

Axes, axes, axes

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Abstract

The fontaxes package simulates multiple independent font selection axes on top of certain single NFSS axes: *base family*, *figure style*, and *figure alignment* on top of *family*; *primary shape* and *secondary shape* on top of *shape*; and *math weight* and *math figure alignment* on top of *math version*.

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1 Introduction

The introduction of the New Font Selection Scheme (NFSS) has greatly simplified the usage of \TeX with fonts different from the Computer Modern fonts originally

designed for T_EX. However, the NFSS has some limitations. In particular, it defines only one axis for the font shape, which caters for both the actual *shape* of the font (e.g. upright, italic or slanted) and the *case* of the font (e.g. mixed case and small-caps). For example, if the current font shape is italic, then selecting small capitals using `\scshape` or `\textsc` will revert to an upright shape, even if the font has italic small capitals

The `fontaxes` package alleviates the deficiencies of the NFSS by simulating multiple axes on top of single NFSS axes. In particular, it replaces the single NFSS shape axis by a primary and a secondary shape axis, catering for the shape and the case of the font, respectively. Moreover, the package introduces three new axes to deal with different *figure versions*, which are provided by many professional fonts.

2 Usage

You can load this package by adding

```
\usepackage{fontaxes}
```

to the preamble of your document. This redefines and makes available certain font selection commands, which are described in the rest of this section.

2.1 Shape

The `fontaxes` package splits the NFSS's single shape axis into two: the primary shape axis (n, it, etc.) and the secondary shape axis (ulc, sc, etc.).

`\upshape` The commands `\upshape`, `\itshape`, and `\slshape` are redefined to access the primary axis only. For access to a swash shape, the command `\swshape` has been added.

`\swshape` The commands `\scshape` and `\sscshape` (spaced small caps) access the secondary axis. To return from any small-caps shape to upper-lower case, you can use the command `\ulcshape`.

`\sscshape` All these commands update the two shape axes using the low-level commands `\fontprimaryshape{<value>}` and `\fontsecondaryshape{<value>}`.

`\fontprimaryshape` If you want to change which values are used by the various commands `\<abbr>shape`, redefine the corresponding `\<abbr>default`. The additional commands `\swdefault`, `\sscdefault`, and `\ulcdefault` are provided with their default values `sw`, `ssc`, and `ulc`, respectively.

`\fontsecondaryshape`

`\swdefault`

`\sscdefault`

`\ulcdefault`

2.2 Figure version

Different figure versions are usually implemented as different font families (e.g. MinionPro-`{OsF, LF, T0sF, TLF}` or `ppl{j, x}`). The `fontaxes` package splits off the axes *figure style* and *figure alignment*, which leaves the *base family* (e.g. MinionPro or `ppl`).

<code>\txfigures</code>	The fontaxes package knows two figure styles, text and lining (accessible via
<code>\lnfigures</code>	<code>\txfigures</code> and <code>\lnfigures</code>), and two modes of figure alignment, tabular and
<code>\tbfigures</code>	proportional (accessible via the switches <code>\tbfigures</code> and <code>\prfigures</code>).
<code>\prfigures</code>	Additionally, you can access both axes directly using the low-level commands
<code>\fontfigurestyle</code>	<code>\fontfigurestyle{⟨value⟩}</code> and <code>\fontfigurealignment{⟨value⟩}</code> .
<code>\fontfigurealignment</code>	If you want to change the font family without changing the figure ver-
<code>\fontbasefamily</code>	sion, use <code>\fontbasefamily{⟨value⟩}</code> . (All these commands require a successive
	<code>\selectfont</code> to make the changes take effect.)
	For choosing the figure versions to be used in math mode, you can use the
	corresponding axis <i>math figure alignment</i> . Note that there is currently no means
	for changing the figure style used in math.

2.3 Math version

<code>\boldmath</code>	By default, \TeX provides two math versions, normal and bold, as well as com-
<code>\unboldmath</code>	mands <code>\boldmath</code> and <code>\unboldmath</code> for switching between them. The fontaxes
	packages redefines these commands to operate on the axis <i>math weight</i> .
<code>\tabularmath</code>	A second axis <i>math figure alignment</i> is introduced that allows you to
<code>\proportionalmath</code>	switch between tabular and proportional figures using <code>\tabularmath</code> and
	<code>\proportionalmath</code> . (This assumes the presence of additional math versions
	tabular and boldtabular; the package will copy the setups of math versions
	normal and bold at the end of the preamble in case you do not provide your own
	declarations.)
<code>\mathweight</code>	You can directly assign values to the axes using the low-level commands
<code>\mathfigurealignment</code>	<code>\mathweight{⟨value⟩}</code> and <code>\mathfigurealignment{⟨value⟩}</code> .
	Table 1 summarizes which commands set which values on which axes.

2.4 Additional commands

<code>\textsw</code>	Similar to the well-known <code>\textit</code> , <code>\textsc</code> , etc. this package provides commands
<code>\textssc</code>	<code>\textsw</code> , <code>\textssc</code> , <code>\textulc</code> , <code>\textfigures</code> , <code>\liningfigures</code> , <code>\tabularfigures</code>
<code>\textulc</code>	and <code>\proportionalfigures</code> that take one argument and apply the font change
<code>\textfigures</code>	only to the argument. For example, <code>\textsw{⟨text⟩}</code> is roughly equivalent to
<code>\liningfigures</code>	<code>{\swshape⟨text⟩}</code> (but automatically adds italic corrections).
<code>\tabularfigures</code>	The command <code>\figureversion{⟨options⟩}</code> allows easy switching of multiple
<code>\proportionalfigures</code>	aspects of figures simultaneously. It takes as an argument a comma-separated list
<code>\figureversion</code>	of one or more of the following options:

text, osf	for text figures,
lining, lf	for lining figures,
tabular, tab	for tabular figures,
proportional, prop	for proportional figures.

For example, `\figureversion{lf, tab}` selects tabular lining figures.

Table 1: Summary of commands

Command	Axis	Value	Default
<code>\upshape</code>	<code>\fontprimaryshape</code>	<code>\updefault</code>	n
<code>\itshape</code>		<code>\itdefault</code>	it
<code>\slshape</code>		<code>\sldefault</code>	sl
<code>\swshape</code>		<code>\swdefault</code>	sw
<code>\ulcshape</code>	<code>\fontsecondaryshape</code>	<code>\ulcdefault</code>	ulc
<code>\scshape</code>		<code>\scdefault</code>	sc
<code>\sscshape</code>		<code>\sscdefault</code>	ssc
<code>\txfigures</code>	<code>\fontfigurestyle</code>	text	
<code>\lnfigures</code>		lining	
<code>\tbfigures</code>	<code>\fontfigurealignment</code>	tabular	
<code>\prfigures</code>		proportional	
<code>\langle none \rangle</code>	<code>\fontbasefamily</code>	<i>\langle font-dependent \rangle</i>	
<code>\boldmath</code>	<code>\mathweight</code>	bold	
<code>\unboldmath</code>		normal	
<code>\tabularmath</code>	<code>\mathfigurealignment</code>	tabular	
<code>\proportionalmath</code>		proportional	

3 Implementation

3.1 High-level author commands (Level 1)

3.1.1 Shape

```

\upshape Axis 1: primary shape
\itshape 1 \*package
\slshape 2 \DeclareRobustCommand\upshape{\not@math@alphabet\upshape\relax
\swshape 3 \fontprimaryshape\updefault\selectfont}
          4 \DeclareRobustCommand\itshape{\not@math@alphabet\itshape\mathit
          5 \fontprimaryshape\itdefault\selectfont}
          6 \DeclareRobustCommand\slshape{\not@math@alphabet\slshape\relax
          7 \fontprimaryshape\sldefault\selectfont}
          8 \DeclareRobustCommand\swshape{\not@math@alphabet\swshape\relax
          9 \fontprimaryshape\swdefault\selectfont}

\scshape Axis 2: secondary shape
\sscshape 10 \DeclareRobustCommand\scshape{\not@math@alphabet\scshape\relax
\ulcshape 11 \fontsecondaryshape\scdefault\selectfont}
          12 \DeclareRobustCommand\sscshape{\not@math@alphabet\sscshape\relax
          13 \fontsecondaryshape\sscdefault\selectfont}
          14 \DeclareRobustCommand\ulcshape{\not@math@alphabet\ulcshape\relax
          15 \fontsecondaryshape\ulcdefault\selectfont}

```

`\noscshape` Provide an alias for compatibility with the slantsc package

```
16 \let\noscshape\ulcshape
```

`\swdefault`

`\ulcdefault` 17 \providecommand\swdefault{sw}

`\sscdefault` 18 \providecommand\ulcdefault{ulc}

```
19 \providecommand\sscdefault{ssc}
```

`\textsw`

`\textssc` 20 \DeclareTextFontCommand{\textsw}{\swshape}

`\textulc` 21 \DeclareTextFontCommand{\textssc}{\sscshape}

```
22 \DeclareTextFontCommand{\textulc}{\ulcshape}
```

3.1.2 Figure version

`\txfigures` Axis 1: figure style

`\lnfigures` 23 \def\txfigures{\@nomath\txfigures

```
24 \fontfigurestyle{text}\selectfont}
```

```
25 \def\lnfigures{\@nomath\lnfigures
```

```
26 \fontfigurestyle{lining}\selectfont}
```

`\tbfigures` Axis 2: figure alignment

`\prfigures` 27 \def\tbfigures{\@nomath\tbfigures

```
28 \fontfigurealignment{tabular}\selectfont}
```

```
29 \def\prfigures{\@nomath\prfigures
```

```
30 \fontfigurealignment{proportional}\selectfont}
```

`\figureversion` This code originally appeared in the package MinionPro. I have adapted it to work within fontaxes' framework and also changed some option names.

```
31 \newcommand\fontaxes@fv@prefix{fontaxes@fv@switch@}
```

```
32 \newcommand*\fontaxes@fv@newoption[1]
```

```
33 {\expandafter\newcommand\csname\fontaxes@fv@prefix #1\endcsname}
```

```
34 \fontaxes@fv@newoption{text} {\txfigures}
```

```
35 \fontaxes@fv@newoption{osf} {\txfigures}
```

```
36 \fontaxes@fv@newoption{lining} {\lnfigures}
```

```
37 \fontaxes@fv@newoption{lf} {\lnfigures}
```

```
38 \fontaxes@fv@newoption{tabular} {\tbfigures\tabularmath}
```

```
39 \fontaxes@fv@newoption{tab} {\tbfigures\tabularmath}
```

```
40 \fontaxes@fv@newoption{proportional}{\prfigures\proportionalmath}
```

```
41 \fontaxes@fv@newoption{prop} {\prfigures\proportionalmath}
```

We simply iterate over the list of figure versions specified in the argument to `\figureversion` and check if we have specified a matching option.

```
42 \newcommand\fontaxes@fv@list{}
```

```
43 \newcommand\fontaxes@fv{}
```

```
44 \DeclareRobustCommand*\figureversion[1]{%
```

```
45 \edef\fontaxes@fv@list{\zap@space#1 \@empty}%
```

```
46 \@for\fontaxes@fv:=\fontaxes@fv@list\do{%
```

```
47 \ifundefined\fontaxes@fv@prefix\fontaxes@fv}{%
```

```

48     \PackageWarning{fontaxes}%
49     {Unknown figure style ‘\fontaxes@fv’\MessageBreak
50      specified as the argument to \string\figureversion.\MessageBreak
51      Figure style not changed}%
52   }{%
53     \@nameuse{\fontaxes@fv@prefix\fontaxes@fv}%
54   }%
55 }%
56 }

```

We have made `\figureversion` robust to protect it in moving arguments (e.g., section titles). Additionally, we want it to simply be ignored when `hyperref` is building PDF strings (e.g., for bookmarks). The same is true for similar commands, but we only include a selection of them (only the forms with arguments).

```

57 \AtBeginDocument{
58   \ifpackageloaded{hyperref}{%
59     \pdfstringdefDisableCommands{%
60       \let\figureversion\@gobble
61       \let\textfigures\@firstofone
62       \let\liningfigures\@firstofone
63       \let\tabularfigures\@firstofone
64       \let\proportionalfigures\@firstofone
65       \let\textsw\@firstofone
66       \let\textssc\@firstofone
67       \let\textulc\@firstofone
68     }%
69   }{}%
70 }

```

Axis 3: base family `\fontbasefamily{...}`

```

\textfigures
\liningfigures 71 \DeclareTextFontCommand{\textfigures}{\txfigures}
\tabularfigures 72 \DeclareTextFontCommand{\liningfigures}{\lnfigures}
\proportionalfigures 73 \DeclareTextFontCommand{\tabularfigures}{\tbfigures\tabularmath}
74 \DeclareTextFontCommand{\proportionalfigures}
75   {\prfigures\proportionalmath}

```

3.1.3 Math version

```

\boldmath Axis 1: weight
\unboldmath 76 \def\boldmath{\@nomath\boldmath
77   \mathweight{bold}}
78 \def\unboldmath{\@nomath\unboldmath
79   \mathweight{normal}}

```

```

\tabularmath Axis 2: figure alignment
\proportionalmath 80 \def\tabularmath{\@nomath\tabularmath
81   \mathfigurealignment{tabular}}

```

```
82 \def\proportionalmath{\@nomath\proportionalmath
83 \mathfigurealignment{proportional}}
```

3.2 Low-level author commands (Level 2)

```
\mathweight{bold,normal} sets \mathversion
\mathfigurealignment{tabular,proportional} sets \mathversion
\fontfigurestyle{text,lining} sets \fontfamily
\fontfigurealignment{tabular,proportional} sets \fontfamily
\fontbasefamily{...} sets \fontfamily
\fontprimaryshape{n,it,sl,sw} sets \fontshape
\fontsecondaryshape{ulc,sc,ssc} sets \fontshape
```

```
\mathweight
\mathfigurealignment 84 \DeclareRobustCommand\mathweight[1]{%
85 \fontaxes@get@math \edef\fontaxes@math@weight{#1}\fontaxes@set@math}
86 \DeclareRobustCommand\mathfigurealignment[1]{%
87 \fontaxes@get@math \edef\fontaxes@math@align{#1}\fontaxes@set@math}

\fontfigurestyle
\fontfigurealignment 88 \DeclareRobustCommand\fontfigurestyle[1]{%
\fontbasefamily 89 \fontaxes@get@family \edef\fontaxes@figure@style{#1}\fontaxes@set@family}
90 \DeclareRobustCommand\fontfigurealignment[1]{%
91 \fontaxes@get@family \edef\fontaxes@figure@align{#1}\fontaxes@set@family}
92 \DeclareRobustCommand\fontbasefamily[1]{%
93 \fontaxes@get@family \edef\fontaxes@family@base{#1}\fontaxes@set@family}

\fontprimaryshape
\fontsecondaryshape 94 \DeclareRobustCommand\fontprimaryshape[1]{%
95 \fontaxes@get@shape \edef\fontaxes@shape@one{#1}\fontaxes@set@shape}
96 \DeclareRobustCommand\fontsecondaryshape[1]{%
97 \fontaxes@get@shape \edef\fontaxes@shape@two{#1}\fontaxes@set@shape}
```

3.3 Internals (Layer 3)

```
\fontaxes@set@math sets \mathversion
\fontaxes@set@family sets \fontfamily
\fontaxes@set@shape sets \fontshape
```

```
\fontaxes@math@weight The macros that hold the current values of the axes (here with some de-
\fontaxes@math@align fault values that will most certainly be overwritten during initialization; see
\fontaxes@family@base \fontaxes@get@...)
\fontaxes@figure@style 98 \newcommand*\fontaxes@math@weight{normal}
\fontaxes@figure@align 99 \newcommand*\fontaxes@math@align{proportional}
\fontaxes@shape@one 100 \newcommand*\fontaxes@family@base{MinionPro}
\fontaxes@shape@two 101 \newcommand*\fontaxes@figure@style{text}
102 \newcommand*\fontaxes@figure@align{proportional}
```

```

103 \newcommand*\fontaxes@shape@one{n}
104 \newcommand*\fontaxes@shape@two{ulc}

\fontaxes@set@math
\fontaxes@set@family 105 \newcommand*\fontaxes@set@math{%
\fontaxes@set@shape 106 \fontaxes@encode@math
107 \mathversion{\fontaxes@code}%
108 \fontaxes@save\math@version}
109 \newcommand*\fontaxes@set@family{%
110 \fontaxes@encode@family
111 \fontfamily{\fontaxes@code}%
112 \fontaxes@save\f@family}
113 \newcommand*\fontaxes@set@shape{%
114 \fontaxes@encode@shape
115 \fontshape{\fontaxes@code}%
116 \fontaxes@save\f@shape}

\fontaxes@get@math Check for changes: if changed, try to decode and update axes.
\fontaxes@get@family 117 \newcommand*\fontaxes@get@math{%
\fontaxes@get@shape 118 \iffontaxes@changed\math@version{%
119 \fontaxes@decode@{math}{\math@version}%
120 \ifx\fontaxes@edoc\relax\else
121 \edef\fontaxes@math@weight{\expandafter\@firstoftwo\fontaxes@edoc}%
122 \edef\fontaxes@math@align{\expandafter\@secondoftwo\fontaxes@edoc}%
123 \fi
124 \fontaxes@save\math@version
125 }{}}%
126 }

127 \newcommand*\fontaxes@get@family{%
128 \iffontaxes@changed\f@family{%
129 \let\fontaxes@edoc\relax
130 \expandafter\fontaxes@split@family\f@family--\@nnil
131 \ifx\fontaxes@split@suffix\relax\else
132 \fontaxes@decode@{figures}{\fontaxes@split@suffix}%
133 \fi
134 \ifx\fontaxes@edoc\relax

Try alternative
135 \expandafter\fontaxes@split@familyalt\f@family
136 \@empty\@empty\@empty\@empty\@nnil
137 \ifx\fontaxes@split@suffix\relax\else
138 \fontaxes@decode@{figuresalt}{\fontaxes@split@suffix}%
139 \fi
140 \ifx\fontaxes@edoc\relax
141 \fontaxes@warn@undecodable{family ‘\f@family’}%
142 \edef\fontaxes@family@base{\f@family}%
143 \else
144 \edef\fontaxes@family@base{\fontaxes@split@prefix}%
145 \edef\fontaxes@figure@style{\expandafter\@firstoftwo\fontaxes@edoc}%

```


Do not overwrite align (does not occur in alternative naming scheme)

```

146     \fi
147   \else
Store values
148     \edef\fontaxes@family@base{\fontaxes@split@prefix}%
149     \edef\fontaxes@figure@style{\expandafter\@firstoftwo\fontaxes@edoc}%
150     \edef\fontaxes@figure@align{\expandafter\@secondoftwo\fontaxes@edoc}%
151   \fi
152 }{}%
153 }

154 \newcommand*\fontaxes@get@shape{%
155   \iffontaxes@changed\fontaxes@shape{%
156     \fontaxes@decode@{shape}{\fontaxes@shape}%
157     \ifx\fontaxes@edoc\relax\else
158       \edef\fontaxes@shape@one{\expandafter\@firstoftwo\fontaxes@edoc}%
159       \edef\fontaxes@shape@two{\expandafter\@secondoftwo\fontaxes@edoc}%
160     \fi
161     \fontaxes@save\fontaxes@shape
162   }{}%
163 }

```

3.4 Encoding

```

\fontaxes@encode@math
\fontaxes@encode@family
\fontaxes@encode@figures
\fontaxes@encode@figuresalt
\fontaxes@encode@shape
164 \newcommand*\fontaxes@encode@math{%
165   \fontaxes@encode@{math}{\fontaxes@math@weight}\fontaxes@math@align}}%
166 }

Default is concatenation
167 \newcommand*\fontaxes@encode@math@default{%
168   \edef\fontaxes@code{\fontaxes@math@weight\fontaxes@math@align}}

169 \newcommand*\fontaxes@encode@family{%
170   \fontaxes@encode@{family}
171   {\fontaxes@family@base}\fontaxes@figure@style}\fontaxes@figure@align}}%
172 }

Try different naming conventions
173 \newcommand*\fontaxes@encode@family@default{%
174   \fontaxes@encode@figures
175   \edef\fontaxes@code{\fontaxes@family@base-\fontaxes@code}%
176   \fontaxes@check@family\fontaxes@code
177   \iffontaxes@exists\else
178     \fontaxes@encode@figuresalt
179     \edef\fontaxes@code{\fontaxes@family@base\fontaxes@code}%
180     \fontaxes@check@family\fontaxes@code
181     \iffontaxes@exists\else
182       \edef\fontaxes@code{\fontaxes@family@base}%
183     \fi

```

```

184 \fi
185 }

186 \newcommand*\fontaxes@encode@figures{%
187   \fontaxes@encode@{figures}{\fontaxes@figure@style}{\fontaxes@figure@align}}%
188 }
189 \newcommand*\fontaxes@encode@figures@default{%
190   \edef\fontaxes@code{OsF}%
191   \PackageWarning{fontaxes}{Unknown figure version
192     '\fontaxes@figure@style\space + \fontaxes@figure@align'\MessageBreak
193     Encoding to '\fontaxes@code'}%
194 }

195 \newcommand*\fontaxes@encode@figuresalt{%
196   \fontaxes@encode@{figuresalt}{\fontaxes@figure@style}{\fontaxes@figure@align}}%
197 }
198 \newcommand*\fontaxes@encode@figuresalt@default{%
199   \PackageWarning{fontaxes}{Unknown figure version
200     '\fontaxes@figure@style\space + \fontaxes@figure@align'\MessageBreak
201     Encoding to '\fontaxes@code'}%
202   \edef\fontaxes@code{j}%
203 }

204 \newcommand*\fontaxes@encode@shape{%
205   \fontaxes@encode@{shape}{\fontaxes@shape@one}{\fontaxes@shape@two}}%
206 }

```

Default is (reverse) concatenation

```

207 \newcommand*\fontaxes@encode@shape@default{%
208   \edef\fontaxes@code{\fontaxes@shape@two\fontaxes@shape@one}%
209 }

```

\fontaxes@encode@

```

210 \newcommand*\fontaxes@encode@[2]{%
211   \ifundefined{fontaxes@encode@#1#2}
212     {\@nameuse{fontaxes@encode@#1@default}}
213     {\edef\fontaxes@code{\@nameuse{fontaxes@encode@#1#2}}}%
214 }

```

\fontaxes@naming@exception To do: Add a user interface to specify naming exceptions

```

215 \newcommand*\fontaxes@naming@exception[3]{%
216   \expandafter\edef\csname fontaxes@encode@#1#2\endcsname{#3}%
217 }

```

The defaults n and ulc disappear when combined.

```

218 \fontaxes@naming@exception{shape}{n}{ulc}{n}
219 \fontaxes@naming@exception{shape}{n}{sc}{sc}
220 \fontaxes@naming@exception{shape}{n}{ssc}{ssc}
221 \fontaxes@naming@exception{shape}{it}{ulc}{it}
222 \fontaxes@naming@exception{shape}{sl}{ulc}{sl}
223 \fontaxes@naming@exception{shape}{sw}{ulc}{sw}

```

The defaults disappear in the concatenation. `boldtabular` is formed regularly.

```
224 \fontaxes@naming@exception{math}{\normal\proportional}\normal}
225 \fontaxes@naming@exception{math}{\normal\tabular}\tabular}
226 \fontaxes@naming@exception{math}{\bold\proportional}\bold}
```

Provide abbreviations for font family suffixes.

```
227 \fontaxes@naming@exception{figures}{\text\proportional}\OsF}
228 \fontaxes@naming@exception{figures}{\text\tabular}\TOf}
229 \fontaxes@naming@exception{figures}{\lining\proportional}\LF}
230 \fontaxes@naming@exception{figures}{\lining\tabular}\TLF}
```

The `j/x` naming convention does not know about different figure alignments. Let us silently ignore these.

```
231 \fontaxes@naming@exception{figuresalt}{\text\proportional}\j}
232 \fontaxes@naming@exception{figuresalt}{\text\tabular}\j}
233 \fontaxes@naming@exception{figuresalt}{\lining\proportional}\x}
234 \fontaxes@naming@exception{figuresalt}{\lining\tabular}\x}
```

3.5 Decoding

Detect if `\mathversion`, `\fontshape`, `\fontfamily` have been used not under control of this package.

`\fontaxes@figure@style@domain` Assuming an injective encoding function, we can construct decoding tables when we know the function's domain. To do: Warn if decoding entries are overwritten (if the function is not injective).

```
\fontaxes@figure@align@domain
\fontaxes@shape@one@domain
\fontaxes@shape@two@domain
\fontaxes@math@weight@domain
\fontaxes@math@align@domain
235 \newcommand*\fontaxes@figure@style@domain{text,lining}
236 \newcommand*\fontaxes@figure@align@domain{proportional,tabular}
237 \newcommand*\fontaxes@shape@one@domain{n,it,sl,sw}
238 \newcommand*\fontaxes@shape@two@domain{ulc,sc,ssc}
239 \newcommand*\fontaxes@math@weight@domain{normal,bold}
240 \newcommand*\fontaxes@math@align@domain{proportional,tabular}
```

`\fontaxes@create@decode@table` #1 name, #2 list of axes

```
241 \newcommand*\fontaxes@create@decode@table[2]{%
242   \begingroup
243   \fontaxes@foreach{#2}{%
244     \@nameuse{fontaxes@encode@#1}%
245     \global\expandafter
246     \edef\csname fontaxes@decode@#1{\fontaxes@code}\endcsname{#2}%
247   }%
248   \endgroup
249 }
250 \AtEndOfPackage{
251   \fontaxes@create@decode@table{figures}
252   {\fontaxes@figure@style}\fontaxes@figure@align}
253   \fontaxes@create@decode@table{figuresalt}
254   {\fontaxes@figure@style}\fontaxes@figure@align}
```

```

255 \fontaxes@create@decode@table{shape}
256   {{\fontaxes@shape@one}{\fontaxes@shape@two}}
257 \fontaxes@create@decode@table{math}
258   {{\fontaxes@math@weight}{\fontaxes@math@align}}
259 }

```

\fontaxes@warn@undecodable

```

260 \newcommand*\fontaxes@warn@undecodable[1]{%
261   \PackageWarning{fontaxes}{I don't know how to decode\MessageBreak #1}}

```

\fontaxes@decode@ Interpret the decoding tables.

```

262 \newcommand*\fontaxes@decode@[2]{%
263   \@ifundefined{fontaxes@decode@#1{#2}}{%
264     \let\fontaxes@edoc\relax
265     \fontaxes@warn@undecodable{#1 '#2'}%
266   }{\edef\fontaxes@edoc{\@nameuse{fontaxes@decode@#1{#2}}}%
267 }

```

\fontaxes@save Save states of macros for future comparison

\iffontaxes@changed

```

268 \newcommand*\iffontaxes@changed[1]{%
269   \expandafter\ifx\csname fontaxes@last@string#1\endcsname#1%
270     \expandafter\@secondoftwo
271   \else
272     \expandafter\@firstoftwo
273   \fi
274 }
275 \newcommand*\fontaxes@save[1]{%
276   \expandafter\let\csname fontaxes@last@string#1\endcsname#1%
277 }

```

3.6 Compatibility

If no math versions `tabular` and `boldtabular` are defined in the preamble, we provide defaults by copying the states of normal and bold (assuming, in turn, that these two exist).

```

278 \AtBeginDocument{%
279   \fontaxes@provide@mv@copy{tabular}{normal}%
280   \fontaxes@provide@mv@copy{boldtabular}{bold}%
281 }

```

\fontaxes@provide@mv@copy

Declare math version #1 to be a copy of math version #2 if #1 does not exist already. To accomplish this we have to know that a math version's configuration is basically stored in a macro `\mv@<name>` (which makes us dependent on the NFSS implementation; sigh ...).

```

282 \newcommand*\fontaxes@provide@mv@copy[2]{%
283   \@ifundefined{mv@#1}{%
284     \DeclareMathVersion{#1}%
285     \expandafter\let\csname mv@#1\expandafter\endcsname

```

```

286     \csname mv@#2\endcsname
287   }{ }%
288 }

```

3.7 Tools

`\fontaxes@check@family` Check if family switching would yield an existing shape.

```

\iffontaxes@exists 289 \newif\iffontaxes@exists
290 \newcommand*\fontaxes@check@family[1]{%
291   \begingroup
292   \fontfamily{#1}\try@load@fontshape
293   \expandafter
294   \ifx\csname\curr@fontshape\endcsname\relax
295     \aftergroup\fontaxes@existsfalse
296   \else
297     \aftergroup\fontaxes@existstrue
298   \fi
299 \endgroup
300 }

```

`\fontaxes@split@prefix` The results of splitting a family name.

```

\fontaxes@split@suffix 301 \newcommand*\fontaxes@split@prefix{}
302 \newcommand*\fontaxes@split@suffix{}

```

`\fontaxes@split@family` Font name contains one hyphen, split there

```

303 \newcommand*\fontaxes@split@family{}
304 \def\fontaxes@split@family#1-#2-#3\@nnil{%
305   \let\fontaxes@split@prefix\relax
306   \let\fontaxes@split@suffix\relax
307   \def\@tempa{#3}%
308   \ifx\@tempa\empty\else
309     \def\fontaxes@split@suffix{#2}%
310     \ifx\fontaxes@split@suffix\empty
311       \let\fontaxes@split@suffix\relax
312     \else
313       \def\fontaxes@split@prefix{#1}%
314     \fi
315   \fi
316 }

```

`\fontaxes@split@familyalt` Name consists of four characters, split off the last one

```

317 \newcommand*\fontaxes@split@familyalt{}
318 \def\fontaxes@split@familyalt#1#2#3#4#5\@nnil{%
319   \let\fontaxes@split@prefix\relax
320   \let\fontaxes@split@suffix\relax
321   \edef\@tempa{#5}%
322   \ifx\@tempa\empty
323     \ifx\empty#4\else
324       \def\fontaxes@split@prefix{#1#2#3}%

```

```

325     \def\fontaxes@split@suffix{#4}%
326     \fi
327 \fi
328 }

```

`\fontaxes@foreach` Execute #2 for each combination of values of the axes given in #1 (in the form `{\cs}{\cs}...`).

```

329 \newcommand\fontaxes@foreach[2]{%
330   \begingroup
331   \def\fontaxes@foreach@{#2}%
332   \@tfor\@tempa:=#1\do{%
333     \@temptokena\expandafter{\fontaxes@foreach@}%
334     \edef\fontaxes@foreach@{%
335       \noexpand\@for
336       \expandafter\noexpand\@tempa:=%
337       \expandafter\noexpand\csname
338         \expandafter\expandafter
339         \expandafter\@gobble
340         \expandafter\string\@tempa
341         @domain%
342       \endcsname
343       \noexpand\do{\the\@temptokena}%
344     }%
345   }%
346   \expandafter\endgroup\fontaxes@foreach@
347 }
348 \</package>

```

3.8 Tests

The file `test-fontaxes.tex` (docstrip target `test`) exercises some features of `fontaxes`. Since it is rather ad-hoc code, it is not shown here. (It also requires the `MinionPro` package.)