

R Markdown

Educational Psychology Computing Club
September 22, 2014

Markdown



- Plain text formatting
- Easy to read

"...a simple little **humane** markup language"
–Jeff Atwood, *Coding Horror*



WIKIPEDIA
The Free Encyclopedia



Markup

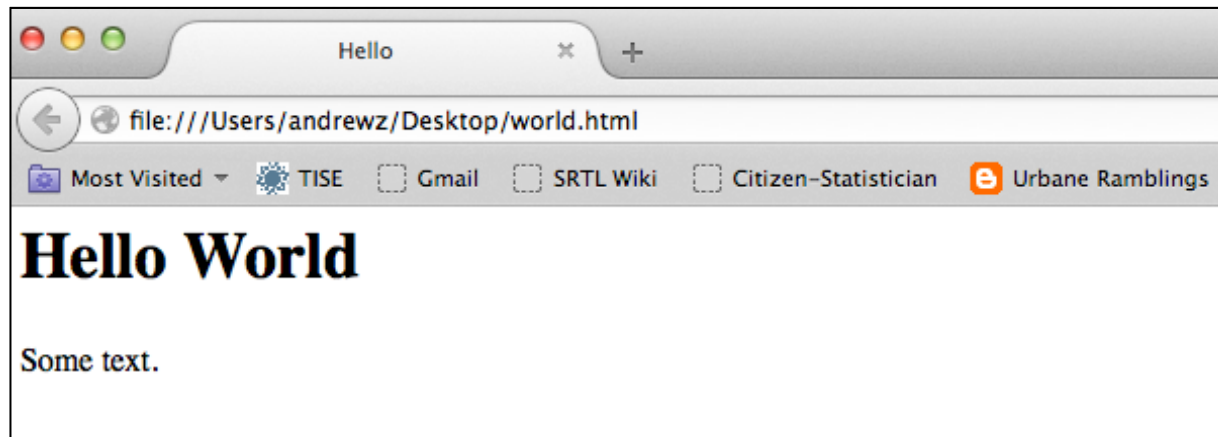
```
<html>
  <head>
    <title>Hello</title>
  </head>
  <body>
    <h1>Hello World</h1>
    <p>Some text.</p>
  </body>
</html>
```

Markdown

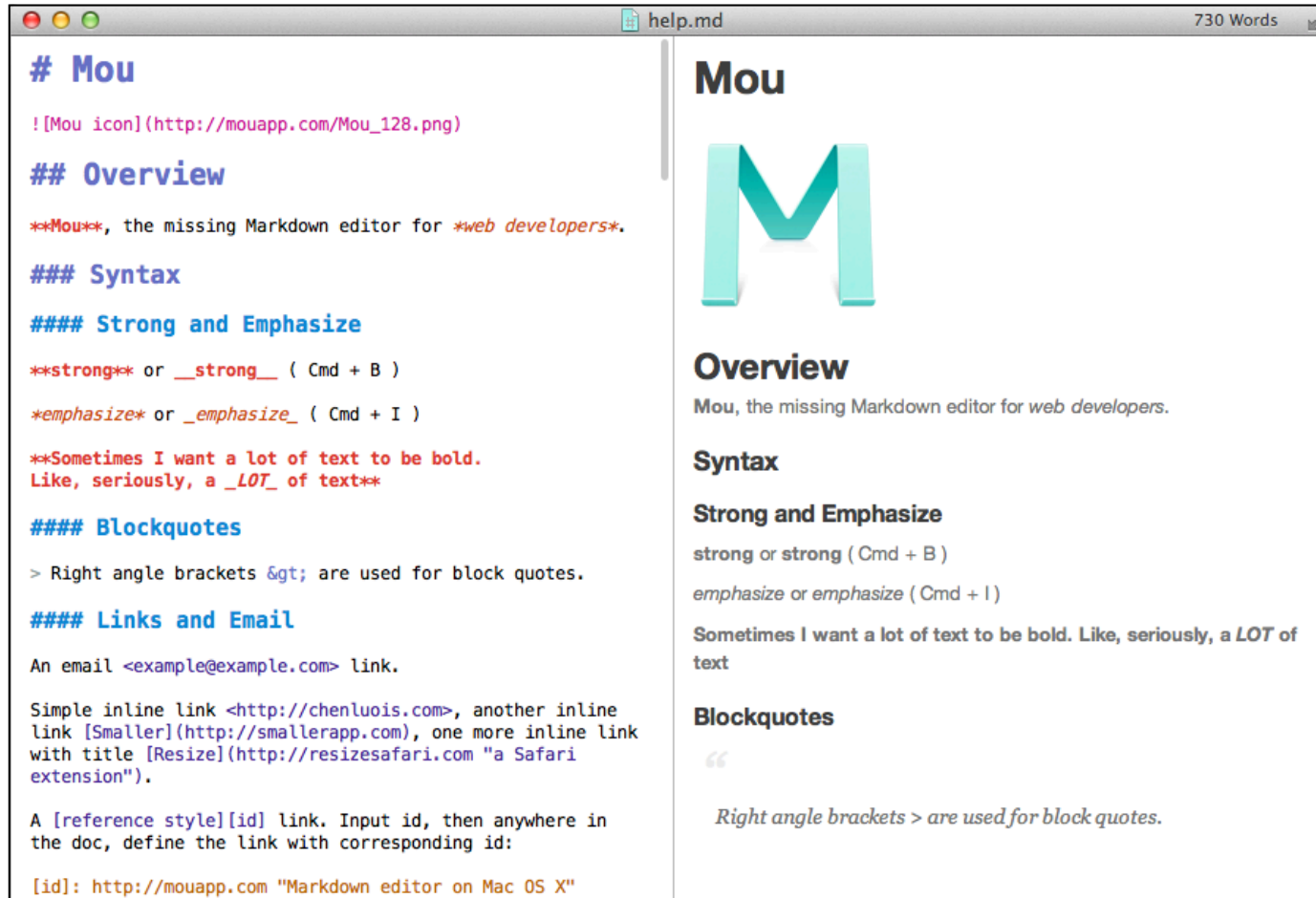
```
---
title: Hello
---

# Hello World

Some text.
```



Markdown Editors



Mou (for Mac): <http://mouapp.com/>

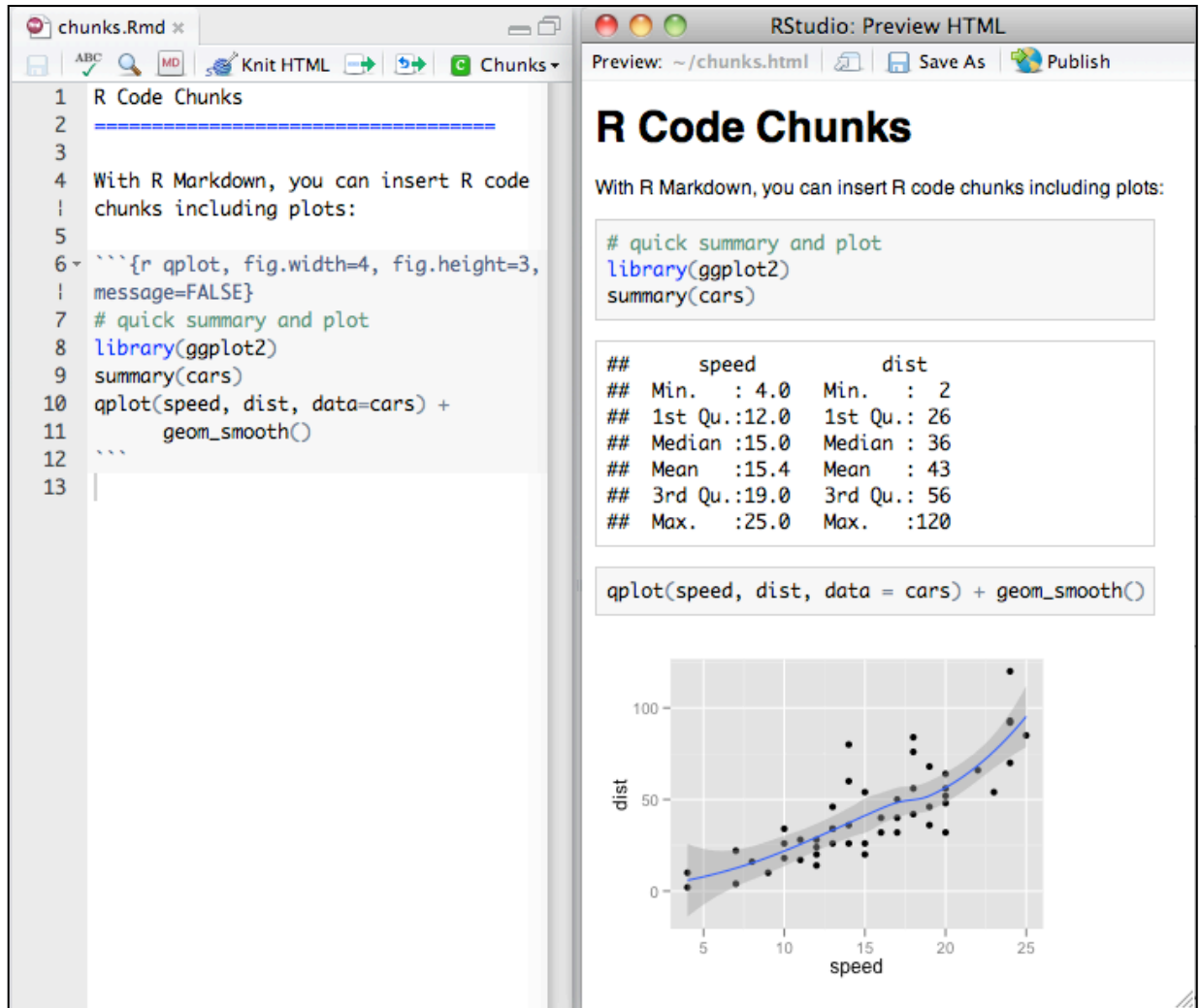
Mou alternatives (for Windows): <http://alternativeto.net/software/mou/?platform=windows>

R Markdown



- Uses Markdown syntax
- Embeds R syntax

<http://rmarkdown.rstudio.com/>

The screenshot shows the RStudio interface with two panes. The left pane, titled 'chunks.Rmd', contains R Markdown code. The right pane, titled 'RStudio: Preview HTML', shows the rendered HTML output. The code in the left pane includes a title 'R Code Chunks', a paragraph about R Markdown, and an R code chunk that loads the 'ggplot2' library, summarizes the 'cars' dataset, and creates a scatter plot of 'dist' vs 'speed' with a smoothed trend line. The preview in the right pane shows the rendered HTML, including the title, paragraph, summary table, and the plot.

```
1 R Code Chunks
2 =====
3
4 With R Markdown, you can insert R code
5 chunks including plots:
6
7 ```{r qplot, fig.width=4, fig.height=3,
8    message=FALSE}
9 # quick summary and plot
10 library(ggplot2)
11 summary(cars)
12 qplot(speed, dist, data=cars) +
13   geom_smooth()
```

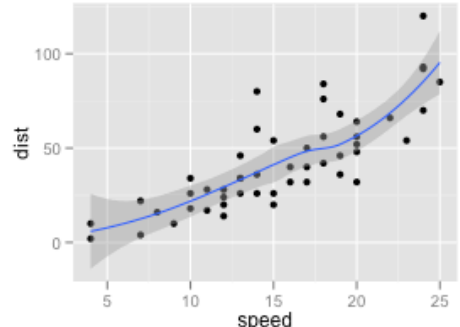
R Code Chunks

With R Markdown, you can insert R code chunks including plots:

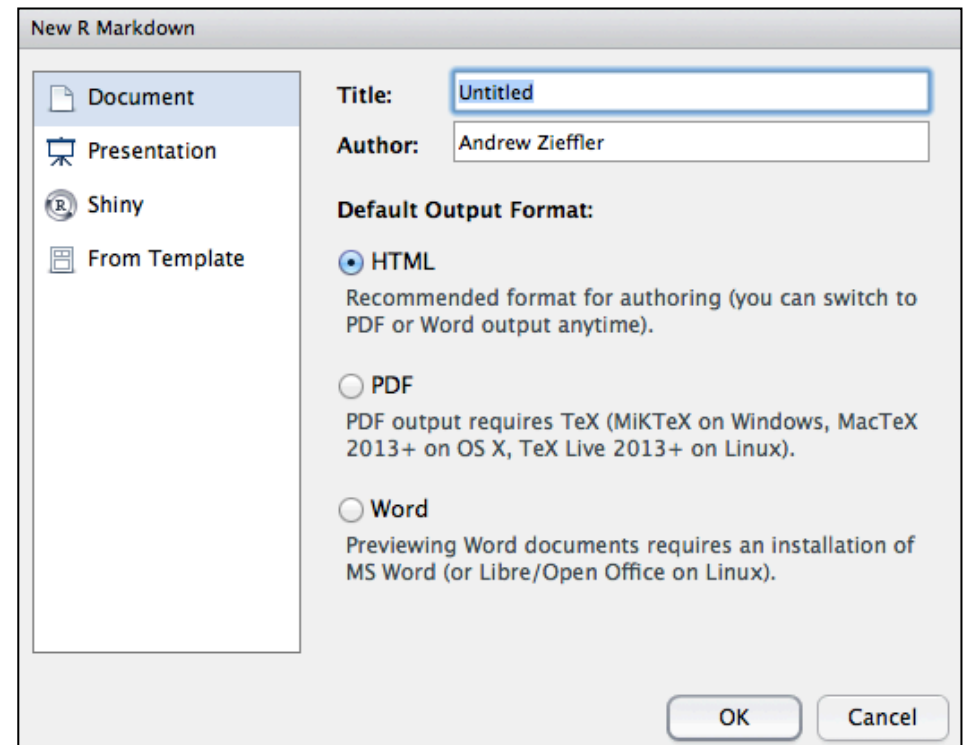
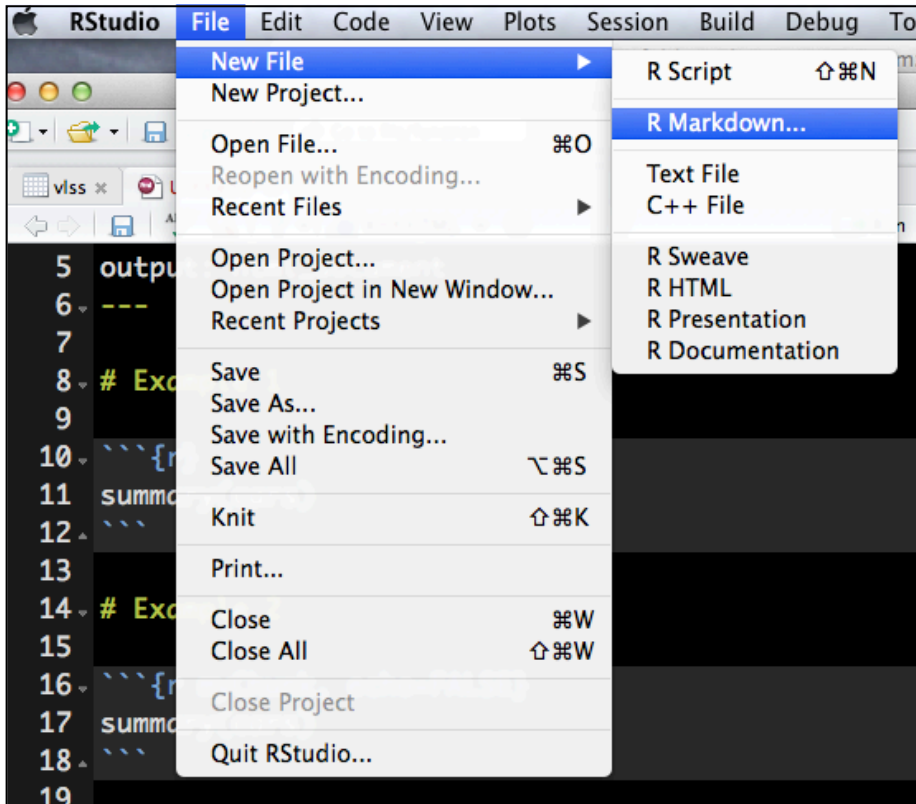
```
# quick summary and plot
library(ggplot2)
summary(cars)
```

##	speed	dist
## Min.	: 4.0	Min. : 2
## 1st Qu.:	12.0	1st Qu.: 26
## Median :	15.0	Median : 36
## Mean :	15.4	Mean : 43
## 3rd Qu.:	19.0	3rd Qu.: 56
## Max.	: 25.0	Max. : 120

```
qplot(speed, dist, data = cars) + geom_smooth()
```

A scatter plot showing the relationship between 'speed' (x-axis, ranging from 5 to 25) and 'dist' (y-axis, ranging from 0 to 100). The plot includes a blue smoothed trend line and a grey shaded area representing the confidence interval. The data points are black dots.

R Markdown Document



RStudio v0.98.1062

- **Document:** Web document, PDF file or MS Word file
- **Presentation:** ioslides (*html*), Slidy (*html*), Beamer (*PDF*)
- **Shiny:** Interactive apps (slides *or* document)
- **From Template:** Use a template for custom documents

Code Chunks

```
` `` {r}`  
Your R syntax goes here  
` ``
```

Code chunk:

```
` `` {r}`  
summary(cars)  
` ``
```

Output:

```
summary(cars)
```

```
##      speed      dist  
##  Min.   : 4.0   Min.   : 2  
## 1st Qu.:12.0   1st Qu.: 26  
## Median :15.0   Median : 36  
## Mean   :15.4   Mean    : 43  
## 3rd Qu.:19.0   3rd Qu.: 56  
## Max.   :25.0   Max.    :120
```

Code Chunk Options

```
```${r} name, option1, option2, ...}  
 Your R syntax goes here
```
```

Code chunk:

```
```${r} myChunk, echo=FALSE}  
summary(cars)
```
```

Output:

```
##      speed      dist  
## Min.   : 4.0   Min.   : 2  
## 1st Qu.:12.0   1st Qu.: 26  
## Median :15.0   Median : 36  
## Mean   :15.4   Mean    : 43  
## 3rd Qu.:19.0   3rd Qu.: 56  
## Max.   :25.0   Max.    :120
```

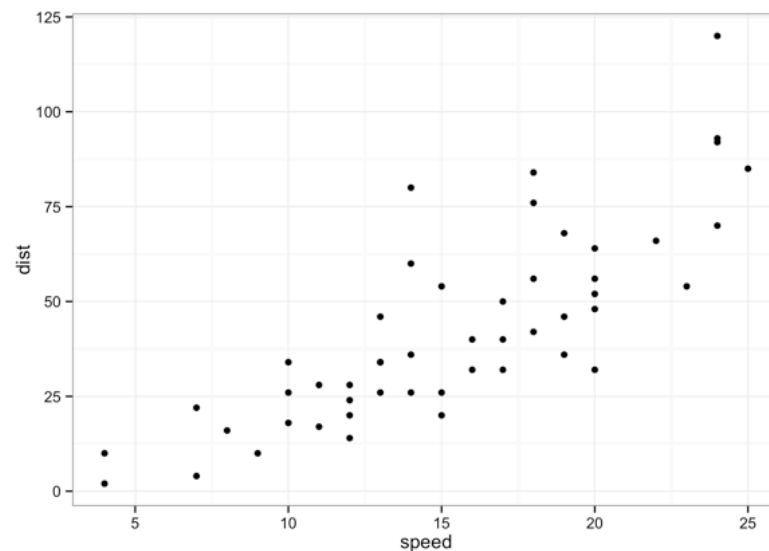

Figures

Code chunk:

```
```{r fig1, out.width='600px', out.height='600px',fig.cap='Here  
is my figure caption.', fig.align='center'}
library(ggplot2)
ggplot(data=cars, aes(x=speed, y=dist)) +
 geom_point() +
 theme_bw()
```
```

Output:

```
library(ggplot2)  
ggplot(data=cars, aes(x=speed, y=dist)) +  
  geom_point() +  
  theme_bw()
```



Other Options

- `echo = TRUE` (logical)
- `warning = TRUE` (logical)
- `message = TRUE` (logical)
- `tidy = FALSE` (logical)
- `cache = TRUE` (logical)



knitr

- `fig.cap = 'caption'` (character)
- `fig.align = default` (character; 'left', 'right', 'center')
- `fig.width = 7` (numeric; in inches)
- `fig.height = 7` (numeric; in inches)
- `out.width = NULL` (character)
- `out.height = NULL` (character)

Many others. Find all of them and their descriptions at
http://yihui.name/knitr/options#chunk_options

Inline Code Chunks

```
`r` Your R syntax goes here `
```

Code chunk:

```
Here is an example of an inline code chunk. The mean  
speed is `r` mean(cars$speed) `.
```

Output:

```
Here is an example of an inline code chunk. The mean speed is 15.4.
```

Equations

Inline equation: $equation$

Display equation:
$$equation$$

MathML equation: $equation$

Code chunk:

```
$$  
\hat{Y}_{ij} = \beta_0 + \beta_1(X_1) + \epsilon_{ij}  
$$
```

Output:

$$\hat{Y}_{ij} = \beta_0 + \beta_1(X_1) + \epsilon_{ij}$$

Unless you use MathML, there is no equation numbering support in RStudio currently....although it has already been added as a feature request.

YAML: The Header

YAML (*YAML ain't markup language*) is a human-friendly standard for describing the structure of data and embedded this structure within the data being described.

```
---  
title: "R Markdown Example File"  
author: "Andrew Zieffler"  
date: "September 21, 2014"  
output: html_document  
---
```

Adding to the document's metadata allows document formatting, etc.

YAML: Options

```
---  
title: "R Markdown Example File"  
author: "Andrew Zieffler"  
date: "September 21, 2014"  
output:  
  html_document:  
    toc: true  
    highlight: zenburn  
    theme: united  
---
```

Correctly structured YAML needs to be indented

Bibliography

Add a bibliography to the document metadata

```
---  
title: "R Markdown Example File"  
author: "Andrew Zieffler"  
date: "September 21, 2014"  
output: html_document  
bibliography: myBibliography.bib  
---
```

Create myBibliography.bib

Insert a level-1 heading called "References"

```
# References
```

.bib Files

A *.bib* file is a plain-text file that contains a BibTeX database. The database is a list of references and their metadata. Reference managers (e.g., Papers, Zotero, Mendeley) can all produce BibTeX entries.

```
@book{agresti,  
  author = {Alan Agresti},  
  title = {Categorical Data Analysis},  
  publisher={Wiley},  
  year={2002},  
  edition={2nd},  
  address={New York},  
}  
  
@article{algina,  
  author = {J. Algina and H. J. Keselman and R. D. Penfield},  
  title = {An Alternative to {C}ohen's Standardized Mean Difference Effect  
          Size: A Robust Parameter and Confidence Interval in the Two  
          Independent Groups Case},  
  journal={Psychological Methods},  
  year={2005},  
  volume={10},  
  number={3},  
  pages={317--328},  
}
```

Place the .bib file in the same folder as your RMD document.

Including Citations

Citations go inside square brackets and are separated by semicolons. Each citation must have a key, composed of '@' + the citation identifier from the database.

Here is some text and a citation [[@agresti](#); [@algina](#)].

Citations

Here is some text and a citation (Agresti 2002; Algina, Keselman, and Penfield 2005).

References

Agresti, A. 2002. *Categorical Data Analysis*. 2nd ed. New York: Wiley.

Algina, J., H. J. Keselman, and R. D. Penfield. 2005. "An Alternative to Cohen's Standardized Mean Difference Effect Size: A Robust Parameter and Confidence Interval in the Two Independent Groups Case." *Psychological Methods* 10 (3): 317–28.

Citations may optionally have a prefix, a locator, and a suffix.

Here is some text and a citation [see @agresti; @algina, p. 317].

Here is some text and a citation (see Agresti 2002; Algina, Keselman, and Penfield 2005, 317).

A minus sign (-) before the @ will suppress mention of the author in the citation.

Agresti says that this is cool stuff [-@agresti].

Agresti (2002) says that this is cool stuff .

Use APA Formatted Citations and References

By default, pandoc uses Chicago style (author-date format) for citations and references. To use another style, you will need to specify a CSL 1.0 style file in the `cs1` metadata field.

```
---  
title: "R Markdown Example File"  
author: "Andrew Zieffler"  
date: "September 21, 2014"  
output: html_document  
bibliography: myBibliography.bib  
csl: apa-single-spaced.csl  
---
```

You will need to download the *apa-single-spaced.csl* file from <https://zotero.org/styles>. Place the CSL file in the same folder as your RMD document.

Find Out More

- **Markdown Syntax:** <http://daringfireball.net/projects/markdown/syntax>
- **R Markdown:** <http://rmarkdown.rstudio.com/>
- **Knitr:** <http://yihui.name/knitr/>
- **BibTeX:** http://en.wikibooks.org/wiki/LaTeX/Bibliography_Management
- **Create a custom template:** http://rmarkdown.rstudio.com/tufte_handout_format.html

<http://mashable.com/2013/06/24/markdown-tools/>