

Document preparation with L^AT_EX in Emacs

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<https://github.com/MooersLab/BerlinEmacsAug22>

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Berlin Emacs Meetup, Zoom Meeting
31 August 2022, 19 - 20:30 (CEST)

40 to 51 hours per week



OPEN ACCESS



PEER-REVIEWED

RESEARCH ARTICLE

The adaptation of academics to the Covid-19 crisis in terms of work time allocation

Hugo Horta , Anna Panova , João Santos , Maria Yudkevich

Published: August 24, 2022 • <https://doi.org/10.1371/journal.pone.0273246>

Outline

- \LaTeX in Emacs
- Research Papers with writing logs
- Books
- Beamer: Slideshows and Posters
- Tools

Writing tasks in academic science

- correspondence: e-mails, letters of support and recommendation
- grant funding: applications, progress reports, grant reviews
- research reporting: papers, posters, talks, manuscript reviews
- teaching: lecture slides
- administrative: annual reports, committee reports, Biosketches, CVs

Tasks that I still do with a word processor.

Dissatisfaction with Word Processors

- Trouble scrolling long documents on Macs.
- Tedious figure handing.
- Limited equation editor.
- Poor support for tracking changes.

Winding path to Emacs with L^AT_EX

- Markdown, RMarkdown, GitHub Book
- AsciiDoc
- Scrivener
- LyX
- LaTeX in several LaTeX editors and IDE ❤.
- LaTeX in TextMate
- LaTeX in Sublime Text.
- LaTeX in Vim
- LaTeX in Overleaf ❤️
- reStructuredText and org-mode ❤
- LaTeX in Emacs. ❤️

606 Overleaf Projects

Overleaf

New Project

All Projects

Your Projects

Shared with you

Archived Projects

Trashed Projects

TAGS/FOLDERS

- + New Folder
- 0 ASAP submit! (9)
- 0 in press (0)
- 0 in review (2)
- 0 in revision (3)
- 0 writing now (6)

Features & Benefits ▾

Templates

Plans & Pricing

Help ▾

Projects

Account ▾

Search projects...

<input checked="" type="checkbox"/> Title	Owner	Last Modified ▾	Actions
3502 Berlin Emacs Document preparation with LaTeX in Emacs	You	41 minutes ago by You	
2022 2022words	You	a day ago by You	
069 10K folders for facile project management in one academic career	You	5 days ago by You	
3245 IUCr 2023	You	6 days ago by You	
3244 ACA 2023 Baltimore	You	6 days ago by You	
3240 US-RSE	You	6 days ago by You	
2178 Polyglot literate programming in Structural Biology with Quarto	You	6 days ago by You	
2179 Integrative structural biology computing with Jupyter	You	6 days ago by You	
9011 OUHSC writing	You	6 days ago by You	
458 Rsnips	You	7 days ago by You	
2111 LaTeX in Emacs	You	8 days ago by You	

Overleaf GUI with this slideshow

The screenshot shows the Overleaf Emacs interface. The top bar displays the title "3502 Berlin Emacs Document preparation with LaTeX in Emacs". The left sidebar shows a file tree with various files like geometry2.png, geometry4.png, introduction.png, itemCtCJ.png, loadingPackages.png, mintedError.png, Preview.png, unfoldOneSection.png, wordCountPlot.png, wordCountTxt.png, writingLogOutline.png, and writingLogSections.png. Below the file tree, there's a section titled "File outline" with subsections for "Introduction", "Slides that need illustrations", and "Elements of a LaTeX document". The main area has two tabs: "Source" and "Rich Text". The "Source" tab is active, showing LaTeX code with line numbers from 163 to 202. The code includes sections like \frame, \titlepage, \note, \section{Outline}, \begin{frame}[t]{Outline}, \begin{frame}[center], \begin{frame}[large], \begin{frame}[font=\bf\bullet\color{magenta}], and \begin{frame}[font=\bf\bullet\color{magenta}]{Tasks that I still do with a word processor.}'. The "Rich Text" tab is also visible. On the right side, there's an "Outline" panel showing a hierarchical tree structure of the document sections. The word "Outline" is highlighted in red.

Outline

- **LATEX in Emacs**
- Letters
- Research Papers with writing logs
- Books
- Slideshows
- Posters

My uses of L^AT_EX

- Mooers (2016) Protein Science
- Mooers (2020) Protein Science
- Mooers and Brown (2021) Protein Science
- Mooers (2021) Computing in Science and Engineering.
- Acquah et al. (2021) International Journal of Molecular Science
- Acquah (2022) PhD dissertation
- 14 lectures times 8 years
- ~50 slideshows
- ~20 posters

Advantages of working with L^AT_EX

- **It is fun!** Combine coding with writing.
- Equation typesetting par excellence.
- Automated placement of figures.
- Support for multi-part documents (books).
- Overleaf supports collaborative writing.

Downsides of L^AT_EX

- Only for 2% of the population.
- Some packages only work with certain compilers (e.g., xelatex).
- Sometimes difficult to debug.
- Some publishers limit customization.

Elements of a LaTeX document

- preamble (\sim init.el)
- document environment
 - sections, subsection, subsubsections
 - equations
 - code listings
 - tables
 - figures
 - citations

C-c C-e document environment

script4.tex



```
- 0 U: script4.tex > LaTeX/MP +4 Fly/— Ref WC[0+0/0] yas ivy AC Wrap
( 5/35) Environment type (default document):
```

array
center
description
displaymath
document

Adding package name in mini-buffer

```
1 \documentclass[[10point, letterpaper]]{article}
```

```
2
```



```
* 48 U: script4.tex ► LaTeX/MP +4 Fly/— Ref WC[0+0/0] yas ivy AC Wrap  
Packages: minted
```

Package with options

script4.tex

```
1 \documentclass[10point,letterpaper]{article}
2
3 \usepackage{minted}
4 \usepackage{ulem}
```



```
* 86 U: script4.tex > LaTeX/MP +4 Fly/-- Ref WC[0+0/0] yas ivy AC Wrap
(Optional) Options (k=v): letterpaper
```

Options for geometry package

```
script4.tex
4 \usepackage{ulem}
* 86 U: script4.tex > LaTeX/MP +4 Fly/- Ref WC[0+0/0] yas ivy AC Wrap      5 : 0
*Messages* | *Completions*
1 Click on a completion to select it.
In this buffer, type RET to select the completion near point.

141 possible completions:
2 a0paper          a1paper          a2paper          a3paper          a4paper          a5paper
3 a6paper          ansipaper        ansipaper        ansicpaper       ansidpaper       ansiepaper
4 asymmetric       b0j              b0paper         b1j              b1paper         b2j
5 b2paper          b3j              b3paper         b4j              b4paper         b5j
6 b5paper          b6j              b6paper         bindingoffset   bmargin          body
7 bottom           c0paper         c1paper         c2paper         c3paper         c4paper
8 c5paper          c6paper         centering       columnsep       divide          driver
9 dvipdfm          dvipdfmx        dvips           foot            footnotesep    footskip
10 hcentering      hdivide         head            headheight     headsep         height
11 heightrounded   hmargin          hmarginratio   hoffset         hscale          ignoreall
12 ignorefoot      ignorehead       ignoreheadfoot includemp       ignoremp        includeall
13 includehead     includeheadfoot layoutoffset   layoutsize     landscape       layout
14 layoutheight    layoutoffset    layoutoffset   layoutsize     layoutoffset   layoutwidth
15 left             lines            lmargin         luatex          mag             margin
16 marginpar       marginparsep   marginparwidth marginratio   nofoot          nohead
17 noheadfoot      nomarginpar   offset          onecolumn      outer           paper
18 paperheight     papername      papersize      paperwidth    pass            pdftex
19 portrait         ratio           reset          reversemarginpar reversemp      right
20 rmargin          scale           screen          showcrop       showframe      text
21 textheight       textwidth       tmargin         top             total           totalheight
22 totalwidth       truedimen      twocolumn      twoside        vcentering     vdivide
23 verbose          vmargin        vmarginratio   voffset        vscale          vtex
24 width           xdvipdfmx     xetex          

% 1.4k U: *Completions* > Completion List yas ivy
(Optional) Options (k=v): letterpaper,total={7in,9in} 1 : 0 All
```

Package with options

script4.tex

```
1 \documentclass[[10point,letterpaper]]{article}
2
3 \usepackage{minted}
4 \usepackage{ulem}
5 \usepackage[letterpaper,total={7in,9in}]{geometry}
```



* 137 U: script4.tex > LaTeX/MP +4 Fly/--- Ref WC[0+0/0] yas ivy AC Wrap
Packages:

6 : 0 < A

Document environment

script4.tex

```
1 \documentclass[[10point, letterpaper]]{article}
2
3 \usepackage{minted}
4 \usepackage{ulem}
5 \usepackage[letterpaper, total={7in, 9in}]{geometry}
6
7 \begin{document}
8
9 \end{document}
```

Custom L^AT_EX Commands

```
29 \makeindex
30
31 % todolist env from https://tex.stackexchange.com/questions/247681/how-to-create-checkbox-todo-list
32 % done with checkmark, wontfix with x, next with finger.
33 % Use square brackets around the commands: e.g., [\next]
34 \usepackage{enumitem,amssymb}
35 \newlist{todolist}{itemize}{2}
36 \setlist[todolist]{label=$\square$}
37 \usepackage{pifont}
38 \newcommand{\nmark}{\ding{42}}% next
39 \newcommand{\cmark}{\ding{51}}% checkmark
40 \newcommand{\xmark}{\ding{55}}% x-mark
41 \newcommand{\wmark}{\ding{116}}% wait mark, inverted triangle representing yield sign
42
43 \newcommand{\done}{\rlap{$\square$}\raisebox{2pt}{\large\hspace{1pt}\cmark}}%
44   \hspace{-2.5pt}}
45 \newcommand{\wontfix}{\rlap{$\square$}\raisebox{2pt}{\large\hspace{1pt}\xmark}}
46 \newcommand{\waiting}{\rlap{\raisebox{0.18ex}{\large\hspace{0.17ex}\scriptsize \wmark}}$\square$}
47 % \newcommand{\next}{\nmark}%
48
49
50 \title{Writing Log for hot paper}
51 \author{Blaine Mooers}
52
53 \begin{document}
54 \maketitle
55
56 \section{Why am I writing this paper?}
```

Folded sections of writing log

C-c C-o C-b

script2.tex

```
1 \documentclass[10pt,letterpaper]{article}
53 \begin{document}
56 \section{Why am I writing this paper?}
63 \section{Related Projects}
76 \section{Potential Journals}
131 \section{Potential Titles}
140 \section{Potential Keywords}
156 \section{Potential Internal Reviewers}
167 \section{Potential External Reviewers}
188 \section{Potential Competitors}
200 \section{Potential Collaborators}
211 \section{Related Grant Application Specific Aims}
224 \section{Draft Introduction}
228 \section{Draft Abstract}
233 \section{Writing Log}
235 \subsection{8 August 2022}
239 \section{Next Action}
243 \section{To Be Done, Maybe}
254 \section{Writing progress}
282 \end{document}
```

Unfolded section

C-c C-o r

or

C-c C-o C-o

script2.tex

```
1 \documentclass[10pt,letterpaper]{article}
53 \begin{document}
56 \section{Why am I writing this paper?}
63 \section{Related Projects}
76 \section{Potential Journals}
131 \section{Potential Titles}
140 \section{Potential Keywords}
156 \section{Potential Internal Reviewers}
167 \section{Potential External Reviewers}
188 \section{Potential Competitors}
200 \section{Potential Collaborators}
211 \section{Related Grant Application Specific Aims}
212
213 \begin{itemize}
214 \item change me
215 \item change me
216 \item change me
217 \item change me
```

C-c = generates TOC

```
1 TABLE-OF-CONTENTS on ~/3502BerlinLaTeX/newWL.tex
2 SPC=view TAB=goto RET=goto+hide [q]uit [r]escan [l]abels [f]ollow [x]r [?]Help
3 -----
4     1 Why am I writing this paper?
5     2 Related projects
6     3 Potential Journals
7     4 Potential Titles
8     5 Potential Keywords
9     6 Potential Internal Reviewers
10    7 Potential External Reviewers
11    8 Potential Competitors
12    9 Potential Collaborators
13   10 Related Grant Application Specific Aims
14   11 Draft Introduction
15   12 Draft Abstract
16 13 Writing Log
17   13.1 8 August 2022
18   14 Next Action
19   15 To Be Done, Maybe
20   16 Writing progress
-----
--- *toc*      (TOC) L<> I<> T<ALL> -----
235
236 \section{Writing Log}
237
238 \subsection{8 August 2022}
239
```

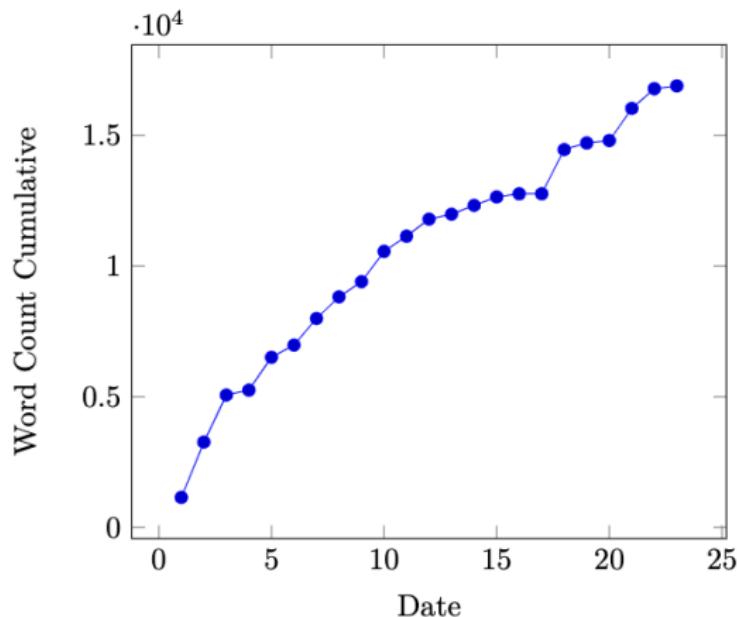
C-c C-j inserts next item

```
17
18 \begin{itemize}
19 \item first item
20 \item second item
21 \item █
22 \end{itemize}
23
24 \end{document}
```

```
* 350 U: script4.tex > LaTeX/MP +2 Fly/- Ref WC[0+44/44] yas ivy AC Wrap
C-c C-j
```

Template writing.log on GitHub¹.

Plot of words written



Float environment for figure

```
39
40 \begin{figure}[htp!]
41   \centering
42   \begin{tikzpicture}
43     \begin{axis}[
44       xlabel={Date},
45       ylabel={Word Count Cumulative},
46       % legend pos=south east,
47       % legend entries={},
48     ]
49     \addplot table [x=Day,y=Words]
50     {wordcount.txt};
51   \end{axis}
52 \end{tikzpicture}
53 \end{figure}
```

External data file

		Source	Rich Text	Ω
>	📁 annotatedBibliog	1	Date Day Words	
>	📁 CoverLetter	2	20210916 1 1148	
>	📁 Figures	3	20210917 2 3267	
📄	booklog.tex	4	20210919 3 5062	
⋮		5	20210920 4 5251	
📄	main.tex	6	20210921 5 6506	
📄	psfg.bst	7	20210922 6 6975	
📄	test.txt	8	20210923 7 7993	
📄	wordcount.txt :	9	20210924 8 8818	
⋮		10	20210925 9 9399	
📄	WritingLog.tex	11	20210926 10 10560	
⋮		12	20210927 11 11141	
⋮		13	20210928 12 11793	
⋮		14	20210929 13 11982	
⋮		15	20210930 14 12318	
⋮		16	20211001 15 12642	
⋮		17	20211002 16 12762	
⋮		18	20211003 17 12762	
⋮		19	20211004 18 14454	

Code for pgfplot and table

```
16 % Code for plotting table
17 \usepackage{pgfplots}
18 \Usepackage{pgfplotstable}
19 \usepackage{booktabs}
20 \usepackage{array}
21 \usepackage{colortbl}
22
23 \pgfplotstableset{%
24   every head row/.style={before row=\toprule, after
25   row=\midrule},
26   every last row/.style={after row=\bottomrule},
27   fixed,precision=2,
28 }
```

21k -: WritingLog.tex | LaTeX/MP +8 Fly/- Ref WC[2979-2/2977] ivy yas AC Wrap | Git-master

Rendered table

Date	Day	Words
20,210,916	1	1,148
20,210,917	2	3,267
20,210,919	3	5,062
20,210,920	4	5,251
20,210,921	5	6,506
20,210,922	6	6,975
20,210,923	7	7,993
20,210,924	8	8,818
20,210,925	9	9,399
20,210,926	10	10,560
20,210,927	11	11,141
20,210,928	12	11,793
20,210,929	13	11,982
20,210,930	14	12,318
20,211,001	15	12,642
20,211,002	16	12,762
20,211,003	17	12,762
20,210,004	18	14,454
20,211,005	19	14,707
20,211,107	20	14,801
20,220,809	21	16,029
20,220,811	22	16,782
20,220,812	23	16,888

Table 1: Date, day and wordcount.

Table environment for pdfplotstable

```
576
577 \begin{table}[]
578   \centering
579   \pgfplotstabletypeset[
580     columns/Date/.style={column name=Date},
581     columns/Day/.style={column name=Day},
582     columns/Word/.style={column name=Words},
583   ]{wordcount.txt}
584   \caption{Date, day and wordcount.}
585   \label{tab:my_label}
586 \end{table}
587
588
```

* 21k :- WritingLog.tex | LaTeX/MP +8 Fly-- Ref WC[2979-1/2978] ivy yas AC Wrap Git-master

Code for default table environment

```
\begin{table}[htp]
\centering
\begin{tabular}{lcl}
\hline
Date & Day & Words \\
\hline
20210916 & 1 & 1,148 \\
20211017 & 2 & 3,267 \\
\hline
\end{tabular}
\caption{\ref{tab:simpleTable}. Sample table in default format.}
\label{tab:simpleTable}
\end{table}
```

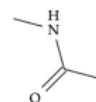
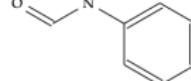
Rendered default table

Date	Day	Words
20210916	1	1,148
20211017	2	3,267

Table: 1. Sample table in default format.

mol2chemfig and chemfig packages

Table 2. Molecular docking and results and substitution patterns of IND (-)-237D analogs with top docking energies.

Analog #	R ₁	R ₂	Docking energy (kcal/mol) $\alpha 6\beta 2$	Docking energy (kcal/mol) $\alpha 4\beta 2$
Model-292	= CH ₂		-8.8	-7.0
Model-2109	- CH ₃		-8.6	-6.9
Model-646			-8.5	-6.9
Model-1258	- NH ₂		-8.5	-6.8
Model-1716			-8.5	-7.2

Code for previous table

```
\begin{table}[H]
\caption{Molecular docking and results and substitution patterns of IND (-)-237D analogs with top docking energies.}
\label{Table 2}
\centering
% \tablesize{} % You can specify the \fontsize here, e.g., \tablesize{\footnotesize}. If commented out \small will be used.
\begin{tabular}{lcccc}
\toprule
& & \multicolumn{2}{c}{\textbf{Docking energy (kcal/mol)}} & \\
\textbf{Analog \#} & & \textbf{R\textsubscript{1}} & \textbf{R\textsubscript{2}} & \textbf{$\alpha$6$\beta$2} \\
\textbf{\$alpha\$4\$beta\$2} & \\
\midrule
Model-292 & = CH\textsubscript{2} & \tiny{\chemfig{OH-[:180,,1]=[:-240]-[:-180]=[:-120](-[:-180])-[:-60]=_(-[:-300])}} & & -8.8 & \\
-7.0 \\
\rule{0pt}{5ex}
Model-2109 & - CH\textsubscript{3} & \tiny{\chemfig{OH-[:-180,,1]=[:-240]-[:-180]=[:-120](-[:-180])-[:-60]=_(-[:-300])}} & & -8.6 & \\
& -6.9 \\
\rule{0pt}{5ex}
Model-646 & \tiny{\chemfig{-N(-[:-300])-[:-60]H}} & & \\
\tiny{\chemfig{OH-[:-180,,1]=[:-240]-[:-180]=[:-120](-[:-180])-[:-60]=_(-[:-300])}} & & -8.5 & -6.9 \\
\rule{0pt}{5ex}
Model-1258 & - NH\textsubscript{2} & \tiny{\chemfig{OH-[:-180,,1]=[:-240]-[:-180]=[:-120](-[:-180])-[:-60]=_(-[:-300])}} & & -8.5 & \\
-6.8 \\
\rule{0pt}{5ex}
Model-1716 & \tiny{\chemfig{[:-165](=[:-225]O)-[:-105]\mcfabov{N}{H}-[:-165]}} & & \\
\tiny{\chemfig{O=[:-330]-[:-30]\mcfabov{N}{H}-[:-330]=[:-30]-[:-330]=[:-270]-[:-210]=[:-150](-[:-90])}} & & -8.5 & -7.2 \\
\rule{0pt}{5ex}
```

Placing urls in footnotes

```
1 # contributor: Blaine Mooers bmoopers1@gmail.com
2 # key: furl
3 # group: urls
4 # name: Send a url to a footnote.
5 # --
6 \footnote{\url{\${1:http}}}. $0
```

- 143 -: furl > Snippet +6 yas ivy > Git:main

Annotated bibliography

- [5] M. Dewey, *A classification and subject index, for cataloguing and arranging the books and pamphlets of a library.* Brick row book shop, Incorporated, 1876. [Online]. Available: /Users/blaine/pdfLibrary/

This is the orginal publication of the Dewey Decimal Classification system.

- [6] C. Dominik, *The Org Mode 9 Reference Manual: Organize your life with GNU Emacs*, 9th ed. Samurai Media Limited, 2016.

- [7] F. Gobbo and M. Vaccari, “The pomodoro technique for sustainable pace in extreme programming teams,” in *International Conference on Agile Processes and Extreme Programming in Software Engineering*. Springer, 2008, pp. 180–184.

- [8] P. Goodson, *Becoming an academic writer: 50 exercises for paced, productive, and powerful writing*. Sage Publications, 2013.

The author is a professor in health sociology at Texas A&M. This book takes a programmed approach to building up the reader’s skills and strengths as a writer. The author emphasizes the need to study the art of writing. This book has a good discussion of how to track

Annote field in BibTeX entry

```
@Book{Dewey1876AClassificationAndSubjectIndexForCataloguingAndArrang
author      = {Dewey, Melvil},
publisher   = {Brick row book shop, Incorporated},
title       = {A classification and subject index, for cataloguing a
keywords    = {069, information retrieval},
year        = {1876},
annotate    = {This is the orginal publication of the Dewey Decimal
url         = {/Users/blaine/pdfLibrary/}
}
```

mainAnnote.tex file

```
1 %% This is annot.tex.  
2 %%  
3 %% You'll need to change the title and author fields to reflect your  
4 %% information.  
5 %%  
6 %% Author: Titus Barik (titus@barik.net)  
7 %% Homepage: http://www.barik.net/sw/ieee/  
8 %% Reference: http://www.ctan.org/tex-archive/info/simplified-latex/  
9  
10 \documentclass[11pt]{article}  
11 \usepackage[letterpaper, total={7in, 9in}]{geometry}  
12  
13 \title{10K folders\\medskip An Annotated Bibliography}  
14 \author{Blaine Mooers (blaine-mooers@ouhsc.edu)\\University of Oklahoma Health Sciences Center}  
15  
16 \begin{document}  
17 \maketitle  
18 \nocite{*}  
19 \bibliographystyle{IEEEannot}  
20 \bibliography{tenKfolders}  
21 \end{document}
```

- 616 -: mainAnnote.tex • LaTeX/MP Fly-- Ref +5 WC[79+0/79] ivy yas AC Wrap Git-master

1

Multi-line equation

```
1 \documentclass{letter}
2
3 \usepackage[letterpaper, total={7in,9in}]{geometry}
4 \usepackage{minted}
5 \usepackage{caption}
6 \usepackage{babel}
7 \usepackage{appendix}
8 \usepackage{amsmath}
9
10
11
12 \begin{document}
13
14 \section{Introduction}
15 \label{sec:introduction}
16
17 This is a test of a type-setting a complex equation.
18
19 \begin{equation}
20 \label{eq:1}
21 \begin{array}{rlr}
22 D_{\{i\}} & \sim \operatorname{Normal}(\left.\mu_{\{i\}}, \sigma\right) & [\text{text{probability of data}}] \\
23 \mu_{\{i\}} & = \alpha + \beta_{\{M\}} M_{\{i\}} + \beta_{\{A\}} A_{\{i\}} & [\text{text{linear model }}] \\
24 \alpha & \sim \operatorname{Normal}(0,0.2) & [\text{text { prior for } }\alpha \text{ text { ] }}] \\
25 \beta_{\{M\}} & \sim \operatorname{Normal}(0,0.5) & [\left.\left(\text{text { prior for } }\beta_{\{M\}}\right)\right] \\
26 \beta_{\{A\}} & \sim \operatorname{Normal}(0,0.5) & [\text{text { prior for } }\beta_{\{A\}}] \\
27 \sigma & \sim \operatorname{Exponential}(1) & [\text{text{ prior for } }\sigma]
28 \end{array}
29 \end{equation}
30
31 \end{document}
```

C-c C-p C-s Preview for section

```
1 \documentclass{article}
2
3 \usepackage[letterpaper, total={7in, 9in}]{geometry}
4 \usepackage{minted}
5 \usepackage{caption}
6 \usepackage{babel}
7 \usepackage{appendix}
8 \usepackage{amsmath}
9
10 \begin{document}
11
12 1 Introduction
13
14 This is a test of a type-setting a complex equation.
15
16 
$$\begin{aligned} D_i &\sim \text{Normal}(\mu_i, \sigma) && [\text{probability of data}] \\ \mu_i &= \alpha + \beta_M M_i + \beta_A A_i && [\text{linear model}] \\ \alpha &\sim \text{Normal}(0, 0.2) && [\text{prior for } \alpha] \\ \beta_M &\sim \text{Normal}(0, 0.5) && [\text{prior for } \beta_M] \\ \beta_A &\sim \text{Normal}(0, 0.5) && [\text{prior for } \beta_A] \\ \sigma &\sim \text{Exponential}(1) && [\text{prior for } \sigma] \end{aligned} \tag{1}$$

17
18 \end{document}
```

C-c C-a compile and view

1 Introduction

This is a test of a type-setting a complex equation.

$$\begin{array}{lll} D_i & \sim \text{Normal}(\mu_i, \sigma) & [\text{probability of data}] \\ \mu_i & = \alpha + \beta_M M_i + \beta_A A_i & [\text{linear model}] \\ \alpha & \sim \text{Normal}(0, 0.2) & [\text{prior for } \alpha] \\ \beta_M & \sim \text{Normal}(0, 0.5) & [\text{prior for } \beta_M] \\ \beta_A & \sim \text{Normal}(0, 0.5) & [\text{prior for } \beta_A] \\ \sigma & \sim \text{Exponential}(1) & [\text{prior for } \sigma] \end{array}$$

eqc snippet

```
1 \documentclass{article}
2
3 \usepackage[letterpaper, total={7in,9in}]{geometry}
4 \usepackage{minted}
5 \usepackage{caption}
6 \usepackage{babel}
7 \usepackage{appendix}
8 \usepackage{amsmath}
9
10 \begin{document}
11
12 \section{Introduction}
13
14 This is a test of a type-setting a complex equation.
15
16 eqc
17     equation float with a caption
18     Latex for captioned equation that is labeled and indexed.
```

Equation float with caption

```
1 \documentclass{article}
2
3 \usepackage[letterpaper, total={7in,9in}]{geometry}
4 \usepackage{minted}
5 \usepackage{caption}
6 \usepackage{babel}
7 \usepackage{appendix}
8 \usepackage{amsmath}
9 \DeclareCaptionType{eqc}{}[]
10 \captionsetup[eqc]{labelformat=empty}
11
12 \begin{document}
13
14 \section{Introduction}
15
16 This is a test of a type-setting a complex equation.
17
18 % Add to preamble to create captioned equation environment.
19 \label{eq:linearModel}
20 \index{linear model}
21 \begin{eqc}[htp]
22 \begin{equation}
23 \label{eq:1}
24 \begin{array}{rlr}
25 D_{-i} & \sim \operatorname{Normal}\left(\mu_{-i}, \sigma\right) & \text { probability of data } \\
26 \mu_{-i} & =\alpha+\beta_{(M)} M_{-i}+\beta_{(A)} A_{-i} & [\text { linear model }] \\
27 \alpha & \sim \operatorname{Normal}(0,0.2) & \{\text { prior for } \alpha\} \\
28 \beta_{(M)} & \sim \operatorname{Normal}(0,0.5) & \{\text { prior for } \beta_{(M)}\} \\
29 \beta_{(A)} & \sim \operatorname{Normal}(0,0.5) & \{\text { prior for } \beta_{(A)}\} \\
30 \sigma & \sim \operatorname{Exponential}(1) & \{\text { prior for } \sigma\}
31 \end{array}
32 \end{equation}
33 \caption{Eq.\ref{eq:1}: Mathematical model for Bayesian linear regression.}
34 \end{eqc}
```

Rendered equation float with caption

1 Introduction

This is a test of a type-setting a complex equation.

$$\begin{aligned} D_i &\sim \text{Normal}(\mu_i, \sigma) && [\text{ probability of data }] \\ \mu_i &= \alpha + \beta_M M_i + \beta_A A_i && [\text{ linear model }] \\ \alpha &\sim \text{Normal}(0, 0.2) && [\text{ prior for } \alpha] \\ \beta_M &\sim \text{Normal}(0, 0.5) && [\text{ prior for } \beta_M] \\ \beta_A &\sim \text{Normal}(0, 0.5) && [\text{ prior for } \beta_A] \\ \sigma &\sim \text{Exponential}(1) && [\text{ prior for } \sigma] \end{aligned}$$

Eq. 1: Mathematical model for Bayesian linear regression.

Code environments

```
52 smalldata$draw <- seq(1:length(smalldata$Omega50_3_1))
53
54 plotdata <- melt(smalldata, id = c("draw"))
55
56 plotdata$eta <- factor(plotdata$variable,
57   levels = levels(plotdata$variable),
58   label = c("eta = 50", "eta = 10",
59             "eta = 5", "eta = 2",
60             "eta = 1", "eta = .9"))
61 my.labs <- list(bquote(eta == 50), bquote(eta == 10),
62                   bquote(eta == 5), bquote(eta == 2),
63                   bquote(eta == 1), bquote(eta == .9))
64
65 # make the plot
66 p <- ggplot(plotdata, aes(x = value, colour = eta))
67 p + geom_density() +
68   scale_colour_manual(values=1:6, breaks = levels(plotdata$eta),
69   labels = my.labs, name = "Shape") +
70   xlab("Correlation Value") +
71   ylab("Density") +
72   ggtitle("Visualization of a correlation from the
73           lkj_corr density in Stan \n for various
74           values of the shape parameter") +
75   theme_bw()
```

Listing BD.4: Example of the use of *LKJ covariance matrices* applied to two a two-level model.

AUCTeX key-bindings?

- C-c C-e → environments
- C-c C-s → sections
- C-c C-a → compile and view document.
- C-c ' → go to errors.
- C-c C-p C-s → Preview regions.
- C-c C-p C-c C-s → Remove preview of region.
- C-c C-k → Kill processsing.
- C-c ; → comment out region
- M-x tex-validate-buffer.

Overleaf Pros and Cons

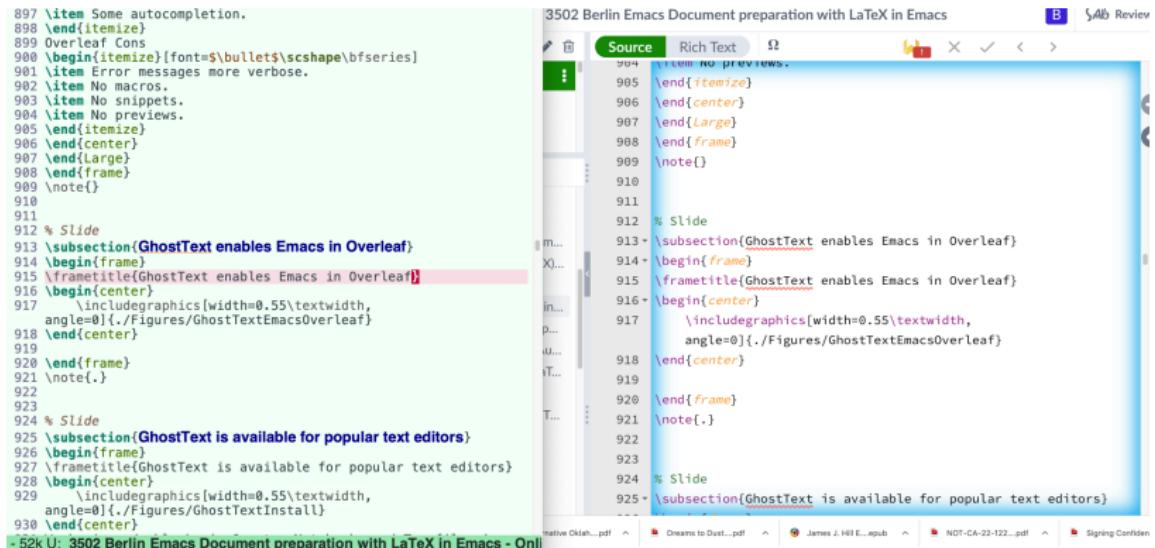
Overleaf Pros

- One mouse click to compile.
- Collaborative writing support.
- File outline.
- Store all writing projects on one site.
- Vim or Emacs key bindings.
- GhostView and Writefull.
- Some autocompletion.

Overleaf Cons

- Error messages more verbose.
- No macros.
- No snippets.
- No previews.

GhostText enables Emacs in Overleaf



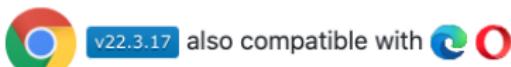
The screenshot shows the Overleaf interface with a LaTeX document open. The document contains several sections and frames, with some parts highlighted in pink and green. The left panel shows the LaTeX source code, and the right panel shows the rendered Rich Text version. The Overleaf logo is visible in the top right corner.

```
897 \item Some autocompletion.
898 \end{itemize}
899 Overleaf Cons
900 \begin{itemize}[font=$\bullet$\scshape\bfseries]
901 \item Error messages more verbose.
902 \item No macros.
903 \item No snippets.
904 \item No previews.
905 \end{itemize}
906 \begin{center}
907 \end{Large}
908 \end{frame}
909 \note{.}
910
911
912 % Slide
913 \subsection{GhostText enables Emacs in Overleaf}
914 \begin{frame}
915 \frametitle{GhostText enables Emacs in Overleaf}
916 \begin{center}
917 \includegraphics[width=0.55\textwidth,
angle=0]{./Figures/GhostTextEmacsOverleaf}
918 \end{center}
919
920 \end{frame}
921 \note{.}
922
923
924 % Slide
925 \subsection{GhostText is available for popular text editors}
926 \begin{frame}
927 \frametitle{GhostText is available for popular text editors}
928 \begin{center}
929 \includegraphics[width=0.55\textwidth,
angle=0]{./Figures/GhostTextInstall}
930 \end{center}
```

Brings snippets to Overleaf!

Available for popular text editors

1. Install your browser extension:



2. Install your editor extension:



GhostText works in code blocks in Jupyter Notebooks and Tex files in Jupyter Lab. Also works in Overleaf. See presentation “Edit live Jupyter notebooks from the comfort of your favorite text editor” about GhostText at the Oklahoma Data Science Workshop².

²<https://mediasite.ouhsc.edu/Mediasite/Channel/python/watch/4da0872f028c4255ae12935655e911321d>

Book document

main.tex file

preamble.tex

./Content/0AAAcontents.tex

./Content/Appendices

style file

global.bib

glossary.tex

acronyms.tex

epigraphs.tex

main.tex file

```
1 %
2 % This is the master file that is called for compiling this document.
3 % The chapaters resides in ./Content
4 % 0AAcontents.tex is the master file of ./Content.
5 % It controls the order in which chapters are loaded for compiling.
6 %
7 % The bibliographfy is global.bib, which resides at the top level,
8 % although it is called by 0AAcontents.tex.
9 %
10 \documentclass[graybox]{svmult}
11 \input{./mybookPreamble}
12 \input{./Content/0AAcontents}
```

* 492 :- main.tex | LaTeX/MP +7 Fly/- Ref WC[73-6/67] ivy yas AC Wrap Git-master

2

Template writing.log on GitHub³.

0AAcontents.tex

```
11 \maketitle
12
13 \frontmatter%%%%%%%%%%%%%
14 %|include{dedic}
15 \include{./Content/Preface}
16 \tableofcontents
17 %|listoffigures
18 %|listoftables
19 % |listofalgorithmes
20 % |listoflistings
21 \printglossary[title=Glossary]
22 \printglossary[type=\acronymtype]
23 % |listof{myequation}{List of Equations}
24
25 \mainmatter%%%%%%%%%%%%%
26
27 \include{./Content/ChPrerequisites}
28
29 %%%%%% Basics %%%%%%
30 \include{./Content/partBasics}
31 \include{./Content/ChIntroBasics}
32 \include{./Content/ChSuggestedReadingList}
33 \include{./Content/ChDirectedAcyclicGraphs}
34 \include{./Content/ChInformationTheory}
35 \include{./Content/ChKruschkeDiagrams}
36
```

- 9.4k -: 0AAcontents.tex | TeX/P +6 WC[817+0/817] ivy yas | Git-master

Chapters

```
1 %!TEX root = ../../main.tex
2 %%%%%%%%%%%%%%% chapter.tex %%%%%%%%%%%%%%%
3 %
4 % \begin{code}{}%
5 % \label{lst:FindByte}
6 % \index{copying and pasting code!lost bytes}
7 % \caption{Python script to find lost bytes.}
8 % \begin{minted}[frame=lines,framerule=2pt]{python}
9 % <insert math here>
10 % \end{minted}
11 % \end{code}
12 %%%%%%%%%%%%%% Springer-Verlag %%%%%%%%%%%%%%
13
14 \chapter{Kruschke-style diagrams}
15 \label{ch:KruschkeDiagrams}
16 \index{Kruschke-style diagrams}
17
18 \section{Introduction}
19
20 Rasmus B{\aa}th wrote a template file for Libre Office's draw program that can  
used to quickly assemble Krushcke style diagrams for hierarchical  
models\footnote{\url{https://github.com/rasmusab/distribution_diagrams}}
* 2.4k :- ChKruschkeDiagrams.tex | LaTeX/MP +5 Fly/- Ref WC[353-45/308] ivy yas AC Wrap
```

Acronyms

ADVI Automatic Differentiation Variational Inference. [112](#)

BDA Bayesian data analysis. [V](#), [VI](#), [XI](#), [9](#)

BUGS Bayesian inference Using Gibbs Sampling. [322](#)

CRI Credible Interval. [9](#), [10](#)

DIC Deviance Information Criterion. [10](#)

GLM General Linear Models. [9](#), [10](#)

GLMM General Linear Mixed Models. [9](#)

HMC Hamiltonian Monte Carlo or Hybrid MC. [VI](#), [VII](#)

HPDI Highest Posterior Density Interval. [9](#)

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40.3 Draws from a Dirichlet vs draws from resampling. This plot is from http://sumsar.net/blog/2015/04/the-non-parametric-bootstrap-as-a-bayesian-model/	88

Beamer frames

```
\subsection{Beamer frames}
\begin{frame}
\frametitle{Beamer frames}
\begin{center}
\Large{
\begin{itemize}[font=$\bullet$\textbf{\textit{sshape}\textbf{series}}]
\item preamble features
    (not making slides look like beamer slides)
\item Title slide
\item code blocks
\item tables, figures
\item animations
\end{itemize}
\end{center}
\end{frame}
\note{The text of what I meant to say.}
```

Title frame

```
% title info
\title{Document preparation with \LaTeX{} in Emacs}
\author{\textbf{Blaine Mooers, PhD} \texttt{blaine-mooers@ouhsc.edu} \\
405-271-8300 }
\institute{\{Department of Biochemistry \& Molecular
Biology\}\textcolor{red}{[2pt]}\{University of Oklahoma Health Sciences Center, } \\
Oklahoma City, Oklahoma, USA\}
% to hide auto date, use \date{}
\date{Berlin Emacs Meetup, Zoom Meeting\textcolor{red}{[2pt]} 31 August 2022, 19 - 20:30
(CEST)}
\begin{document}

% title slide
{
\setbeamertemplate{footline}{} % no page number here
\frame{
\titlepage
\note{

}}}
```

Beamer code blocks

```
\defverbatim[colored]\exampleCodeC{  
  \large{  
    \begin{pythoncode}  
      #+BEGIN_SRC emacs-lisp :results value scalar  
      (*40 1000 1000 1000 1000 1000 1000 1000)  
      #+END_SRC  
      #+RESULTS:  
      : 400000000000000000000000  
    \end{pythoncode}  
  }  
}  
% Slide 24  
  
\begin{frame}  
  \frametitle{Code block with output in the RESULTS drawer}  
  Place cursor inside code block and enter C-c C-c to run code.  
  \exampleCodeC  
  The option ``:results value scalar'' is needed with emacs-lisp.  
  In the org-babel configuration, include emacs-lisp in the list  
  of languages.  
  \end{frame}
```

Code block with output in the RESULTS drawer

Place cursor inside code block and enter C-c C-c to run the code.

```
1 #+BEGIN_SRC emacs-lisp :results value scalar
2 (* 40 1000 1000 1000 1000 1000 1000 1000)
3 #+END_SRC
4 #+RESULTS:
5 : 40000000000000000000000000000000
```

Note that the “:results value scalar” was needed with emacs-lisp. In the org-babel configuration, emacs-lisp has to be in the list of languages.

betterposter documentclass

Structural Molecular Biology in JupyterLab and Colab

Blaine Mooers
University of Oklahoma
Health Sciences Center

Introduction

- Structural biology is vital for modern molecular biology and drug discovery.
- Biomolecular structure determination is done with crystallography, NMR, cryo-EM, SAXS, and other methods.
- Each method uses several to many software packages.
- Doing some or all of the work in Jupyter notebooks would support reproducible research.
- It would also support iterative programming for at least some steps.

Approach

1. Develop libraries of code templates for major software packages.
2. Make templates available for JupyterLab and Colab.
3. Include the code for installing software quickly on Colab.
4. Supply template workflows in Jupyter notebooks.
5. Share on <https://github.com/MooersLab/scipy21poster160>.

Conclusion

Jupyter notebooks can support reproducible research in structural biology.



Code templates ease running
structural biology software
locally in JupyterLab or
in the cloud with Colab.



Take a picture to
download the full paper
or visit <https://github.com/MooersLab/scipy21poster160>

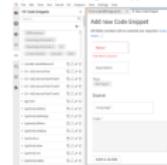
blaine-mooers@ouhsc.edu



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OUHSC Laboratory of Biomolecular Structure and Function
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NIH grants:
R01 CA242845,
P20 GM103640,
P30 CA225520.



Ellyra snippet manager in JupyterLab:



Installing PyMOL on Colab:



PyMOL commands in Python on Colab:



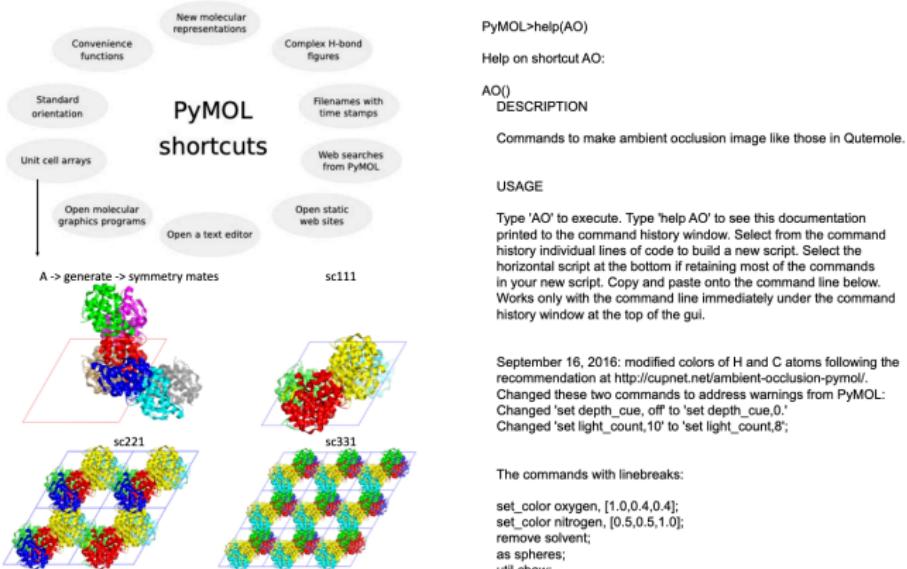
<https://github.com/rafaelbailo/betterposter-latex-template>

(1/2) beamerposter package

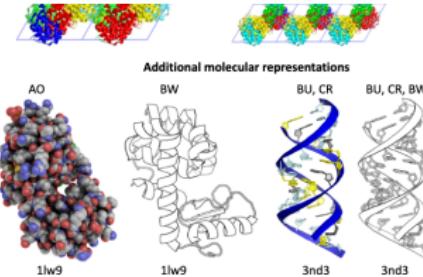
PyMOL Shortcuts For Faster Image Making

Blaine Mooers

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University of Oklahoma Health Sciences Center, Oklahoma City, OK 73104
blaine-mooers@ouhsc.edu



(2/2) beamerposter package



Saving file with timestamp

```
PyMOL>spse 14l.pse
```

```
t4y2019m06d03h11m31s39.pse
```

```
png, pqr, pdb, and all other file types
```

Opening external programs

```
PyMOL>code # open test.pml with VSC
```

```
PyMOL>WS # open NWS page
```

```
PyMOL> RG RNA structure # search  
Research Gate for "RNA structure"
```

```
remove solvent;  
as spheres;  
util.cbaw;  
bg white;  
set light_count,10;  
set spec_count,1;  
set shininess, 10;  
set specular,0.25;  
set ambient,0;  
set direct,0;  
set reflect,1.5;  
set ray_shadow_decay_factor, 0.1;  
set ray_shadow_decay_range, 2;  
set depth_cue, 0;  
ray
```

Commands without linebreaks to be pasted on command line in PyMOL
(See Mooers 2016 Protein Sci. 25(10):1873-82.)

```
set_color oxygen, [1.0,0.4,0.4];set_color nitrogen, [0.5,0.5,1.0];  
remove solvent;as spheres;util.cbaw;bg white;set light_count,8;  
set spec_count,1;set shininess, 10;set specular,0.25;set ambient,8;  
set direct,0;set reflect,1.5;set ray_shadow_decay_factor, 0.1;set  
ray_shadow_decay_range, 2;set depth_cue,0;  
color gray20, symbol c;ray
```

Rationale

The need and gap: The assembly of images of biomolecular structures for presentations and publication is often time consuming. The automation of common but cumbersome tasks can save time. The invoking of external programs from within PyMOL could also save more time because the viewport does not have to be moved aside. External programs include web browsers, text editors, image editors, word processors, email program, and calendars.

Hypothesis: Shortcuts ease structure analysis and image making with PyMOL.

Methods

- Shortcut == function in `pymolshortcuts.py`.
- Provide documentation for each function.
- Use python modules external to PyMOL.

Results

- SC prints list of shortcuts.
- `help(<shortcut>)` prints docstring.
- Docstring includes pml code for reuse.
- `webbrowser,bs4,requests` for web searches.
- `subprocess` opens external programs.
- Also see related [MooersLab/pymolsnips](#)

Summary

- More than 180 shortcuts.
- Access additional modules.
- Access external programs.
- Python 2.7 and 3.7 of PyMOL supported.
- <https://github.com/MooersLab/pymolshortcuts>

Funding

- Warren Delano Memorial Open-source PyMOL fellowship
- NSF MCB-1616865/1616845
- NIH/P20 GM103640 (PI Ann West)

Learning aids

<https://github.com/MooersLab>

- Latex-emacs init.el
- Business letter template
- Writing.log template
- Annotated bibliography template
- PDF and tex file for this slideshow
- Poster template
- Book template
- Manuscript template
- LaTeX snippets
- Quizzes: auctex-mode and general

Sources of help with L^AT_EX

- The error messages and documentation.
- Stack Exchange ❤️❤️.
- Overleaf help pages ❤️❤️❤️ .
- Staff at Overleaf.

One path to mastery of \LaTeX

- Start with org or free account on Overleaf.
- Start with documents useful in your life.
- Slowly add the use of \LaTeX to your workflow.
- Then ease in use of AUCTeX.
- Maybe synch a version on Overleaf via git.
- Use GhostText with Overleaf and Emacs.
- Use yasnippets to pop in favorite boilerplate.
- If \LaTeX is too much for you, use org-mode.

Potential elisp coding projects

I know, make the table in org and export to LaTeX!

- Functions to convert tables from LaTeX to Markdown (pandoc?)
- Functions to convert tables from LaTeX to ReStructuredText
- Function to convert markdown table to LaTeX
- Function to convert ReStructuredText table to LaTeX

Acknowledgements

- Oklahoma Data Science Workshop

Funding:

- NIH: R01 CA242845, R01 AI088011
- NIH: P20 GM103640, P30 CA225520,
P30 AG050911-07S1
- OCAST HR20-002
- PHF Team Science Grant