

# Junicode VF and LuaTeX

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## Introduction

LuaTeX now supports variable fonts. Support for TrueType-flavored variable fonts is buggy (as of luaotfload version 3.18); until these bugs are fixed (reportedly in the next release), users should prefer the Compact File Format flavor of Junicode VF (with extension `.otf` in the `/fonts/variable-cff2` folder).

There are at least two reasons for LuaTeX users to prefer variable over conventional fonts:

- With Junicode VF, you can precisely control the weight and width of letters so as to achieve an even color.<sup>1</sup> With a conventional font, text set in a smaller size (like block quotations or footnotes) may appear lighter than the main text. Users of Junicode VF can set small text in a heavier weight (without going all the way to Bold) for evenness of color, and wider for better legibility.<sup>2</sup>
- Second, if you prefer, for example, weights that are a little different from the ordinary (e.g. “Medium” or “Light” instead of “Regular” for the main text),<sup>3</sup> you can do that very easily. Likewise, you can choose a width

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<sup>1</sup> “Color” is the overall ratio of black and white in a block of text, ideally giving the impression of an even gray.

<sup>2</sup> For example, these footnotes should harmonize well with the main text: that is, the block of footnotes should be approximately the same shade of gray as the main text.

<sup>3</sup> Here’s another footnote, just to expand the footnote block. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. *Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.* Duis aute irure dolor in reprehenderit in voluptate velit.

anywhere from “Condensed” to “Expanded,” adjusting for size as necessary. In short, you have discretion to style Junicode VF in numerous ways, and one document set in Junicode VF can look very different from another.

## Axes

Junicode VF has three axes, two of which are useful to LuaTeX users.

**Weight** The tag is `wght`.<sup>4</sup> This axis corresponds to the distinction between Regular and Bold in a traditional font family; extended font families may also include weights called Light, Medium, and Semibold, to name a few. In Junicode VF, Weight is continuously variable from 300 (Light) to 700 (Bold).

**Width** The tag is `wdth`. Some conventional fonts come in more than one width. In Junicode VF, the width is continuously variable, from “Condensed” (75) to “Expanded” (125). Note that the weight of strokes remains the same as Width increases or decreases,<sup>5</sup> with the result that the ratio of black to white decreases as width increases, and the text becomes a lighter gray. If you set different widths together you may want to slightly decrease the weight of Condensed text and increase the weight of Expanded text so as to compensate.

**Enlarge** The tag is `ENLA`. This is a custom axis, intended for a particular purpose. In medieval manuscripts, sentences often begin with “enlarged minuscules,” that is, letters that are lowercase in shape but written larger than other lowercase letters. Junicode VF’s Enlarge axis provides a way to represent these “enlarged minuscules” in an accessible and flexible way. Values run from 0 to 100, with 0 matching other lowercase letters and 100 at the same height and weight as uppercase letters. Unfortunately, `luaotfload` ignores this axis (perhaps it ignores *all* custom axes), and so it cannot be

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<sup>4</sup> Data structures and features of modern fonts are identified by four-letter tags. You will need these when you set up your document.

<sup>5</sup> For example, the width of the three vertical strokes in the letter **m** is the same whether it is set Condensed (**m**) or Expanded (**m**).

used in Lua<sub>T</sub><sub>E</sub>X documents. Users should use Stylistic Set 6 (“Enlarged Minusculs”) instead. The stylistic set does not provide the same flexibility as the Enlarge axis, but it is an accessible solution and will suffice for most purposes.

These axes can be combined in any way you like, but some combinations will work better than others. In particular, combining two extremes (say, Condensed and Bold) may occasionally produce distorted letter-shapes.

## Selecting Junicode VF with fontspec

Fontspec provides a number of ways to select a font. The commands used to set up the fonts for this document are `\setmainfont` and `\setfontface`. First, to select Junicode VF as the main font with automatic adjustment of weight and width to provide for even text color:<sup>6</sup>

```
\setmainfont{JunicodeTwoBetaVF-Roman}[
  Extension      = .otf,
  ItalicFont      = JunicodeTwoBetaVF-Italic,
  BoldFont        = JunicodeTwoBetaVF-Roman,
  BoldItalicFont  = JunicodeTwoBetaVF-Italic,
  UprightFeatures={
    SizeFeatures={
      {Size={-8.5},      RawFeature={axis={wght=550,width=115}}},
      {Size={8.6-10.99}, RawFeature={axis={wght=475,width=110}}},
      {Size={11-21.59},  RawFeature={axis={wght=400,width=100}}},
      {Size={21.6-},     RawFeature={axis={wght=300,width=95}}},
    },
  },
  ItalicFeatures={
    SizeFeatures={
      {Size={-8.5},      RawFeature={axis={wght=550,width=112}}},
      {Size={8.6-10.99}, RawFeature={axis={wght=475,width=106}}},
      {Size={11-21.59},  RawFeature={axis={wght=400,width=100}}},
      {Size={21.6-},     RawFeature={axis={wght=300,width=95}}},
    },
  },
  BoldFeatures={
    SizeFeatures={
      {Size={-8.5},      RawFeature={axis={wght=700,width=118}}},
```

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<sup>6</sup> This code is adapted from a concept by Andrew Dunning; see <https://github.com/psb1558/Junicod-font/discussions/92>.

```

        {Size={8.6-10.99}, RawFeature={axis={wght=700,width=112}}},
        {Size={11-21.59}, RawFeature={axis={wght=650,width=100}}},
        {Size={21.6-}, RawFeature={axis={wght=600,width=95}}}
    },
},
BoldItalicFeatures={
    SizeFeatures={
        {Size={-8.5}, RawFeature={axis={wght=700,width=112}}},
        {Size={8.6-10.99}, RawFeature={axis={wght=700,width=106}}},
        {Size={11-21.59}, RawFeature={axis={wght=650,width=100}}},
        {Size={21.6-}, RawFeature={axis={wght=600,width=95}}}
    },
},
]

```

Because fontspec does not (yet) support variable font axes, it is necessary to use `RawFeature` to set these up. Axes can be omitted from these declarations when you’re using the font’s default values (wght 400, width 100, ENLA 0), though it is perfectly all right to include these for clarity.

If you need other variants of Junicon VF, use `\setfontface` to select them. For example, this document has a few words in Junicon’s Light weight, so the preamble has this font definition:

```

\setfontface\light{JuniconTwoBetaVF-Roman.otf}[
    SizeFeatures={
        {Size={-8.5}, RawFeature={axis={wght=400,width=115}}},
        {Size={8.5-11}, RawFeature={axis={wght=350,width=110}}},
        {Size={11-22}, RawFeature={axis={wght=300,width=100}}},
        {Size={22-}, RawFeature={axis={wght=300,width=95}}}
    },
]

```

Here the `SizeFeatures` command looks exactly like the ones in `\setmainfont`, except for the different wght values, so the `\light` command can be created by copying and pasting and just a little editing.

## Specimens

*tiny: Recti diligunt te. In canticis sponſa ad ſponſum. Eſt rectum grammaticum. Rectum geometꝝcum. rectum theologicum. ⁊ ſunt differentie totidem regulorꝝ. De recto theologico ſermo nobis eſt. Lauerd ſcið godeſ ſpuſe to hire deozepurðe ſpuſ. þeo richte luuieð þe. þeo beoð richte. þe liuieð efter riple. ⁊ 3e mine leoue ſultren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ̅ ich pille ſpeoken of þurch oper bone ⁊ mid godeſ grace.*

**scriptsize:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geometricum. rectum theologicum. ⁊ sunt differentie totidem regulas. De recto theologico sermo nobis est.* Lauerd seið godes spuse to hire deozepurðe spuf. þeo richte luuið þé. þeo beoð richte. þe liuið efter riple. ⁊ 3e mine leoue sustren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ ich pille speoken of þurch oper bone ⁊ mid godes grace.

**footnotesize:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geometricum. rectum theologicum. ⁊ sunt differentie totidem regulas. De recto theologico sermo nobis est.* Lauerd seið godes spuse to hire deozepurðe spuf. þeo richte luuið þé. þeo beoð richte. þe liuið efter riple. ⁊ 3e mine leoue sustren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ ich pille speoken of þurch oper bone ⁊ mid godes grace.

**small:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geometricum. rectum theologicum. ⁊ sunt differentie totidem regulas. De recto theologico sermo nobis est.* Lauerd seið godes spuse to hire deozepurðe spuf. þeo richte luuið þé. þeo beoð richte. þe liuið efter riple. ⁊ 3e mine leoue sustren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ ich pille speoken of þurch oper bone ⁊ mid godes grace.

**normalsize:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geometricum. rectum theologicum. ⁊ sunt differentie totidem regulas. De recto theologico sermo nobis est.* Lauerd seið godes spuse to hire deozepurðe spuf. þeo richte luuið þé. þeo beoð richte. þe liuið efter riple. ⁊ 3e mine leoue sustren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ ich pille speoken of þurch oper bone ⁊ mid godes grace.

**large:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geometricum. rectum theologicum. ⁊ sunt differentie totidem regulas. De recto theologico sermo nobis est.* Lauerd seið godes spuse to hire deozepurðe spuf. þeo richte luuið þé. þeo beoð richte. þe liuið efter riple. ⁊ 3e mine leoue sustren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ ich pille speoken of þurch oper bone ⁊ mid godes grace.

**Large:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geometricum. rectum theologicum. ⁊ sunt differentie totidem regulas. De recto theologico sermo nobis est.* Lauerd

feið godes spufe to hire deozepurðe spuf. þeo richte luuieð þé. þeo beoð richte. þe liuieð efter riple. ⁊ 3e mine leoue fustren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ̅ ich pille speoken of þurch oper bone ⁊ mid godes grace.

**LARGE:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geomet'icum. rectum theologicum. ⁊ sunt difference totidem regulor̅. De recto theologico sermo nobis est.* Lauerd feið godes spufe to hire deozepurðe spuf. þeo richte luuieð þé. þeo beoð richte. þe liuieð efter riple. ⁊ 3e mine leoue fustren habbeð moni dei icraued me efter riple. Moni cunne riplen beoð. ach twa beoð bemong alle þ̅ ich pille speoken of þurch oper bone ⁊ mid godes grace.

**huge:** *Recti diligunt te. In canticis sponsa ad sponsum. Est rectum grammaticum. Rectum geomet'icum. rectum theologicum. ⁊ sunt difference totidem regulor̅. De recto theologico sermo nobis est.* Lauerd feið godes spufe to hire deozepurðe spuf. þeo richte luuieð þé. þeo beoð richte.

þe liuieð efter riple. ⁊ 3e mine leoue fuftren  
habbeð moni dei icraued me efter riple. Moni  
cunne riplen beoð. ach twa beoð bemong alle  
þ ich pille fpeoken of þurch oper bone ⁊ mid  
godes grace.

**Huge:** *Recti diligunt te.* Lauerd seið  
godes spuse to hire deozepurðe spus.