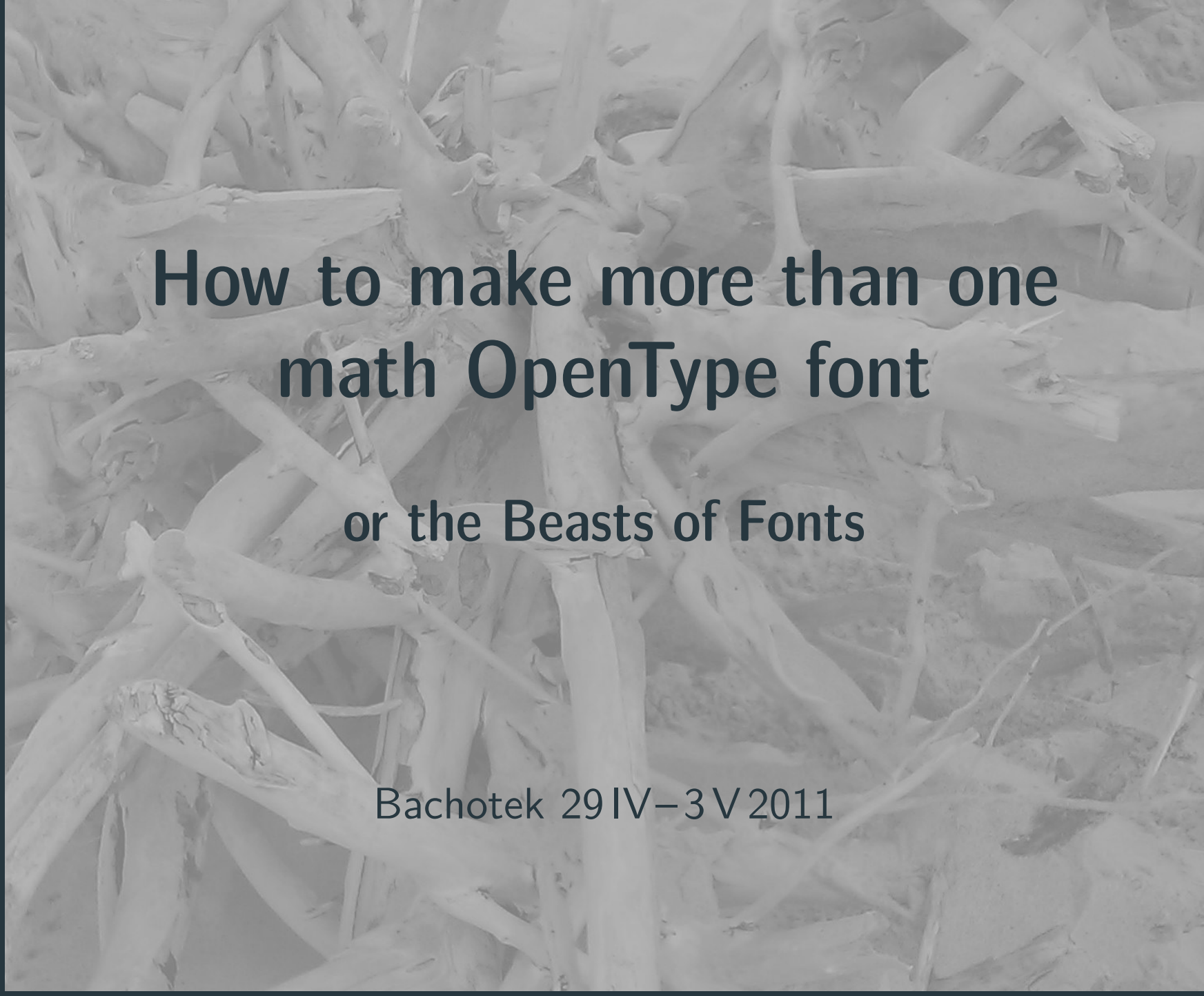

How to make more than one math OpenType font

or the Beasts of Fonts

Bachotek 29 IV – 3 V 2011

Bogusław Jackowski and Piotr Strzelczyk

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This is exactly the reason why since 2007, when Microsoft released their math-equipped Office with the math OpenType font Cambria, only two more math OpenType fonts were created: Asana (Apostolos Syropoulos) and XITS (Khaled Hosny), both stemming from the TEX clique.

THE BEAST OF ENTANGLEMENT

The fundamental question

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Of course, the identification is crucial to fix the problem.

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U+1D454 MATHEMATICAL ITALIC SMALL G
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The math italic letter ‘h’ has the Planck constant meaning permanently assigned:

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= height, specific enthalpy,
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In this particular case, misconception, idiosyncrasy and relics coincide.


THE BEAST
OF MISCONCEPTION

Two basic misconceptions

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A contemporary font could be a smarter structure than a collection of fixed (predefined) shapes. It was an ingenious idea in Gutenberg's times. Today, instead of fancy yet obscure techniques involved in OpenType fonts (so called "features"), glyphs could be implemented as drawing programs. This would be especially beneficial in the case of math fonts.

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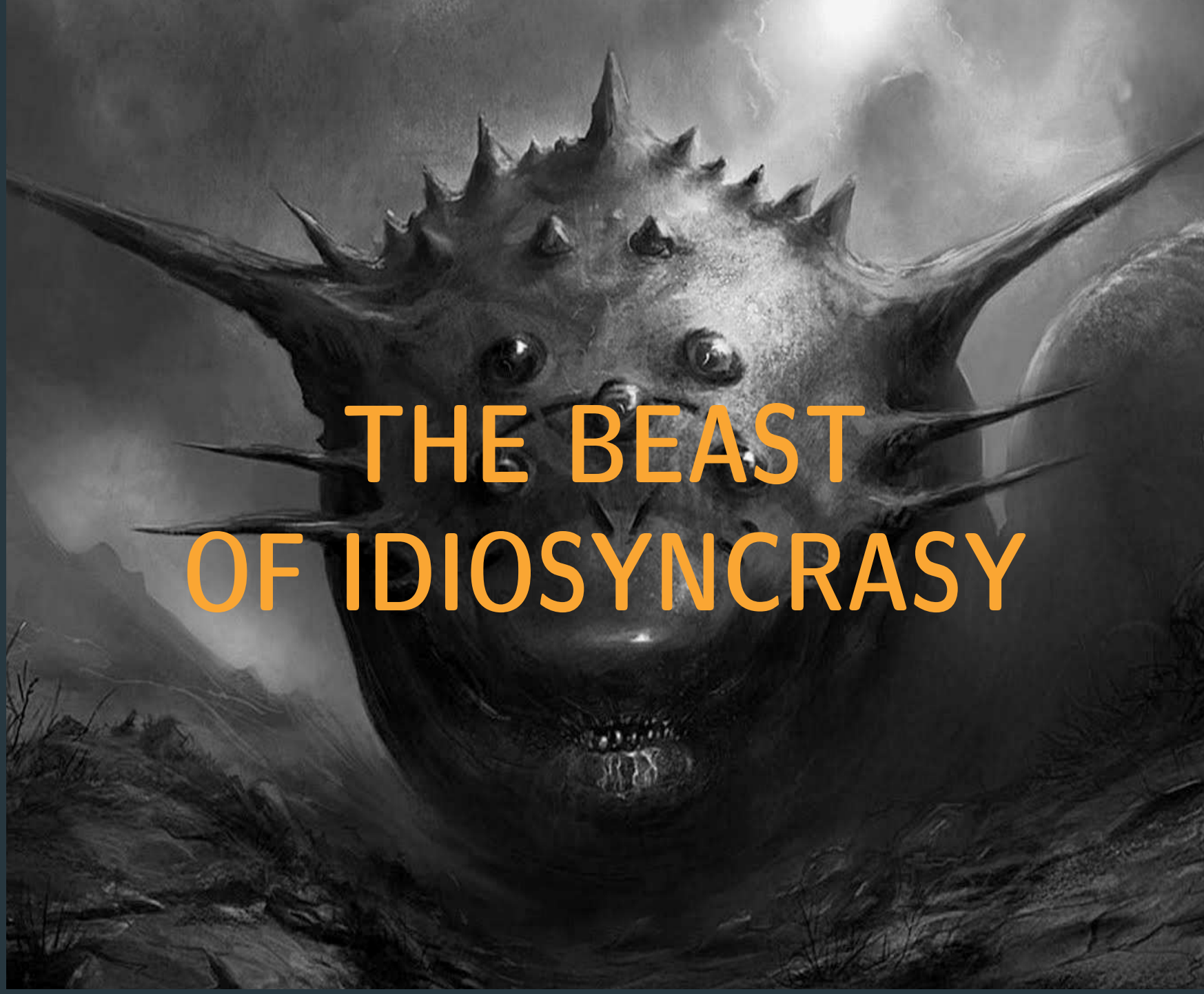
Also, the commonly adored Unicode often, in practice, turns out to be an obstacle. The idea of enumerating all entities used in various areas of human intellectual activities seems somewhat insane. Moreover, enumerating is static, while it is a dynamically adjustable protocol which is needed (cf. the success of the TCP/IP protocol).


THE BEAST
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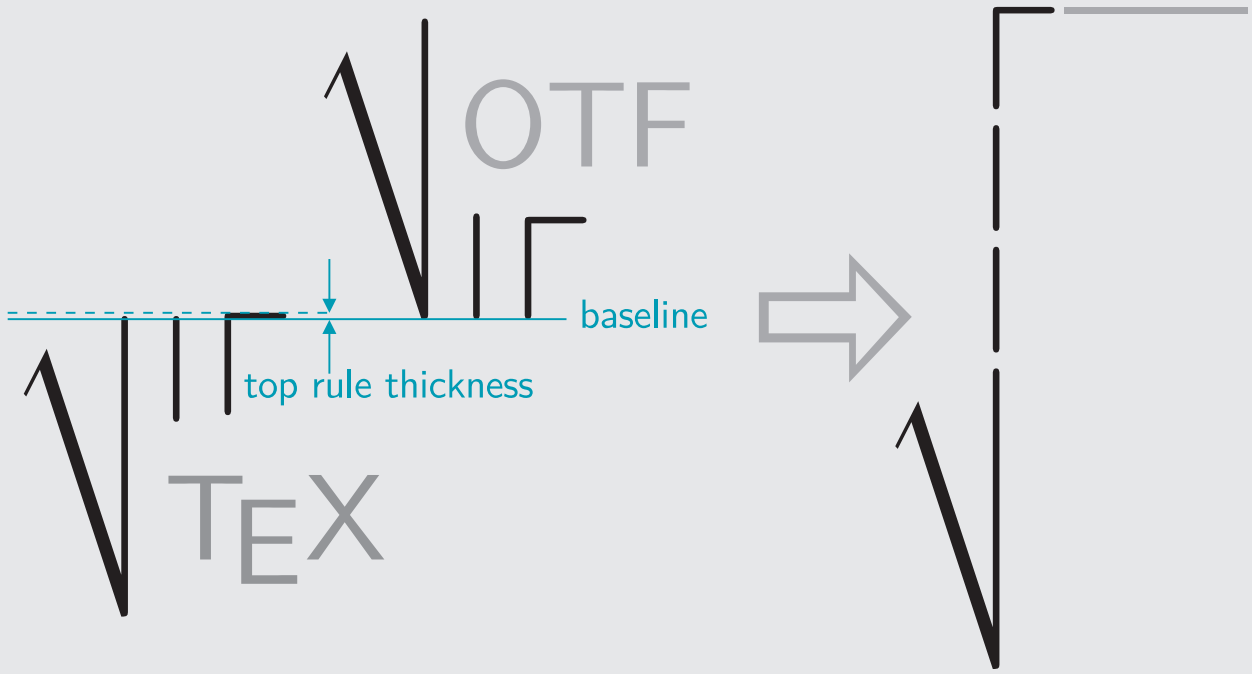

Mathematical glyphs, vertically assembled from smaller pieces, like e.g., the radical, must be placed above the baseline in OpenType fonts and below the baseline in traditional TEX fonts (more precisely, in TEX, the top element of the radical must slightly protrude above the baseline – the amount conveys the thickness of the radical's top rule).


THE BEAST
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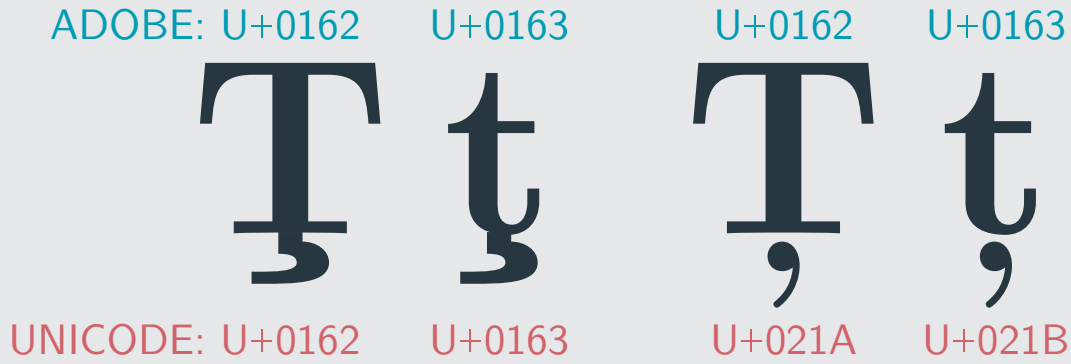

A symptomatic example is the case of glyphs *tcommaaccent* and *Tcommaaccent*. According to the Adobe Glyph List for New Fonts (2010), they are just aliases for *tcedilla* (U+0163) and *Tcedilla* (U+0162), respectively. The Unicode Standard is unequivocal here: the Latin small letter 't' with comma below should have the code U+021B, while the Latin capital letter 'T' with comma below – the code U+021A. After a few attempts to improve the situation, Adobe eventually gave up and reverted to the *status quo ante bellum*.

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The creating of the Latin Modern Math OTF was not as perplexing as it might have been. It is the result of shared experience and efforts by Barbara Beeton, Hans Hagen, Taco Hoekwater, Khaled Hosny, Alan Jeffrey, Adam Twardoch, Ulrik Vieth, George Williams and others, which made our struggle against the insubordinate font matter significantly less painful.

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Very many thanks!

Of course, it is an "incunabulum" font, i.e., it is in its infancy and will be intensively developed in the nearest future.

LATIN MODERN MATH

THE DOMESTICATED MONSTER

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It should be noted that none of the OpenType math fonts that appeared so far is perfect. In this number, of course, Latin Modern Math. Our aim, however, was not creating just one more math OpenType font. We wanted *to pave the way for next math fonts*, in particular, for selected TEX Gyre fonts.

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We believe that, in general, it was an appropriate approach: first results we obtain after two months of coding. We underestimated a little bit the complexity arising from the heterogeneity of sources. But we drastically underestimated the time needed to spot the adequate glyph, its (uni)code and name (conforming to Adobe/Microsoft "standards").

The approach

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lmbsy10, lmbsy7, lmbsy5, lmbx10, lmbx7, lmbx5, lmex10,
lmmi10, lmmi7, lmmi5, lmmib10, lmmib7, lmmib5, lmr10, lmr7, lmr5,
lmss12, lmss10, lmss8, lmssbo10, lmssbx10,
lmsso12, lmsso10, lmsso8, lmsy10, lmsy7, lmsy5,
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lmmi10, lmmi7, lmmi5, lmmib10, lmmib7, lmmib5, lmr10, lmr7, lmr5,
lmss12, lmss10, lmss8, lmssbo10, lmssbx10,
lmsso12, lmsso10, lmsso8, lmsy10, lmsy7, lmsy5,
lmtt12, lmtt10, lmtt8, msam10, msam7, msam5,
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All these fonts had to be crammed into one huge OTF file.
Actually, Latin Modern Math contains more than 4500 glyphs,
and many more are needed. Why is that so?!

The approach

According to the *Draft Unicode Technical Report #25* by Barbara Beeton, Asmus Freytag and Murray Sargent III, math font should contain the following groups of glyphs:

plain (upright, serifed)	Latin*, Greek and digits	lmr, lmmi (uprighted)
bold	Latin, Greek and digits	lmbx, lmmib (uprighted)
italic	Latin and Greek	lmmi
bold italic	Latin and Greek	lmmib
script (calligraphic)	Latin**	eusm (slanted)
bold script (calligraphic)	Latin**	eusb (slanted)
Fraktur	Latin	eufm
bold Fraktur	Latin	eufb
double-struck	Latin and digits	bbold (by Alan Jeffrey)
sans-serif	Latin and digits	lmss
sans-serif bold	Latin, Greek*** and digits	lmssbx
sans-serif italic	Latin	lmsso
sans-serif bold italic	Latin and Greek***	lmssbo
monospace	Latin and digits	lmtt

* plus basic diacritical characters
** caps only (like in CMs – temporarily?)
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- a question: which glyphs should have index forms?

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- does it make sense to produce TEX math fonts simultaneously with OTF ones (no chance for compatibility anyway)?

The OpenType math fonts project is supported
by TEX Users Groups, in particular, by the Czechoslovak
TEX Users Group CS TUG, the German-speaking TEX Users Group
DANTE e.V., the Polish TEX Users Group GUST,
the Dutch-speaking TEX Users Group NTG,
TUG India, UK-TUG, and – last but not least – TUG.

The effigies of the Font Beasts originate from
http://ascend-to-oblivion.blogspot.com/2010/04/wallpapers-creatures.html

The author of the opening (and closing) photo
Roots of Entanglement is Marek Ryćko

THANK YOU FOR YOUR ATTENTION

and

WELCOME TO NEXT BACHOTEXS