

# A L<sup>A</sup>T<sub>E</sub>X Workflow for MSDS

An easy way to quickly get something nice to turn in

by

David Josephs

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## 1. Introduction to L<sup>A</sup>T<sub>E</sub>X

Reasons to give up Word forever, bibtex, and demonstrations

# Contents

## 1. Introduction to $\text{\LaTeX}$

Reasons to give up Word forever, bibtex, and demonstrations

## 2. A Single-Source $\text{\LaTeX}$ Workflow

Integrating code and analysis into  $\text{\LaTeX}$

# L<sup>A</sup>T<sub>E</sub>X Primer

# What is L<sup>A</sup>T<sub>E</sub>X?

- Document Preparation System
  - Typesetting

# Why L<sup>A</sup>T<sub>E</sub>X?

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  - ❖ Manipulate everything

# Using L<sup>A</sup>T<sub>E</sub>X

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- ❖ Bibliography
- ❖ Templates!



# Reproducible Research Using L<sup>A</sup>T<sub>E</sub>X

# A Workflow Using knitr and L<sup>A</sup>T<sub>E</sub>X

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- ❖ .Rnw file extension
- ❖ Normal LaTeX preamble
- ❖ Set knitr chunk and engine options
- ❖ .Rnw → .tex → .pdf

# Chunky

Chunk name and options are defined by '« chunk name and options» ', followed by '=', then your code is included, then the chunk is punctuated with an '@'.

# Making tables with knitr

To make a table, you say `chunk results='asis'`, and print an `xtable`

# Making tables with knitr | Example

```
WheatEater<- read.csv("Data/Wheateater.csv")
model1 <-lm(Tcell Mass,data=WheatEater)
table1<-xtable(model1, label='tb:model1',
caption="Results of the Model")
print(table1,booktabs=T,table.placement='H')
```

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	0.0875	0.0787	1.11	0.2800
Mass	0.0328	0.0106	3.08	0.0061

Results of the Model



# Making figures with knitr

To make a beautiful figure, you set your device to `tikz` (`dev='tikz'`), which produces an amazing, non-rasterized figure. Note on the first run through, this can take a while, which is why we cache our output.

# Making figures with knitr | Example

```
resp<-ggplot(model1, aes(.fitted,.resid))
```

And so on. The next slide contains just basic ggplot output, but compiled using tikz into the pdf (with a surprise).

# Making figures with knitr | Example

An animated plot from `ggplot2`, in PDF form

# Integrating SAS

Integrating SAS is super easy.

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- ❖ SAS code does not save between chunks

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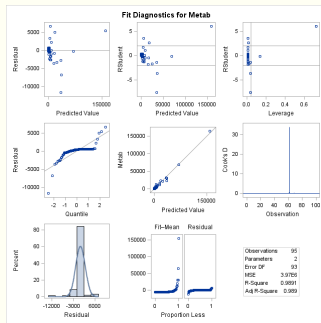
- ❖ `engine = 'sashtml'`
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  - ❖ `engineopts = sasopts`
- ❖ SAS figures are exported as PNGs
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- ❖ SAS tables are exported as HTML
  - ❖ Call with R library XML
  - ❖ Print with xtable
- ❖ SAS code does not save between chunks
  - ❖ Clever echos

# SAS Example

```
proc glm data=powermetabolism plots=all alpha=.05; model  
Metab=powerMass / CLPARM; run;
```

# SAS Example

## Alternatives For SAS University Edition



Diagnostic Plots on the Raw Metabolism Data

# Other Languages

Knitr and LaTeX have full support of Python, C++, C, Java, and you can really easily add your own. I know python can be saved across chunks, and works with tikz



# Conclusions

# Closing Thoughts

✚ Don't use Word

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- ❖ Don't use Word
- ❖  $\text{\LaTeX}$  is fun

# Questions

Thank you!

# Backup slide 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.