

# L<sup>A</sup>T<sub>E</sub>X for academics and researchers who (think they) don't need it

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**Abstract** This paper is written for academics and researchers who don't use L<sup>A</sup>T<sub>E</sub>X and wonder why anyone does. People who *do* use L<sup>A</sup>T<sub>E</sub>X (probably all of the readers of the article in this journal) may wish to share the article with their colleagues.

## 1 Introduction

Why should you learn L<sup>A</sup>T<sub>E</sub>X? To the uninitiated, L<sup>A</sup>T<sub>E</sub>X code looks bizarre. Like this:

```
\item Order each distribution. Let  $x_{(1)} \dots x_{(n)}$  be the  
ordered x values, and  $y_{(1)} \dots y_{(m)}$  be the ordered y  
values; and let  $m \leq n$ .  
\item If  $m=n$  then  $x_i$  and  $y_i$  are both  $(i-0.5)/m$   
quantiles of their distributions; in this case, simply graph  
 $x_i$  against  $y_i$  (if m is very large, say, more than 500,  
then fewer quantiles are needed).  
\item If  $m < n$  then graph  $y_i$  against the  $(i-0.5)/m$   
quantile of the x data. (Again, if m is large, a smaller number of  
quantiles is needed).
```

Why would anyone bother with all that arcane stuff to prepare documents? Why not just use Word or some other word processor?

Well, there are lots of good reasons. For people in some disciplines, L<sup>A</sup>T<sub>E</sub>X is virtually indispensable. You’ve managed to get along without it. But if you give it a try, you may wonder *how* you got along without it. It takes some getting used to, and you’ll probably have some problems at first, but it’s not really that hard; simple things can be done very quickly, and there are lots of resources to help. Once you are used to it, L<sup>A</sup>T<sub>E</sub>X is *easier* to use than word processors; in particular, it makes certain parts of writing scholarly articles much easier. Most of these articles include bibliographies and L<sup>A</sup>T<sub>E</sub>X has tools to manage bibliographies. Different publishers require different formats, L<sup>A</sup>T<sub>E</sub>X has tools to manage these, and some publishers may even provide their own formatting templates, so that everything is set up automatically. Papers may include figures and tables, and, when they do, they will require cross-referencing, and, yes, you guessed it, L<sup>A</sup>T<sub>E</sub>X has tools to handle this, as well. And many papers require revisions, both before and after they are submitted. L<sup>A</sup>T<sub>E</sub>X will renumber everything automatically — references, cross-references, section numbers — everything.

When you want to make presentations, L<sup>A</sup>T<sub>E</sub>X has add-on packages which can help create presentations that look good, and can include many options for overlays and navigating through a presentation. Finally, if you decide to write a book, L<sup>A</sup>T<sub>E</sub>X can handle books of any length, and can produce books of real beauty (for one example, take a look at [3]).

This article is organized as follows: In section 2, I cover some of the basics of using L<sup>A</sup>T<sub>E</sub>X. In section 3 I give a little more detail of the helpful things L<sup>A</sup>T<sub>E</sub>X can do that I listed above. In section 4, I show why some of the bad things you may have heard about L<sup>A</sup>T<sub>E</sub>X aren’t true. Finally, in section 5 I give some resources for those who want to learn more.

## 2 The very basics

L<sup>A</sup>T<sub>E</sub>X is not a word processor. It’s a document preparation system. Rather than type words and then format them using drop down menus, in L<sup>A</sup>T<sub>E</sub>X the formatting is part of the text, all of which is written in ASCII characters. At first, this seems bizarre, but after a while (not too long a while) you begin to appreciate it.

L<sup>A</sup>T<sub>E</sub>X does *exactly* what you tell it. You can *see* what you are telling it; if something goes wrong (and it will) you can try to find the problem yourself, and, if you can't, you can show it to others. You can even e-mail it. Try doing that with something you did in a word processor; "Well, I was using version 9 and I clicked on this, and then on that, then the pull-down menu appeared and I clicked on the default ... then I entered 2". Sheesh. With L<sup>A</sup>T<sub>E</sub>X, you can e-mail your actual code to an expert, or to one of the help groups listed below. The L<sup>A</sup>T<sub>E</sub>X community is friendly, there are places to go to get help, probably right on your campus. In my experience, L<sup>A</sup>T<sub>E</sub>X experts welcome L<sup>A</sup>T<sub>E</sub>X novices. (Some suggestions of where to get help are in Section 5.)

## 3 The good stuff

### 3.1 Sectioning

So, you're writing a long article. It has sections. How to create them? Try this

```
\section*{Introduction}
In this article I prove that the key dependent variable in my field
is related to the particular independent variables I have available
to me, and in just the ways I thought it would be.
\section{Methods}
  \subsection{Subjects}
    A bunch of students who happened to be in my class the day I
    had a bad cold and couldn't give a lecture.
  \subsection Instruments
    Who remembers?
  \subsection Analysis
    I think I tried ANOVA.
\section Results
  All my null hypotheses were rejected.    Now they feel bad.
\section Discussion
  If this doesn't get me a big grant, I'm history in this
  department.  Maybe I can find work as a \LaTeX{} compositor?
```

(Note that you can indent your source however you like).  $\text{\LaTeX}$  will handle the numbering, the formatting, the spacing, and all that, leaving you free to do the writing and the thinking. And  $\text{\LaTeX}$  won't try to guess what you're thinking, or start numbering sections whenever you type a number, or start indenting like crazy.

## 3.2 Cross-referencing

At some points in your article you want to refer to other parts, or to figures, or tables. No problem. At the part you want to refer to you need a `\label` command, and at the point where you make your reference, you need a corresponding `\ref` command. Like this:

In subsection `\ref{SS:section}` I showed you how to create sections and subsections. Below, in section `\ref{S:badstuff}`, I show you why some things you hear about `\LaTeX{}` aren't really true.

This produces the following:

In subsection 3.1 I showed you how to create sections and subsections. Below, in section 4, I show you why some things you hear about  $\text{\LaTeX}$  aren't really true.

## 3.3 A simple table

OK, I admit it. It can be hard to create complicated tables in  $\text{\LaTeX}$ .<sup>1</sup> It's hard to create good complicated tables in *any* program. But simple tables aren't so bad. Here's an example:

```
\begin{table}
  \centering
  \begin{tabular}{lrr}
    Quantile & Male & Female\\\hline
    0\%      & 59  & 44\\
    25\%     & 67  & 62\\
    50\%     & 69  & 64\end{tabular}
```

---

1. Some  $\text{\LaTeX}$  systems automatically put the basics of an environment in place for you, e.g., xemacs, LyX,  $\text{\TeX}$ macs and others.

```

75\%      & 71    & 66\\
100\%     & 77    & 71\\
\end{tabular}
\caption{Quantiles of male and female heights}
\label{tab:malefemale}
\end{table}

```

which produces Table 1:

Quantile	Male	Female
0%	59	44
25%	67	62
50%	69	64
75%	71	66
100%	77	71

Table 1: Quantiles of male and female heights

What does all this do? Well, there isn't space here to go into everything even for this table (see Section 5). But ...

- The `\begin{table}` and `\end{table}` start a *table* which can be placed anywhere in a document, and given a caption and a label. Note that every `\begin` must have a `\end`.
- The `\centering` command horizontally centers everything following; its scope ends at `\end{table}`.
- The `\begin{tabular}` sets up a table, and the `{lrr}` makes it three columns with the first left aligned and the others right aligned.
- The ampersands (the `&` character) separate columns.
- The double backslashes end lines.
- The `\hline` adds a horizontal line.

## 3.4 Graphics

L<sup>A</sup>T<sub>E</sub>X also provides extensive methods to deal with graphics. For social scientists, perhaps the most useful are ways to directly import .pdf and .eps files that are created by other programs, such as statistical packages. Although the full use of imported graphics is complex (see Section 5) a basic example takes the following steps:

1. Create an .eps or .pdf file (e.g., diagram1.pdf) and store it in the same directory with your L<sup>A</sup>T<sub>E</sub>X file for the article you are writing.
2. In the preamble include the following command: `\usepackage{graphicx}`.
3. At the spot where you want your diagram, put `\includegraphics{diagram1}`.

If you would like L<sup>A</sup>T<sub>E</sub>X to move the figure to the closest position where it will fit in your document, give it a label and cross- reference, (just like with the previous table example) the following example will do this:

```
\begin{figure}
  \centering
  \includegraphics{diagram1}
  \caption{This is an example of a figure.}
  \label{fig:example}
\end{figure}
```

## 3.5 BibT<sub>E</sub>X

Although space does not permit a full discussion of bibliography creation in L<sup>A</sup>T<sub>E</sub>X, you should know that there is a package called BibT<sub>E</sub>X which allows you to create extensive bibliographies, enter the information for each citation in a natural way, and then never have to reenter the information again. There are methods for then formatting the citations to match a wide variety of styles.

## 4 The (supposed) bad stuff

### 4.1 L<sup>A</sup>T<sub>E</sub>X is hard to learn

OK, this is *partially* true, in that, if you want to or need to, there is a *lot* you can do with L<sup>A</sup>T<sub>E</sub>X. You can create complicated diagrams, write long books with complex and beautiful formatting, create multiple indexes, and multiple lists, and on and on. But the *basics* of L<sup>A</sup>T<sub>E</sub>X are *not* so hard; in fact, you're well on your way!

### 4.2 L<sup>A</sup>T<sub>E</sub>X can't be annotated

This one is simply incorrect. There are several ways to insert editorial comments into L<sup>A</sup>T<sub>E</sub>X files. One is to use the `\textcolor` command to insert comments in a different color. Another is to use `\marginpar` to insert comments in the margin.

### 4.3 You can't share L<sup>A</sup>T<sub>E</sub>X files with people who use Word

There are some free programs which attempt to convert L<sup>A</sup>T<sub>E</sub>X to Word, for example, latex2rtf (<http://www.tug.org/utilities/texconv/latex2rtf.html>). I haven't tried these extensively. For Windows, I have found the commercial program TeX2Word to be quite useful, see <http://www.chikrii.com/> for more information on this software. Also see Dave Walden's articles in this issue and in issue 3 of this journal <http://www.tug.org/pracjourn/2005-3/walden-travels/walden-travels.pdf>.

### 4.4 You can't see the output while you type

While technically true, on most distribution typesetting a file is a matter of a single keystroke or mouse click, and typesetting is extremely fast.

## 5 Where to go from here

There is a huge variety of materials to help you learn more about L<sup>A</sup>T<sub>E</sub>X:

- CTAN (The Comprehensive T<sub>E</sub>X Archive Network) is a repository of T<sub>E</sub>X macros, packages, formats, utilities, and other goodies, and has lots of material, some of it for beginners. Two that I found useful are
  - For more details on imported graphics, see [www.ctan.org/tex-archive/info/epslatex.pdf](http://www.ctan.org/tex-archive/info/epslatex.pdf)
  - For a more comprehensive introduction to L<sup>A</sup>T<sub>E</sub>X, see [www.ctan.org/tex-archive/info/beginlatex](http://www.ctan.org/tex-archive/info/beginlatex)

but there are numerous other introductory materials there, as well — the above are just my own preferences.

- Books, including:
  1. *Guide to L<sup>A</sup>T<sub>E</sub>X* [2] which is an excellent introduction to L<sup>A</sup>T<sub>E</sub>X.
  2. *Math into L<sup>A</sup>T<sub>E</sub>X* [1], which is particularly useful if you have to type a lot of math, and,
  3. *The L<sup>A</sup>T<sub>E</sub>X Companion* [3]. This is a great book, but not for beginners; it's a great reference, it's also good for impressing people with the power of L<sup>A</sup>T<sub>E</sub>X. If you start using L<sup>A</sup>T<sub>E</sub>X a lot you will probably wind up wanting this one.
- The mailing group for general questions and discussion <http://tug.org/mailman/listinfo/texhax>.
- The T<sub>E</sub>X newsgroup, comp.text.tex, also for general questions and discussion.
- There are a number of FAQs and lists of tips and tricks, two I've used are
  1. <http://www.tex.ac.uk/tex>
  2. <http://www.texnik.de/>

## References

- [1] George Grätzer, *Math into latex*, Birkhäuser, New York, 2000.



- [2] Helmut Kopka and Patrick W. Daly, *Guide to latex*, Addison Wesley, Boston, 2004.
- [3] Frank Mittelbach and Michel Goossens, *The latex companion*, Addison Wesley, Boston, 2004.