

# Open tools for writing open interactive textbooks (and more)

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## 4.6 Update the online github repository

1. Any time you change a file, git will track all of the changes that you make
2. To submit changes, choose the commit button
3. All of your changes will now be uploaded to the online repository.



## Chapter 5

# Hypothes.is

Hypothes.is is a web-browser add-on for annotating the web via inline commenting. This allows anyone to select a snippet of text in a web-browser and then post a comment about the selected text. Annotations can be made publicly or privately. All public annotations can be viewed by anyone else running hypothesis on the same website. Using Hypothesis with your web-book allows you to engage students in interacting with the textbook by allowing them to contribute to content generation (by posting new content), or content revision (by tagging sections in need of revision).

If you publish your bookdown book as a webpage, then you anyone with Hypothes.is can use it to annotate the textbook.

### 5.1 A case study example

I recently compiled a Research Methods in Psychology textbook using the tools described in this tutorial. The landing page describes how Hypothes.is can be used in conjunction with the textbook.

In class I assigned students the task of downloading Hypothes.is, creating a Hypothes.is account, and then throughout the course gave them various assignments where they were responsible for annotating parts of the textbook.

For example, in one assignment I had students annotate sections of the textbook that were in need of improvement. This allows students to participate in content revision as they read the textbook. Other assignments could include focused online discussion about textbook content using annotations, or using annotations as a way for students to add content to the textbook.

## 5.2 hypothesisr

`hypothesisr` is an R package for scraping annotation data collected through the hypothesis app. All public annotations submitted through hypothesis to any website are publically available for download. As a result, the `hypothesisr` package can be used to download and process the annotations submitted to your website.

## 5.3 Hypothesis Explorer

As a part of this project, we have created a Shiny app that conveniently displays and manipulates hypothesis annotation databases in a website. The Shiny app is located in this github repository, [https://github.com/CrumpLab/hypothesis\\_explorer](https://github.com/CrumpLab/hypothesis_explorer)

### 5.3.1 Web-based version

A web-based version of the app can be accessed here: <https://hypothesis-explorer.herokuapp.com>. Note the website currently times out after 55 seconds of inactivity. Reload the page to restart the app. This web-version is currently in beta testing.

### 5.3.2 Running the app locally

To run this app you need to have R and R-Studio installed on your computer. You will also need to have downloaded the Shiny and `hypothesisr` packages. You can run the app by either of the following methods

1. You can download the `hypothesis_explorer` repository as a .zip file, then open the `server.R`, or `ui.R` files in R-studio and click run-app
2. You can have R-studio automatically download and the run app using by entering the following in the command line

```
shiny::runGitHub('hypothesis_explorer', 'CrumpLab')
```

## 5.4 Downloading annotations

The Hypothesis Explorer app currently implements two main functions: **downloading** and **displaying/searching** parts of the publicly available Hypothes.is annotation database.

**Download the annotation database associated with a website:** Type in the name of the website in the search bar. To see an example, enter “crumplab” into the website search and click the download button.

**NOTE OF CAUTION** We use the `hypothesisr` package to scrape parts of the entire Hypothes.is annotation database. As a result, there are some nuances in searching for particular websites that may cause you to accidentally download all of the annotations to a global domain rather than to a particular website.

For example, I have two web-books published on my github domain, these are:

1. <https://www.crumplab.github.io/ResearchMethods>
2. <https://www.crumplab.github.io/programmingforpsych>

I am interested in using the Shiny app to look at only the annotations associated with these two websites. Using “crumplab” as the website will download all of the annotations associated with all subdomains on the site, so it will download annotations for both textbooks. On the other hand, including global domain information by searching “crumplab.github.io” will cause an attempt to download all annotations associated with the entire github domain, which will cause the Shiny app to crash.

## 5.5 Viewing the annotations Search and subset the database

Hypothesis explorer should automatically download any annotations associated with the website that you entered. At the moment, we have only tested this for websites built with github pages.

After the annotation database has been downloaded the two viewable tabs “Summary”, and “Data” will be autopopulated. The Summary tab gives an overview of the top annotated documents, pages, tags and users. The Data tab presents the entire database.

### 5.5.1 Viewing all the variables in the database

The left-hand panel includes a “Variables (in Data View)” text box. Click into the box to see all of the names of each variable (column names) in the database. Clicking one of the variable names will add it to the list, and automatically display the content of that column in the database viewer. Likewise, deleting variable names will hide those columns from being displayed.

### 5.5.2 Subsetting the data

For quickly collapsing aspects of the data by row information, we have four subsetting operations, for displaying only annotations associated with particular documents (e.g., entire books), pages (chapters within a book), tags (associated with each annotation), and users.

### 5.5.3 Voting feature

When a user submits an annotation, other users can post comments underneath the annotation. For example, if a student highlights a section of the textbook and comments that this section should be improved, another student could reply to the original comment. We have implemented a rudimentary comment voting system using these features of hypothesis. For example, up/down style voting can be implemented by instructing users to vote by using the reply feature. Specifically, up votes can be registered by replying with a numeric value of 1, and down votes can be registered by replying with a numeric value of -1.

Hypothesis Explorer automatically looks for any child posts that contain 1s or -1s, counts the total vote for each parent comment, and then displays the count in a column variable called “votes”.

## Chapter 6

# Zotero

Zotero is a free, cross-platform tool to help you collect, organize, cite, and share your research sources. Zotero is similar to Mendeley or EndNote.

The purpose of this chapter is to show how Zotero can be used as a reference manager to allow you to cite works in your book, and automatically compile bibliographies or reference sections. The bookdown package uses Latex bibliography files to generate citations and create bibliographies. These .bib files are text-based files with a specific syntax for coding the relevant information in a citation. Each citation in a .bib file has an associated key that is inserted into an Rmarkdown document to generate a citation. We will use Zotero to avoid writing our own .bib from scratch. Instead, there are convenient methods for populating Zotero with a database of references, and for compiling a .bib file from a Zotero database that can be used in bookdown.

### 6.1 Getting Started

1. Create an account with Zotero, click register in the top-right corner
2. Download the Zotero Desktop app
3. Download the Zotero Connector extension for your web-browser

Zotero operates on the cloud as well as on your desktop. You can connect your online Zotero account with your desktop app in the preferences.

### 6.2 Populating Zotero with references

There are multiple ways to import references into Zotero. In the Zotero desktop app you can create folders to organize your references.

### 6.2.1 Drag and Drop .pdfs

1. Create a new folder and name it
2. Drag and drop .pdfs into the folder
3. Highlight the .pdfs, then right-click, and choose “retrieve metadata for pdf”.
4. For most journal articles, Zotero will be able to automatically find the citation information for your .pdf. This will convert the .pdf into a Zotero citation that includes both the citation information, as well as the .pdf

### 6.2.2 Import citations and pdfs from the web

1. Ensure that your Desktop app is open, and that you have installed the Zotero plugin for your web-browser
2. Use google scholar to search for an article
3. Click the Zotero button in your web-browser
4. You should see a list of all of the articles on the google scholar page.
5. Click any or all the articles you want to import, then import them
6. Zotero will download the citation information along with any associated .pdf to the current folder that is open in the Zotero desktop app.

Zotero is fairly flexible, so the above process will generally work when you are accessing many different databases, and journal web-pages for specific articles.

### 6.2.3 A note of caution

The citation information that Zotero downloads is sometimes inaccurate. Be sure to check the fields for each of your citations to ensure they are accurate. For example, page ranges are often missing.

## 6.3 Generating a .bib file

1. Right-click a Zotero folder
2. Choose “Export Collection”
3. Choose “Bibtex”
4. Save the file
5. Copy the file into the folder for your bookdown project
6. add the file to the bibliography line in the Index.Rmd file.



## 6.4 Citing references in an RMarkdown file

Citations are added using the following format `@citationkey`, or `[@citationkey]` to place the author, year citation in parentheses. The citation key name is listed for each citation in the bib file. Here are a couple of links with some additional examples: [examples from bookdown](#), and [examples from RMarkdown](#).

The source code for this book contains two .bib files: `book.bib` and `packages.bib`. Each citation in those files has an associated citation key. Here is an example of citing the bookdown package (Xie, 2015). This is an example of citing R-core team (R Core Team, 2016)

### 6.4.1 Cite while you write

A minor inconvenience when using .bib for citations in Rmarkdown is that you have to know the citation key, and these are easy to forget. One option is to load up your .bib file, then search through it to find the citation key.

Another option is to download and install the `citr` package. Once this package is installed, you can use its `cite while you write` feature. Click the tools menu, addins, then, insert citations. This will open up a window showing all of the citations in your bib files. You can click multiple citations, and then insert the citation keys into your Rmarkdown document. This is a convenient method for quickly finding needed citation keys. I recommend first opening the `index.rmd` file (which points to your .bib files), and then opening the insert citations tool; this will allow the tool to find your .bib files. After this point, you should be able to use the tool when you are working within .Rmd files for each chapter.



## Chapter 7

# Shiny

Shiny is an R package for creating a web site to interact with R. For example, a website could include various widgets for user input. User input data gets sent to a server running R, which then executes R code. Output from R can be sent back to the webpage in the form of data tables and graphs. A working example using the default shiny app available in R-studio is presented below. Note the shiny app will only display in the web-book version of this tutorial, and not the .pdf or epub versions.

```
knitr::include_app("https://shiny-crump-test.herokuapp.com",  
  height = "600px")
```

In the above example, the shiny app has loaded a dataset into R and plotted a histogram. The sidepanel contains a scrollbar that allows a user to change the bin-size of the histogram. When the scrollbar is moved the new bin-size settings are sent to the server, R recomputes the histogram, and the website dynamically shows a histogram with new bin-sizes.

This example shiny app is running as a standalone website, but it has been embedded inside the web-book see the example from bookdown for more info

### 7.1 Sharing Shiny Apps

Shiny apps come with a few caveats, including learning how to program in R, learning how to program reactive expressions in Shiny (lots of good tips here, and here), and then figuring out how to host the Shiny app over the web.

Shiny apps can be shared without a web server. For example, the shiny app in this repository [https://github.com/CrumpLab/experimentsimulator\\_ttest](https://github.com/CrumpLab/experimentsimulator_ttest) can

be downloaded and run directly in R-studio. However, in this case, the shiny app is run locally and can not be embedded in a web-book.

Shiny offers free and paid services for hosting Shiny apps on their servers. If you deploy a Shiny app using this method, then simply place the url for your shiny app into the embedding code (see the raw .Rmd file for this chapter see to how the above shiny app was embedded into this page). It is also possible to run your own Shiny server, or to use other free or paid cloud-computing services to run Shiny apps.

## 7.2 A minimal working example using Heroku

Heroku is a flexible and free (with paid options) cloud-computing service that can be used to serve Shiny apps.

This repository shows an example of configuring Heroku to run an R shiny app: <https://github.com/CrumpLab/testShinyHeroku>

# Bibliography

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Xie, Y. (2015). *Dynamic Documents with R and knitr*. Chapman and Hall/CRC,  
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