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# A Story of *kpfonts*: Reaching the Limits of *NFSS*

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CHRISTOPHE CAIGNAERT

## Abstract

The *kpfonts* package allows to use a large family of *kp* fonts. This paper describes a long development of this package, since its beginnings in 2005 to the last release published in 2010.

During the years, many options were added to the package, that responded to users' demands. Particular options allow for instance to switch between basic and lighter fonts, between several ligatures of the letter *f* or the letter *t*, between recent and old-style shapes of digits, between serif and sans-serif mathematical fonts.

The paper also demonstrates usage of the *kpfonts* package with some combinations of options.

## Key words

Font, *kpfonts* package

## Abstrakt

Balíček *kpfonts* umožňuje používat velkou rodinu fontů *kp*. Tento článek popisuje dlouhý vývoj tohoto balíčku od počátku v roce 2005 až po poslední verzi publikovanou v roce 2010.

V průběhu let byly do balíčku přidávány různé volby reagující na připomínky uživatelů. Jednotlivé volby umožňují přepínat mezi různými variantami jednotlivých jevů použitých v písmu. Například přepínání mezi základní a světlou variantou písma, přepínání mezi různými variantami ligatur s písmenem *f* nebo s písmenem *t*, přepínání mezi současnými a starými kresbami číslic v matematickém módu nebo přepínání mezi patkovou a bezpatkovou sazbou matematiky.

Článek také obsahuje ukázky použití balíčku *kpfonts* s různými kombinacemi voleb.

## Klíčová slova

Font, balíček *kpfonts*

Like a bird on the wire,  
Like a drunk in a midnight choir,  
I have try, in my way, to be free.

LEONARD COHEN – *Bird on the wire*

One day, some years ago, I was with DANIEL FLIPO, the author of the *lettrine* package and the French module of *babel*.

He reminded me  $\text{\LaTeX}$  is a community software, and, if I don't find what I want, I have to write it! Without him, probably, *kpfonts* wouldn't exist...  
Greetings to him...

## Before *kpfonts*

### I'm not a...

I have been a mathematics teacher in an High School in the north of France since 1980. My students are 19 or 20. I have been interesting in Computer Science since the middle of the seventies.

I'm not a typographer and I'm not a  $\text{\TeX}$ , or  $\text{\LaTeX}$ , expert. I'm unable to program in  $\text{\TeX}$  language! Nothing fated me to become a font designer and package author...

Nothing at all!

### First steps with computer typesetting

The first computer I bought was an Apple IIe! Then, I began writing some papers with the Apple Writer<sup>1</sup> software, obviously text and not math documents...

Then I bought an HP Personal Computer with a 8MHz 80286 processor! I began writing some mathematics using Chiwriter<sup>2</sup>, a shareware at that time.

Some years later, I used a student release of Scientific Word, Scientific Workplace<sup>3</sup>, release 2.5. It was a private  $\text{\LaTeX}$  editor with a limited wysiwyg formula editor. This was my first typesetting with good output. Scientific Word was good, but not very versatile, and month after month, I reached its limits. It was possible to insert any  $\text{\LaTeX}$  command, but if it was unknown for its some  $\text{\LaTeX}$  commands, but they appear on screen as grey boxes. Some basics commands like  $\sum$   $\lim$  in math line needs a grey box for  $\lim$   $\lim$   $\lim$ . Because I'm never fully satisfied, I got more and more grey boxes in my documents with more and more  $\text{\TeX}$ / $\text{\LaTeX}$  commands not interpreted on screen...

Therefore, I decided to forget it and I'm using pdf $\text{\TeX}$  now.

Perhaps, it seems stupid for you, but, during these years, I was working alone to discover that software. In my High School, most math teachers are, at this moment, writing math by hand, some of them use a too well known text editor, and I'm alone to look for a better output quality... with  $\text{\LaTeX}$ .

And you know it's not easy to discover  $\text{\LaTeX}$  alone!

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<sup>1</sup>[http://en.wikipedia.org/wiki/Apple\\_Writer](http://en.wikipedia.org/wiki/Apple_Writer)

<sup>2</sup><http://en.wikipedia.org/wiki/ChiWriter>

<sup>3</sup>[http://en.wikipedia.org/wiki/Scientific\\_WorkPlace](http://en.wikipedia.org/wiki/Scientific_WorkPlace)

## First interest about fonts

I have been interested in typography for a long time and I read that pdf<sub>T</sub>E<sub>X</sub> can use TrueType fonts. I followed the article of DAMIR RAKITYANSKY<sup>4</sup> to install my first *ttf* fonts.

Thus, I discovered ligatures, kerning, metrics, virtual fonts: *pl*, *vpl*, *tfm*, *vf*, *fd*, *map* and *sty* files of the L<sup>A</sup>T<sub>E</sub>X font's world, and also *ttf*, *pf**b*, *af**m* files issued from typography.

Because some users, Windows® users mainly, never use a console and a command line, I wrote a new paper, in French<sup>5</sup> and in English<sup>6</sup>, about installing *ttf* fonts for pdf<sub>T</sub>E<sub>X</sub> and a step by step for those using TeXnicCenter. Otherwise, I built the necessary files for a lot of Windows® *ttf* fonts and free *ttf* fonts coming from a website<sup>7</sup>.

I also made an artistic document for a local exhibition combining computer handwriting fonts with the meaning of the message, unfortunately for you, in French, called *Rendez-Vous*<sup>8</sup>.

Doing that work, I also discovered *the* font editor *fontforge* but also some other font editors: one of my friends is working in typography and I used his professional computer during the week-end.

I obviously discovered the Bezier's curves and the design of the non-Metafont glyphs...

## First steps of the future *kpf*onts

My first font was called *Christophe*, it was my first attempt to alter *Palladio* (the URW *Palatino*) as a challenge ... for myself!

From the beginning, the principles are

- very basic design, with a light number of Bezier's curves,
- dynamic design with a marked diagonal force line from WSW to ENE.

You can see here the roman upright *a* of *kpf*onts and some other font packages and the approximative corresponding set of Bezier's curves of the same letter, normal weight *a*.

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<sup>4</sup><http://www.radamir.com/tex/ttf-tex.htm>

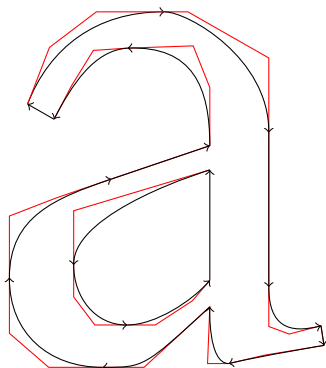
<sup>5</sup><http://c.caignaert.free.fr/Installer-Police-ttf.pdf>

<sup>6</sup><http://c.caignaert.free.fr/Install-ttf-Font.pdf>

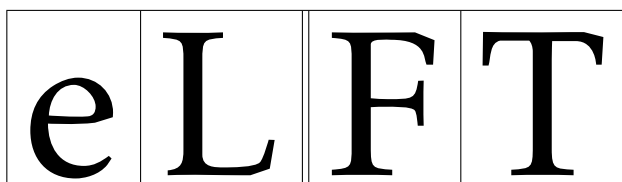
<sup>7</sup><http://c.caignaert.free.fr/ttf.html> or,  
<http://c.caignaert.free.fr/ttf-english.html>

<sup>8</sup><http://c.caignaert.free.fr/Rendez-Vous.pdf>

Kp-Fonts	CM	Palatino	Utopia	Times
a	a	a	a	a



Now, you can see the force line (sharp cut) and its symmetrical echo:



## The development

I saw a beggar leaning on his wooden crutch,  
 he said to me, "You must not ask for so much."  
 And a pretty woman leaning in her darkened door,  
 she cried to me, "Hey, why not ask for more?"

LEONARD COHEN – *Bird on the wire*

## Beginnings of math set fonts

My first tests with math fonts was to use *URW Garamond* with math symbols of *pxfonts*, the package I use at this moment in my documents.

I called this *gxfonts*...

I discovered the global organisation of math fonts, with the main

- *operators*, like  $0123 + - = \Gamma \Delta$ , and math operators like “sin”,
- *letters* like  $abc \alpha \beta \gamma$ ,
- *symbols*, the basic symbols, as  $\rightarrow \mapsto \Rightarrow \exists$ ,

- *largesymbols*, the multisized basic symbols, as  $\Sigma \sum \int \int$

and a lot of other things like AMS symbols, etc.

This includes also the math alphabets, math delimiters...

I was impressed by the special tricks of DONALD KNUTH as

- long arrows made with minus sign and a regular arrow: “-” and “→” give “→”,
- long double arrows with equal sign and regular double arrow: “=” and “⇒” give “⇒”,
- the use of the fake width and italic correction in math mode, width for subscript and italic correction for superscript,
- the famous *skewchar*, fake kerning to put the math accents:  $\tilde{a}$ .

It’s like building the Golden Gate Bridge with three oz of spaghetti...

When the *gxfonts* package was  $\beta$ -release, I sent an output to MICHEL BOVANI, the author of the *fourier* package, asking him his opinion.

Many thanks to him: he told me, with chosen words, it was *very bad*! And, nicer, he told me *why*! For instance, the roman and greek letters of *gxfonts* were like cats and dogs...

Thus, I saw, at that moment, I designed the Greek letters according to the design of the roman letters of *Christophe*. Even the two projects were not linked at first, it was not so surprising: the same author and the same mood for design...

Therefore, it was obvious I had to combine these...

## The *kpfonts* package

The 1.0 release

Then I decided to make a *full* package of fonts, i.e. needing only one `\usepackage` to run.

It was 2005/04/20, my fiftieth birthday. In many cases, a lot of people think that your life is behind you at 50! And perhaps I have to prove I was not a has-been!

From that moment I decided to write a comprehensive package including

- the roman, sans serif and teletype fonts
- all the symbols including AMS symbols, *not* symbols,
- calligraphic and script alphabets,
- *frenchstyle* math option needing upright uppercase and greek letters

At that time, I had:

- the normal and bold text fonts including small caps, from *Christophe*,

- the slanted greek letters, from *gxfonts*,
- and my todo list was cluttered:
- the sans-serif and teletype fonts,
  - the textcomp symbols, (there are fully supported only from Release 2.1 2008/03/21),
  - the symbols, large symbols, AMS symbols,
  - the upright greeks, calligraphic, script, full mathbb and fractur alphabets,
  - reading the *fontinst* doc file carefully,
  - fixing the font's math dimensions: I keep the math font dimensions as DONALD KNUTH fixed it, except the position of a subscript with no superscript, lower with *kpfonts* than usually in  $\text{\TeX}$ .

I didn't realize the great deal of work at that time. The next two years were the busiest of the story.

If you read the `readme.txt` file, you can find Release 1.0 2007/04/20. It was my 52nd birthday. For many years, the first new set of fonts designed for  $\text{\LaTeX}$ .

I was very anxious about the feedbacks.

From the beginning, *kpfonts* support the *frenchstyle* option, with upright uppercase roman and lowercase greek letters in math mode. Even if, at that time, I had no idea about the forecoming of *kpfonts*, from the beginning, I would propose some options to customize the typesetting.

## Old style options

At that time, my birthday was obviously very important, because the next line of the `readme.txt` file is

Release 1.1 2007/05/04 New 'oldstyle' option, and `\sqrt` bug fixed.  
only *fifteen days* later!

I had built the *oldstyle* option during the two previous years and it was almost ready when I uploaded the 1.0 release...

In fact, I think it is a good thing to build a package but a better thing to build a *different* package. A large set of options to customize the typesetting will make the *difference*. This appeared little by little during the work, like an obvious element.

In France, we have a well known collection of books called "La Pleïade" using a *Garamond* font set with the *cl* and *sl* old ligatures and long tail *Q*.

I decided, because I like it, to offer these possibilities as an option, with old-style numbers as default. Later, asked by German users, I built an *oldstylenums* option without the extra ligatures (Release 2.1 2008/03/21).

You can see the design, using *light* option here:

upright	oldstyle	upright	oldstyle
ct	ċt	st	ſt

italic	oldstyle	italic	oldstyle
<i>ct</i>	<i>ċt</i>	<i>st</i>	<i>ſt</i>

The font dimensions of the superscripts are altered with oldstyle numbers in math mode taking their design into account.

Because the T1 encoding is full, I had to find two slots for the new *ċt* and *ſt* old ligatures. I chose to use the slots of two Icelandic letters. I had nothing against Icelandic people or language, but I had to make a decision... Obviously, *kpfonts* sent a warning in this case.

### The *kpfonts* package, release 2

It was the first major evolution of the package: Release 2.0 2008/01/01.

The new f ligatures, light fonts and very old style options appeared with Release 2.0 2008/01/01. You can see that the second part of 2007 was a very intensive work period!

It was a new main number because, for me, the *light* option is **the major alteration** of *kpfonts*.

Obviously, at that time, I thought, one more time, that *kpfonts* was finished, except bug corrections...

### Light fonts

In my opinion, too bold fonts are in bad taste. Using the facilities of the font editors and a good deal of work, I built lighter fonts with the same metrics, corresponding to the *light* option.

It was necessary to design again the mathematical symbols: when you have a line of .7 pt in 10 pt, the light font is .5 pt.

You can see below the normal weight and light, upright and italic *a*:



upright	light	italic	light
a	a	<i>a</i>	<i>a</i>

What is more, it's not insignificant to save up to 20 % toner when printing...

### New *f* ligatures

A ligature is the way to stick two characters into one. The most common ligatures with T<sub>E</sub>X are the *f* ligatures: *ff*, *fi*, *fl*, *ffi* and *ffl*.

There are different ways to design them. See examples below with the *fi* ligature:

URW Garamond	Kp-Fonts 1.xx	Kp-Fonts	Palladio
fi	fi	fi	fi

URW Garamond	Kp-Fonts 1.xx	Kp-Fonts	Palladio
<i>fi</i>	<i>fi</i>	<i>fi</i>	<i>fi</i>

At first, I make a bad choice, like a bridge, as with *Garamond* for instance. It was a bad choice relatively to the design of the *f* of my fonts: the effect was not good because of the short terminal of its ascender. Thus, I decided to change it. It was necessary to change the design of the ascenders of these ligatures.

Note the old and new *fi* of *kpfonts* and the almost fake ligature in upright URW *Palladio* used by *palatino*, *pxfonts*, and *mathpazo* packages.

### Very old style options

In very old documents, instead of the round *s*, we find a long *f*, except at the end of the word. I didn't find any package to typeset text and math document with the long *f*. Then, I decided to build the necessary files and to offer these possibilities. It was done with the Re1ease 2.1 2008/03/21.

For instance, *st* using italic shape and light fonts, you can see I also installed new ligatures:

Default	Old style	Very old style
<i>st</i>	<i>ſt</i>	<i>ſt</i>

At this moment, the idea to make a package with a large set of options to custom the typesetting was definitely established.

### Large small capitals

It's interesting in a font package to have real small capitals and not fakes... From the beginning, I designed some small caps. In fact, I designed *very small* small caps, approximatively high as an *x* letter. I like it because they are different!

It's also not usual because in many cases, the small caps are fakes, scaled uppercase indeed. Don't forget than a fake seems not too bad if the scaling is not too strong, i.e. if the small caps are not too small! It's also one of the reasons because small caps are usually rather large...

I decided then to work on a large small caps set of fonts. Indeed the font editors are able to blend some fonts. Blending the existing *small* small caps and usual uppercase letters gives a good design to begin the work.

It was the Re1ease 2.2 2008/05/21, using *light* option here.

lowercase	small cap	large small cap	uppercase
d	D	D	D

Then, *kpfonts* has two sizes of small caps. It's very rare and the very full *otf* font file type don't plan it!

Usually, like here, I use small small caps for the people's names and large small caps for the acronyms.

The lowercase *q* record

Usually, with a font set, you get four designs for a letter: upright and italic, normal and bold. If there are true small caps, you get also the small cap, normal and bold, six designs in this case.

For the lowercase *q*, you get forty roman designs, and more with the sans-serif and teletype fonts! Look at these, even there are no italic small caps "q":

Default:

upright	bold	italic	bold
q	q	q	q





Light:

upright	bold	italic	bold
q	q	q	q





Small caps:

default	bold	large	bold
Q	Q	Q	Q





Light small caps:

default	bold	large	bold
			

Long tail small caps:

default	bold	large	bold
			

Long tail light small caps:





default	bold	large	bold
			





We get all theses glyphs with the lowercase *q*!

No *f* ligatures

This option, *nofligatures* appeared with the Release 2.3 2008/09/09 asked by users because some people didn't like the ligatures.

With some packages, or modern T<sub>E</sub>X based engines, you can disable these ligatures but the result can be ugly:

Times <i>f{i}</i>	Utopia <i>f{i}</i>	Kp-Fonts <i>f{i}</i>	<i>nofligatures</i>
			

Times <i>f{i}</i>	Utopia <i>f{i}</i>	Kp-Fonts <i>f{i}</i>	<i>nofligatures</i>
			

And, don't forget it's worse at normal size! With upright *Times*, *f* and *i* seem incompatible, like cats and dogs, and with *Utopia*, the ascender of the *f* and the dot of the *i* are too close and aren't fitting together.

You can see that the result is not too bad with my fonts, but, I should like shorten the ascender of the *f* letter in this case. In my opinion, the look is better at normal size!

### Slanted small caps

In both  $\text{\TeX}$  and new font selection scheme, NFSS, smallcaps and slanted (or italic) are *shapes*. The result is the impossibility to get some slanted small caps.

Installing slanted small caps, *scsl* shape, requires only some lines in the installation file, used by *fontinst* program, and also some lines in the *sty* file.

You can see an example below.

*Everybody, including TED SLANTED, can see it's better than JACK UPRIGHT does usually!*

Slanted small caps appear with the same Release 2.3 2008/09/09. Later, a new option *easyscsl* allows you to fit together `\textsc` and `\textsl`. It's an option because, if you use `\textsc{\textsl{...}}` with other fonts, you get some edge effect. This option appeared with Release 3.3 2010/04/20, and sent a warning to the console. This point will be discussed in its relative section.

Math fonts during this times

For some pages, we have been speaking about text fonts but math typesetting is also going on!

First, the *oldstylemath*, *veryoldstylemath* and *oldstylenumsmath* appeared at the same time as the text equivalent.

From the Release 2.2, you can use *narrowiints* option,  
`\displaystyle\iiint dx\,dy\,dz`, see the output:

default	<i>narrowiints</i>
$\iiint dx dy dz$	$\iiint dx dy dz$

And with the Release 2.3, you get the *partialup* option,  
`\dfrac{\partial z}{\partial x}`, the output is:

default	<i>partialup</i>
$\frac{\partial z}{\partial x}$	$\frac{\partial z}{\partial x}$

## New text kerning and math accents, the 3.0 release

New kerning

There were some defaults in *kpfonts*, and, at that time, we could see that the main was the kernings. One of the first lines of the Readme file is

Release 1.11 2007/06/03 Correct bad kernings of 'quote' symbols

It proves that, from the beginnings, the kerning was a problem. Perhaps it's the biggest challenge for a beginner!

The kerning by pairs is the way to tighten or spread two characters depending of the exact design of these.

See for instance *Ye* with and without kerning, using *light* option here.

with	without
Ye	Ye

The font editors offer a lot of possibilities. One of these is the automatic kerning, usually you have to choose:

- the left and right characters to kern,
- the required space between two characters,
- the technique: minimum distance, average distance, average weight,
- the exceptions: numerals, lowercase-uppercase: see “LaTeX”, for instance, there is a kerning *T-e* but no kerning *a-T*...
- the equivalents, *o* and *ô* have often the same kerning...

These programs do their best but are not very good indeed. And a beginner like me was too confident to these. Even if, at that time, I corrected all the generated kernings by hand, I was too confident with the automatic kerning of the font editors...

Some users protest rightly about incoherent kerning. I asked on *fctt*, the French version of *ctt*, and everybody thought a new kerning would be a good thing although it can change the typesetting. I decided to work on it...

At the same time, subscript and superscript position, i.e. width and italic correction, of all the math alphabets were revisited. It's a very long hard work, with a large set of tests and reinstallation of *kpfonts*. During these 6 months, I produced, with *fontinst* and batch files, at least 200 000 files...

It was on CTAN with the Release 3.0 2009/03/03, and I thought now the work was not very far from some good fonts. Therefore, the new main number version was an evidence.

See for instance *Av* kerning in upright shape and *To* in italic with the 1.xx or 2.xx release versus the same with the 3.xx one, default fonts.

before 3.0	3.0 and after	no kerning
Av	Av	Av

before 3.0	3.0 and after	no kerning
$To$	$To$	$To$

Scaled 8 times, the first doesn't appear to spread, but it's the case at normal size. That's the reason why the first kernings are too strong. Then, I'm working on screen... Thus I bought a laser printer and work now with printed tests!

New math accents and *widernmath* option

With this release, I installed new math accents like `\widearc`, as in some other packages. You can see it below:

<code>\widearc</code>	<code>\widearccarrow</code>	<code>\wideparen</code>	<code>\widering</code>
$\widearc{M_0M_1}$	$\widearccarrow{M_0M_1}$	$\wideparen{M_0M_1}$	$\widering{M_0M_1}$

You get also the new option *widernmath*. The object is to provide slightly wider math typesetting, particularly for users working with 9 or 10 pt as basic font size. Small sizes need proportionally bigger spaces...

*amsmath* options

The Release 3.1 2009/05/20, offers the possibility to use the options of *amsmath* as option of *kpfonts*. This affects the basics and AMS math fonts and also the special math fonts of *kpfonts*...

These two unknown options affect the default position of subscript in integral or summation symbols. To get more information, see the doc files of AMS or *kpfonts* packages.

Sans-serif math versions

The last major evolution of *kpfonts* was the Release 3.2 2010/03/03 allowing the math typesetting using sans-serif fonts. You can do it with a new option, *sfmath*, or with the new math versions: *sf* and *boldsf*. Obviously, for a full access, you get also both *rm* and *boldrm* math versions.

Some default symbols are serified, like `\sum`: thus they have a new design, as you can see:



roman	sans-serif
$\sum_{p=0}^n \sum_{p=0}^n$	$\sum_{p=0}^n \sum_{p=0}^n$

Otherwise, I designed some sans-serif greek letters, uppercase and lowercase, slanted and upright:

roman	sans-serif
$\alpha \beta \alpha \beta \Gamma \Psi \Gamma \Psi$	$\alpha \beta \alpha \beta \Gamma \Psi \Gamma \Psi$

Perhaps you are reading this and slightly going asleep, but perhaps you don't see exactly what it means. For instance, when you type `\alpha`, depending of the options and math version, you can get 12 different designs: normal or bold (×2), upright or slanted (×2), default or light roman or sans-serif (×3)!

## Special tricks

In fact, I don't agree with special tricks in a package, but I use this possibility sometimes!

- To get the *s* with *veryoldstyle* option, often at the end of the words, I use a classic fake ligature `s=`
- *narrowiints*

In the `kpfonts.sty` file, we find some lines like

```
\re@DeclareMathSymbol{\iintop}{\mathop}{\largesymbolsA}
{\narrowiints33}
```

where

- `\narrowiints` is 1 if the *narrowiints* option is selected, empty if not and,
- the default `\iint` symbol is decimal 33 and the narrower is decimal 133...
- Long tail Q is called
  - *Qoldstyle* in the *afm* files and the *etx* files used by *fontinst* and,
  - *Q* in the *pfb* and *enc* files.

Thus, in the *pdf* or *ps* files, it's *Q* and the search function of *Acroread* or *Ghostscript* finds it any times...

I use the same trick for the *slong* of the *veryoldstyle* option.

## Some examples

### Text

I use the example of the L<sup>A</sup>T<sub>E</sub>X Companion, slightly altered when using the *veryoldstyle* option.

### Default

For the price of £45, almost anything can be found floating in fields. ¡THE DAZED BROWN FOX QUICKLY GAVE 12345-67890 JUMPS! — ¿But aren't Kafka's Schloß and Æsop's Œuvres often naïve vis-à-vis the dæmonic phœnix's official rôle in fluffy soufflés?

*For the price of £45, almost anything can be found floating in fields. ¡THE DAZED BROWN FOX QUICKLY GAVE 12345-67890 JUMPS! — ¿But aren't Kafka's Schloß and Æsop's Œuvres often naïve vis-à-vis the dæmonic phœnix's official rôle in fluffy soufflés?*

### Options *oldstylenums* and *light* or *textlight*

For the price of £45, almost anything can be found floating in fields. ¡THE DAZED BROWN FOX QUICKLY GAVE 12345-67890 JUMPS! — ¿But aren't Kafka's Schloß and Æsop's Œuvres often naïve vis-à-vis the dæmonic phœnix's official rôle in fluffy soufflés?

*For the price of £45, almost anything can be found floating in fields. ¡THE DAZED BROWN FOX QUICKLY GAVE 12345-67890 JUMPS! — ¿But aren't Kafka's Schloß and Æsop's Œuvres often naïve vis-à-vis the dæmonic phœnix's official rôle in fluffy soufflés?*

### Option *nofligatures*

For the price of £45, almost anything can be found floating in fields. ¡THE DAZED BROWN FOX QUICKLY GAVE 12345-67890 JUMPS! — ¿But aren't Kafka's Schloß and Æsop's Œuvres often naïve vis-à-vis the dæmonic phœnix's official rôle in fluffy soufflés?

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### Option *oldstyle*

For the price of £45, almost anything can be found floating in fields.  
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¿But aren't Kafka's Schloß and Æsop's Œuvres often naïve vis-à-vis the  
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### Option *veryoldstyle* and *light* or *textlight*

For the price of £45, almost anything can be found floating in fields.  
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### Quiz

Find the minimal options' set of the package used here. Except when using the *veryoldstyle* option, the source file is always the same, sometimes upright, sometimes italic.

1. A.QUEER says: make 29 *active* characters if definitely nasty!
2. A.QUEER says: make 29 **active** characters is definitely nasty!
3. A.QUEER says: make 29 *active* characters is definitely nasty!
4. A.QUEER says: make 29 **active** characters is definitely nasty!
5. A.QUEER says: make 29 *active* characters is definitely nasty!
6. A.QUEER says: make 29 **active** characters is definitely nasty!
7. A.QUEER says: make 29 **active** characters is definitely nasty!
8. A.QUEER says: make 29 **active** characters is definitely nasty!
9. A.QUEER says: make 29 *active* characters is definitely nasty!
10. A.QUEER says: make 29 **active** characters is definitely nasty!

*Read the solution at the end of the article!*

*If you were very attentive, you have to get 10 points...*

### Math

I use the example of the L<sup>A</sup>T<sub>E</sub>X Companion...

# 1 Sample page of mathematical typesetting

First some large operators both in text:  $\iiint_{\mathbb{Q}} f(x, y, z) dx dy dz$  and  $\prod_{\gamma \in \Gamma_{\widetilde{C}}} \partial(\widetilde{X}_{\gamma})$ ; and also on display:

$$\begin{aligned} \iiint_{\mathbb{Q}} f(w, x, y, z) dw dx dy dz &\leq \oint_{\partial Q} f' \left( \max \left\{ \frac{\|w\|}{|w^2 + x^2|}; \frac{\|z\|}{|y^2 + z^2|}; \frac{\|w \oplus z\|}{\|x \oplus y\|} \right\} \right) \\ &\lesssim \bigcup_{Q \in \mathbb{Q}} \left[ f^* \left( \frac{(\mathbb{Q}(t))}{\sqrt{1 - t^2}} \right) \right]_{t=\alpha}^{t=\vartheta} \end{aligned} \quad (1)$$

For  $x$  in the open interval  $] -1, 1[$  the infinite sum in Equation (2) is convergent; however, this does not hold throughout the closed interval  $[-1, 1]$ .

$$(1 - x)^{-k} = 1 + \sum_{j=1}^{\infty} (-1)^j \left\{ \begin{matrix} k \\ j \end{matrix} \right\} x^j \quad \text{for } k \in \mathbb{N}; k \neq 0. \quad (2)$$

Options *lightmath* and *narrowiints*

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# 1 Sample page of mathematical typesetting

First some large operators both in text:  $\iiint_Q f(x,y,z) \, dx \, dy \, dz$  and  $\prod_{\gamma \in \Gamma_{\widetilde{C}}} \partial(\widetilde{X}_{\gamma})$ ; and also on display:

$$\begin{aligned} \iiint_Q f(w,x,y,z) \, dw \, dx \, dy \, dz &\leq \oint_{\partial Q} f' \left( \max \left\{ \frac{\|w\|}{|w^2+x^2|}, \frac{\|z\|}{|y^2+z^2|}, \frac{\|w \oplus z\|}{\|x \oplus y\|} \right\} \right) \\ &\approx \bigcup_{Q \in \widetilde{Q}} \left[ f^* \left( \frac{|Q(t)|}{\sqrt{1-t^2}} \right) \right]_{t=\alpha}^{t=\vartheta} \end{aligned} \tag{1}$$

For  $x$  in the open interval  $] -1, 1[$  the infinite sum in Equation (2) is convergent; however, this does not hold throughout the closed interval  $[-1, 1]$ .

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## This document

This document uses only *textlight* option. Obviously, in some parts, using `\fontfamily`, the relative options are simulated...

Except the examples above, for math, I use only two *special tricks* to get the narrow `\iiint` and the upright `\partial` symbol.

Except in the *example* section:

- The text examples are scaled 8 times, except for *Utopia* scaled  $8 \times .92$  times.
- The math examples are scaled two times.
- The people's names use default small caps, and the acronyms large small caps.

## The limits of NFSS

### Non existing features

Some features of *kpfonts* don't exist in the new font selection scheme:

- 2 sizes of small caps:
  - The commands `\textothersc{...}` and `\otherscshape` allows you to use these two sizes. There are often used in this document.
  - The option *largesmallcaps* changes the default small caps size. Then, you can use standard commands to get large small caps!
- slanted small caps:
  - The commands `\textscsl{...}`, `\scslshape`, `\textotherscsl{...}` and `\otherscslshape` allows you to use these slanted small capitals.
  - You can also use the *easyscsl* option or the *slantsc* package to get slanted small caps as expected: `\textsc{\textsl{...}}`. But, you have to redefine these commands and the result can be disappointing!

```
\documentclass{minimal}
\usepackage{palatino}
\usepackage{slantsc}
\begin{document}
\textsl{\textsc{Hello}}
\end{document}
```

gives you 2 warnings... and the output is *upright* "Hello" in *palatino*! It's the reason why the *easyscsl* option of *kpfonts* sends an explicit warning.

  - The option *largesmallcaps* also affects the default slanted small caps size.
- light variant fonts:
  - Because of the edge affects described below, there are no commands to switch between default and light fonts.



For instance, you have to redefine commands like `\textit`: therefore, you want the *italic* of the **actual** font, not the default!

- But the option *rmx* allows you to use these fonts without `\fontfamily{...}\selectfont`!

The corresponding table is

option	weight	<i>rmx</i>
<i>light</i>	m	l
	m	m
<i>light</i>	b/bx	sb/sbx
	b/bx	b/bx

## Exponential number of files

Usual cases

In most cases, when you have a font's family, like *URW Garamond*, you get basically 4 fonts

- upright or italic, and,
- normal or bold.

In fact

- 4 pairs *pfb/afm*, the design of characters and the metrics, or,
- 4 *tff* or *otf* files including design and metrics.

$\text{\TeX}$  or  $\text{\LaTeX}$  doesn't need the design or characters, they need only the metrics, the *tfm* files to build the *dvi*. It's one of the reasons why the *dvi* files are very light.

A *dvi* viewer or *dvips* (or equivalent) or pdf $\text{\TeX}$  needs the design of characters to produce the final document.

We describe briefly the chain to find the good metrics. Now, imagine you are  $\text{\TeX}$ , it's easy if you try:

- You have an active family and encoding, for instance *jkp* and T1, default *kpfonts* family and Cork encoding,
- you read the T1jkp.f $\text{\textit{d}}$  file, for font definition,
- you have an active shape and weight, for instance *it* and *n*, italic and normal weight,
- you read the line:

```
\DeclareFontShape{T1}{jkp}{m}{it}{<-> jkpmi8t}{}{}
```

in the *fd* file. *jkpmi8t* is the name of the needed *tfm* file, including metrics, ligatures and kerning.

Usual cases, like *Garamond*, require less than 50 files for an OT1 and T1 installation...

*kpfonts* case

For “hackers”, special use or curiosity, look at the rules to build the corresponding family names

<b>roman</b>	jkp[l,x][k][f][osn,os,vos]
<b>sans serif</b>	jkps[k][f][osn,os,vos]
<b>teletype</b>	jkptt[osn,os,vos]

with the relative options:

<b>l, x</b>	light, rmx
<b>k</b>	largesmallcaps
<b>f</b>	nofligatures
<b>osn, os, vos</b>	oldstylenums, oldstyle, veryoldstyle

Only for the roman fonts, because we can choose between OT1 and T1 encoding, we have 72 families, excluding the TS1 ones for *textcomp*... The total number of families is 187 in 3.12 release!

Most of the roman families are relative to 15 *tfm* metrics files

- upright, italic, smallcaps, slanted, slanted smallcaps
- each in normal, bold and bold extended...

But each *tfm* corresponds here to a *vf*, virtual font, file because there is no direct link between each one and a *pf* file!

In 3.12 release, we get

- 668 virtual font, *vf*, files,
- 858 tex font metric, *tfm*, files.

The *kpfonts* TDS tree includes a total of 1,875 files...

I'm alone and it's impossible for me to be sure with a good probability there is no bug!

And more, writing this paper, I found one bug: *light* and *veryoldstyle* medium weight font were not *light* but default!

About an asked option

A new option, now, like long tail Q without special ligatures *ct* and *st*, but with old style numbers or not, as asked by a user, it's 240 *tfm* files more, and 240 *vf* files and also 24 families *fd* files more, only for T1 encoding and roman fonts.

For sans serif fonts, it's 96 *tfm*, 96 *vf* and 8 *fd* new files. No action and no more files for teletype fonts!

The number required by the OT1 encoding is the same, for a complete sum of 1,408 new files... Increasing the total number of *kpfonts* files about 75 %!

You see here the explicit exponential effect!

In fact, this option will be not be hard to install (2 new *etx* files, the encoding files for *fontinst*, and some new lines in the installation file), but I don't agree with this demand because there is already a command `\othertailQ` and another `\othertailscq` to the work...

Last way to be free

And if you want some options to choose freely:

- classic L<sup>A</sup>T<sub>E</sub>X *f* ligatures or not,
- *cl* ligature or not,
- *sl* ligature or not,
- oldstyle or lining numbers,
- round *s* or long *f*,
- long tail *Q* or classic *Q*,

if I'm not wrong it's about 20,000 files more...

The object of *kpfonts* is not to increase indefinitely the number of files on your hard disk.

The object of *kpfonts* is not to be in the Guinness book!

I don't think it's sensible to exceed 2,000 files in a package, even it's possible!

To go further, to be free, I think somebody has to build some *otf* fonts using their advanced possibilities and has to use it running XeL<sup>A</sup>T<sub>E</sub>X or LuaT<sub>E</sub>X, but it's another challenge...

Obviously, *otf* fonts will solve the above features problems without an exponential number of files, but won't easily solve these:

- small or large small caps;
- light or default fonts.

## The end

Now I think the work is (almost) done and I'm proud of three things:

- the package runs mainly correctly,
- some people like the fonts and some people don't like them,
- some people like to customize their text and/or math typesetting using the set of options.

If everybody finds these 3 axioms are reasonable, you know what, I'm happy...

If I, if I have been unkind,  
I hope that you can just let it go by.

LEONARD COHEN – *Bird on the wire*

Solution of the quiz on page 84:

- 1. *lighttext and veryoldstyle*
- 2. *oldstylelnums and largesmallcaps*
- 3. *easyscs1 and oldstyle*
- 4. *lighttext and nofligatures*
- 5. *lighttext and oldstyle*
- 6. *no option*
- 7. *nofligatures*
- 8. *lighttext*
- 9. *largesmallcaps*
- 10. *lighttext, largesmallcaps, easyscs1 and nofligatures*