

L^AT_EX Equation Syntax

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April 29, 2013

1 Background and Strengths

L^AT_EX is a packaging, enhancement and interface to T_EX, a mathematically-savvy document preparation system. Both had existed before Microsoft Word, but have been largely confined to academic circles in math-related fields.

L^AT_EX is essentially a **markup language** - like, e.g., HTML. Its primary strengths:

1. **Equation editing and typesetting.** This was the main reason I deserted Word (for methods-article work) in 2005 : it just couldn't do what I needed from it. It cannot do *everything* – but pretty nearly so.
2. **Leanness, stability and reproducibility.** Except for figure files, all you ever need to retain is your source file (and if your figure is produced via R , you need only the R code; see below). L^AT_EX and T_EX are both open-source and extremely stable by intent. In fact, T_EX inventor Don Knuth instructed the version numbers to converge to π – with Version π to be released after his death, “*at which point all remaining bugs will become features*”.
3. **A great compatible citation-markup system.** It is called BibT_EX. You won't have to worry about licenses and version upgrades for your bibliographic list again, and you can export its content to EndNote etc. as XML.
4. **Produce documents that are professional-looking with self-consistent formatting rules, even if you are not particularly talented in these respects.** Of course, if you use, e.g. MS Word, and don't change any formatting (who does that?), you *might* get a reasonably self-consistently formatted document. But L^AT_EX is a different league in that respect.
5. **Being free, open-source and crowd-sourced, there is great help available online, as well as new developments arising from needs of people like you.** This community support not quite as amazing as the R one, but it's good enough.

6. Nowadays, you can also make great \LaTeX - based presentations using the **beamer package**. This is how Eli has been making his beautiful lecture notes.
7. Last but not least, R and \LaTeX are increasingly integrated for report production.
 - The **Sweave** command is available in **base R**. It compiles `.Rnw` files – these are \LaTeX documents with additional markup, to allow the embedding of R code chunks and expressions. The output is a \LaTeX document with all figures, tables, etc. already produced and embedded. All R package vignettes, and most R instruction books, were produced this way.
 - More recently, the **knitr** R package provides an easier-to-work-with version of **Sweave** (according to users), and also a method to produce HTML documents via the same methodology – which is precisely what I've been tormenting you with my own far-less-beautiful lecture notes. Further more, the HTML version as well allows you to use \LaTeX equation syntax.

Eli and I would like you to learn these integrated document-production tools; but first you should learn to write \LaTeX equations.

2 Let's Go Write some Equations Online...

<http://latex.informatik.uni-halle.de/latex-online/latex.php>