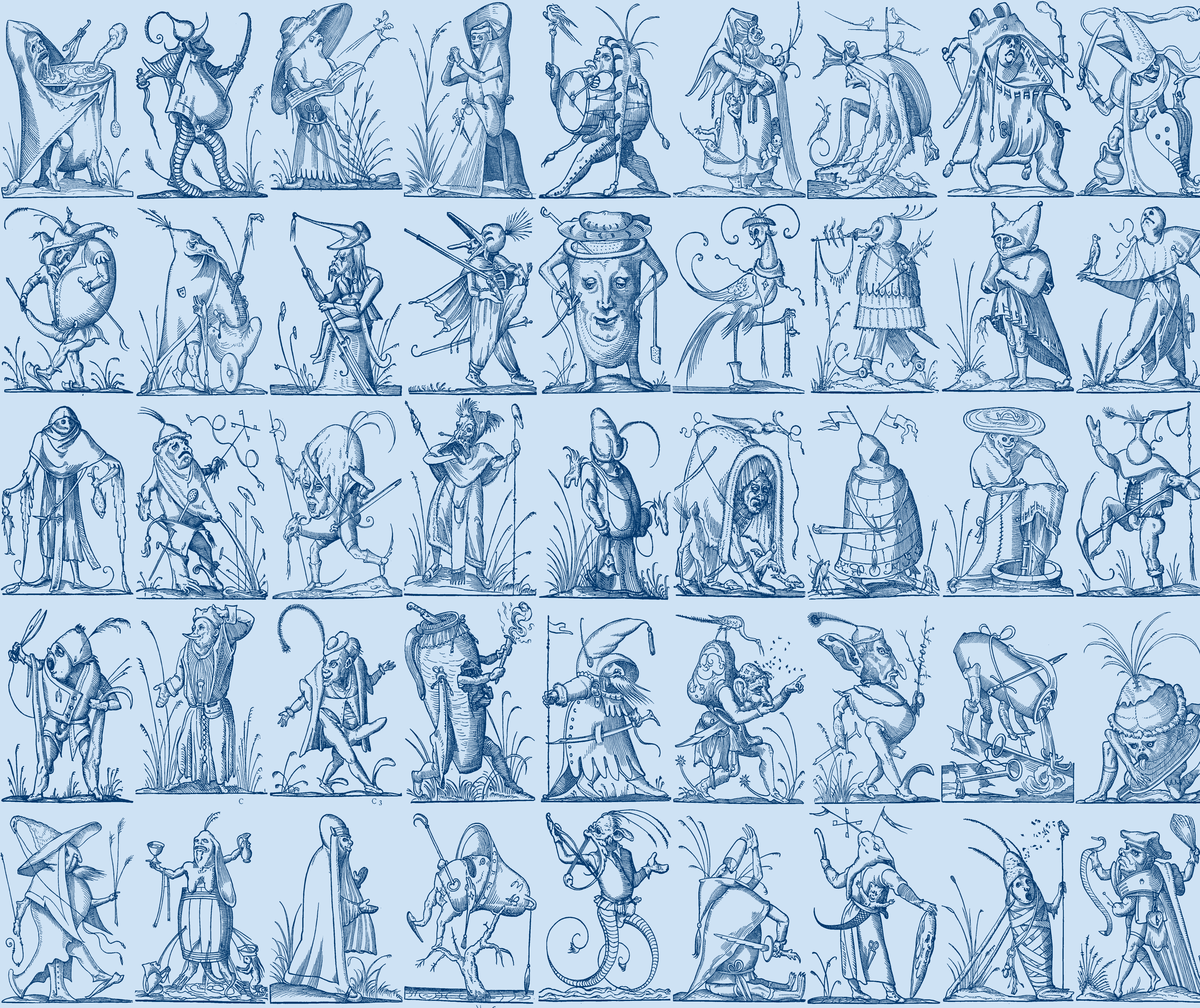
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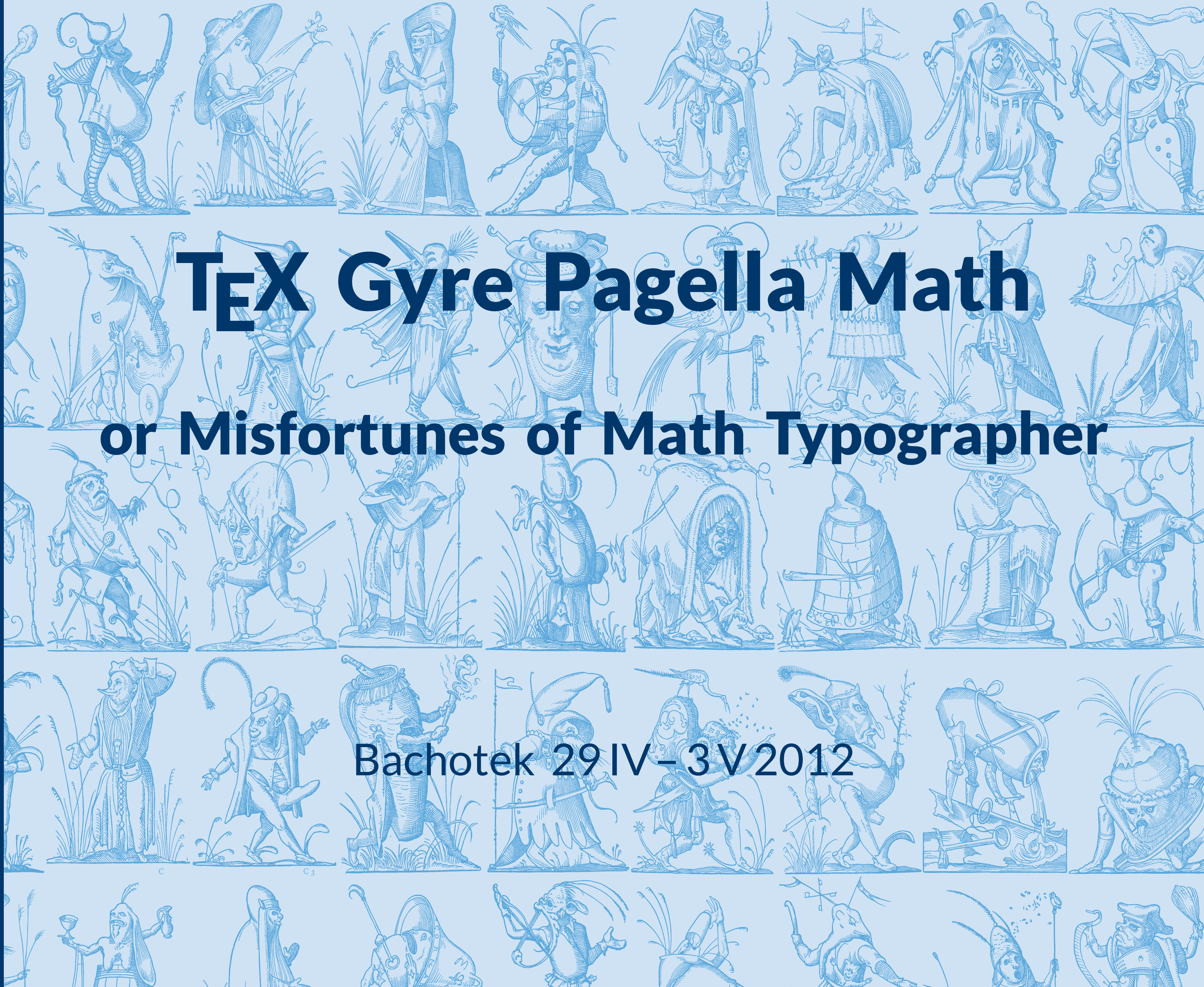

$\TeX$ Gyre Pagella Math

or Misfortunes of Math Typographer

Bachotek 29 IV – 3 V 2012

B. Jackowski, P. Strzelczyk and J. M. Nowacki

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Then it could be called as well a musical font or a playing cards font, because most of existing math fonts (except Cambria) contain the relevant symbols.

$$\clubsuit\diamondsuit\heartsuit\spadesuit \quad ♪\flat\sharp\natural$$

“Draft Unicode Technical Report #25. UNICODE SUPPORT FOR MATHEMATICS” (by Barbara Beeton, Asmus Freytag, and Murray Sargent III) mentions them explicitly.

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Less naïve answer: *the font must contain mathematical symbols, that are "flexible", i.e., that may adjust their size to a subformula, like, e.g., integral or radical.*

$$\textstyle\int\prod\surd\sum \;\; \displaystyle\int\prod\surd\sum$$

What is a math font?

According to the mentioned “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
italic	Latin and Greek
bold	Latin, Greek and digits
bold italic	Latin and Greek
sans-serif	Latin and digits
sans-serif italic	Latin
sans-serif bold	Latin, Greek and digits
sans-serif bold italic	Latin and Greek
script (calligraphic)	Latin
bold script (calligraphic)	Latin
Fraktur	Latin
bold Fraktur	Latin
double-struck	Latin and digits
monospace	Latin and digits

What is a math font?

We specified the component font table in detail as follows:

B – basic, **A** – accented, **G** – Greek, **D** – digits, **O** – other, **P** – punctuation

	B	A	G	D	O	P
plain (upright, serifed)	$+_s$	$+_s$	$+_s^x$	$+_s$	+	$+_s$
italic	$+_s$		$+_s$			
bold	$+_s$		$+_s^x$	$+_s$		
bold italic	$+_s$		$+_s$			
sans-serif	+			+		
sans-serif italic	+					
sans-serif bold	+		+	+		
sans-serif bold italic	+		+			
script (calligraphic)	+					
bold script (calligraphic)	+					
Fraktur	+					
bold Fraktur	+					
double-struck	+			+		
monospace	+			+		

x relevant unicode slots contain digamma; we do not include it

s subscripts and subsubscript are to be added

We would like all TEX Gyre math fonts (Pagella, Termes, Schola, and Bonum) to share this scheme.

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Besides the abundancy of component subfonts, a math font in the OpenType format should contain a special table, *MATH*, specified in a confidential Microsoft® document “The MATH table and OpenType Features for Math Processing”.

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How did we build TEX Gyre Pagella Math?

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$\alpha\beta\gamma AB\Gamma$

EXTRA FONT
Diego Puga's
Math Pazo (Greek)

abcABC

MAIN FONT
TG Pagella:
regular, italic,
bold, bold italic

abcABC

SANS SERIF FONT
DejaVu Sans:
regular, italic,
bold, bold italic

SCRIPT FONT
Gluksza's
Odstemplik

$\mathcal{abcABC}$

DOUBLE STRUCK FONT
Alan Jeffrey's
BBOLD

$\mathbb{abcABC}$

MONOSPACE FONT
LM Mono Condensed

`abcABC`

MATH SYMBOLS
made mostly
from scratch

$\int \prod \surd \sum$

FRAKTUR FONT
DEK's / Zapf's
Euler

$\mathfrak{abcABC}$

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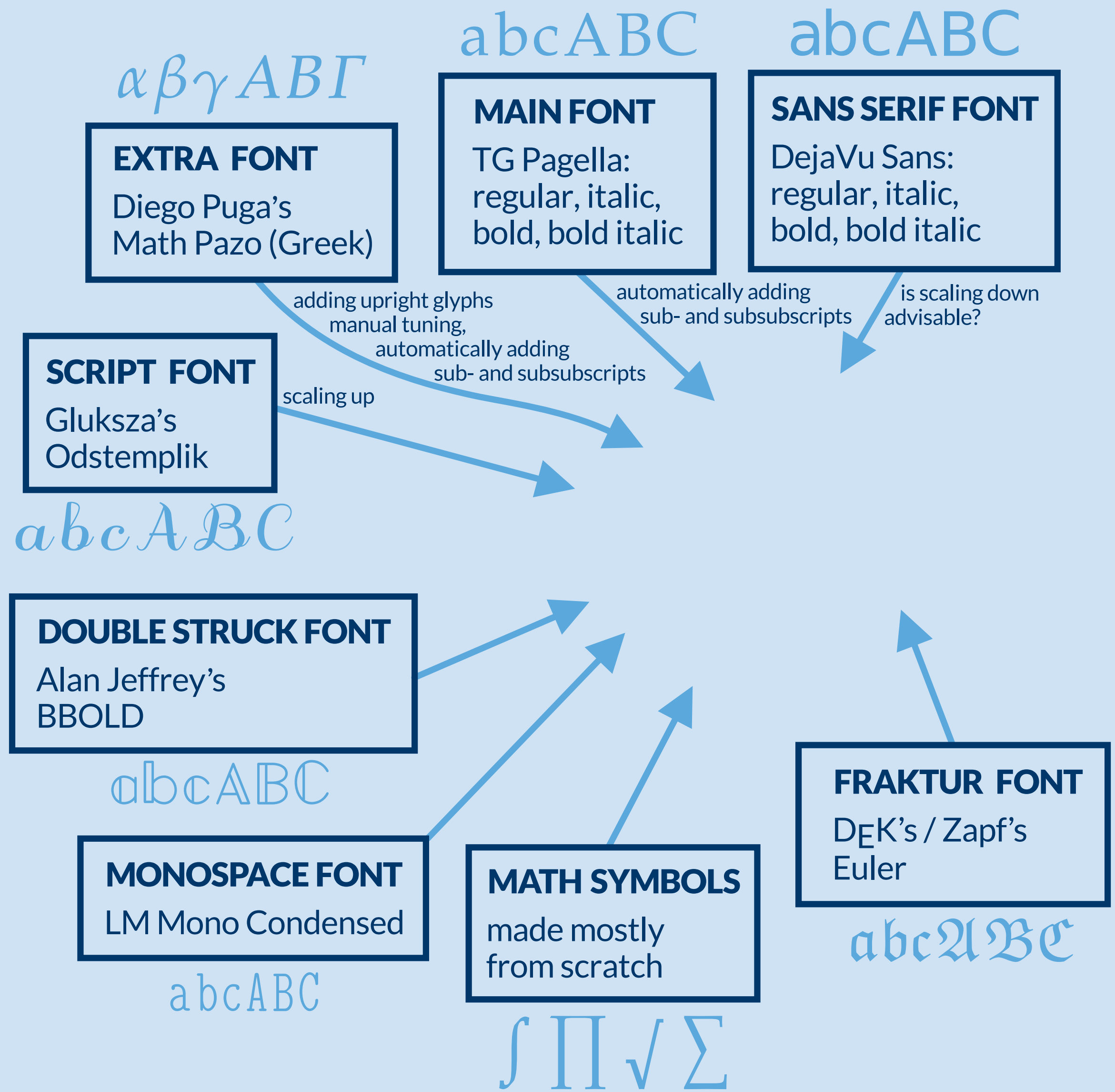

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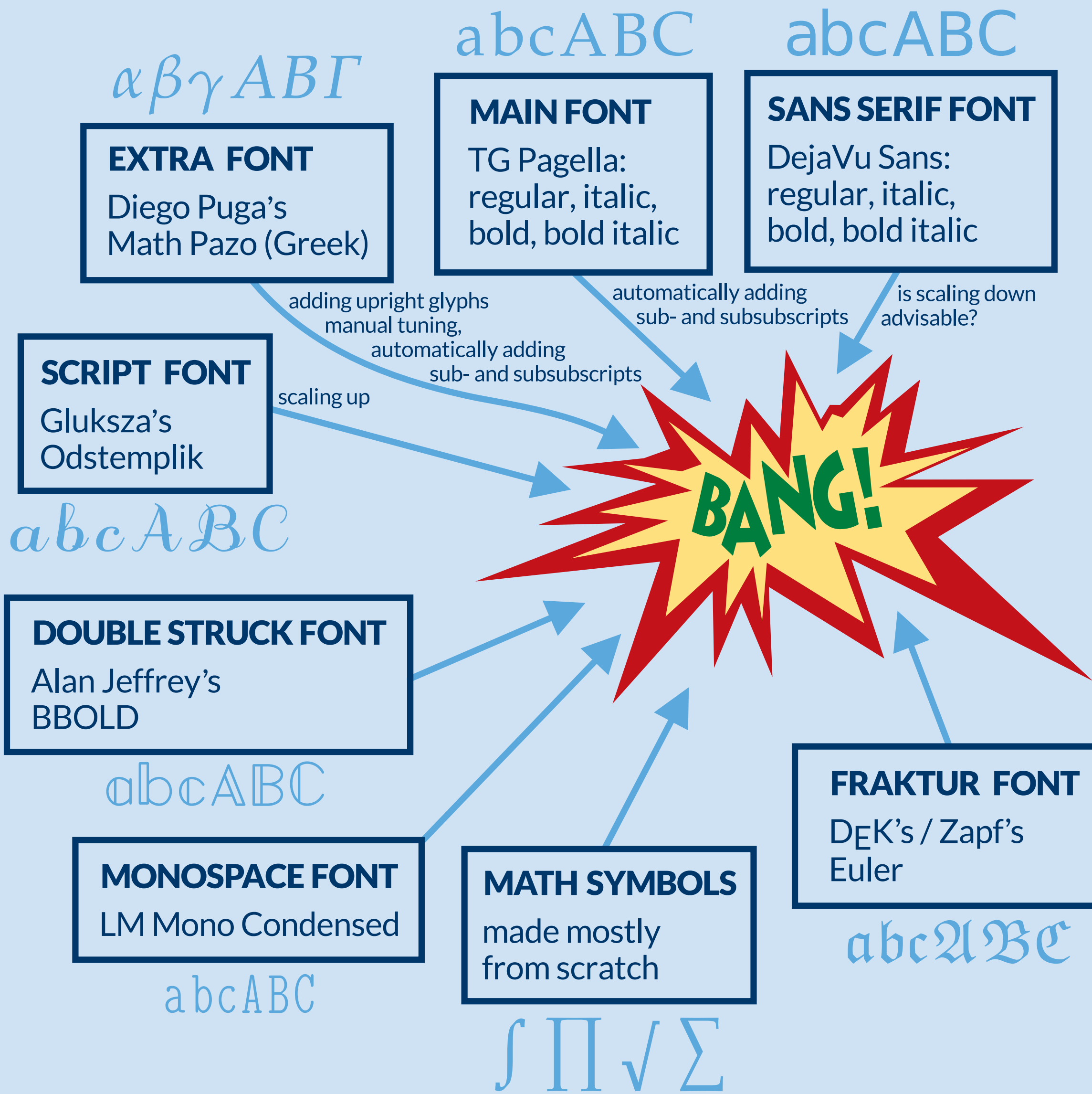

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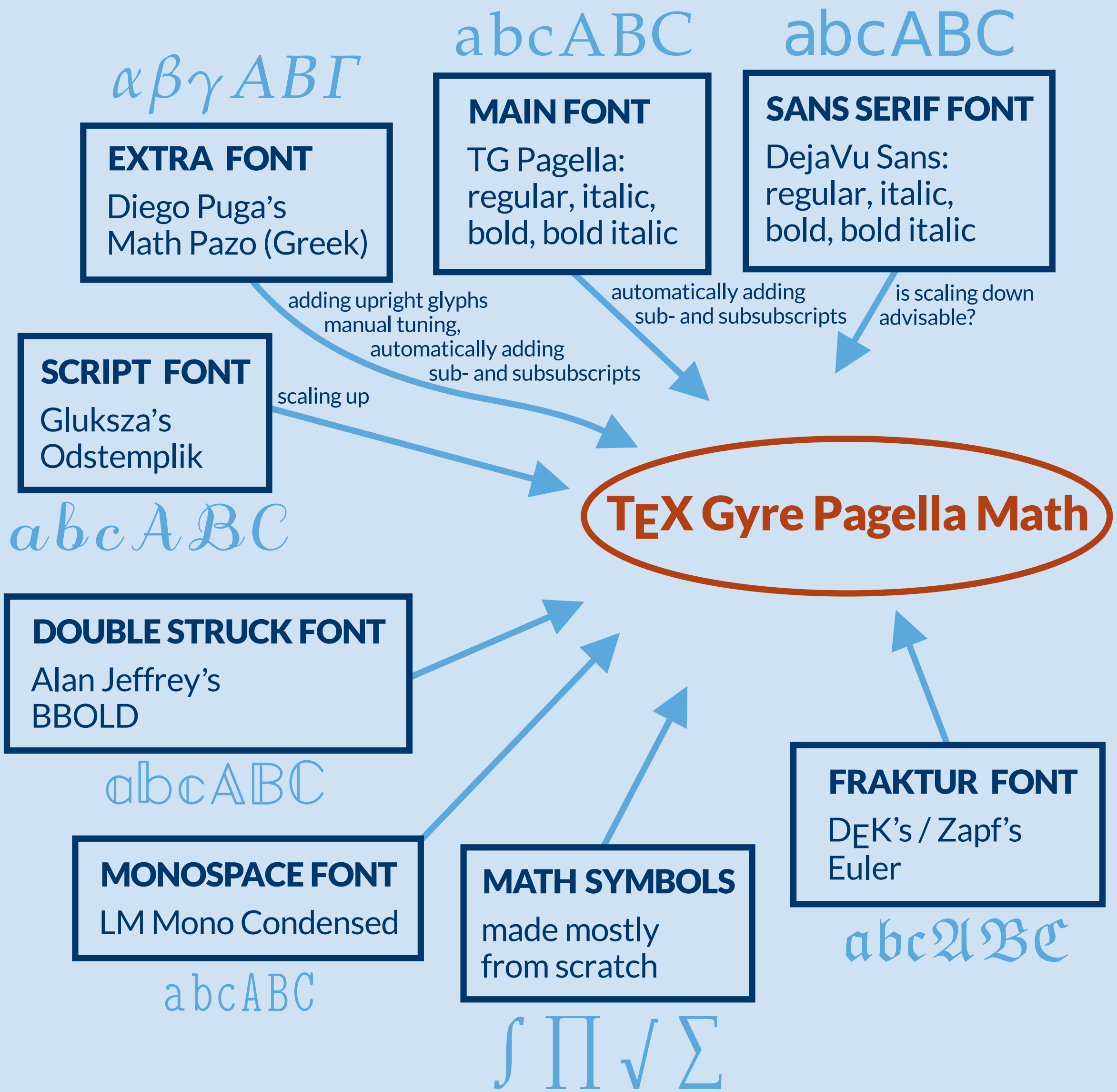

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What to do when your best friends

What to do when your best friends turn out to be your beast friends?

Problematic friends

Problematic friends

- Unicode Standard
  - surprises, riddles, inconsistency, ambiguity, missing info (or at least typograpic hints) about a possible usage for a lot of glyphs
  - on one hand, overloading with superfluous glyphs, on the other hand, logical incompletenes
  - in general, numbering all the things in the world does not seem to be a good idea…
  - statistics wanted! – which glyphs from the Unicode repertoire are actually used?

Problematic friends

- Word + Cambria

  surprises and riddles, errors in implementation and documentation, misconceptions...

Problematic friends

- METAPOST

  permanently buggy the crucial *turningnumber* operation, memory limitations in ver. 1.2, erroneous memory handling (probably) in ver. 1.5…

Problematic friends

- XƎTEX

  font caching not perfectly synchronized with the system one, unexpected treatment of font names, some zero-width characters gain width…

Problematic friends

- FontForge + luaTEX

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```
nary_product varv: nary_product nary_product.v1 ;
integral varv: integral integral.v1 integral.v2
   integral.v3 integral.v4 integral.v5 integral.v6 ;
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```

```
while (true) {
[...]
 if (i > 10000) {
   /* endless loop */
   endless_loop_error(g, y);
   goto FOUND;
 }
 if (char_tag(g, y) == list_tag) {
   y = char_remainder(g, y);
   goto CONTINUE;
 }
}
```

`ftp://ftp.gust.org.pl/pub/GUST/BachoTeX2012/TeXGyreMath/texgyrepagella-math-0903.otf`

The creating of the TEX Gyre Pagella Math OTF was not as perplexing as it might have been. It is the result of shared experience and efforts by (in alphabetic order): Barbara Beeton, Łukasz Dziedzic, Gluksza, Hans Hagen, Taco Hoekwater, Khaled Hosny, Alan Jeffrey, Mojca Miklavec, Diego Puga, Arthur Reutenauer, Adam Twardoch Ulrik Vieth, George Williams, and others including lots of our Polish colleagues, which made our struggle against the insubordinate font matter significantly less painful.

Very many thanks!

Future works

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- TEX Gyre Termes Math.

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- And last but not least – a dream: ordering the code and preparing a documentation for the font(s) and FFDKO, not speaking about documenting METATYPE 1...

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 replicas of woodcuts used as the illustrations originate from the book “Les songes drolatiques de Pantagruel” printed by the Parisian printer Richard Breton in 1565; the woodcuts were prepared by a certain François Desprez.

THANK YOU FOR YOUR ATTENTION

and

WELCOME TO NEXT BACHOTEXS