

The ETbb package—Edward Tufte’s version of Bembo

Michael Sharpe

Background

The fonts in this package were derived ultimately from the collection of fonts commissioned by Edward Tufte for his own books, and released in 2015 as ET-Bembo under the MIT license. (The sources for that collection were fonts using the family name ET-book.) That collection was enhanced in 2019 under the name XETBook by Daniel Benjamin Miller, and it is his package which was the starting point for ETbb, where the bb denotes the Berry abbreviation for Bembo. The final section of this document makes a detailed comparison with the earlier fbb package, which is also Bembo-like, derived from Cardo. The most significant differences are that ETbb has a regular upright that is about 20% darker than the corresponding fbb, and its ascender height is noticeably less. These differences make ETbb have a less spindly appearance that is closer in spirit to the print produced by traditional metal versions of Bembo.

Package properties

The package makes a number of changes to the XETBook fonts:

- The released version of ET-Bembo lacks kerning tables—a serious omission—rectified in ETbb.
- The scale has been increased by 3.36% so that the x-height of the upright regular face is 431, very close to Computer Modern and Libertine.
- The lining figures in some faces were reduced so as to be a bit less than the cap-heights.
- The lining figures in XETBook were proportional rather than tabular. I’ve added new tabular lining and old-style figures.
- Added superior letters and figures to all faces. E.g., `\textsu{ABCabc123}` renders as ^{ABCabc123}.
- Added inferior figures to all faces.
- The originals comprised glyphs in the Adobe Standard Encoding, forming a rather sparse subset of the T1 encoding. I’ve added accented and composite glyphs that provide complete coverage of the T1 encoding as well as many glyphs required in the orthography of a number Eastern European countries.
- Small caps have been added to all faces.
- There is a new glyph for the German capital sharp S (*ß*, *großes eszett*, U+1E9E), approved in 2017 for optional use in German orthography. Small cap versions are also provided.
- The glyph capital P has been changed from its default closed shape, as used in almost all modern digital renderings of Bembo, to the more historically accurate open shape. See, for example, the

reproduction of Pietro Bembo's *De Aetna* at
<https://ia601405.us.archive.org/34/items/ita-bnc-ald-00000673-001/ita-bnc-ald-00000673-001.pdf>.
 (A higher resolution rendering of a two-page sample is available from https://upload.wikimedia.org/wikipedia/commons/8/89/De_Aetna_1495.jpg.)

Package options and macros

This package has most of the same features and options as the `fbf` package and even includes the `altP` option, though that has no effect because the alternate P shapes in `fbf` are the default in `ETbb`.

Text figures may be selected from four types:

- Proportional lining (LF), selected by options `lining`, `proportional` [`or p`]; (`lining`, or `lf`, is the default figure style;)
- Tabular lining (TLF), selected by options `lining` [`or lf`], `tabular` [`or t`]; (`tabular` is the default figure alignment;)
- Proportional oldstyle (OsF), selected by option `oldstyle` [`or osf`], `proportional` [`or p`];
- Tabular oldstyle (TOsF), selected by options `oldstyle` [`or osf`], `tabular` [`or t`].

The package also defines macros that allow you use alternate figure styles locally:

Macro	result	comment
<code>\textlf{0123456789}</code>	0123456789	print 0123456789 in proportional lining figures
<code>\texttlf{0123456789}</code>	0123456789	print 0123456789 in tabular lining figures
<code>\textosf{0123456789}</code>	0123456789	print 0123456789 in proportional oldstyle figures
<code>\texttosf{0123456789}</code>	0123456789	print 0123456789 in tabular oldstyle figures
<code>\textsu{0123456789}</code>	0123456789	print 0123456789 in superior figures
<code>\textin{0123456789}</code>	0123456789	print 0123456789 in inferior figures

The macro `\textlf{123}` is identical in effect to `{\lfstyle 123}`, and similarly for the other lining and oldstyle macros, while `\textsu{123}` has the same effect as `{\sufigures 123}` and `\textin{123}` has the same effect as `{\infigures 123}`. If you prefer typing longer names, you may use `\textinferior` as a synonym for `\textin`, and similarly for `\textsu`.

The `\textfrac` macro constructs fractions using `\textsu` and `\textin`, raising the result to align with the text baseline. The behavior is quite configurable, there being three parameters available to control the kerns before and after the fraction solidus, and the amount to raise the resulting box. The three parameters are passed as options to `ETbb`, named

```
foresolidus % default value -.03em
aftsolidus  % default value .02em
raisefrac   % default value .111em
```

(The values should always be em units in order to behave correctly with respect to scaling.) If you were to change the default behavior with the option

```
raisefrac=0em
```

you would get a fraction with the denominator's baseline at the baseline of the `\text` figures, namely $-.111\text{em}$. Those who wish the fractional part to be vertically centered with respect to lining figures should specify

```
raisefrac=.053em
```

All the above have to do with globally defined settings for `\textfrac`, but that macro allows one optional argument that can override the effect of `raisefrac`, with, e.g., `\textfrac[.1em][6]{11}` raising the fraction $6/11$ by $.1\text{em}$ instead of the default specified in the original options.

EXAMPLES:

- `2\textfrac{17}{32}` renders as $2^{17/32}$ with default settings.
- `2\textfrac[.053em]{17}{32}` produces a fraction centered on the mid-height of lining figures: $2^{17/32}$.
- `2\textfrac[0em]{17}{32}` produces a fraction with numerator and denominator at the normal heights of superior and inferior figures: $2^{17/32}$.

Option `sup` changes the form of footnote markers to use ETbb's superior figures, unless you have re-defined the meaning of `\thefootnote` prior to loading ETbb. For more control over size, spacing and position of footnote markers, use the `superiors` package: E.g.,

```
\usepackage[supstm=ETbb-Regular-sup-t1]{superiors}
```

Option `sharpS` replaces `SS` in the T1 encoding by the new U+1E9E glyph and replaces the small cap `ss` by the small cap version of U+1E9E. Only figure-styles TLF, LF, OsF and T0sF are handled, and only in the T1 encoding.

Option `scof` forces the use of OsF figures in a small caps block, no matter what the default figure settings.

There is a `scaled` [or `scale`] option (e.g., `scaled=.97`) that allow you to adjust the text size against, say, a math package.

A suggested math companion

This text package works well with `newtxmath` with the `libertine` option, because the latter has italics of the same italic angle as ETbb and of very similar `xheight` and weight. If you have the MinionPro fonts (version 2.0 or higher) and have set them up with FontPro and the `minion2newtx` CTAN package, then the `minion` option to `newtxmath` provides a very good math companion with better Greek letters than `libertine`. The suggested invocation for `libertine` math is:

```
% load babel package and options here
\usepackage[p,osf]{ETbb} % osf in text, tabular lining figures in math
\usepackage[scaled=.95,type1]{cabin} % sans serif in style of Gill Sans
\usepackage[varqu,varl]{zi4}% inconsolata typewriter
\usepackage[T1]{fontenc} % LY1 also works
\usepackage[libertine,vvarbb]{newtxmath}
%\usepackage[cal=boondoxo,bb=boondox,frak=boondox]{mathalfa}
```

Here is a short sample based on this preamble:

The typeset math below follows the ISO recommendations that only variables be set in italic. Note the

use of upright shapes for d , e and π . (The first two are entered as `\mathrm{d}` and `\mathrm{e}`, and in fonts derived from `newtxmath` or `mtpro2`, the latter is entered as `\uppi`.)

Simplest form of the *Central Limit Theorem*: Let X_1, X_2, \dots be a sequence of iid random variables with mean 0 and variance 1 on a probability space $(\Omega, \mathcal{F}, \mathbb{P})$. Then

$$\mathbb{P}\left(\frac{X_1 + \dots + X_n}{\sqrt{n}} \leq y\right) \rightarrow \mathfrak{N}(y) := \int_{-\infty}^y \frac{e^{-t^2/2}}{\sqrt{2\pi}} dt \quad \text{as } n \rightarrow \infty,$$

or, equivalently, letting $S_n := \sum_1^n X_k$,

$$\mathbb{E}f(S_n/\sqrt{n}) \rightarrow \int_{-\infty}^{\infty} f(t) \frac{e^{-t^2/2}}{\sqrt{2\pi}} dt \quad \text{as } n \rightarrow \infty, \text{ for every } f \in \mathrm{bC}(\mathbb{R}).$$

Glyphs in TS1 encoding

The layout of the TS1 encoded Text Companion font, which is rendered *in regular style only*, is as follows.

	'0	'1	'2	'3	'4	'5	'6	'7	
'00x	0	1	2	3	4	5	6	7	"0x
'01x	8	9	10	, 11	ı 12	, 13	14	15	
'02x	16	17	„ 18	19	20	— 21	— 22	23	"1x
'03x	24	25	26	27	28	29	30	31	
'04x	ı 32	33	34	35	\$ 36	37	38	' 39	"2x
'05x	40	41	* 42	43	, 44	45	. 46	/ 47	
'06x	48	49	50	51	52	53	54	55	"3x
'07x	56	57	58	59	60	— 61	62	63	
'10x	64	65	66	67	68	69	70	71	"4x
'11x	72	73	74	75	76	77	78	○ 79	
'20x	128	129	130	131	† 132	‡ 133	‖ 134	‰ 135	"8x
'21x	• 136	°C 137	138	139	f 140	141	142	143	
'22x	144	145	146	147	? 148	ı 149	150	™ 151	"9x
'23x	152	153	154	155	156	157	158	159	
'24x	160	161	¢ 162	£ 163	¤ 164	¥ 165	ı 166	§ 167	"Ax
'25x	168	© 169	ª 170	171	¬ 172	173	® 174	175	
'26x	° 176	± 177	² 178	³ 179	180	μ 181	¶ 182	· 183	"Bx
'27x	184	¹ 185	º 186	187	¼ 188	½ 189	¾ 190	€ 191	
'32x	208	209	210	211	212	213	× 214	215	"Dx
'33x	216	217	218	219	220	221	222	223	
'36x	240	241	242	243	244	245	÷ 246	247	"Fx
'37x	ff 248	ffi 249	ff 250	fl 251	l 252	fi 253	i 254	f 255	
	"8	"9	"A	"B	"C	"D	"E	"F	

List of macros to access the TS1 symbols in text mode:
(The commented lines are in fbb but not ETbb.)

```
% 0 \capitalgrave
% 1 \capitalacute
% 2 \capitalcircumflex
% 3 \capitaltilde
% 4 \capitaldieresis
% 5 \capitalhungarumlaut
% 6 \capitalring
% 7 \capitalcaron
% 8 \capitalbreve
% 9 \capitalmacron
% 10 \capitaldotaccent
    11 \capitalcedilla
    12 \capitalogonek
    13 \textquotestraightbase
    18 \textquotestraightdblbase
    21 \texttwelveudash
    22 \textthreequartersemdash
    23 \textcapitalcompwordmark
% 24 \textleftarrow
% 25 \textrightarrow
% 26 \t % tie accent, skewed right
% 27 \capitaltie % skewed right
% 28 \newtie % tie accent centered
% 29 \capitalnewtie % ditto
% 31 \textascendercompwordmark
    32 \textblank
    36 \textdollar
    39 \textquotesingle
    42 \textasteriskcentered
% 45 \textdblhyphen
    47 \textfractionsolidus
% 48 \textzerooldstyle
% 49 \textoneoldstyle
% 50 \texttwooldstyle
% 49 \textthreeoldstyle
% 50 \textfouroldstyle
% 51 \textfiveoldstyle
% 52 \textsixoldstyle
% 53 \textsevenoldstyle
% 54 \texteightoldstyle
% 55 \textnineoldstyle
% 60 \textlangle
    61 \textminus
% 62 \textrangle
% 77 \textmho
```

79 \textbigcircle
 % 87 \textohm
 % 91 \textlbrackdbl
 % 93 \textrbrackdbl
 % 94 \textuparrow
 % 95 \textdownarrow
 % 96 \textasciigrave
 % 98 \textborn
 % 99 \textdivorced
 %100 \textdied
 %108 \textleaf
 %109 \textmarried
 %110 \textmusicalnote
 %126 \texttildebelow
 %127 \textdblhyphenchar
 %128 \textasciibreve
 %129 \textasciicaron
 %130 \textacutedbl
 %131 \textgravedbl
 132 \textdagger
 133 \textdaggerdbl
 134 \textbardbl
 135 \textperthousand
 136 \textbullet
 137 \textcelsius
 %138 \textdollaroldstyle
 %139 \textcentoldstyle
 140 \textflorin
 %141 \textcolonmonetary
 %142 \textwon
 %143 \textnaira
 %144 \textguarani
 %145 \textpeso
 %146 \textlira
 %147 \textrecipe
 148 \textinterrobang
 149 \textinterrobangdown
 %150 \textdong
 151 \texttrademark
 %152 \textpertenthousand
 %153 \textpilcrow
 %154 \textbaht
 %155 \textnumero
 %156 \textdiscount
 %157 \textestimated
 %158 \textopenbullet
 %159 \textservicemark
 %160 \textlquill

```

%161 \textrquill
162 \textcent
163 \textsterling
164 \textcurrency
165 \textyen
166 \textbrokenbar
167 \textsection
%168 \textasciidieresis
169 \textcopyright
170 \textordfeminine
%171 \textcopyleft
172 \textlnot
%173 \textcircledP
174 \textregistered
%175 \textasciimacron
176 \textdegree
177 \textpm
178 \texttwosuperior
179 \textthreesuperior
%180 \textasciiacute
181 \textmu
182 \textparagraph
183 \textperiodcentered
%184 \textreferencemark
185 \textonesuperior
186 \textordmasculine
%187 \textsurd
188 \textonequarter
189 \textonehalf
190 \textthreequarters
191 \texteuro
214 \texttimes
246 \textdiv
%
```

There is a macro `\textcircled` that may be used to construct a circled version of a single letter using `\textbigcircle`. The letter is always constructed from the small cap version, so, in effect, you can only construct circled uppercase letters: `\textcircled{M}` and `\textcircled{m}` have the same effect, namely \textcircled{M} .

Usage with fontspec

Because the package supplies a file named `ETbb.fontspec` whose contents list the `otf` files that correspond to each of Regular, Bold, Italic and BoldItalic, you may load `ETbb` with just

```

\usepackage{fontspec}
\setmainfont{ETbb}
```

Other than the usual choices of figure style, the only remaining choice available is through `StylisticSet=2`,

which substitutes the new Sharp S glyphs in place of the familiar β , SS and ss. See the table in the next section for details.

Selection of the new Sharp S in LaTeX

The following table summarizes the behavior of the text macros `\SS`, `\ss` and the macro `\MakeUppercase`.

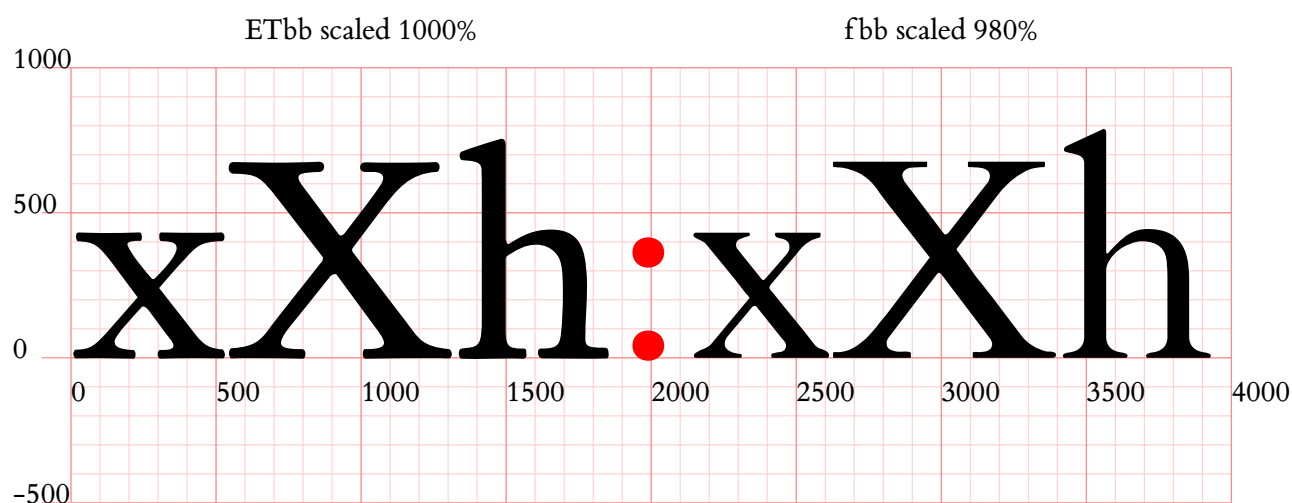
sharpS option	<code>\ss</code>	<code>\SS</code>	<code>\MakeUppercase{\ss}</code>	<code>\textsc{\ss}</code>
Not set	β	SS	SS	ss
sharpS	β	β	β	β

In unicode TeX, the behavior laid out in the table above is achieved using `StylisticSet=2`.

Detailed comparison with fbb

The following picture, in which the units are approximately in bp, shows some of the differences between ETbb-Regular and fbb-Regular, the first scaled up by 10 and the second by 9.8 so that their x-heights (and Cap-heights) are the same. From the picture below you can note the following.

- The serifs are much more substantial in ETbb.
- The ascenders are considerably higher in fbb—in fact, by 50 em units. Those very tall ascenders make for poor positioning of quotes, superscripts and the like.
- Stems are a little thicker (by about 10%) in ETbb.
- There is a slight bowing out in the letter h and similar letters like n of ETbb that is not present in fbb, making for more visual interest, IMO. This would not be of any importance at small print sizes.
- Overall, ETbb has lower contrast (ratio of thickest to thinnest strokes) than fbb, making for a more uniform gray appearance on the printed page.



The following page presents a comparison of a ETbb and fbb with identical text rendered in two columns. For me, there is no question that ETbb is the preferable font for document text.

ETbb on left, fbb on right, normalized to same x-height

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ac tortor dignissim convallis aenean. Adipiscing elit duis tristique sollicitudin nibh. At imperdiet duis accumsan sit. Posuere sollicitudin aliquam ultrices sagittis. In hac habitasse platea dictumst quisque sagittis purus sit. Vulputate mi sit amet mauris commodo quis imperdiet. Vel risus commodo viverra maecenas accumsan lacus vel facilisis volutpat. Tortor vitae purus faucibus ornare suspendisse. Non consectetur a erat nam at lectus. Curabitur gravida arcu ac tortor. Tempus urna et pharetra pharetra massa massa ultricies mi quis. Nisl nisi scelerisque eu ultrices vitae auctor eu. A lacus vestibulum sed arcu non odio euismod lacinia at. Ut venenatis tellus in metus vulputate eu. Ornare massa eget egestas purus viverra accumsan in nisl. Mauris augue neque gravida in fermentum et sollicitudin ac orci. Turpis egestas sed tempus urna et pharetra pharetra. Nunc lobortis mattis aliquam faucibus.

Nulla facilisi morbi tempus iaculis urna id volutpat lacus. Est ultricies integer quis auctor elit. Risus quis varius quam quisque id. Mus mauris vitae ultricies leo integer malesuada nunc vel risus. Sit amet purus gravida quis blandit turpis cursus in hac. Nam at lectus urna duis convallis convallis tellus. Amet dictum sit amet justo. Tortor consequat id porta nibh venenatis cras. Ante metus dictum at tempor. Senectus et netus et malesuada fames ac turpis.

Non tellus orci ac auctor augue mauris augue neque gravida. Bibendum at varius vel pharetra vel turpis nunc. Pellentesque adipiscing commodo elit at imperdiet duis accumsan sit. Quis enim lobortis scelerisque fermentum duis faucibus in. Scelerisque eu ultrices vitae auctor. Blandit volutpat maecenas volutpat blandit. Morbi leo urna molestie at elementum eu. Tristique magna sit amet purus gravida quis blandit. Felis eget nunc lobortis mattis aliquam faucibus purus in. Pharetra diam sit amet nisl suscipit. Odio pellentesque diam volutpat commodo sed egestas egestas fringilla phasellus. Vitae nunc sed velit dignissim. Nulla pellentesque dignissim enim sit. Sem viverra aliquet eget sit amet tellus.

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ac tortor dignissim convallis aenean. Adipiscing elit duis tristique sollicitudin nibh. At imperdiet duis accumsan sit. Posuere sollicitudin aliquam ultrices sagittis. In hac habitasse platea dictumst quisque sagittis purus sit. Vulputate mi sit amet mauris commodo quis imperdiet. Vel risus commodo viverra maecenas accumsan lacus vel facilisis volutpat. Tortor vitae purus faucibus ornare suspendisse. Non consectetur a erat nam at lectus. Curabitur gravida arcu ac tortor. Tempus urna et pharetra pharetra massa massa ultricies mi quis. Nisl nisi scelerisque eu ultrices vitae auctor eu. A lacus vestibulum sed arcu non odio euismod lacinia at. Ut venenatis tellus in metus vulputate eu. Ornare massa eget egestas purus viverra accumsan in nisl. Mauris augue neque gravida in fermentum et sollicitudin ac orci. Turpis egestas sed tempus urna et pharetra pharetra. Nunc lobortis mattis aliquam faucibus.

Nulla facilisi morbi tempus iaculis urna id volutpat lacus. Est ultricies integer quis auctor elit. Risus quis varius quam quisque id. Mus mauris vitae ultricies leo integer malesuada nunc vel risus. Sit amet purus gravida quis blandit turpis cursus in hac. Nam at lectus urna duis convallis convallis tellus. Amet dictum sit amet justo. Tortor consequat id porta nibh venenatis cras. Ante metus dictum at tempor. Senectus et netus et malesuada fames ac turpis.

Non tellus orci ac auctor augue mauris augue neque gravida. Bibendum at varius vel pharetra vel turpis nunc. Pellentesque adipiscing commodo elit at imperdiet duis accumsan sit. Quis enim lobortis scelerisque fermentum duis faucibus in. Scelerisque eu ultrices vitae auctor. Blandit volutpat maecenas volutpat blandit. Morbi leo urna molestie at elementum eu. Tristique magna sit amet purus gravida quis blandit. Felis eget nunc lobortis mattis aliquam faucibus purus in. Pharetra diam sit amet nisl suscipit. Odio pellentesque diam volutpat commodo sed egestas egestas fringilla phasellus. Vitae nunc sed velit dignissim. Nulla pellentesque dignissim enim sit. Sem viverra aliquet eget sit amet tellus.