Diabetes and Public Housing

Marc Macarulay

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Public Health

University of Washington

2020

Committee:

Clarence Spigner

Alastair Matheson

Program Authorized to Offer Degree: Health Services © Copyright 2020

Marc Macarulay

University of Washington

Abstract

Diabetes and Public Housing

Marc Macarulay

Chair of the Supervisory Committee: Clarence Spigner

Health Services

"Here is my abstract"

Table of Contents

		Page
List of	Figures	ii
List of	Tables	iii
Introd	UCTION	I
Снарте	R I: BACKGROUND AND SIGNIFICANCE	3
I.I	Lists	. 4
I.2	Line breaks	. 4
1.3	R chunks	. 5
I.4	Inline code	. 5
1.5	Including plots	. 6
1.6	Loading and exploring data	. 7
1.7	Additional resources	. 13
Снарте	R 2: METHODS	14
2. I	Study Setting and Study Design	. I4
2.2	Chemistry 101: Symbols	. 15
2.3	Physics	. 16
2.4	Biology	. 16
Снарте	Tables, Graphics, References, and Labels	17
3. I	Tables	. 17
3.2	Figures	. 19
3.3	Footnotes and Endnotes	. 22

3.4	Cross-referencia	ng chapters and sections	2
3.5	Bibliographies		2
3.6	Anything else?		2
Conclu	SION		20
Appendi	x A:	The First Appendix	2
Appendi	x B:	The Second Appendix, for Fun	2
Согорн	ON		30
Referen	ICES		3,

List of Figures

Figure N	Number Pa	ge
3.I	UW logo	19
3.2	Mean Delays by Airline	20
3.3	Subdiv. graph	22
3.4	A Larger Figure, Flipped Upside Down	22

List of Tables

Table Number					J	Page					
I.I	Max Delays by Airline					•	•				I
3.1	Correlation of Inheritance Factors for Parents and Child				 						18

Introduction

This is a test to see if I can reference (Keene, Guo, & Murillo, 2018)

Welcome to the *R Markdown* thesis template. This template is based on (and in many places copied directly from) the UW LaTeX template, but hopefully it will provide a nicer interface for those that have never used TeX or LaTeX before. Using *R Markdown* will also allow you to easily keep track of your analyses in R chunks of code, with the resulting plots and output included as well. The hope is this *R Markdown* template gets you in the habit of doing reproducible research, which benefits you long-term as a researcher, but also will greatly help anyone that is trying to reproduce or build onto your results down the road.

Hopefully, you won't have much of a learning period to go through and you will reap the benefits of a nicely formatted thesis. The use of LaTeX in combination with *Markdown* is more consistent than the output of a word processor, much less prone to corruption or crashing, and the resulting file is smaller than a Word file. While you may have never had problems using Word in the past, your thesis is likely going to be at least twice as large and complex as anything you've written before, taxing Word's capabilities. After working with *Markdown* and R together for a few weeks, we are confident this will be your reporting style of choice going forward.

Why use it?

R Markdown creates a simple and straightforward way to interface with the beauty of LaTeX. Packages

have been written in R to work directly with LaTeX to produce nicely formatting tables and paragraphs. In addition to creating a user friendly interface to LaTeX, *R Markdown* also allows you to read in your data, to analyze it and to visualize it using R functions, and also to provide the documentation and commentary on the results of your project. Further, it allows for R results to be passed inline to the commentary of your results. You'll see more on this later.

Who should use it?

Anyone who needs to use data analysis, math, tables, a lot of figures, complex cross-references, or who just cares about the final appearance of their document should use *R Markdown*. Of particular use should be anyone in the sciences, but the user-friendly nature of *Markdown* and its ability to keep track of and easily include figures, automatically generate a table of contents, index, references, table of figures, etc. should make it of great benefit to nearly anyone writing a thesis project.

Background and Significance

This is a test to see if I can reference(Keene et al., 2018)

Here is a brief introduction into using *R Markdown*. *Markdown* is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. *R Markdown* provides the flexibility of *Markdown* with the implementation of R input and output. For more details on using *R Markdown* see http://rmarkdown.rstudio.com.

Be careful with your spacing in *Markdown* documents. While whitespace largely is ignored, it does at times give *Markdown* signals as to how to proceed. As a habit, try to keep everything left aligned whenever possible, especially as you type a new paragraph. In other words, there is no need to indent basic text in the Rmd document (in fact, it might cause your text to do funny things if you do).

I.I LISTS

It's easy to create a list. It can be unordered like

- Item 1
- Item 2

or it can be ordered like

- I. Item I
- 2. Item 2

Notice that I intentionally mislabeled Item 2 as number 4. *Markdown* automatically figures this out! You can put any numbers in the list and it will create the list. Check it out below.

To create a sublist, just indent the values a bit (at least four spaces or a tab). (Here's one case where indentation is key!)

- ı. İtem ı
- 2. Item 2
- 3. Item 3
 - Item 3a
 - Item 3b

1.2 LINE BREAKS

Make sure to add white space between lines if you'd like to start a new paragraph. Look at what happens below in the outputted document if you don't:

Here is the first sentence. Here is another sentence. Here is the last sentence to end the paragraph. This should be a new paragraph.

Now for the correct way:

Here is the first sentence. Here is another sentence. Here is the last sentence to end the paragraph.

This should be a new paragraph.

1.3 R CHUNKS

When you click the Knit button above a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this (cars is a built-in R dataset):

summary(cars)

spe	dist						
Min.	: 4.0	Min.	:	2.00			
1st Qu.	:12.0	1st Qu.	:	26.00			
Median	:15.0	Median	:	36.00			
Mean	:15.4	Mean	:	42.98			
3rd Qu.	:19.0	3rd Qu.	:	56.00			
Max.	:25.0	Max.	:1	L20.00			

I.4 INLINE CODE

If you'd like to put the results of your analysis directly into your discussion, add inline code like this:

The cos of 2π is 1.

Another example would be the direct calculation of the standard deviation:

The standard deviation of speed in cars is 5.2876444.

One last neat feature is the use of the ifelse conditional statement which can be used to output text depending on the result of an R calculation:

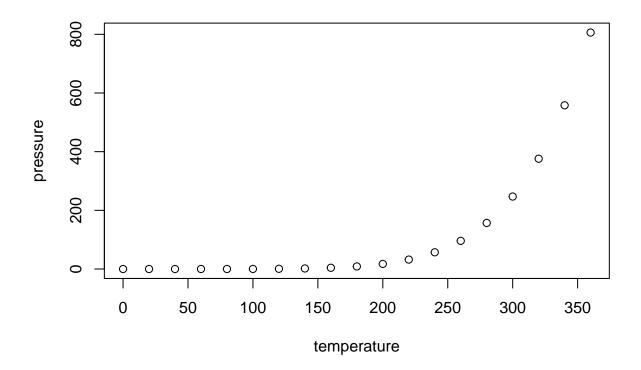
The standard deviation is less than 6.

Note the use of > here, which signifies a quotation environment that will be indented.

As you see with \$2 \pi\$ above, mathematics can be added by surrounding the mathematical text with dollar signs. More examples of this are in [Mathematics and Science] if you uncomment the code in [Math].

1.5 Including plots

You can also embed plots. For example, here is a way to use the base R graphics package to produce a plot using the built-in pressure dataset:



Note that the echo=FALSE parameter was added to the code chunk to prevent printing of the R code that generated the plot. There are plenty of other ways to add chunk options. More information is available at http://yihui.name/knitr/options/.

Another useful chunk option is the setting of cache=TRUE as you see here. If document rendering becomes time consuming due to long computations or plots that are expensive to generate you can use knitr caching to improve performance. Later in this file, you'll see a way to reference plots created in R or external figures.

i.6 Loading and exploring data

Included in this template is a file called flights.csv. This file includes a subset of the larger dataset of information about all flights that departed from Seattle and Portland in 2014. More information about

this dataset and its R package is available at http://github.com/ismayc/pnwflights14. This subset includes only Portland flights and only rows that were complete with no missing values. Merges were also done with the airports and airlines data sets in the pnwflights14 package to get more descriptive airport and airline names.

We can load in this data set using the following command:

```
flights <- read.csv("data/flights.csv")</pre>
```

The data is now stored in the data frame called flights in R. To get a better feel for the variables included in this dataset we can use a variety of functions. Here we can see the dimensions (rows by columns) and also the names of the columns.

```
dim(flights)
```

[1] 52808 16

names(flights)

```
[1] "month" "day" "dep_time" "dep_delay" "arr_time"
[6] "arr_delay" "carrier" "tailnum" "flight" "dest"
[11] "air_time" "distance" "hour" "minute" "carrier_name"
```

[16] "dest_name"

Another good idea is to take a look at the dataset in table form. With this dataset having more than 50,000 rows, we won't explicitly show the results of the command here. I recommend you enter the command into the Console *after* you have run the R chunks above to load the data into R.

```
View(flights)
```

While not required, it is highly recommended you use the dplyr package to manipulate and summarize your data set as needed. It uses a syntax that is easy to understand using chaining operations. Below I've created a few examples of using dplyr to get information about the Portland flights in 2014. You will also see the use of the ggplot2 package, which produces beautiful, high-quality academic visuals.

We begin by checking to ensure that needed packages are installed and then we load them into our current working environment:

```
# List of packages required for this analysis
pkg <- c("dplyr", "ggplot2", "knitr", "bookdown", "devtools")
# Check if packages are not installed and assign the
# names of the packages not installed to the variable new.pkg
new.pkg <- pkg[!(pkg %in% installed.packages())]
# If there are any packages in the list that aren't installed,
# install them
if (length(new.pkg))
   install.packages(new.pkg, repos = "http://cran.rstudio.com")
# Load packages (huskydown will load all of the packages as well)
library(huskydown)</pre>
```

The example we show here does the following:

- Selects only the carrier_name and arr_delay from the flights dataset and then assigns this subset to a new variable called flights 2.
- Using flights2, we determine the largest arrival delay for each of the carriers.

```
library(dplyr)

Attaching package: 'dplyr'

The following objects are masked from 'package:stats':
    filter, lag

The following objects are masked from 'package:base':
    intersect, setdiff, setequal, union

flights2 <- flights %>%
    select(carrier_name, arr_delay)

max_delays <- flights2 %>%
    group_by(carrier_name) %>%
    summarize(max_arr_delay = max(arr_delay, na.rm = TRUE))
```

A useful function in the knitr package for making nice tables in *R Markdown* is called kable. It is much easier to use than manually entering values into a table by copying and pasting values into Excel or LaTeX. This again goes to show how nice reproducible documents can be! (Note the use of results="asis", which will produce the table instead of the code to create the table.) The caption. short argument is used to include a shorter title to appear in the List of Tables.

library(knitr)

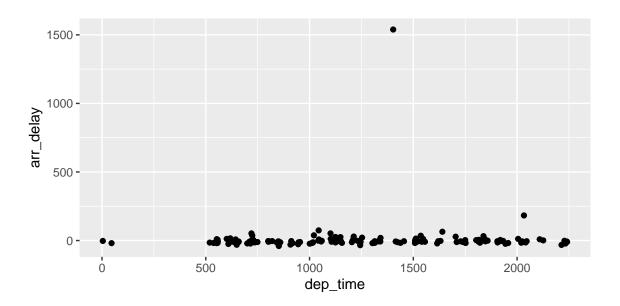
Table 1.1: Maximum Delays by Airline

Airline	Max Arrival Delay
Alaska Airlines Inc.	338
American Airlines Inc.	1539
Delta Air Lines Inc.	651
Frontier Airlines Inc.	575
Hawaiian Airlines Inc.	407
JetBlue Airways	273
SkyWest Airlines Inc.	421
Southwest Airlines Co.	694
United Air Lines Inc.	472
US Airways Inc.	347
Virgin America	366

The last two options make the table a little easier-to-read.

We can further look into the properties of the largest value here for American Airlines Inc. To do so, we can isolate the row corresponding to the arrival delay of 1539 minutes for American in our original flights dataset.

We see that the flight occurred on March 3rd and departed a little after 2 PM on its way to Dallas/Fort Worth. Lastly, we show how we can visualize the arrival delay of all departing flights from Portland on March 3rd against time of departure.



1.7 Additional resources

- Markdown Cheatsheet https://github.com/adam-p/markdown-here/wiki/
 Markdown-Cheatsheet
- R Markdown Reference Guide https://www.rstudio.com/wp-content/uploads/2015/ 03/rmarkdown-reference.pdf
- Introduction to dplyr-https://cran.rstudio.com/web/packages/dplyr/vignettes/ introduction.html
- ggplot2 Documentation http://docs.ggplot2.org/current/

7

Methods

2.1 STUDY SETTING AND STUDY DESIGN

TEX is the best way to typeset mathematics. Donald Knuth designed TEX when he got frustrated at how long it was taking the typesetters to finish his book, which contained a lot of mathematics. One nice feature of *R Markdown* is its ability to read LaTeX code directly.

If you are doing a thesis that will involve lots of math, you will want to read the following section which has been commented out. If you're not going to use math, skip over or delete this next commented section.

15

2.2 CHEMISTRY 101: SYMBOLS

Chemical formulas will look best if they are not italicized. Get around math mode's automatic italicizing in LaTeX by using the argument \$\mathrm{formula here}\$, with your formula inside the curly brackets. (Notice the use of the backticks here which enclose text that acts as code.)

So,
$$Fe_2^{2+}Cr_2O_4$$
 is written $\mathrm{Fe_2^{4}Cr_2O_4}$;

Exponent or Superscript: O⁻

Subscript: CH₄

To stack numbers or letters as in Fe_2^{2+} , the subscript is defined first, and then the superscript is defined.

Bullet: CuCl • 7H2O

Delta: Δ

Reaction Arrows: \longrightarrow or $\xrightarrow{solution}$

Resonance Arrows: \leftrightarrow

2.2.1 Typesetting reactions

You may wish to put your reaction in an equation environment, which means that LaTeX will place the reaction where it fits and will number the equations for you.

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$$
 (2.1)

We can reference this combustion of glucose reaction via Equation (2.1).

2.2.2 OTHER EXAMPLES OF REACTIONS

$$NH_4Cl_{(s)}\mathop{\Longrightarrow} NH_{3(g)}+HCl_{(g)}$$

$$MeCH_2Br + Mg \xrightarrow[below]{above} MeCH_2 \bullet Mg \bullet Br$$

2.3 PHYSICS

Many of the symbols you will need can be found on the math page http://web.reed.edu/cis/help/latex/math.html and the Comprehensive LaTeX Symbol Guide (http://mirror.utexas.edu/ctan/info/symbols/comprehensive/symbols-letter.pdf).

2.4 BIOLOGY

You will probably find the resources at http://www.lecb.ncifcrf.gov/~toms/latex.html helpful, particularly the links to bsts for various journals. You may also be interested in TeXShade for nucleotide typesetting (http://homepages.uni-tuebingen.de/beitz/txe.html). Be sure to read the proceeding chapter on graphics and tables.

3

Tables, Graphics, References, and Labels

3.1 TABLES

By far the easiest way to present tables in your thesis is to store the contents of the table in a CSV or Excel file, then read that file in to your R Markdown document as a data frame. Then you can style the table with the kable function, or functions in the kableExtra pacakge.

In addition to the tables that can be automatically generated from a data frame in R that you saw in [R Markdown Basics] using the kable function, you can also create tables using *pandoc*. (More information is available at http://pandoc.org/README.html#tables.) This might be useful if you don't have values specifically stored in R, but you'd like to display them in table form. Below is an example. Pay

careful attention to the alignment in the table and hyphens to create the rows and columns. Generally I don't recommend this approach of typing the table directly into your R Markdown document.

Table 3.1: Correlation of Inheritance Factors for Parents and Child

Factors	Correlation between Parents & Child	Inherited
Education	-0.49	Yes
Socio-Economic Status	0.28	Slight
Income	0.08	No
Family Size	0.18	Slight
Occupational Prestige	0.21	Slight

We can also create a link to the table by doing the following: Table 3.1. If you go back to Loading and exploring data and look at the kable table, we can create a reference to this max delays table too: Table 1.1. The addition of the (\#tab:inher) option to the end of the table caption allows us to then make a reference to Table \@ref(tab:label). Note that this reference could appear anywhere throughout the document after the table has appeared.



Figure 3.1: UW logo

3.2 FIGURES

If your thesis has a lot of figures, *R Markdown* might behave better for you than that other word processor. One perk is that it will automatically number the figures accordingly in each chapter. You'll also be able to create a label for each figure, add a caption, and then reference the figure in a way similar to what we saw with tables earlier. If you label your figures, you can move the figures around and *R Markdown* will automatically adjust the numbering for you. No need for you to remember! So that you don't have to get too far into LaTeX to do this, a couple R functions have been created for you to assist. You'll see their use below.

In the R chunk below, we will load in a picture stored as uw.png in our main directory. We then give it the caption of "UW logo", the label of "uwlogo", and specify that this is a figure. Make note of the different R chunk options that are given in the R Markdown file (not shown in the knitted document).

include_graphics(path = "figure/uw.png")

Here is a reference to the UW logo: Figure 3.1. Note the use of the fig: code here. By naming the R chunk that contains the figure, we can then reference that figure later as done in the first sentence here. We can also specify the caption for the figure via the R chunk option fig.cap.

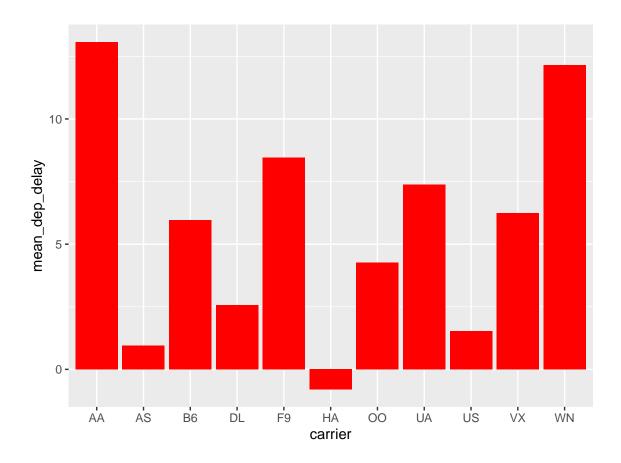


Figure 3.2: Mean Delays by Airline

Below we will investigate how to save the output of an R plot and label it in a way similar to that done above. Recall the flights dataset from Chapter I. (Note that we've shown a different way to reference a section or chapter here.) We will next explore a bar graph with the mean flight departure delays by airline from Portland for 2014. Note also the use of the scale parameter which is discussed on the next page.

```
flights %>% group_by(carrier) %>%
  summarize(mean_dep_delay = mean(dep_delay)) %>%
  ggplot(aes(x = carrier, y = mean_dep_delay)) +
  geom_bar(position = "identity", stat = "identity", fill = "red")
```

Here is a reference to this image: Figure 3.2.

A table linking these carrier codes to airline names is available at https://github.com/ismayc/pnwflights14/blob/master/data/airlines.csv.

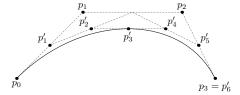


Figure 3.3: Subdiv. graph

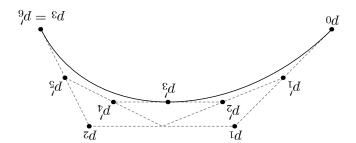


Figure 3.4: A Larger Figure, Flipped Upside Down

Next, we will explore the use of the out.extra chunk option, which can be used to shrink or expand an image loaded from a file by specifying "scale=". Here we use the mathematical graph stored in the "subdivision.pdf" file. Here is a reference to this image: Figure 3.3. Note that echo=FALSE is specified so that the R code is hidden in the document.

More Figure Stuff

Lastly, we will explore how to rotate and enlarge figures using the out.extra chunk option. (Currently this only works in the PDF version of the book.) As another example, here is a reference: Figure 3.4.

3.3 FOOTNOTES AND ENDNOTES

You might want to footnote something. ¹ The footnote will be in a smaller font and placed appropriately. Endnotes work in much the same way.

¹footnote text

3.4 Cross-referencing chapters and sections

The bookdown documentation is an excellent source for learning how to cross-reference in a bookdown project such as a huskydown document. Here we only cover the most common uses for a typical thesis. If you want something more complex or fancy, please refer to the bookdown documentation and seek help from the developers of that package.

By default, all of your chapter and section headers will get an auto-generated ID label For example, e.g., # Chapter 1 will have an auto-generated ID chapter-1. Note that the ID label is all lower case, and has no spaces. If you have any kind of punctuation in your header, such as a colon (:), it will not appear in the ID label. Then in your text you can reference chapter one in your Rmd file like this: 'as discussed in Chapter \@ref(chapter-1)', which will print as 'as discussed in Chapter 1'

We strongly recommend that you to manually assign ID labels to your chapter header to make it easy to cross-reference. For example, at the top of the Rmd file for this chapter, you can see:

Tables, Graphics, References, and Labels {#ref-labels}

The {#ref-labels} part of this header is the ID label. It doesn't show in the output, but is there for us to use for easy cross-referencing, because it can be short, and we don't need to change it elsewhere our document when we update the chapter header. We can use this custom ID label in our Rmd document like this: 'as discussed in Chapter \@ref(ref-labels)', which will print as 'as discussed in Chapter 3'. If you need to show custom text instead of the chapter number, you use this syntax in your Rmd document: see [my chapter about labels] (#ref-labels) for more details which will appear as 'see my chapter about labels for more details'

To cross-reference a specific section in the same chapter, we recommend adding a custom ID label to the section header, and using that to cross-reference. For example, earlier in this chapter we have a section on tables and in the Rmd file we see ## Tables {#tables}. We can cross-reference that in the text like this 'as discussed in the section on [tables] (#tables)' which will appear as 'as discussed in the above section on tables'

To cross-reference a section in a different chapter we can use the ID label from that section directly. For example, we can write in our Rmd document as discussed in the section on [R code chunks] (#r-chunks) in Chapter \@ref(rmd-basics) which will appear as 'as discussed in the section on R code chunks in Chapter 1'.

If you prefer to cross-reference by the section number, we can use custom ID labels in our Rmd document. For example, to refer to a section in our first chapter, we can write in the Rmd document: as discussed in section \@ref(r-chunks) in Chapter \@ref(rmd-basics). This will appear with section and chapter numbers like so: as 'as discussed in section 1.3 in Chapter 1'.

3.5 Bibliographies

Of course you will need to cite things, and you will probably accumulate an armful of sources. There are a variety of tools available for creating a bibliography database (stored with the .bib extension). In addition to BibTeX suggested below, you may want to consider using the free and easy-to-use tool called Zotero. Some Zotero documentation is at http://libguides.reed.edu/citation/zotero. In addition, a tutorial is available from Middlebury College at http://sites.middlebury.edu/zoteromiddlebury/.

R Markdown uses pandoc (http://pandoc.org/) to build its bibliographies. One nice caveat of this is that you won't have to do a second compile to load in references as standard LaTeX requires. To cite references in your thesis (after creating your bibliography database), place the reference name inside square brackets and precede it by the "at" symbol. For example, here's a reference to a book about worrying: (???). This Molina1994 entry appears in a file called thesis.bib in the bib folder. This bibliography database file was created by a program called BibTeX. You can call this file something else if you like (look at the YAML header in the main .Rmd file) and, by default, is to placed in the bib folder.

For more information about BibTeX and bibliographies, see (http://web.reed.edu/cis/help/latex/index.html)². There are three pages on this topic: bibtex (which talks about using BibTeX,

at http://web.reed.edu/cis/help/latex/bibtex.html), bibtexstyles (about how to find and use the bibliography style that best suits your needs, at http://web.reed.edu/cis/help/latex/bibtexstyles.html) and bibman (which covers how to make and maintain a bibliography by hand, without BibTeX, at http://web.reed.edu/cis/help/latex/bibman.html). The last page will not be useful unless you have only a few sources.

If you look at the YAML header at the top of the main .Rmd file you can see that we can specify the style of the bibliography by referencing the appropriate csl file. You can download a variety of different style files at https://www.zotero.org/styles. Make sure to download the file into the csl folder.

Tips for Bibliographies

- Like with thesis formatting, the sooner you start compiling your bibliography for something as large as thesis, the better.
- The cite key (a citation's label) needs to be unique from the other entries.
- When you have more than one author or editor, you need to separate each author's name by the word "and" e.g. Author = {Noble, Sam and Youngberg, Jessica},.
- Bibliographies made using BibTeX (whether manually or using a manager) accept LaTeX markup, so you can italicize and add symbols as necessary.
- To force capitalization in an article title or where all lowercase is generally used, bracket the capital letter in curly braces.

3.6 Anything else?

If you'd like to see examples of other things in this template, please contact us (email bmarwick@uw.edu) with your suggestions. We love to see people using *R Markdown* for their theses, and are happy to help.

Conclusion

If we don't want Conclusion to have a chapter number next to it, we can add the {-} attribute.

More info

And here's some other random info: the first paragraph after a chapter title or section head *shouldn't be* indented, because indents are to tell the reader that you're starting a new paragraph. Since that's obvious after a chapter or section title, proper typesetting doesn't add an indent there.

A

The First Appendix

This first appendix includes all of the R chunks of code that were hidden throughout the document (using the include = FALSE chunk tag) to help with readibility and/or setup.

In the main Rmd file

```
# This chunk ensures that the huskydown package is
# installed and loaded. This huskydown package includes
# the template files for the thesis.
if(!require(devtools))
  install.packages("devtools", repos = "http://cran.rstudio.com")
```

```
if(!require(huskydown))
  devtools::install_github("benmarwick/huskydown")
library(huskydown)
In Chapter 3:
# This chunk ensures that the huskydown package is
# installed and loaded. This huskydown package includes
# the template files for the thesis and also two functions
# used for labeling and referencing
if(!require(devtools))
  install.packages("devtools", repos = "http://cran.rstudio.com")
if(!require(dplyr))
    install.packages("dplyr", repos = "http://cran.rstudio.com")
if(!require(ggplot2))
    install.packages("ggplot2", repos = "http://cran.rstudio.com")
if(!require(ggplot2))
    install.packages("bookdown", repos = "http://cran.rstudio.com")
if(!require(huskydown)){
  library(devtools)
  devtools::install_github("benmarwick/huskydown")
  }
library(huskydown)
flights <- read.csv("data/flights.csv")</pre>
```

3

The Second Appendix, for Fun

Colophon

This document is set in EB Garamond, Source Code Pro and Lato. The body text is set at 11pt with EBGaramond(3).

It was written in R Markdown and ETEX, and rendered into PDF using huskydown and bookdown.

This document was typeset using the XeTeX typesetting system, and the University of Washington Thesis class class created by Jim Fox. Under the hood, the University of Washington Thesis LaTeX template is used to ensure that documents conform precisely to submission standards. Other elements of the document formatting source code have been taken from the Latex, Knitr, and RMarkdown templates for UC Berkeley's graduate thesis, and Dissertate: a LaTeX dissertation template to support the production and typesetting of a PhD dissertation at Harvard, Princeton, and NYU

The source files for this thesis, along with all the data files, have been organised into an R package, xxx, which is available at https://github.com/xxx/xxx. A hard copy of the thesis can be found in the University of Washington library.

This version of the thesis was generated on 2020-05-09 17:34:50. The repository is currently at this commit:

The computational environment that was used to generate this version is as follows:

- Session	info	
setting	value	

```
version R version 3.6.1 (2019-07-05)
os
        Windows 10 x64
system
        x86_64, mingw32
         RTerm
иi
language (EN)
collate English_United States.1252
         English_United States.1252
ctype
         America/Los_Angeles
tz
         2020-05-09
```

date

* version date lib source package assertthat 0.2.1 2019-03-21 [1] CRAN (R 3.6.1) backports 1.1.4 2019-04-10 [1] CRAN (R 3.6.0) 0.18.1 2020-05-01 [1] Github (rstudio/bookdown@cd97d40) bookdown callr 2019-07-18 [1] CRAN (R 3.6.1) 3.3.1 cli 2019-03-19 [1] CRAN (R 3.6.1) 1.1.0 colorspace 1.4-1 2019-03-18 [1] CRAN (R 3.6.1) crayon 1.3.4 2017-09-16 [1] CRAN (R 3.6.1) desc 1.2.0 2018-05-01 [1] CRAN (R 3.6.2) devtools * 2.2.1 2019-09-24 [1] CRAN (R 3.6.2) digest 0.6.20 2019-07-04 [1] CRAN (R 3.6.1) * 0.8.3 2019-07-04 [1] CRAN (R 3.6.1) dplyr ellipsis 0.3.0 2019-09-20 [1] CRAN (R 3.6.2) 2019-05-28 [1] CRAN (R 3.6.1) evaluate 0.14 fs 2019-05-06 [1] CRAN (R 3.6.1) 1.3.1 2019-06-16 [1] CRAN (R 3.6.0) ggplot2 * 3.2.0 git2r 0.26.1 2019-06-29 [1] CRAN (R 3.6.2)

```
glue
              1.3.1
                      2019-03-12 [1] CRAN (R 3.6.1)
gtable
              0.3.0
                      2019-03-25 [1] CRAN (R 3.6.1)
highr
              0.8
                      2019-03-20 [1] CRAN (R 3.6.1)
                      2019-10-04 [1] CRAN (R 3.6.2)
htmltools
              0.4.0
                      2020-05-01 [1] Github (benmarwick/huskydown@a909835)
huskydown
            * 0.0.5
knitr
            * 1.27
                      2020-01-16 [1] CRAN (R 3.6.2)
labeling
                      2014-08-23 [1] CRAN (R 3.6.0)
              0.3
lazyeval
              0.2.2
                      2019-03-15 [1] CRAN (R 3.6.1)
                      2014-11-22 [1] CRAN (R 3.6.1)
              1.5
magrittr
memoise
              1.1.0
                      2017-04-21 [1] CRAN (R 3.6.2)
              0.5.0
                      2018-06-12 [1] CRAN (R 3.6.1)
munsell
              1.4.2
                      2019-06-29 [1] CRAN (R 3.6.1)
pillar
pkgbuild
              1.0.6
                      2019-10-09 [1] CRAN (R 3.6.2)
                      2018-08-16 [1] CRAN (R 3.6.1)
              2.0.2
pkgconfig
                      2018-10-29 [1] CRAN (R 3.6.2)
pkgload
              1.0.2
prettyunits
              1.0.2
                      2015-07-13 [1] CRAN (R 3.6.1)
              3.4.0
                      2019-07-03 [1] CRAN (R 3.6.1)
processx
              1.3.0
                      2018-12-21 [1] CRAN (R 3.6.1)
ps
              0.3.3
                      2019-10-18 [1] CRAN (R 3.6.2)
purrr
R6
              2.4.0
                      2019-02-14 [1] CRAN (R 3.6.1)
              1.0.1
                      2019-03-17 [1] CRAN (R 3.6.1)
Rcpp
remotes
              2.1.0
                      2019-06-24 [1] CRAN (R 3.6.2)
              0.4.3
                      2020-01-24 [1] CRAN (R 3.6.2)
rlang
rmarkdown
              2.1
                      2020-01-20 [1] CRAN (R 3.6.3)
                      2018-01-03 [1] CRAN (R 3.6.1)
rprojroot
              1.3-2
rstudioapi
                      2019-03-19 [1] CRAN (R 3.6.1)
              0.10
scales
              1.0.0
                      2018-08-09 [1] CRAN (R 3.6.1)
sessioninfo
              1.1.1
                      2018-11-05 [1] CRAN (R 3.6.2)
```

```
stringi
              1.4.3
                      2019-03-12 [1] CRAN (R 3.6.0)
                      2019-02-10 [1] CRAN (R 3.6.1)
stringr
              1.4.0
testthat
              2.3.1
                      2019-12-01 [1] CRAN (R 3.6.2)
                      2019-06-06 [1] CRAN (R 3.6.1)
tibble
              2.1.3
tidyselect
              0.2.5
                      2018-10-11 [1] CRAN (R 3.6.1)
            * 1.6.1
                      2020-04-29 [1] CRAN (R 3.6.3)
usethis
withr
                      2018-03-15 [1] CRAN (R 3.6.1)
              2.1.2
xfun
             0.8
                      2019-06-25 [1] CRAN (R 3.6.1)
yaml
              2.2.0
                      2018-07-25 [1] CRAN (R 3.6.0)
```

- [1] C:/Users/Marc/Documents/R/win-library/3.6
- [2] C:/Program Files/R/R-3.6.1/library

References 34

References

Keene, D. E., Guo, M., & Murillo, S. (2018). "That wasn't really a place to worry about diabetes": Housing access and diabetes self-management among low-income adults. *Social Science & Medicine*, 197, 71–77. http://doi.org/10.1016/J.SOCSCIMED.2017.11.051