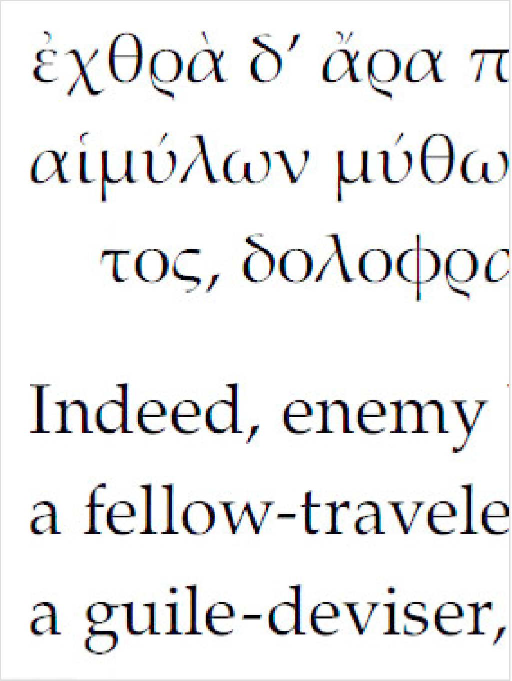
The Beauty of LaTeX

Latest update

4 July 2011 Code and examples uploaded to GitHub.


ἐχθρὰ δ’ ἄρα π
αἱμύλων μύθω
τος, δολοφρο

Indeed, enemy
a fellow-travele
a guile-deviser,

There are several reasons why one should prefer LaTeX to a WYSIWYG word processor like Microsoft Word: *portability*, *lightness*, *security* are just a few of them (not to mention that LaTeX is *free*). There is still a further reason that definitely convinced me to abandon MS Word when I wrote my dissertation: you will never be able to produce *professionally typeset* and *well-structured* documents using most WYSIWYG word processors. LaTeX is a free typesetting system that allows you to focus on *content* without bothering about the layout: the software takes care of the actual typesetting, structuring and page formatting, producing documents of astonishing elegance. The software I use to write in LaTeX on a Mac compiles documents in PDF format (but exporting to other formats such as RTF or HTML is also possible). It supports unicode and all the advanced typographic features of OpenType and AAT fonts, like *Adobe Garamond Pro* and *Hoefler Text*. It allows fine-tuned control on a number of typesetting options, although just using the default configuration results in documents with high typographic quality. In what follows I review some examples, comparing how fonts are rendered in MS Word and in LaTeX.

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Breaking news

May 20, 2009 Microsoft is expected to add support for OpenType features in Microsoft Word 2010, shipping in 2010.

See also

Typesetting an academic CV in LaTeX. 6 templates to compile a cv using XeTeX and expert fonts.

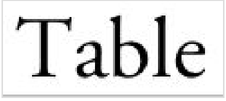
LaTeX on Mac OS X: my open source LaTeX toolbox for Mac OS.

Accessing OpenType features in XeTeX: how to control expert font features via `fontspec`.

1. Kerning

Kerning is the process of selectively adjusting the spacing between letters pairs to improve the overall appearance of text. Examples of letter pairs that need kerning treatment are AV, AY, PA, and AT. These letter pairs often look awkward together, and need to either be moved closer together, or further apart manually. Professional typesetting systems and fonts allow fine-grained adjustments for such letter pairs. Popular word processors either lack support for kerning tables or *disable* kerning by default (this is the case with both Microsoft Word for Mac OS v.X and 2008) [Thanks to Mark Dancer and Nicholas Shera for pointing this out] .

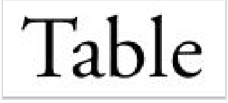
MS Word (wrong default kerning for the "Ta" letter pair):



Table

[Adobe Garamond Pro, 48pt] pdf doc

LaTeX (correct kerning for the "Ta" letter pair):



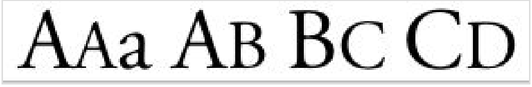
Table

[Adobe Garamond Pro, 48pt] pdf tex

2. Real small caps and titling caps

Most word processors create *fake* small capitals by adjusting the size of capitals. Professional fonts contain different sets of glyphs for small capitals and full-size capitals that any serious typesetting system should be able to use in the appropriate context. In particular, *real small capitals* are more than resized versions of uppercase capitals: they have a relatively heavier stroke and are designed to be visually compatible with lowercase characters of the same typeface. Some OpenType fonts have special “titling” alternates that are designed for all-uppercase type set at large sizes and have a lighter stroke.

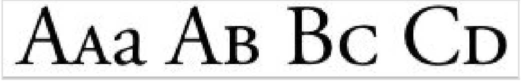
MS Word (fake small caps):



AAa AB BC CD

[Adobe Garamond Pro, 48pt] pdf doc

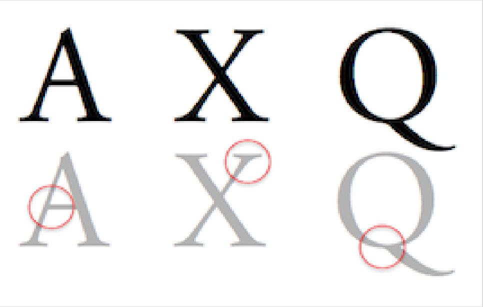
LaTeX (real small caps):



AAa AB BC CD

[Adobe Garamond Pro, 48pt] pdf tex

LaTeX (regular vs titling caps):

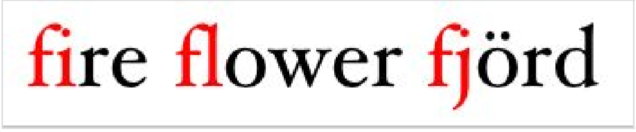


[Adobe Garamond Pro, 120pt] pdf tex

3. Common ligatures

A good typesetting programme should always use contextual intelligence and substitution tables to determine whether ligatures are needed. Common ligatures are essential to professionally typeset text.

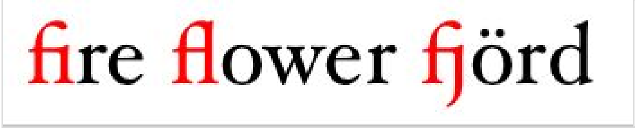
MS Word (common ligature errors):



fire flower fjörd

[Hoefler Text, 48pt] pdf doc

LaTeX (correct use of ligatures):



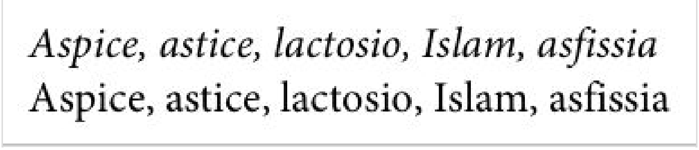
fire flower fjörd

[Hoefler Text, 48pt] pdf tex

4. Rare and ancient ligatures

XeTeX in conjunction with professional fonts gives the possibility to exploit the whole set of rare ligatures and decorations, that are automatically added to the text.

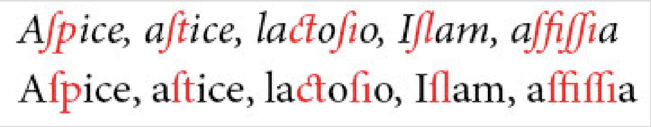
MS Word (text with no ligature):



Aspice, astice, lactosio, Islam, asfissia
Aspice, astice, lactosio, Islam, asfissia

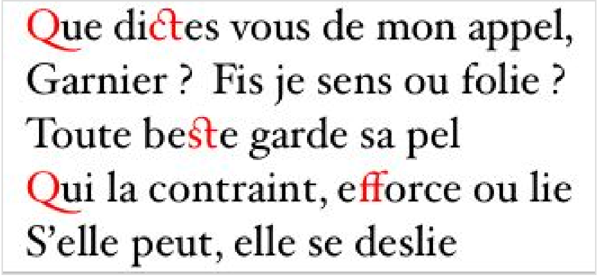
[Adobe Minion Pro, 24pt] pdf doc

LaTeX (text with rare and old-style ligatures):



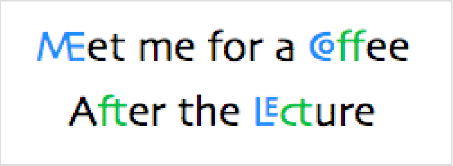
Aſpice, aſtice, lactoſio, Iſlam, aſfiſſia
Aſpice, aſtice, lactoſio, Iſlam, aſfiſſia

[Adobe Minion Pro, 24pt] pdf tex



Que dictes vous de mon appel,
Garnier ? Fis je sens ou folie ?
Toute beste garde sa pel
Qui la contraint, efforce ou lie
S'elle peut, elle se deslie

[Hoefler Text, 24pt] pdf tex



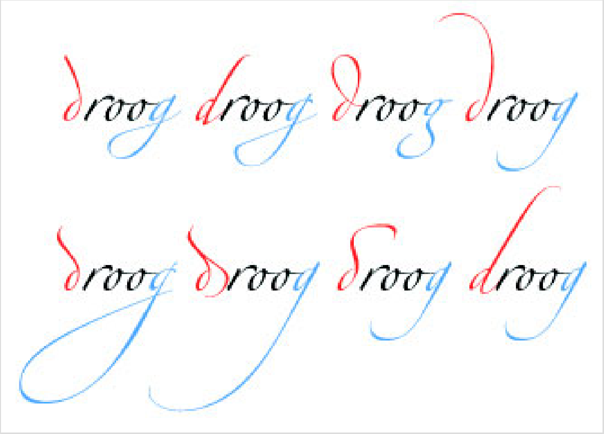
Meet me for a Coffee
After the Lecture

[Skia, 24pt] pdf tex

5. Glyph variants

Expert fonts often include variants or alternate shapes for alphabetic characters and numbers. XƎTEX with the fontspec package offers the possibility to access and select variants on single characters or for a whole text block.

LATEX (example of font variants):

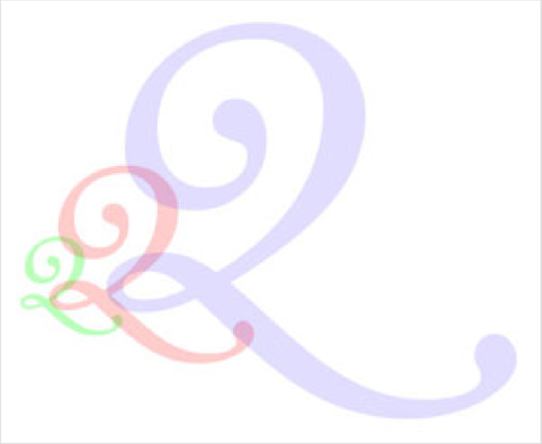


[Zapfino, 25pt] pdf tex

6. Transparency

The fonstpec package allows you to set font transparency in your XƎTEX source.

LATEX (alpha transparency)

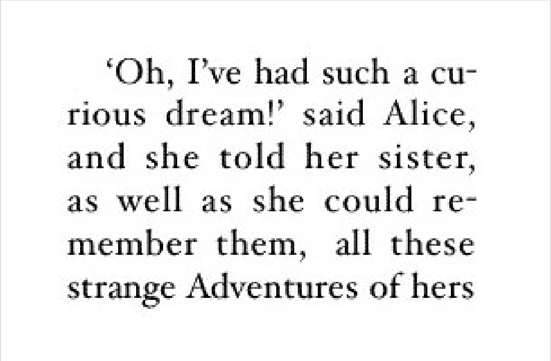


[Hoefler Text Italic, 48+pt] pdf tex

7. Line breaks, justification and hyphenation

Readability results not only from a good selection of typefaces, but also from a correct distribution of characters and whitespace per line. To attain this goal, most WYSIWYG word processors use relatively dumb justification/hyphenation procedures (i.e. algorithms that establish the position for line breaks by processing text *line by line*). LaTeX uses an advanced algorithm, based on seminal work by Donald Knuth and Michael F. Plass and enhanced by Frank Liang in 1983 for his PhD dissertation, which considers paragraphs as `wholes´ in order to decide where to add line breaks. The algorithm uses language-specific patterns in order to decide the preferred position for hyphenation. The engine then selects line breaks so as to make paragraphs look *as good as possible*. Information that is taken into account for calculating optimal line breaks includes the number of consecutive lines ending with hyphens, word tightness on each line, the change of tightness between consecutive lines. Further development has enabled the LaTeX engine to allow certain characters to stick into the margin, thus generating an *optically* straight margin - i.e., a margin that *looks* straight without being geometrically so. LaTeX's hyphenation settings can be fine-tuned by expert users.

Advanced hyphenation/justification in LaTeX:



‘Oh, I’ve had such a cu-
rious dream!’ said Alice,
and she told her sister,
as well as she could re-
member them, all these
strange Adventures of hers

[Hoefler Text, 10pt] pdf tex

- For visual examples of the differences between paragraph and line-by-line based justification algorithms, see this analysis by Maarten Sneep.
- For a browser-based implementation of the Knuth-Plass hyphenation algorithm check out this JavaScript library by Bram Stein.

8. Getting expert fonts

XeTeX gives the best results with expert fonts such as those based on OpenType technology but works with standard TrueType fonts as well. Zillions of expert fonts can be purchased online from digital foundries, but Mac OS comes bundled with a number of excellent fonts with expert features (e.g. Hoefler Text, Optima, Skia, Apple Chancery, Zapfino). More free OpenType fonts are available on the net. Check out for example the Gentium, Charis SIL and Doulos SIL fonts from SIL, Cardo by David J. Perry, the free fonts designed by Jos Buivenga (the creator of Fontin), this collection of professional quality fonts selected by Vitaly Friedman or the amazing Font Squirrel.

9. Typesetting with LaTeX: selected links

- SIL International, the XeTeX typesetting system ››
- Luc Devroye, Fonts with TeX - possibly the most comprehensive selection of resources on fonts in TeX/LaTeX.
- Andrew Roberts, LaTeX vs. MS Word.
- Allin Cottrell, Word Processors: Stupid and Inefficient.
- Kevin O'Malley, LaTeX: It's Not Just for Academia - part 1 :: part2.
- TeX showcase - edited by Gerben Wierda, it features examples of what you can do with TeX.
- Humanities books typeset with TeX - examples of professional TeX typesetting of books in the humanities, selected by the Association of American University Presses.
- TeX font sampler - booklet illustrating and comparing how different typefaces look like in LaTeX.
- LaTeX typefaces - comparison of fonts available with the standard LaTeX distribution.
- LaTeX - A document preparation system - official site of the LaTeX project.
- TUG.org - The TeX Users Group (TUG) was founded in 1980 for educational and scientific purposes, to provide an organization for those who have an interest in typography and font design, and are users of the TeX typesetting system invented by Donald Knuth.

10. Acknowledgments

Many of the examples in this article are based on the documentation of the `fontspec` package by *Will Robertson*, who deserves most of the credits for making expert font features in XeTeX so easy to use. Thanks to all those who helped improve this article with valuable feedback: *Bastien Guerry*, *Nicholas Shera*, *Mark Dancer*, *Olaf 'Rhialto' Seibert*, *David Crossland*, *Tiago Tresoldi*, *Ehud Kaplan*, *Henri Langenhoven*.

11. Technical notes

These examples were created on a Mac, partly on Mac OS 10.3.9, Microsoft Word v.X and TeXShop 1.35, partly on Mac OS 10.5.3 with Word:Mac 2008 and TeXShop 2.x, the XƎTEX engine with the `fontspec` package, and using the following fonts: Adobe Garamond Pro, Adobe Minion Pro (commercial fonts), Hoefler Text, Skia, Zapfino (fonts bundled with Mac OS X). This article, the PDF samples and TEX sources are licensed under a Creative Commons Attribution-Share Alike 3.0 Unported License. A backlink is sufficient for attribution. All materials used in this article can be obtained via GitHub. The TEX, LATEX and XƎTEX logos on this page are rendered via a nifty XHTML and CSS hack by Edward O'Connor. [COinS metadata]

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