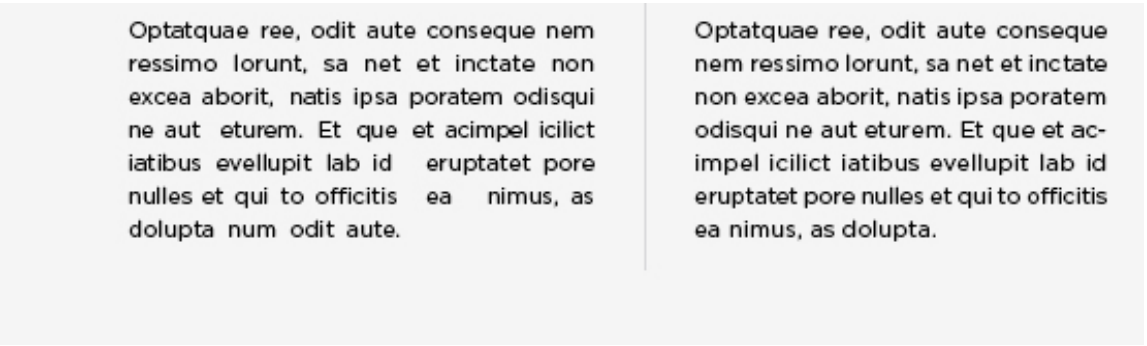
Unit based width variants of glyphs for balanced justification

Starting point



Right: enhanced justification without rivers

Apart from the fact that Swiss typography prefers left-aligned typesetting to justification and strictly rejects the modification of fonts to achieve an outer form, in everyday use for magazines and newspapers there is a regular need to adapt the content to the length and form.

These adaptations are achieved by changing the spacing between **letters**, **words** and sometimes also **lines** or the **scaling of characters**. As the adjustments have a detrimental effect on the typographical qualilty of the text and thus also the readability, I am looking here for a method that can be used more harmoniously and reduces the disadvantages that certainly arise.

Investigated Solution

The method of **unitization of glyph shapes should form the basis** and adjustments should be made **using different width variants of glyphs letters**, without an effect on the stem widths or the rhythm of the characters.

A usable font shall be created and used to investigate whether the **unitized scaling** of glyphs is better suited vs. the **continuous scaling of glyphs** to reduce the disturbances in legibility perceived by the average reader.

Historical and existing solutions

Gutenberg

Lower Case characters from Gutenberg

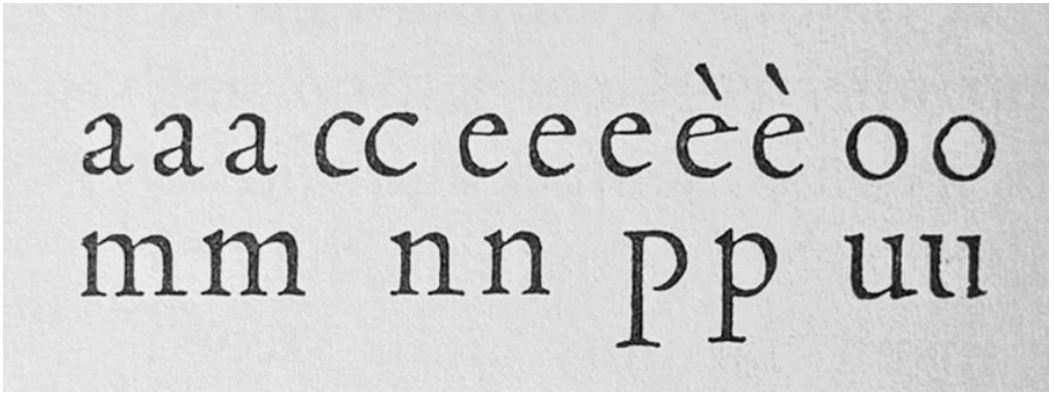
Gutenberg not only used a variety of **ligatures** and **abbreviations**, but also two versions of **characters in different widths**. This enabled him to fill the columns exactly without having to vary the empty space extensively.

In addition, he also used the right-hand edge for overhanging elements.

The result is a homogeneous typesetting that avoided rivers in the text and guides the eyes along the line to achieve good readability.

Historical and existing solutions

Griffo

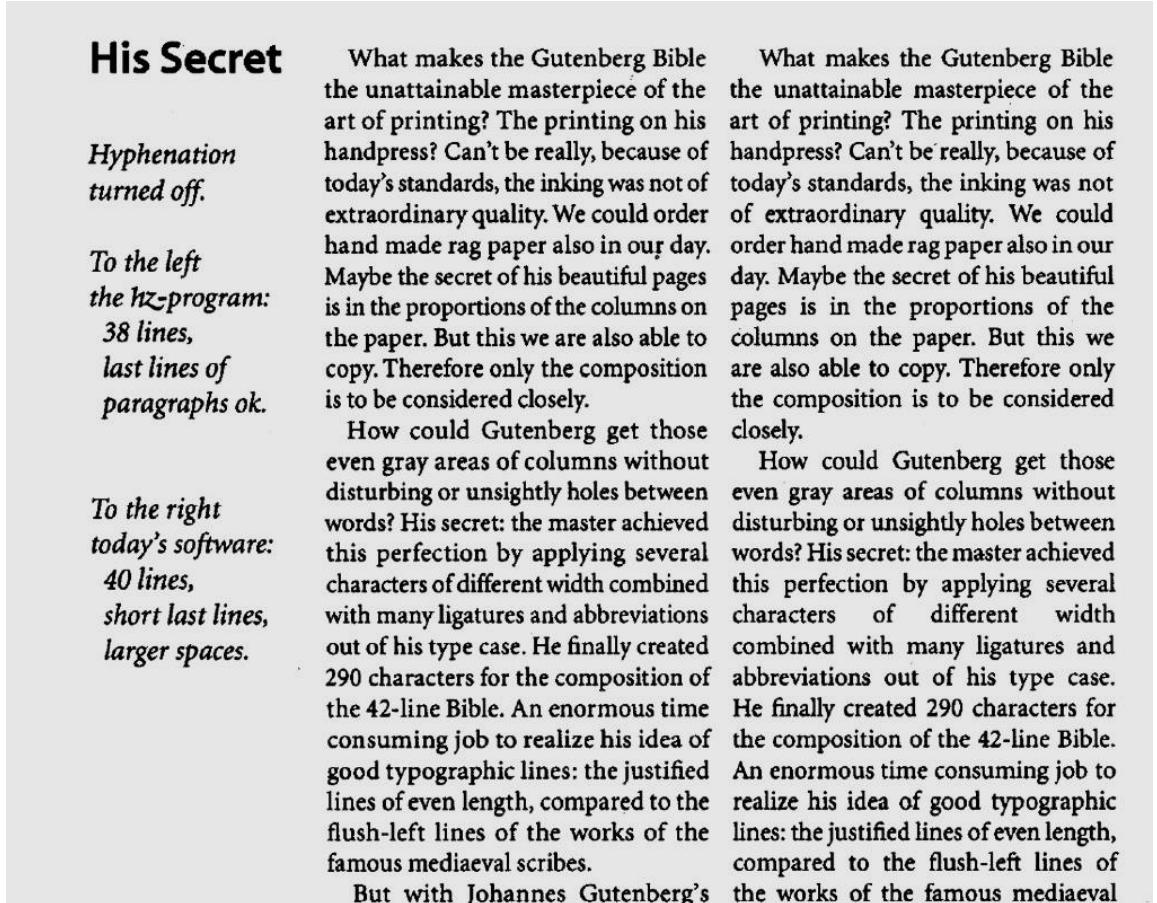


Variant characters from Griffo

In Manutius *De Aetna* 1495 edition, Griffo also provided up to **three different variants**. Giovanni Mardersteig assumes that he wanted to “regain the liveliness and smoothness of the manuscript, as the Venetians of the time were accustomed to handwritten books and the uniformity of the printed page was held in low esteem”.

Historical and existing solutions

Zapf



His Secret

Hyphenation turned off.

To the left the hz-program: 38 lines, last lines of paragraphs ok.

To the right today's software: 40 lines, short last lines, larger spaces.

What makes the Gutenberg Bible the unattainable masterpiece of the art of printing? The printing on his handpress? Can't be really, because of today's standards, the inking was not of extraordinary quality. We could order hand made rag paper also in our day. Maybe the secret of his beautiful pages is in the proportions of the columns on the paper. But this we are also able to copy. Therefore only the composition is to be considered closely.

How could Gutenberg get those even gray areas of columns without disturbing or unsightly holes between words? His secret: the master achieved this perfection by applying several characters of different width combined with many ligatures and abbreviations out of his type case. He finally created 290 characters for the composition of the 42-line Bible. An enormous time consuming job to realize his idea of good typographic lines: the justified lines of even length, compared to the flush-left lines of the works of the famous mediaeval scribes.

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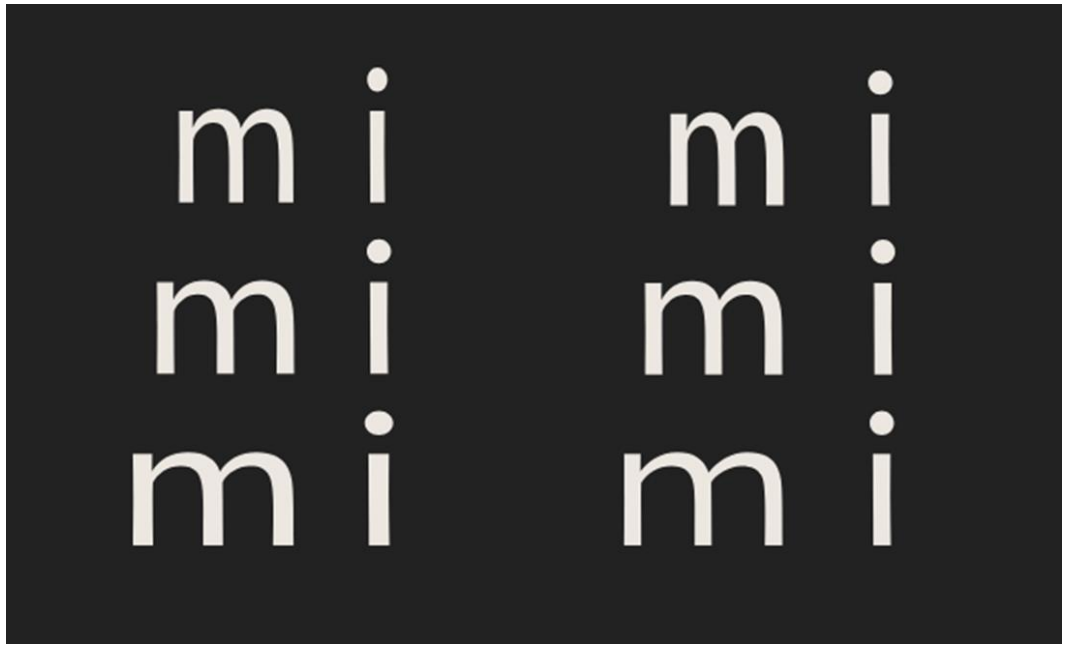
The typeface designer Hermann Zapf invented in cooperation with URW the Hz-Program in 1993, which changes not only the **word spacing** in justification to produce the perfect grey type area but also **changes the kerning** and the **width of the characters** while retaining the stem widths.

Historical and existing solutions

Adobe



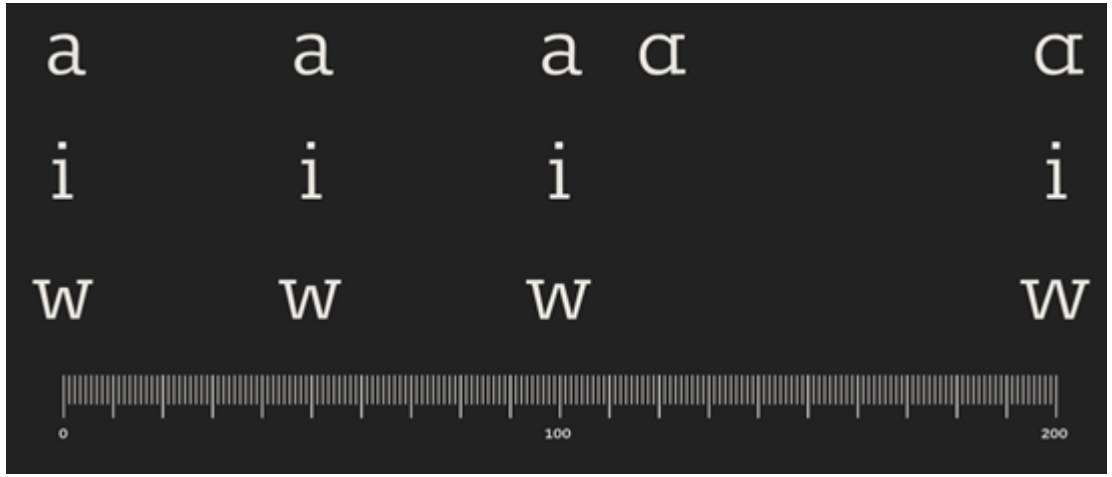
Left: Glyph scaling changes also stem widths

The Hz-program was patented by URW (expired in 2010) and was aquired by Adobe for inclusion as **line-breaking/justification** algorithm in the InDesign application.

But InDesign's way of **varying glyph widths** is simpler than that of the hz-program, and the result is inferior typography. When the hz-program scales the characters horizontally, the vertical strokes are kept the same.

Historical and existing solutions

Ammon

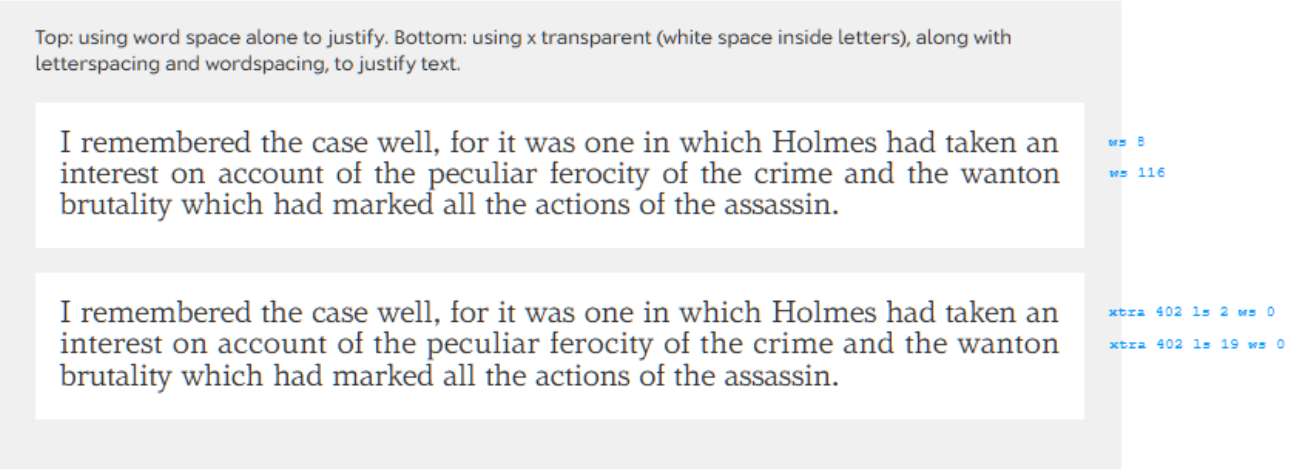


Aproach for different widths incl. alternates

Johannes Ammon (finaltype) presented in 2019 his experimental approach for better web typography and created a variable typeface which **manipulates the glyphs** according to their capabilities or **alternate the shapes** completely, which is used by a line breaking algorithm.

Historical and existing solutions

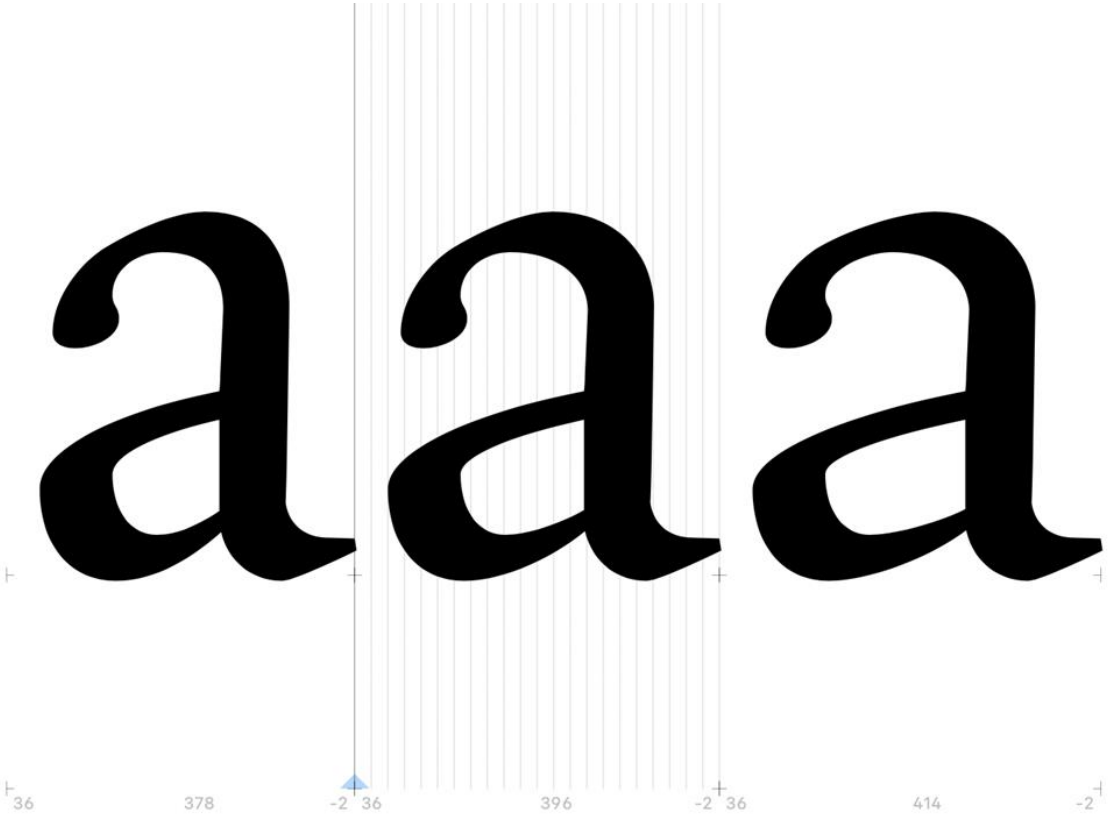
Fister



https://variablefonts.typenetwork.com/topics/spacing/variations

At the ATypI 2022 Lasse Fister provided a Tech Talk about responsive spacing in connection with variable fonts. Using the example of the Roboto Flex font, the **parameter wdth** alters the width of the glyphs in the X dimension to fine-tune the justification as it changes the number of characters per line.

Implementation of the solution



The project will use the above findings based on the latest font technologies to develop a font prototype.

Unitization is also applied to the characters and a comparison is made between a fixed stem interval (/n in constant width) versus a parameterized stem interval (/n as a flex value for the rhythm).

The **limits** of ordinary forms are to be explored, how narrow or wide each glyph can be depicted without painful disturbances. This can be done **differently for each glyph**, e.g. depending on the generalized shape form.

Test procedure for evaluation

Im Anfang war das Wort, und das Wort war bei Gott, und Gott war das Wort. Dasselbe war im Anfang bei Gott. Alle Dinge sind durch dasselbe gemacht, und ohne dasselbe ist nichts gemacht, was gemacht ist. In ihm war das Leben, und das Leben war das Licht der Menschen. Und das Licht scheint in der Finsternis, und die Finsternis hat's nicht ergriffen. Es war ein Mensch, von Gott gesandt, der hieß Johannes. Der kam zum Zeugnis, um von dem Licht zu zeugen, damit sie alle durch ihn glaubten. Er war nicht das Licht, sondern er sollte zeugen von dem Licht. Das war das wahre Licht, das alle Menschen erleuchtet, die in diese Welt kommen. Er war in der Welt, und die Welt ist durch ihn gemacht; aber die Welt erkannte ihn nicht.

Riddle for testing conspicuousness of width variants

In a preliminary test as a **riddle**, I used a variable font that provides the character widths for the letters /a /d /e /h /r /s /t (next to /n, the most frequently used letters in German texts) in **three variants** and mixes them in the output (using Opentype calt-Feature). The test has shown that the different character widths can be successfully hidden using this method.

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Project deliverables

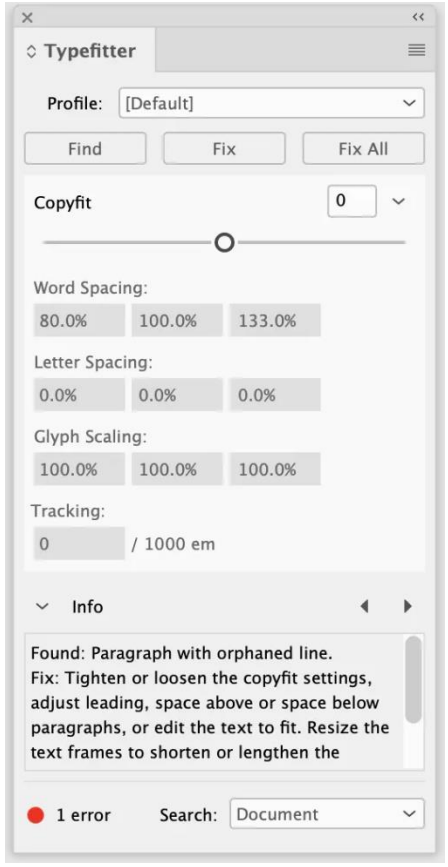
	Stem	Counter
Traditional Scaling	flex	flex
Variable Scaling	fix	flex
Unitized Scaling	fix	stepwise

Comparision on methods.

As a result, fonts should be available and text examples created with which the following tests can be carried out:

- **Traditional scaling** as reference (changing stem thickness)
- **Variable scaling** (stepless method e.g. wdth axis)
- **Unitized scaling** with fixed step intervals

Future practical application scenario



Example Plug-In

For **interactive use,** the setting can be applied individually to the selected text in an additional panel (e.g. InDesign plug-in)

Based on the fill level of design containers, a **server-side process** can determine the necessary parameters for the font and carry out the output completely automatically.