

```
# subtraction  
43 - 5
```

```
## [1] 38
```

```
# multiplication  
43 * 5
```

```
## [1] 215
```

```
# division  
43/5
```

```
## [1] 8.6
```

For exponents, we raise X to the power of y by using $^$. That is X^y .

```
# raise 43 to the power of 5  
43 ^ 5
```

```
## [1] 147008443
```

Take the square root of some number x by using the function `sqrt()`. That is `sqrt(x)`.

```
# take the square root of 43  
sqrt(43)
```

```
## [1] 6.557439
```

1.1.3 Troubleshooting

- Keep in mind that R follows the order of operations, $2 + 2 * 2$ is equal to 6 and not 8.

```
# correct  
2 + 2 * 2
```

```
## [1] 6
```

```
# incorrect  
(2 + 2) * 2
```

```
## [1] 8
```

1.2 Creating an Object

1.2.1 Problem

You want to create an object to hold a number

1.2.2 Solution

To create an object:

1. type in a name for the object, like `newobject` then
2. use the assignment operator `<-`,
3. input a number, mathematical expression, dataset, or text on the right side of `<-` that you want assigned to the `newobject`

```
# assigning the number 4 to a new object named "myobject"  
myobject <- 4
```



```
# assigning the text "hallelujah hollaback" to a new object named "second_object"
second_object <- "hallelujah hollaback"
```

Type the name of an object in order to see what it contains.

```
myobject
```

```
## [1] 4
```

```
second_object
```

```
## [1] "hallelujah hollaback"
```

1.2.3 Troubleshooting

- There cannot be any spaces in the name of an object. Instead you could use dots, dashes, underscores, or capitalization to distinguish between words: `small.data`, `big-data`, `bigger_data`, `mediumData`.
- Text needs to be in quotation marks in order to be assigned to an object.
- Object names are case sensitive `Myobject` is not the same as `myobject`

1.3 Creating a Vector

A vector is a list of numbers or characters. We will create vectors for a variety of reasons in this course.

1.3.1 Problem

You want to create a vector.

1.3.2 Solution

Use the function `c()` to create a list by separating the entries with a comma.

```
# create a vector called 'prime'
prime <- c(1, 3, 5, 7)
```

```
prime
```

```
## [1] 1 3 5 7
```

```
# create a vector called "first_name"
first_name <- c("Matthew", "Mosi", "Manu", "Ekundayo", "Kwasi")
```

```
first_name
```

```
## [1] "Matthew" "Mosi"      "Manu"      "Ekundayo" "Kwasi"
```

1.3.3 Troubleshooting

- As the name of a function, `c()` is case sensitive. Use the lowercase `c`.
- Make sure that all elements are separated by a comma.
- Vectors are typically assigned to some object.

1.4 Indexing

We can use indexing to pull out specific sets of observations from a vector or dataset.

1.4.1 Problem

You want to select a specific one observation based on its position within a vector or matrix.

1.4.2 Solution

We index by using the brackets `[x, y]` after an object where `x` is the row and `y` is the column.

```
# we have a vector
prime <- c(1, 3, 5, 7)

# we want the number 3, which is the second observation in the vector
prime[2]
```

```
## [1] 3

# we have a matrix
yup <- matrix(c(prime, 2, 6, 10, 14), nrow = 2, ncol = 4, byrow = T)
yup
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    3    5    7
## [2,]    2    6   10   14
```

```
# We want the observation in the first row and fourth column
yup[1, 4]
```

```
## [1] 7
```

1.4.3 Problem

You want to select an entire row or column.

1.4.4 Solution

You can select an entire row by leaving the column index position blank `yup[2,]`. You can select an entire column by leaving the row index position blank `yup[, 2]`.

```
# We have our matrix
```

```
yup
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    3    5    7
## [2,]    2    6   10   14
```

```
# We want the second row
```

```
yup[1, ]
```

```
## [1] 1 3 5 7
```

```
# We want the third column
```

```
yup[ , 3]
```

```
## [1] 5 10
```


Chapter 2

Bivariate Comparisons

2.1 Crosstab

2.1.1 Problem

You want to make a crosstab.

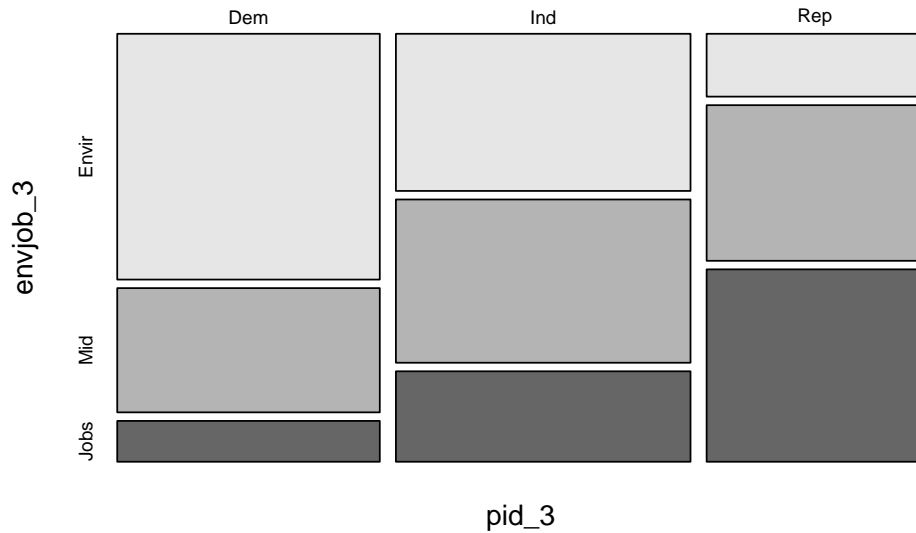
2.1.2 Solution

1. Load the `poliscidata` package.
2. In order to create a crosstab in R, we use the function called `xtp()`.
3. The function follows the following template:

```
xtp(data = your data, y = dependent variable, x = independent variable, w = weights)
```

1. Specify the dataset, the dependent variable, the independent variable, and the weights (if applicable)

```
# Create a crosstab where the dependent variable is "envjob_3", the independent variable is "pid_3"  
# The dataset is "nes", which is found in the "poliscidata" package.  
xtp(data = nes, y = envjob_3, x = pid_3, w = wt)
```



```
##      Cell Contents
## |-----|
## |                      Count |
## |          Column Percent |
## |-----|
##
## =====
##                pid_3
## envjob_3      Dem      Ind      Rep      Total
## -----
## Envir          1005      721      212      1938
##                59.82%   38.25%   15.30%
## -----
## Mid              508      749      525      1782
##                30.24%   39.73%   37.88%
## -----
## Jobs              167      415      649      1231
##                9.94%    22.02%   46.83%
## -----
## Total           1680      1885      1386      4951
##                33.93%   38.07%   27.99%
## =====
```

2.1.3 Troubleshooting

- Make sure that the `poliscidata` package is loaded. Use `library(poliscidata)` to load.

- The arguments for the independent and dependent variables are just the variable names. They do not follow the template of `data$variable`.
- Crosstabs are used when both the independent and dependent variables are categorical. Avoid making a crosstab with numeric data.