On the origin of patterning in movable Latin type : Renaissance standardisation, systematisation, and unitisation of textura and roman type

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CHAPTER 4

The translation of the handwritten textura quadrata to textura type was much more straightforward than that of the Humanistic minuscule to roman type. Because their round and open texture is more difficult to control at small sizes, the Humanistic minuscule and its Carolingian precursor were much more irregularly written than the textura quadrata. Therefore, translating the Humanistic model into roman type while relying solely on the eye would have been complex and time consuming. It is plausible that patterning of the Humanistic minuscule was required for the production of roman type. As was demonstrated using the LetterModeller application in the previous chapter, such structuring is possible because of the intrinsic patterning in the Humanistic minuscule.

The present chapter focuses on the standardisation of widths both in textura and roman type production. Due to the morphological relationship between textura handwriting and the Humanistic minuscule, the production of roman type was simplified by casting it on an adapted version of the scheme that was already in use for the production of textura type. The chapter will first describe the process of optically spacing type before discussing the advantages of using standardised widths instead. It will then discuss the similarities in widths in gothic and Renaissance prints, using a horizontal grid system that I developed to measure width standardisation. This grid system will be applied to textura and roman characters in order to further highlight the similarities in their character widths. The aim is to provide further evidence that, thanks to the underlying morphologic relationship between textura and Humanistic handwriting, the Renaissance punchcutters could make use of standardised handwriting in the production of roman type in a process analogous to that of the production of textura type.

4.1 Optical spacing

Before presenting any evidence of standardised widths in type, an understanding of type spacing, which results in the fitting, is needed. This section describes the process that is mostly used nowadays, which focuses on equilibrium of white space. In this process letter forms are designed first and then spacing is defined with the focus on an even distribution of the space between the letters. This method is widely accepted to have been used by the Renaissance punchcutters too.

Spacing type and defining side bearings are not, in theory, highly complex matters. The goal is that letters combined in words show an optimised pattern: 'Perfect spacing means that the letters in a word are bonded like bricks, and therefore maximum word pattern recognition is possible with no cause for the eye to be arrested in its scanning on account of spacing.'[146]

Only the space within the x-height of the lowercase letters is important for spacing roman type. The lengths of the ascenders and descenders do not have any influence on the spacing. Exceptions to this rule are formed by colliding parts of letters outside the x-height, such as the combination 'gj' in which, depending on its design, the terminal of the j may collide with the bottom part of the g (this combination is not unusual in Dutch). Most type designers start spacing by making a fence of n's or m's, and judge the spacing of other characters against the fence. In the case of Figure 4.1 the stem interval is the same within and between the n's. Because the shapes of the right and left stems of the n are identical, the side bearing can be centred exactly between the stems.

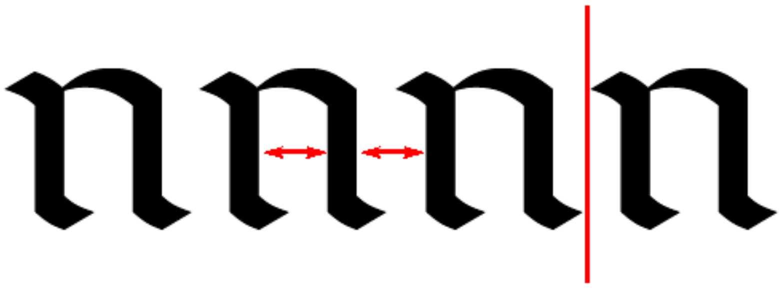

Figure 4.1 Dividing space between point symmetrical letterforms.

In roman type, not many shapes can be centred between side bearings. The o and the part of the l within the x-height normally form exceptions in archetypal and present-day roman type.[147] In case the two stems of the n are not identical, as shown in Figure 4.2, positioning the side bearings in such a way that the letter is optically centred requires an extra step. After defining the fence pattern, an arbitrary side bearing can be drawn in between the characters. This results in a distance between the right stem of the left n and the side bearing (indicated with '1'). By placing the side bearing at the same distance from the right stem of the right n, the character width is defined.

[146] Kindersley, *Optical Letter Spacing*, p.24.

[147] If the n is made with short serifs on the left and a long one on the right, like Jenson did, it can be centred between the side bearings too, but the o and l will usually be centred in any roman type design even if the n is not.

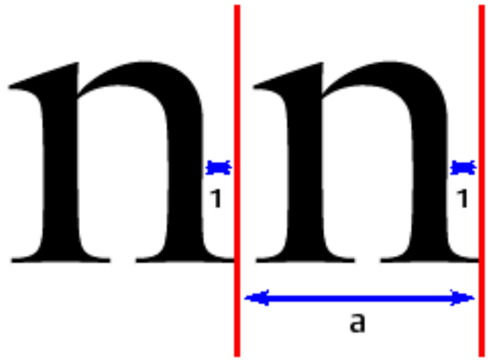

Figure 4.2 Defining the character width of the lowercase n.

Theoretically, this is enough information to space all other letters and characters, because these can be placed optically correctly between a number of n's. The side bearings of the n mark the side bearings of the spaced letters in between them. Letters that share (almost) the same forms, like the related bowls of the b, d, p and q with the o, can be spaced identically. Therefore it is not necessary to space every character separately; instead, groups of related letter forms can be made.

It has always been common practice to centre characters optically within their space. In theory, this is not necessary: if all letters within a font have the same deviation, that is to say the same offset, the spacing is identical to that of optically centred letters. However, matters become complex if different fonts, such as italics, are combined in lines: the other fonts must have the same deviation or the word spaces that combine the fonts become irregular. Therefore, it makes more sense to optically centre a character within its space. In Figure 4.3 the character space is marked by black strokes and the n is optically centred in between those strokes. As a result, the distance from the left side bearing to the left stem is larger than the distance from the right side bearing to the right stem.

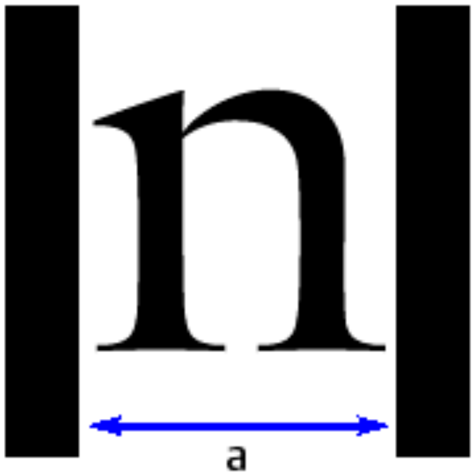

Figure 4.3 Optically positioning the n in the centre of the character width.

This positioning of the n obstructs the stem interval. When the n is optically centred, the distances from the left stem to the left side bearing and from the right stem to the right side bearing are not completely identical: 'The width between the uprights of n is measured, and a half of that amount is given to the left side of the letter and slightly less on the other side, because the arched corner seems to add to the space.'[148]

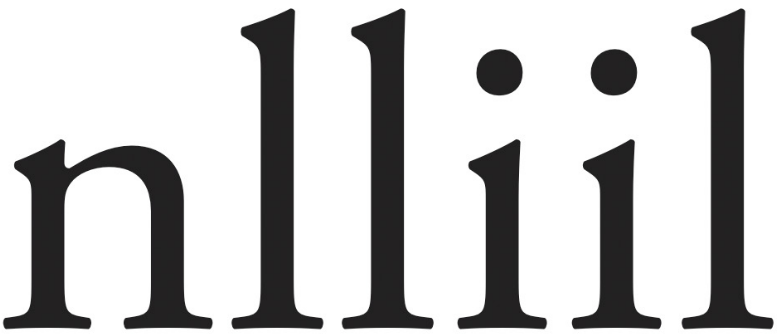

Figure 4.4 Adobe Garamond shows a slightly disrupted stem interval.

The different distances from the stems of the n to side bearings are the result of designing the letter forms before spacing them. In most cases the n will have symmetrical serifs instead of asymmetrical ones, as shown in Jenson's roman type (Figure 3.36). As a consequence the stem interval will not be completely even if equilibrium of white space has been achieved: in Figure 4.4 the distances between the stems are all different, with most space between the i's. Equilibrium of white space is especially visible when type is spaced at a relatively large size, like what is

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[148] Walter Tracy, *Letters of Credit: A View of Type Design* (Boston: David R. Godine, 1986), p.74.

done on high-resolution computer screens today. Such a refinement was simply not possible to control for the early punchcutters considering the small size of their types.

Figure 4.5 Spacing the a in between two n's.

Placing the other characters in between the n's, as is shown in Figure 4.5, is not the only way to define their character widths. Another method is to place the next character twice in a row within the same rhythm by eye (Figure 4.6). Defining the right side bearing (indicated with 1) automatically results in the left side bearing of the following character. Measuring the distance from any arbitrary point of the following character (2) and using this information to define the same side bearing for the repeated character results in the right side bearing (3).

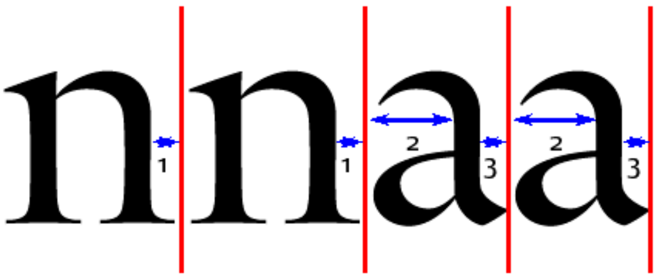

Figure 4.6 Defining side bearings by repetition.

Optical spacing is a back and forth process. If characters do not fit in the pattern, for instance because they are too wide or too condensed, they have to be revised. If the pattern is predefined, as discussed in the previous chapter, the proportions of the characters and their widths are inseparably connected. This makes spacing a more straightforward process. How the spacing and the casting of movable type were interconnected is discussed in Appendix 10, *Spacing and casting*.

4.2 Advantages of width standardisation

Before examining any evidence of width standardisation, it is important to understand the practical reasons for using such a system rather than optical spacing in Renaissance type production. By using the standardised construction that is an organic element of the patterns of both handwritten textura and Humanistic minuscule, the Renaissance punchcutters could reduce the number of widths on which characters were placed. In the production of movable type, the advantages of such an approach are twofold. First, one can predefine the widths of the characters, which serves to define and preserve the pattern before a punch is cut. This prevents an empirical process in which each punch has to be visually judged against others. Second, the number of widths of the copper bars required for striking matrices can be limited in this way, thereby also preventing loss of valuable material when justifying (finishing) the matrices.

4.3 Comparing widths in textura and roman type

If width standardisations were applied in the type production process, one should be able to distil proof of this from artefacts. Unfortunately there are neither matrices nor foundry type preserved from Gutenberg's and Jenson's time. This leaves only the measurement of Renaissance prints. To highlight the similarities in the widths of their characters, this section compares prints of textura and roman type.

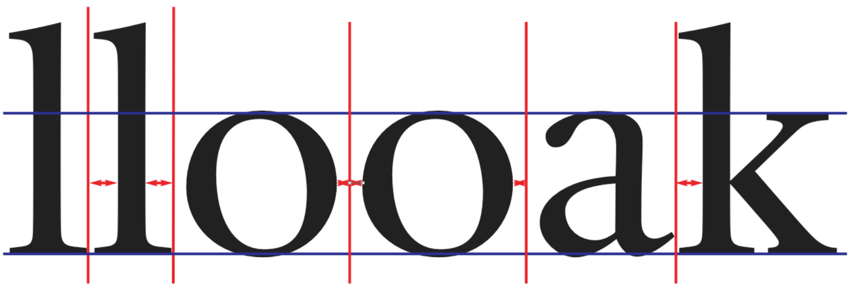

Figure 4.7 Distilling the positioning of the side bearings.

The method that I have developed during my research for distilling the widths from historical prints is as simple as it is effective (Figure 4.7). Irrespective of whether the spacing is done optically or on a predefined pattern, in roman type two letters will have an identical positioning of the left and right side bearings within the x-height: the l and the o because within the x-height these letters are symmetrical. When a text contains a sequence of either two l's or twice the o, the side bearing between the repeated letters will by definition be centred. As soon as the position of this side bearing has been set in a historical print, the text can be checked for other exemplars of the same letter and the side bearings of the adjacent letters can be determined in the same way as shown in Figure 4.6. Also there will be many shapes related to the l and o which will normally share the same positioning of the side bearings. For example the left side of the lowercase k will usually be identical to the left side of the l and hence will have the same positioning of the side bearing. The bowls of b, d, p, and q will most likely share the positioning of the side bearings of the o.

Figure 4.8 shows Gutenberg's textura type on a limited number of widths. The widths are numbered, starting from '1' for the smallest one (this is not a value of any kind, but simply an indication of relative width). Letters like b, p, and u share the same width (indicated with '4') just like the geometric letter model illustrates. The a has been placed on the same width. The m shares its width with the c-u ligature.

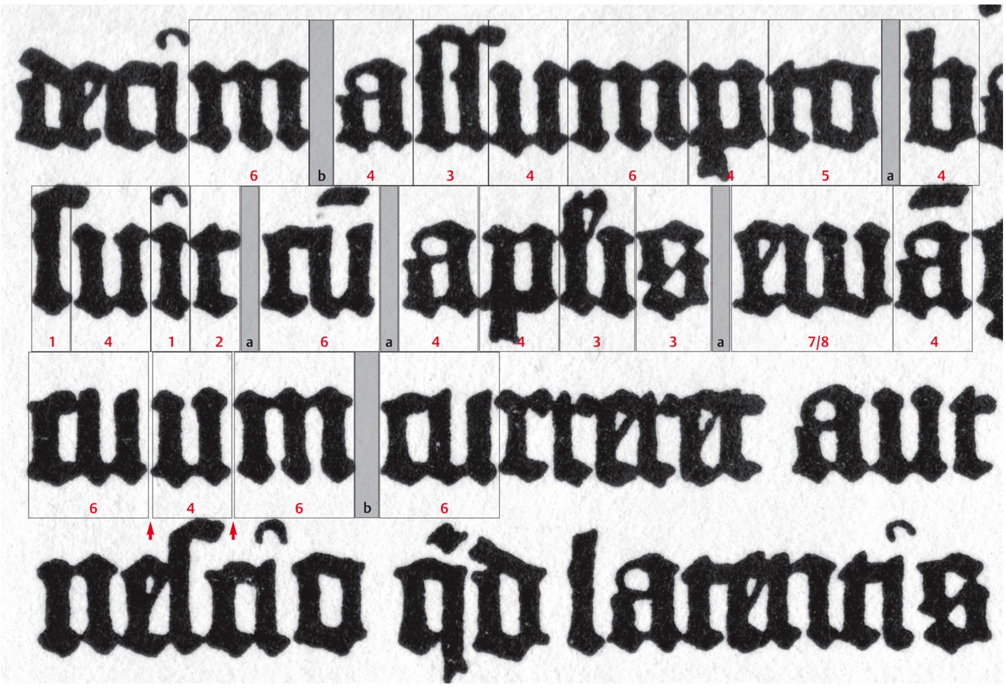

Figure 4.8 Gutenberg's textura type shows a limited number of widths.

In contrast, Figure 4.9 shows details from *De Evangelica Præparatione*, in which Jenson's roman type was used for the first time. As my hypothesis predicts, a limited number of widths, comparable with Gutenberg's textura type, can also be found here.

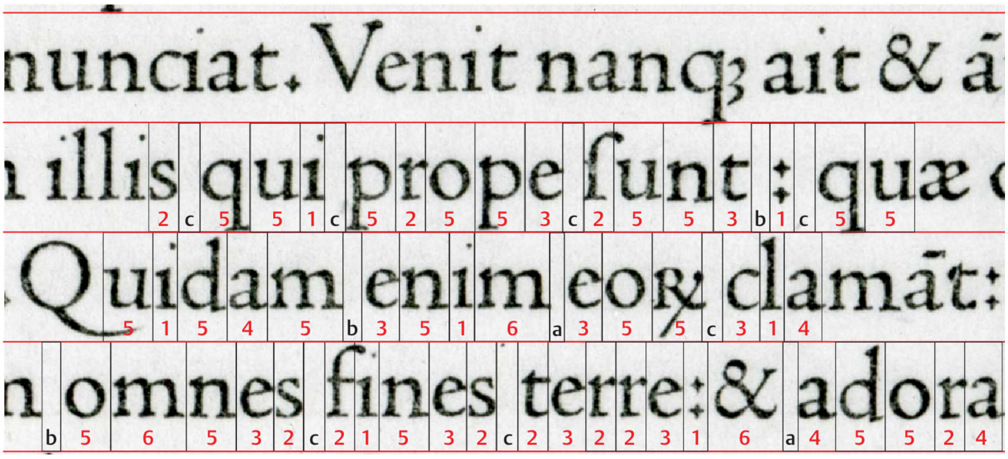

Figure 4.9 Jenson's roman as applied in *De Evangelica Præparatione* from 1470.

Even the rougher hybrid type from Sweynheym and Pannartz, applied in *Postillæ in Biblia* by the Franciscan teacher Nicolaus de Lyra (ca.1270–1349) in 1472 (Figure 4.10), shows standardised widths. In some cases the letters seem to be positioned on incorrect widths (indicated with blue) that belong to other ranges.

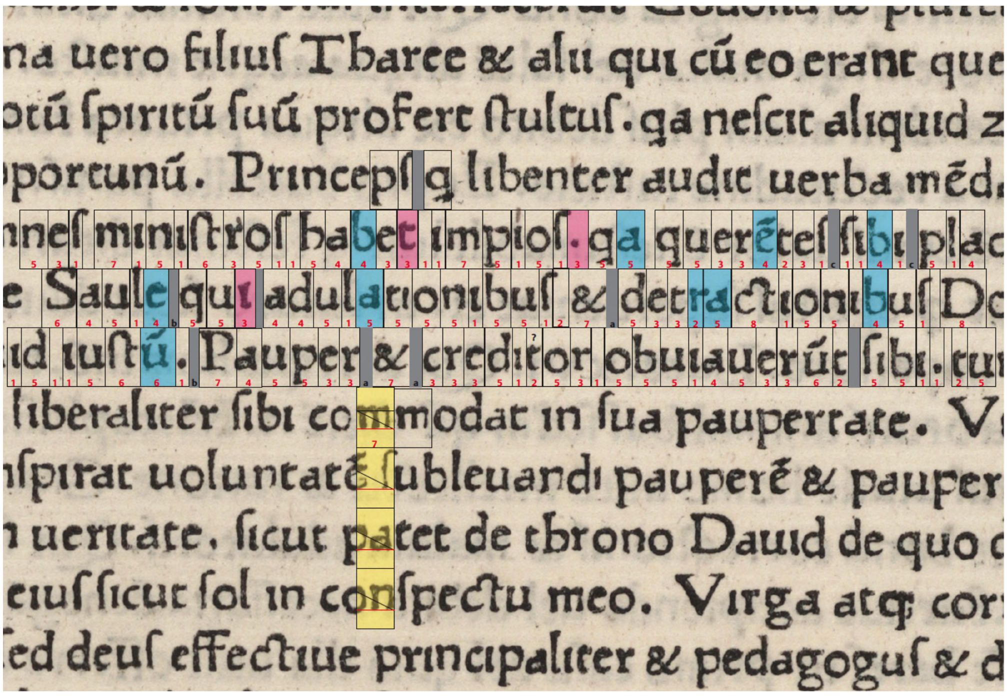

Figure 4.10 Sweynheym and Pannartz's roman type from 1472.[149]

This raises the question of whether the type was cast with fixed-width moulds, i.e., a different mould for every character width in contrast with an adjustable mould. Or were mistakes made when copper bars with consequently prefixed widths were

149 <https://wikis.uit.tufts.edu/confluence/display/TischTech/23>

selected for the striking? In any case, the rhythmic pattern of the type is clearly inferior in comparison with that of Gutenberg and Jenson.

In this section textura and roman prints were compared to show that a limited number of widths can be found in both types. The following sections will present a framework that can be used to standardise the horizontal proportions of type, and will then use this framework to examine evidence suggesting that such a framework was not only used by Gutenberg, but by Jenson and other Renaissance punchcutters as well.

4.4 Comparing textura and roman type fitting

This section will demonstrate that a grid-based width system is clear in textura type. Then it will provide examples of the textura grid being applied to roman type. The aim is to show that the Renaissance punchcutters directly applied textura patterns to roman type, which is possible due to the morphologic relationship between the textura quadrata and the Humanistic minuscule.

The distinguished type designer and author on typography Adrian Frutiger (1928–2015), especially renowned for his sans-serif typeface Univers, considered it plausible that Jenson, like Gutenberg, adopted a grid system as framework for the rhythmic patterning of type. This is in support of my hypothesis that the standardisation of the Humanistic minuscule for roman type production was in analogy to the more natural standardisation of textura handwriting for the production of type. According to Frutiger, the framework resulted in counters and side bearings of equal weight. This created an even stem interval. Frutiger drew his own serifed roman typefaces accordingly (Figure 4.11).

Figure 4.11 Frutiger's even patterning of stem distances in his serifed roman type (top).

His former teacher, the Swiss type designer, calligrapher, and author Walter Käch (1901–1970), disagreed and had the opinion that the side bearings should be kept narrower.[150] Narrower spacing is inevitably the case with sans-serif typefaces, as can be seen in the second line of Figure 4.11. This is due to the lack of serifs, which form wedges between letters and help to preserve the stem interval.

Because of its vertical stressing as result of the lacking of curves, the fitting of textura quadrata is fairly simple: the vertical strokes can be placed at equal distances and hence the spaces between the strokes and the side bearings are generally also equal.

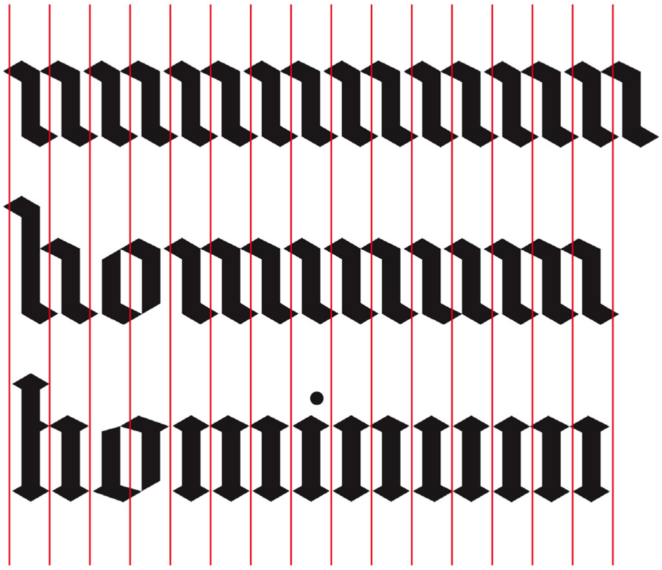

Figure 4.12 The fitting of textura type.

Figure 4.12 shows that textura type can be fitted by placing the side bearings exactly in between the stems; the 'fencing' is very strong here. The division by vertical lines automatically leads to a simple unit-arrangement system: one unit for the i, two for the n and the u, and three for the m. In the bottom row the stroke endings have been moved backwards. This not only optimises the position of the o within its fixed width, but also prevents that the difference between stroke endings and the arches becomes too small, which would make the letters difficult to differentiate from each other. Hence, textura is constructed with backwards-moved stroke endings.[151]

[150] Heidrun Osterer and Philipp Stamm, *Adrian Frutiger – Typefaces: The Complete Works* (Basel: Birkhäuser Architecture, 2008), p.18.

[151] Noordzij, *The Stroke*, p.54.

In the second row the space around the o is –both visually and measurably– too wide, but this can be corrected by extending the horizontally stressed strokes further. Doing so helps to keep the o on two units, like the n. Otherwise the width of the o has to be reduced and this would disrupt the pattern of the vertical strokes: the distances between the vertical strokes and the side bearings would differ from these of the other letters that contain vertical strokes. Also it would add an unnecessarily deviating character width.

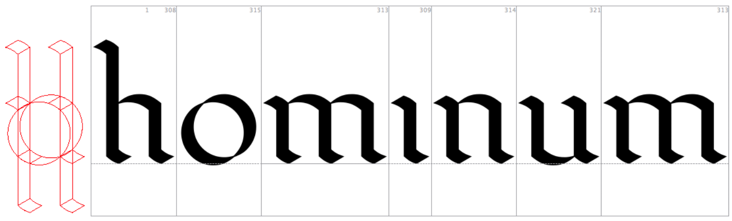

Figure 4.13 In the Humanistic minuscule some vertical strokes are replaced by curves.

In contrast with textura type, roman type combines vertical strokes with bowls and diagonals because it finds its origin in the Humanistic minuscule. This breaks up the measurable uniformity of the distances between vertical strokes: for example the distance measured from curve to stem differs from the distance measured from stem to stem (Figure 4.13). Jenson was not the first punchcutter to be confronted with this problem; others before him, such as Adolph Rush, Conrad Sweynheym and Arnold Pannartz also had to tackle this problem. However, being more refined than any of its precursors, Jenson's type especially shows a highly systematised handling of the fitting.

Figure 4.14 Fitting of Jenson's roman type on a textura-based pattern.

Although the shapes clearly differ, the morphology is in essence the same for textura and roman type. Hence the curved parts can be considered overshoots of the straight strokes. Defining the side bearings for roman type can therefore be done in the same simple way as for textura type (Figure 4.14). This implies that the same groups of letters share the same character widths in both textura type and in roman type. Jenson's roman type clearly shows the same fence posting as textura type; further evidence of this fence posting will be presented in the next chapter. It is interesting to see in Figure 4.15 that Van Krimpen's drawings for Haarlemmer (which were made on an existing Monotype unit-arrangement system to reduce costs)[152] clearly show the simple rhythmic pattern ('fence posting')[153] that I traced in Renaissance type. This structure is in fact inherent to calligraphy, although because of inevitable inconsistencies in handwriting it does not appear as rigidly in the Humanistic minuscule as in roman type.

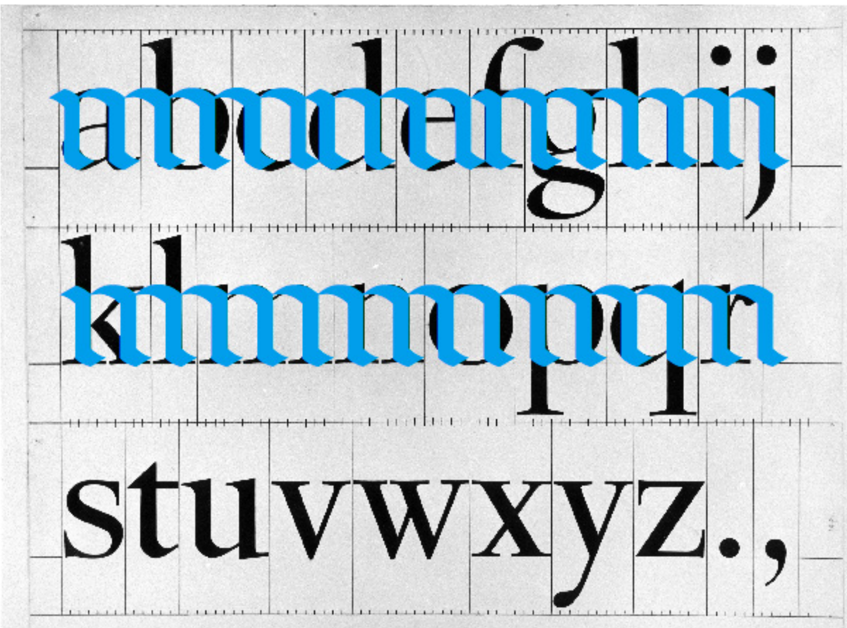

Figure 4.15 Fence posting appears in Van Krimpen's drawings for Haarlemmer.

Besides the above evidence distilled from historic prints, one additional piece of historic information supports the idea that these punchcutters directly applied structures from textura type to roman type: the Da Spira brothers, Sweynheim and Pannartz, and Jenson all worked in Germany before they went to Italy (Jenson from 1458 to 1461 in Mainz). Jenson was especially sent by the King of France

[152] John Dreyfus, *The Work of Jan van Krimpen* (Haarlem/Utrecht: Joh. Enschedé en Zonen/W. de Haan, 1952) p.35.

[153] The pattern that is the result of positioning the stems at equal distances ressembles a fence.

Charles VII to Mainz to learn printing from Gutenberg and to bring the profession to France.[154] Lowry describes this mission as 'industrial espionage'.[155] All aforementioned Renaissance punchcutters, renowned for their roman types, were therefore not only familiar with textura; all of them had also cut gothic type. This lends further support to my hypothesis that the roman type production process was analogous to that of textura type; it seems highly likely that the Renaissance punchcutters directly applied textura patterns to roman type.

This chapter described the practice of optical type fitting and presented arguments in favour of a systematised process. It introduced and illustrated the concept of the standardisation of character widths in gothic and Renaissance prints. A horizontal grid fitting system was then introduced and, due to the morphologic relationship between the handwritten origins of textura and roman type, this could be applied to both gothic and roman prints in order to highlight similarities in both types. The aim is to draw further parallels between textura and roman type production, thus supporting my hypothesis that the Renaissance punchcutters standardised handwriting to the type production process and that, more generally, roman type was possibly largely the result of technical rather than purely æsthetic considerations. The next chapter will elaborate on the horizontal grid fitting and will use the resulting framework to try to distil evidence of such a standardisation system in both textura and roman type.

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[154] Albert Kapr, *Johannes Gutenberg: Persönlichkeit und Leistung* (München: C.H. Beck, 1988), p.252.

[155] Lowry, *Nicolas Jenson and the Rise of Venetian Publishing in Renaissance Europe*, p.49.