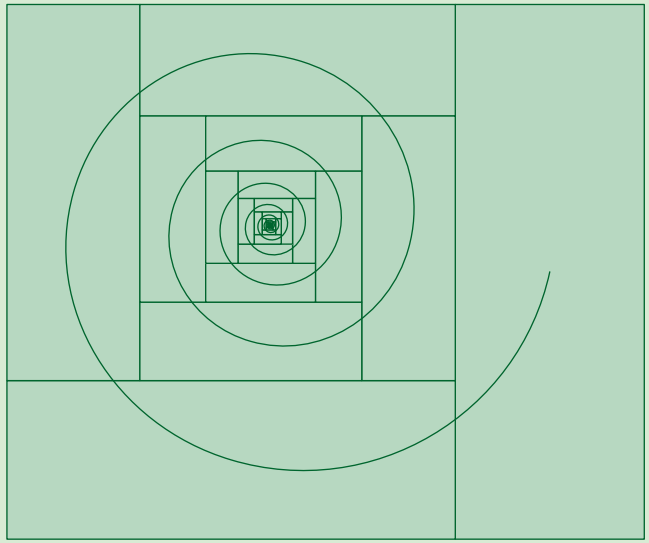
Latin Modern fonts at eleventh hour



Brno, 26 November, 2005

Bogusław Jackowski

aaa
aaa
aaa
aaa
aaa
aaa
ccc
eee
eee
eee
eee
eee
ggg
yyy
yyy

Latin Modern fonts: what are they?

A collection of fonts (currently 69)
in the PostScript Type 1 and OTF formats,
based on the Computer Modern fonts, equipped
with a rich repertoire of diacritical characters

Availability—CTAN, for example:
ftp://ftp.dante.de/tex-archives/fonts/lm

current version:	0.99.3
number of glyphs:	46 849 (ca 680 per font)
licence:	openware, LPPL-based
maintainers:	B. Jackowski and J. M. Nowacki, GUST

Latin Modern fonts: what are they for?

The Latin Modern project, launched by local TEX users groups in Spring 2002, aimed at the collection of multilingual Latin-based fonts that could be used as a *default* font family in the realm of TEX.

Moreover, being distributed in both POSTSCRIPT Type 1 and OTF formats, the Latin Modern fonts can be used in any system that supports these formats.

Why Latin Modern fonts?

Other possibilities:

- Computer Modern fonts (D. E. Knuth, 1982)
  obsolete because of the lack of diacritical characters
- EC fonts (J. Knappen and N. Schwartz, 1997)
  obsolete because of the lack of outline fonts
- CM-Super family (V. Volovich, 2002)
  very large and difficult to maintain

The Latin Modern distribution

- PostScript Type 1 fonts, produced by METATYPE1 (METAPOST engine plus a bunch of AWK scripts)
- OpenType fonts, prepared using Adobe Font Development Kit for OpenType (implemented features: `liga`, `onum`, `cpsp`, `dlig`, `frac`)
- Support for TEX (∗.tfm files)
- Support for dvips and pdfTEX (∗.map and ∗.enc files)
- Support for LATEX (∗.fd and ∗.sty files)
- Substitutions (partial, of course) for CM, PL, CS, VN; the idea: to use the original TFM files with the relevant Latin Modern PFB files and dvips requisites
- METATYPE1 sources

The Latin Modern distribution: the collection of fonts

- Fonts occurring both in LMs and CMs (50)
  lmb10 lmbx5 lmbx6 lmbx7 lmbx8 lmbx9 lmbx10 lmbx12 lmbxi10 lmbxo10
  lmcsc10 lmr5 lmr6 lmr7 lmr8 lmr9 lmr10 lmr12 lmr17
  lmri7 lmri8 lmri9 lmri10 lmri12 lmro8 lmro9 lmro10 lmro12
  lmss8 lmss9 lmss10 lmss12 lmss17 lmsso8 lmsso9 lmsso10 lmsso12 lmsso17
  lmssbx10 lmssdc10 lmssq8 lmssqo8
  lmtcsc10 lmtt8 lmtt9 lmtt10 lmtt12 lmtti10 lmtto10 lmvtt10
- Fonts present in LMs and absent from CMs (19)
  lmbo10 lmcsco10 lmro17 lmssbo10 lmssdo10 lmssqbx8 lmssqbo8
  lmtcso10 lmtk10 lmtko10 lmtl10 lmtlo10 lmtlc10 lmtlco10
  lmvtk10 lmvtko10 lmvtl10 lmvtlo10 lmvtto10
- Fonts absent from LMs and present in CMs
  math companion (!)
  cmdunh10 cmff10 cmfi10 cmfib8 cminch cmtex8 cmtex9 cmtex10 cmu10

á ă ắ
ằ ẳ â
ả ẩ ấ
ầ à a
a a a
a a a
c c c
e e e
e e e
e e e
e e e
e e e
g g g
y y y
y y y

Latin Modern distribution: dark and light typewriter fonts

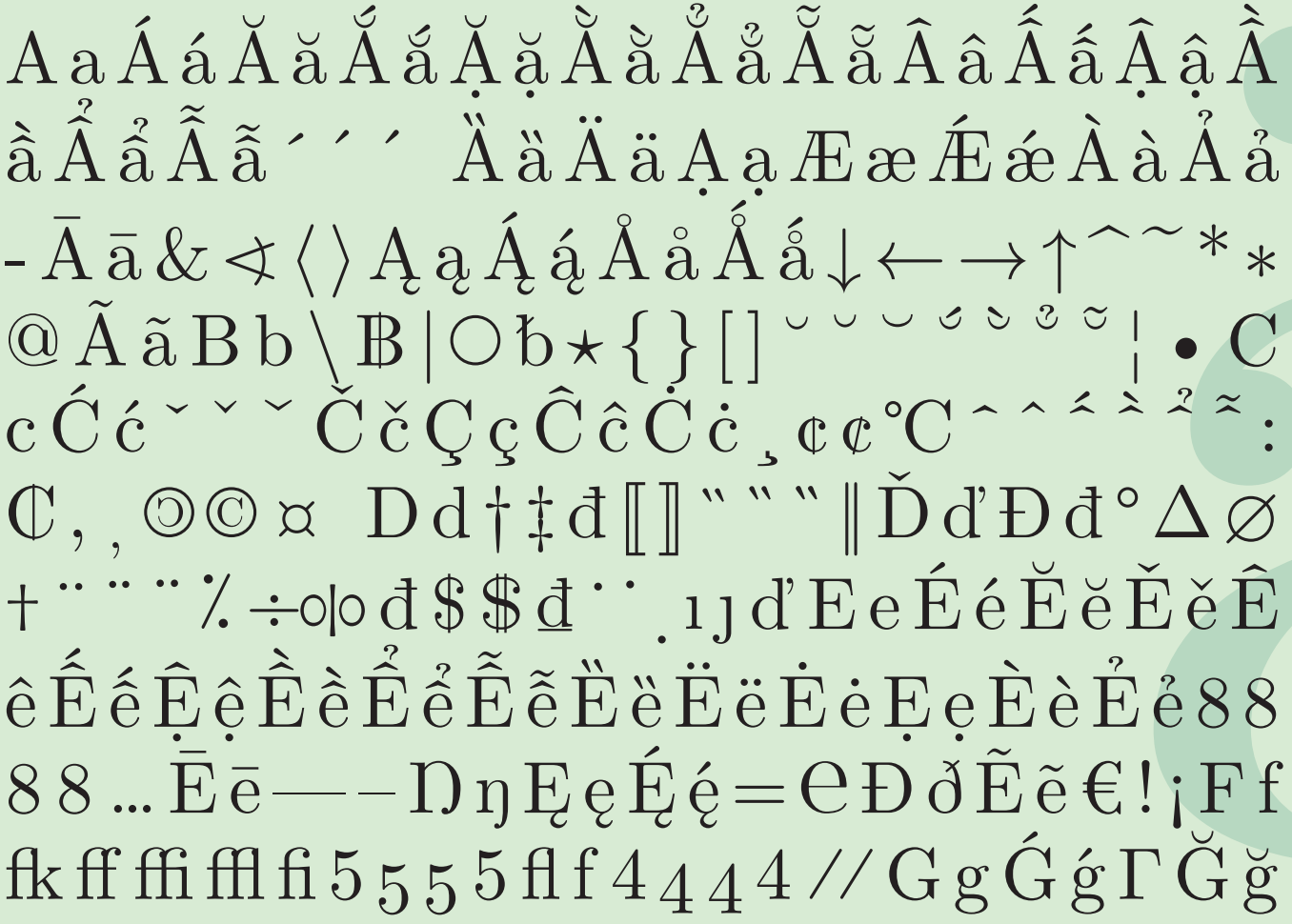
- lmtl10 (light): abcdefABCDEF012345
- lmtt10 (normal): **abcdefABCDEF012345**
- lmtk10 (dark): **abcdefABCDEF012345**
- lmtlc10 (light condensed): abcdefABCDEF012345
- lmvtl10 (light): abcdefABCDEF012345
- lmvtt10 (normal): **abcdefABCDEF012345**
- lmvtk10 (dark): **abcdefABCDEF012345**
- *plus all oblique variants*

The Latin Modern distribution: encodings

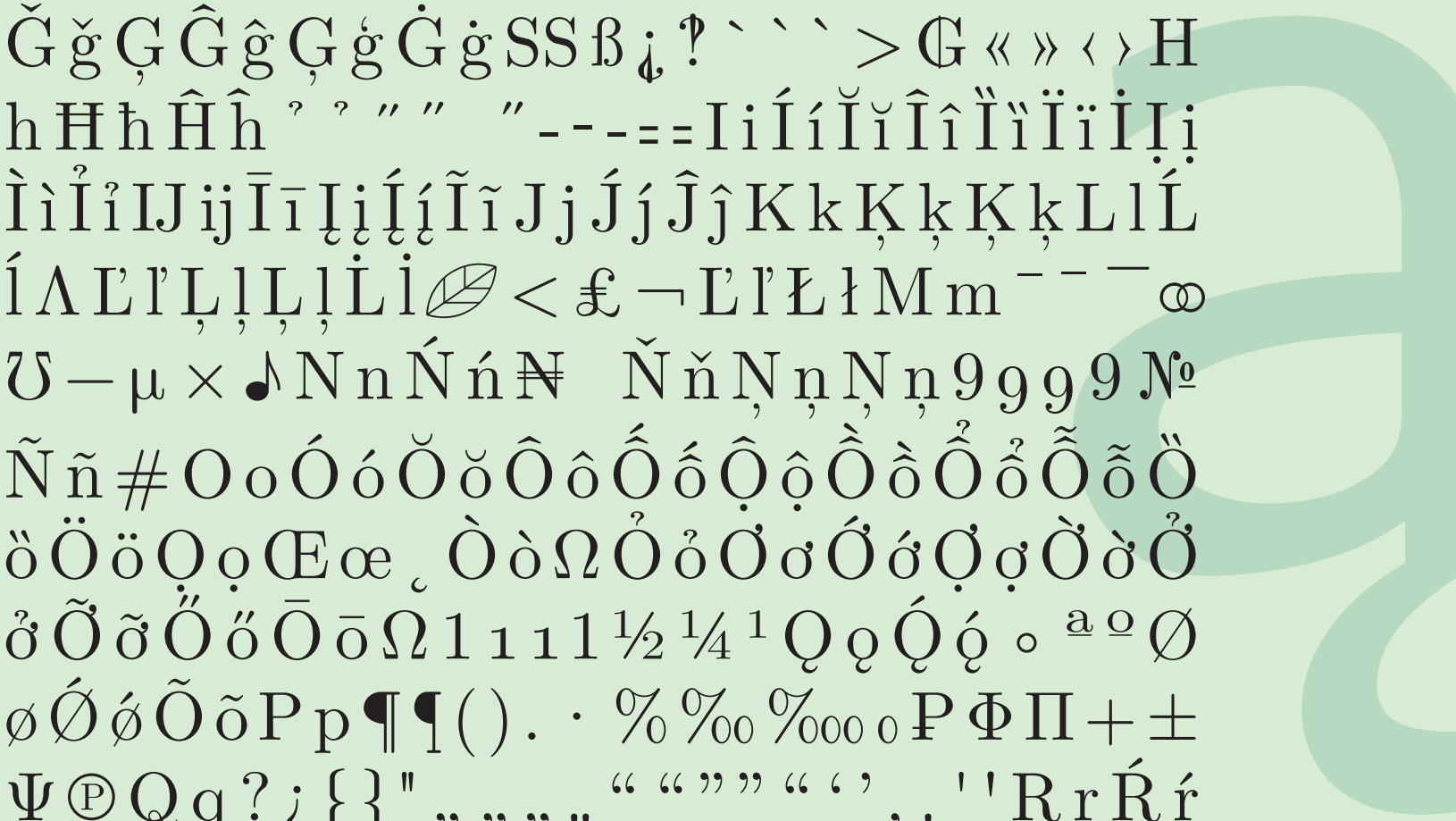
The LM package provides TEX font metric files for:

- EC (Cork) encoding (ec-∗.tfm)
- EL (European Letters aka dense) encoding, el-∗.tfm (originally introduced by the ConTEXt fraternity)
- QX (GUST) encoding, qx-∗.tfm
- Y&Y's TEX'n'ANSI aka LY1 encoding, texnansi-∗.tfm
- T5 (Vietnamese) encoding, t5-∗.tfm
- Text Companion for EC fonts aka TS1, ts1-∗.tfm

The Latin Modern distribution: the collection of glyphs



The Latin Modern distribution: the collection of glyphs



á ă ắ
ằ ẳ â
ả ẩ ấ
ầ à ằ
ä ą ą́
a a a
c c c
e e e
e e e
e e e
e e e
e e e
g g g
y y y
y y y

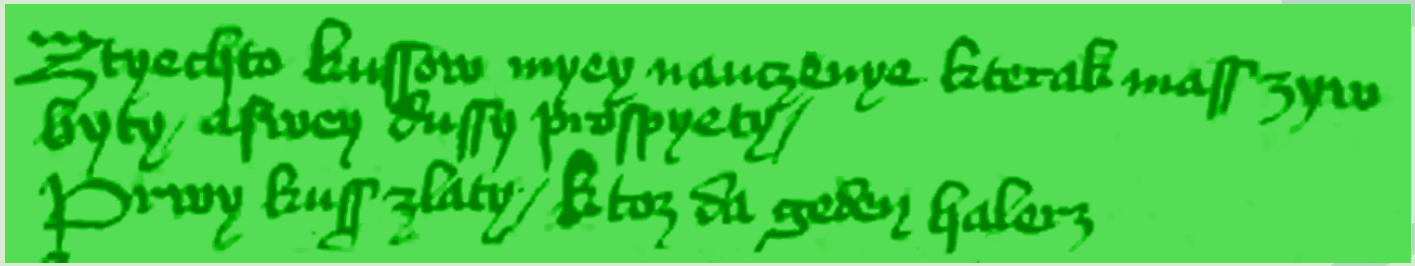
The Latin Modern distribution: the collection of glyphs

√ Ř ř Ŗ ŗ Ŗ ŗ R̃ r̃ Ṙ ṙ Ʀ ※ ® ® ° ° ◌́ S s Ś ś
Š š Ş ş Ŝ ŝ Ș ș § ; ℠ 7 7 7 7 - Σ 6 6 6 6 / £
- T t Ť ť Ţ ţ Ț ț Θ Þ þ 3 3 3 3 ¾ — ³ ◌͡◌ ◌͡◌ ◌͡◌
~ ˜ ∼ t̓ ™ — 2 2 2 2 ² U u Ú ú Ŭ ŭ Û û Ǜ ǜ Ü
ü Ụ ụ Ù ù Ủ ủ Ư ư Ứ ứ Ự ự Ừ ừ Ử ử Ữ ữ Ű
ű Ū ū _ Ų ų Ƴ Ů ů Ũ ũ V v © ˙ ® ␣ W w Ẃ
ẃ Ŵ ŵ Ẅ ẅ Ẁ ẁ ₩ X x Ξ Y y Ý ý Ŷ ŷ Ÿ
ÿ Ỵ ỵ ¥ Ỳ ỳ Ỷ ỷ Ỹ ỹ Z z Ź ź Ž ž Ż ż 0 o o 0

á ă ǎ
ǎ å â
å ǻ ā́
à̊ à ä̆
ä ą ą́
ā a a
c c c
e e e
e e e
e e e
e e e
e e e
g g g
y y y
y y y

Who is to be blamed for the plentitude of diacritical characters?

Six hundred years ago people tried to avoid them:



Ztyechto kuſſow myey nauczenye kterak maſſ zyw
byty aſwey duſſy proſpyety /
Prwy kuſſ zlaty / ktoz da geden halerz

Z těchto kusóv měj naučenie, kterak máš živ
býti a svej duši prospěti.
Prvý kus zlatý: Ktož dá jeden haléř...

Jan Hus (1371–1415), *Devět zlatých kusů*

á ă ắ
ǎ ẳ â
ả ẩ ấ
ầ à ằ
ä ą ą́
ā ã a
c c c
e e e
e e e
e e e
e e e
e e e
g g g
y y y
y y y

Who is to be blamed for the plentitude of diacritical characters?

Mistr Jan Hus
Orthographia Bohemica

Alois Vojtěch Šembera, *Mistra Jana Husi ortografie česká*. Vydál Alois Vojtěch Šembera. Ve Vidni 1857, s. 48 (v Archívu hl. m. Prahy?)

What can be found in the Internet about haček?

- It was introduced by Jan Hus (probably)
- HACEK can be acute to your heart...

The acronym HACEK refers to a grouping of gram-negative bacilli:
Haemophilus species,
Actinobacillus actinomycetemcomitans,
Cardiobacterium hominis,
Eikenella corrodens,
Kingella species.
These organisms are responsible for *acute* heart diseases.

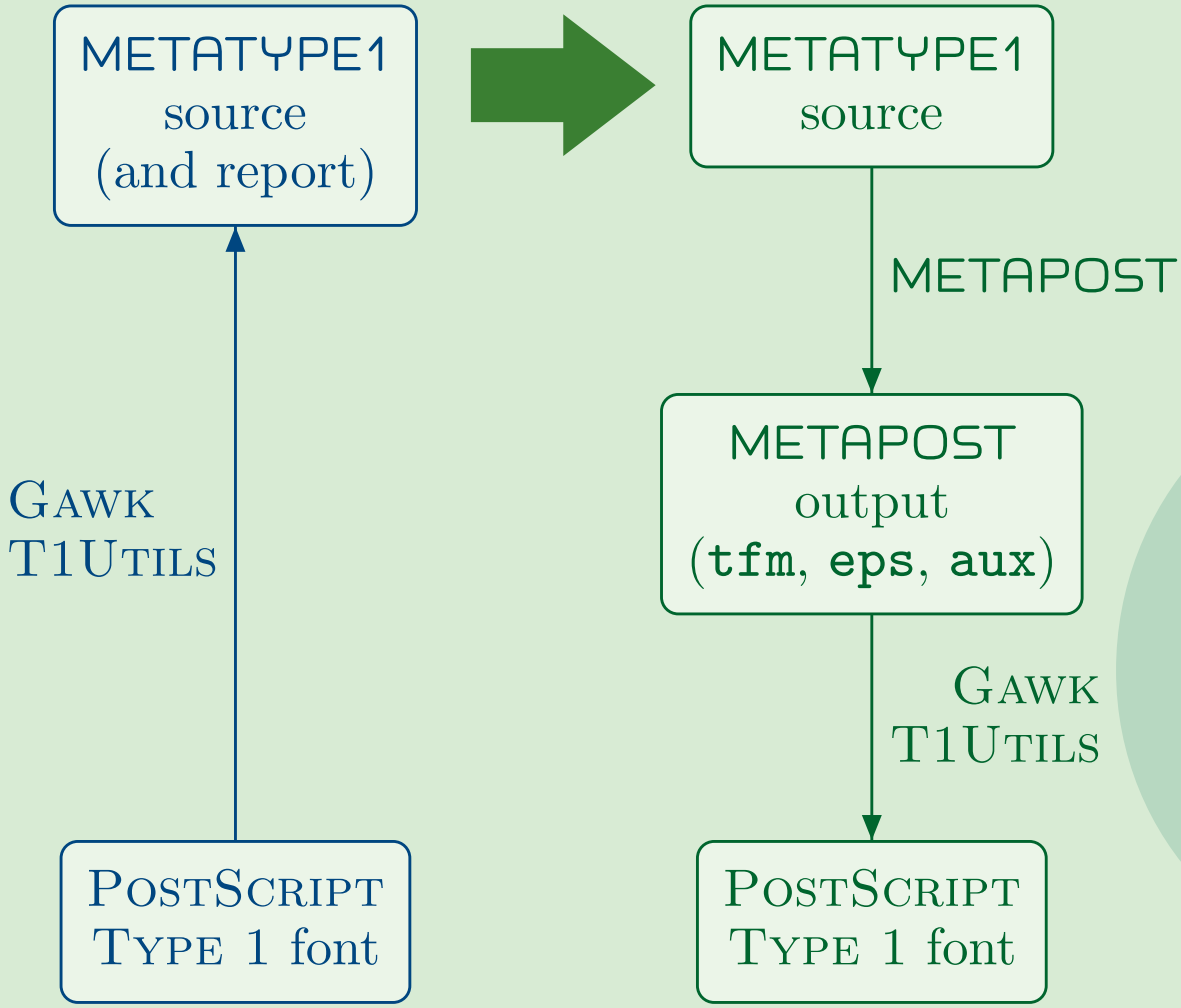
What can be found in the Internet about haček?

- It was introduced by Jan Hus (probably)
- HACEK can be acute to your heart...
- Which, in a way, agrees with D. E. Knuth's anticipation:

  Type design can be hazardous [...] Once you get hooked, you will develop intense feelings about letterforms; the medium will intrude on the messages that you read. And you will perpetually be thinking of improvements to the fonts that you see everywhere, especially those of your own design.

  Isn't it a heart disease?

How the Latin Modern family was created?



The structure of a Latin Modern source: a driver file (lmr10)

```
1. % LATIN MODERN font: a driver file for lmr10
2. input fontbase;
3. vardef cm_pal = "cmr10" enddef;
4. input comm_mac;       % common defs, CM params
5. input comm_mph;       % common header
6. input lmr10.mpm;      % metric data
7. input lmr10.mph;      % PS-oriented header
8. beginfont
9. input lmr10.mpg;      % ‘‘frozen’’ glyphs
10. input comm_mpg;      % common glyphs (mainly diacritics)
11. if known generating: % optimize proofing time
12.  input lmr10.mpl;    % ligatures and kerns
13. fi
14. endfont
15. %%%% EOF
```

The structure of a Latin Modern source: a boring excerpt from the file comm_mpg.mp (“common glyphs”)

```
. . .
%% \vb\- Aacute:\- \PICT{Aacute}\-
acc_glyph(_A)(_Acute)(_Aacute);
%% \vb\- aacute:\- \PICT{aacute}\-
acc_glyph(_a)(_acute)(_aacute);
%% \vb\- Abreve:\- \PICT{Abreve}\-
acc_glyph(_A)(_Breve)(_Abreve);
%% \vb\- abreve:\- \PICT{abreve}\-
acc_glyph(_a)(_breve)(_abreve);
%% \vb\- Abreveacute:\- \PICT{Abreveacute}\-
acc_glyph(_A)(_breveacute)(_Abreveacute);
%% \vb\- abreveacute:\- \PICT{abreveacute}\-
acc_glyph(_a)(_breveacute)(_abreveacute);
. . .
```

á ǎ ắ
ắ ẳ â
ả ẩ ấ
ầ à ằ
ä ą ą
ā ã å
ć č ç
é e e
e e e
e e e
e e e
e e e
g g g
y y y
y y y

A few examples of less boring accented characters

d’ ģ ́ l’
L’ ť ẏ

A few examples of less boring accented characters

d’ ġ́ ģ́ l’ L’ t’ y.

á ă ắ
ắ ẳ â
ả ẩ ấ
ầ à ằ
ä ą ą
ā ã å
ć č ç
é ě ě
e e e
e e e
e e e
e e e
g g g
y y y
y y y

A few examples of less boring accented characters

d’ ģ į l’ Ľ ť ẏ ę

á ă ắ
ǎ ẳ â
ả ẩ ấ
ầ à ằ
ä ą ą́
ā ã å
ć č ç
é ě ĕ
ê e e
e e e
e e e
e e e
g g g
y y y
y y y

A few examples of less boring accented characters

d’ ģ ģ́ l’ L’ ť’ ẏ

Compatibility issues

- A subset of CM's font metric files can be safely used with LM's PFB files; known exceptions:
  - lack of math (will be fixed soon)
  - a macro `\hbar` produces slightly worse result (green – **CM**, gray – LM, blue – **LM** glyph):

Compatibility issues

- A subset of CM's font metric files can be safely used with LM's PFB files; known exceptions:
  - lack of math (will be fixed soon)
  - a macro `\hbar` produces slightly worse result
  - there are some discrepancies between CS and LM Type 1 (PFB) fonts, reported by Karel Píška; for example, the widths of guillemots differ, most significantly in 5-point fonts:

    `csr5.pfb`: 5000/9 = 555.556; `lmr5.pfb`: 750

    but in `csr10.pfb` i and `lmr10.pfb` the respective widths are consistent:

    `csr10.pfb`: 5000/9 = 555.556
    `lmr10.pfb`: 5000/9 = 555.556

Compatibility issues

- A subset of CM's font metric files can be safely used with LM's PFB files; known exceptions:
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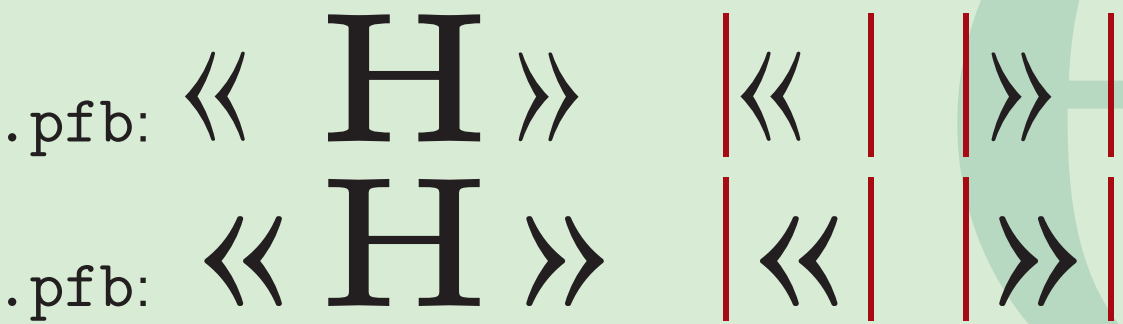


Compatibility issues

- A subset of CM's font metric files can be safely used with LM's PFB files
- In general, however, full compatibility cannot be even dreamt of
  - the sets of fonts differ
  - the exact dimensions of glyphs cannot be retained (the infamous limit of 16 heights, 16 depths and 64 italic corrections)
  - in the LM fonts some apparent flaws of the CM fonts have been corrected (both concerning metric data and character shapes)

Compatibility issues

So, why not to follow the Senior Typographer, Hermann Zapf, who quite recently decided to improve his Optima?

Compatibility issues

What can we do to make the LM fonts usable for the Czech TEX community?

- We have already equipped LMs in Czech double quotes
- Accents (haček) have been modified
- CS encoding(s), i.e., the relevant $*$.tfm files, can be easily added to the LM distribution
- We are open to further suggestions

Compatibility issues: an example of strange kernings that have been corrected

The file `roman.mf` reads:

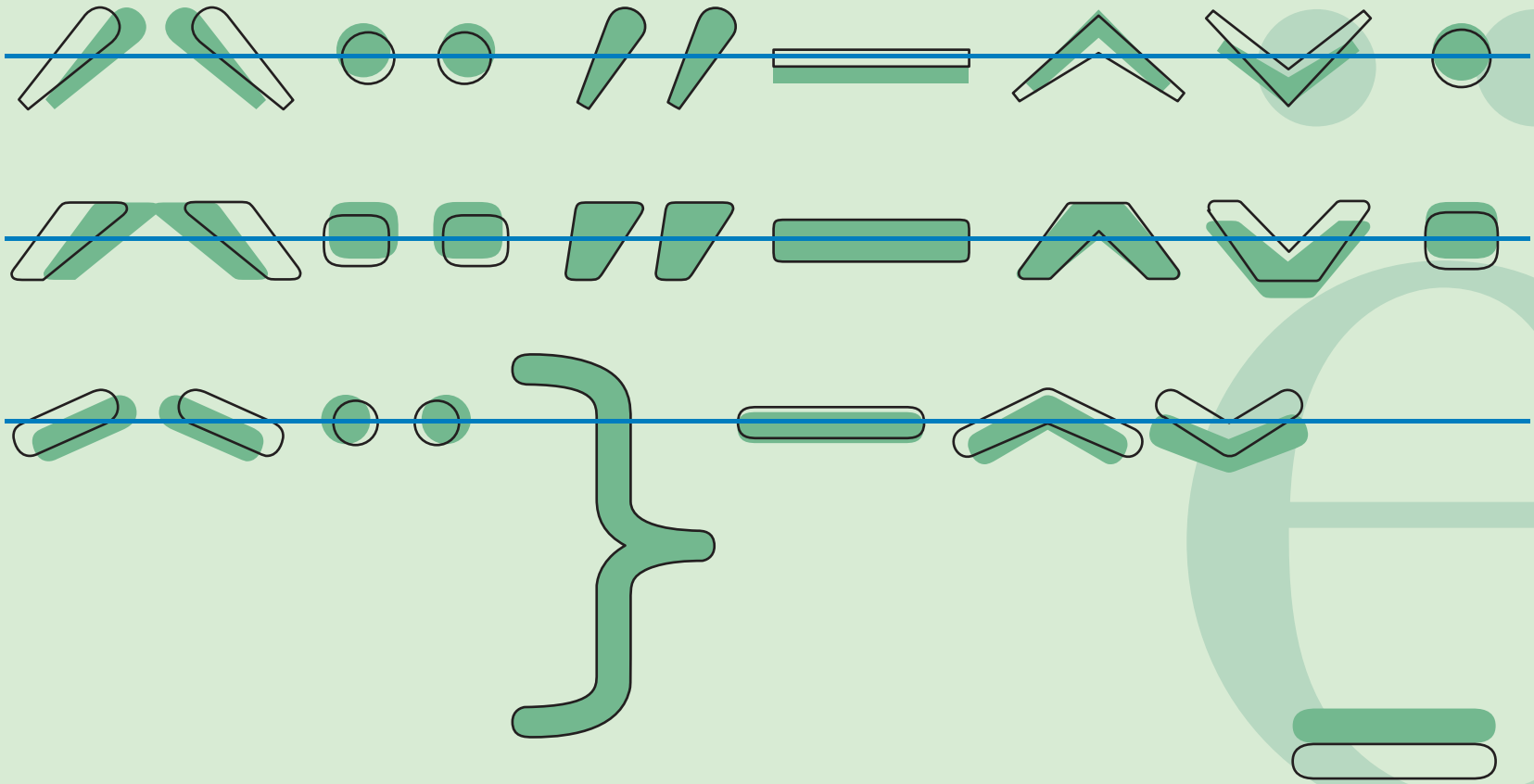
```
% three degrees of kerning:
k#:=-.5u#; kk#:=-1.5u#; kkk#:=-2u#;
ligtable "k":
  if serifs: "v": "a" kern -u#, fi
  "w": "e" kern k#, "a" kern k#,
       "o" kern k#, "c" kern k#;
```

The kern pair **k-a** appears in TFMs of serif fonts twice: first with the value $-u\#$, next with the value $k\#$, i.e., $-0.5u\#$; moreover, there are no **v-a**, **v-c**, **v-e**, and **v-o** kern pairs in sansserif fonts, although there are **k-c**, **k-a**, **k-e**, **k-o**, **w-a**, **w-c**, **w-e**, and **w-o** kern pairs in these fonts.

The problem of missing **v-**$*$ kerns in sansserif variants occurs in EC, CS, PL, VN, and CM-Super fonts!

á ă ắ
ǎ ẳ â
ả ấ ắ
à ằ ä
ä ą ą́
ā ã å
ć č ç
é ě ĕ
ê ế ề
ể ễ ë
ë e e
e e e
g g g
y y y
y y y

Compatibility issues: a few example glyphs (mostly accents) that we decided to touch

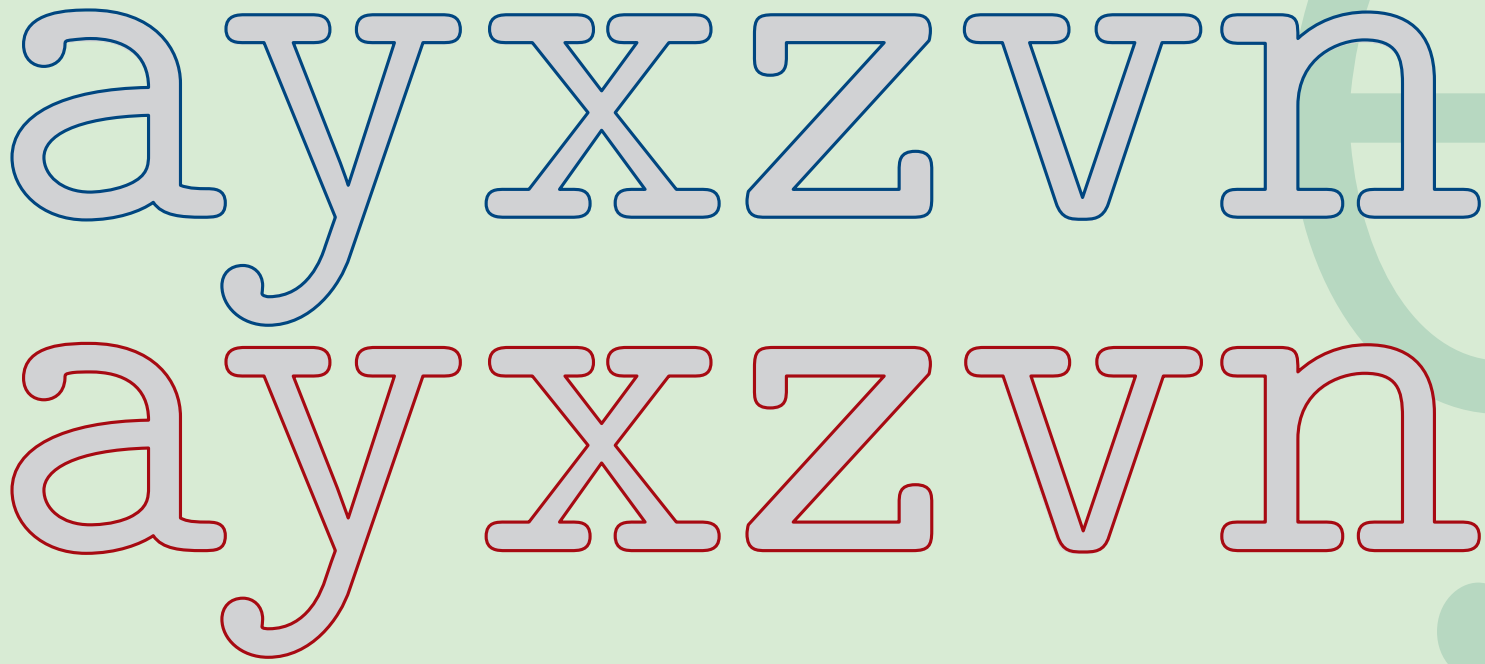


solid green – CM, outline black – LM

á ǎ ắ
ă ẳ â
ả ẩ ấ
à à̊ ằ
ä ą ą́
ā ã å
ć č ç
é ě ĕ
ê ế ề
ể ễ ḝ
ë ė ẹ
e e e
g g g
y y y
y y y

Compatibility issues: an example feature that we are not going to touch

In the LM typewriter fonts, the letters ‘v’, ‘y’, ‘x’ were reported to be “too thin”; the comparison with the original fonts shows, that this was D. E. Knuth’s design:



Font ∗vtt10: CM’s bitmap; CM’s outlines; LM’s outlines

á ă ắ
ǎ ẳ â
ả ấ ắ
à à ằ
ä ą ą́
ā ã å
ć č ç
é ě ĕ
ê ế ề
ể ễ ḝ
ë ė ę
ę ę́ ẽ
g g g
y y y
y y y

Plans for the future

- We are not going to equip the Latin Modern fonts with non-Latin alphabets, such as cyrillic, Greek, etc.
- We are not going to increase the number of so called *optical sizes*—can you see any difference?

e e e ẽ

Plans for the future

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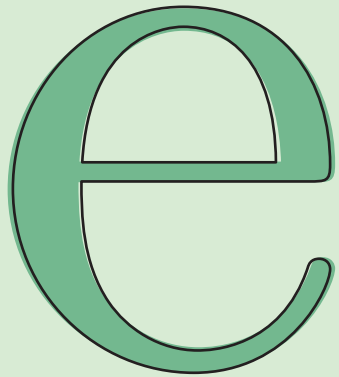
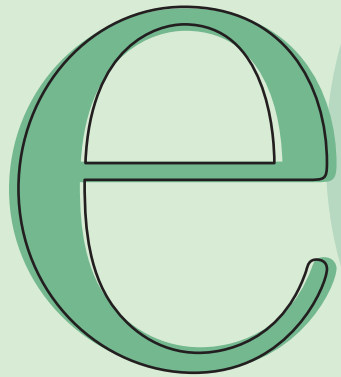
- We are not going to increase the number of so called *optical sizes*—can you see any difference?



cmr8 at 9pt

cmr9 at 9pt



cmr10 at 9pt

á ă ắ
ắ ẳ â
ẳ ẵ ấ
ầ à ằ
ä ą ą́
ā ã å
ć č ç
é ě ĕ
ê ế ề
ể ễ ḝ
ë ė ę
ę ę́ ẽ
g g g
y y y
y y y

Plans for the future

- We are not going to equip the Latin Modern fonts with non-Latin alphabets, such as cyrillic, Greek, etc.
- We are not going to increase the number of so called *optical sizes*
- In general, we are not going to go too far with the "improvement" of the original D. E. Knuth's design—we will consider the changing of only those features which would have hampered the extending of the Latin Modern family with new diacritical characters

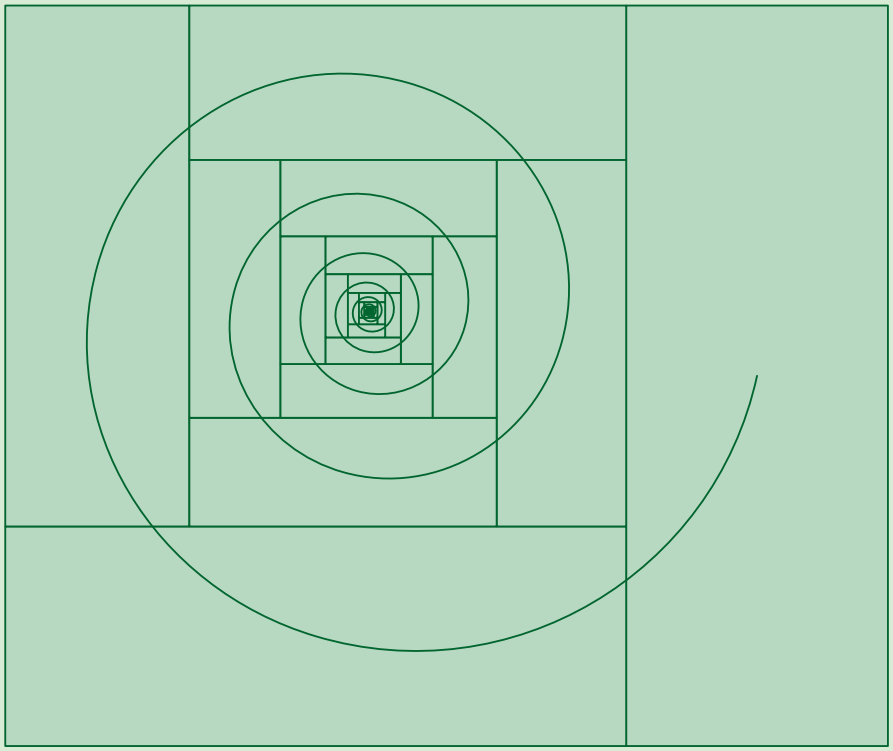
Plans for the future: to do

- Fixing bugs and misfeatures—as soon as possible
- Reaching the basic stability of the metric data of the package—before the release of the version 1.00 (scheduled for Spring 2006, BachoTEX)
- Adding a basic math companion (borrowed from CMs, to begin with)—timing as above
- The improvement of kerning (reluctantly), glyph shapes (redrawing all accents from scratch?), and hinting; improving OTFs by, e.g., the addition of new features—not in a hurry
- Further extensions to the character set (e.g., African languages)—after the release of the version 1.0
- More math, small caps—far future?..

Should you have remarks concerning the current LM release, please consult Harald Harders's www page *Wishes for Latin Modern*:

http://www.harald-harders.de/latex/lmodern.html

At the moment the page is unmaintained; nevertheless, a lot of information can be found there.



The *Latin Modern* project is supported by TEX Users Groups, in particular, by the German-speaking TEX Users Group DANTE e.V., the Polish TEX Users Group GUST, the French-speaking TEX Users Group GUTenberg, the Dutch-speaking TEX Users Group NTG and—last but not least—TUG.