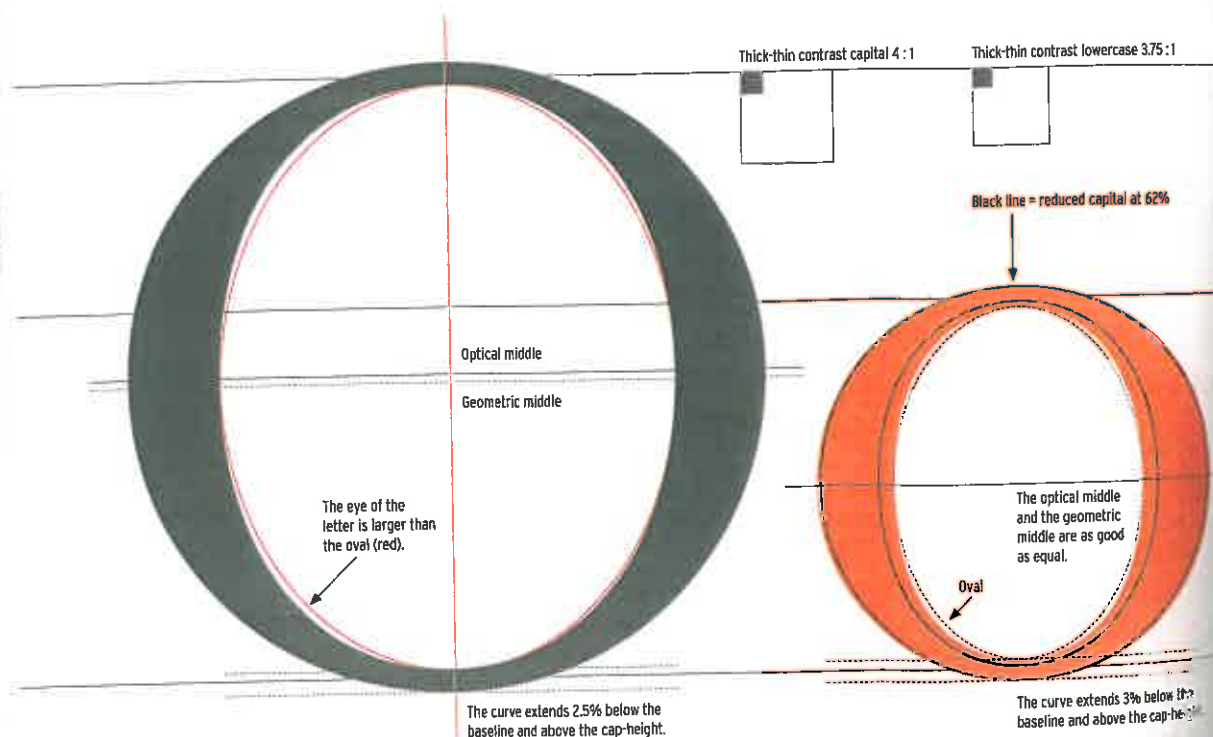


**The first letters** As well as the H, O, n, l, o and p, Dutch type designer Gerard Unger also likes to include the R, a and g in his first design sketches. As such, each type designer has their own way of working toward the creation of a new typeface.

Alongside this working method, there are also a number of facts to take into account during the design process. A square appears to be square only if it is drawn 1% wider and the same is true for circular forms. To make a circular form appear the same size as a square, it should extend an extra 2% to 3% on each side. The point of a triangle appears to line up with a square only if it extends 3% further. These are of course just indications. The definite measurements are completely dependent on the design and the designer's eye.

The left-slanting axis and the thick-thin contrast originate from the days of handwriting. The so-called scribes used quills with a broad nib. Holding this at an angle of 30–45 degrees created a slanting axis and the differences in contrast within the letter. When the printed letter replaced handwriting, this axis became more vertical. On the following pages, characters from different typefaces are compared to illustrate the differences and to show how letters are constructed.

The Monotype Perpetua shown below is a Transitional in Vox\*. It has an almost vertical to vertical axis. The lowercase letters are slightly thinner than the capitals and the capitals have a greater thick-thin contrast.



Monotype Cen

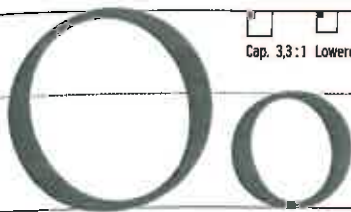
Stempel Garar

Monotype Bas

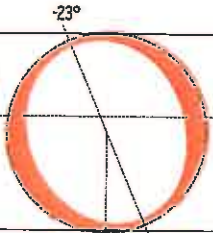
Bodoni Classic

Bauer Serif

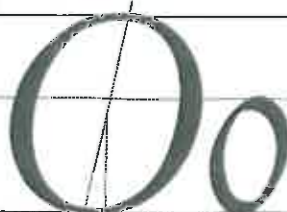
Monotype Centaur (Humanistic)



Cap. 3,3:1 Lowercase 3,2:1



Monotype Centaur Italic

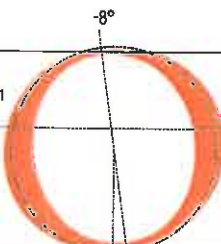


11°

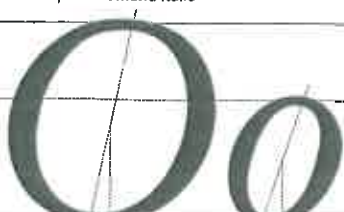
Stempel Garamond (Garalde)



Cap. 3,3:1 Lowercase 3,3:1



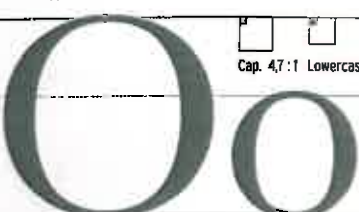
Stempel Garamond Italic



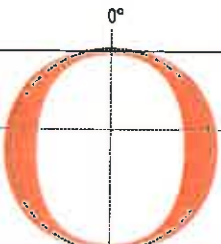
11°

18°

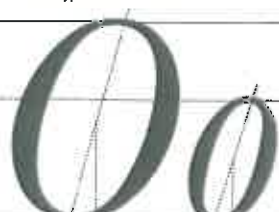
Monotype Baskerville (Transitional)



Cap. 4,7:1 Lowercase 3,3:1



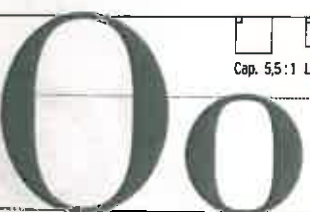
Monotype Baskerville Italic



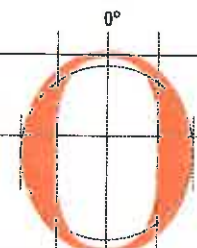
15°

18°

Bodoni Classico (Didone)



Cap. 5,5:1 Lowercase 4,6:1



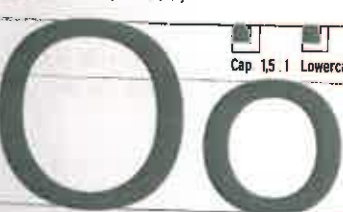
Bodoni Classico Italic



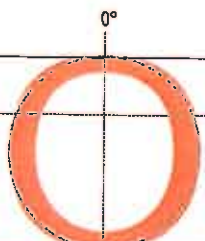
14°

13°

Bauer Serifa 55 (Slab-serif)



Cap. 1,5:1 Lowercase 1,4:1



Bauer Serifa 56 Italic



11°

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Gerard such, a new

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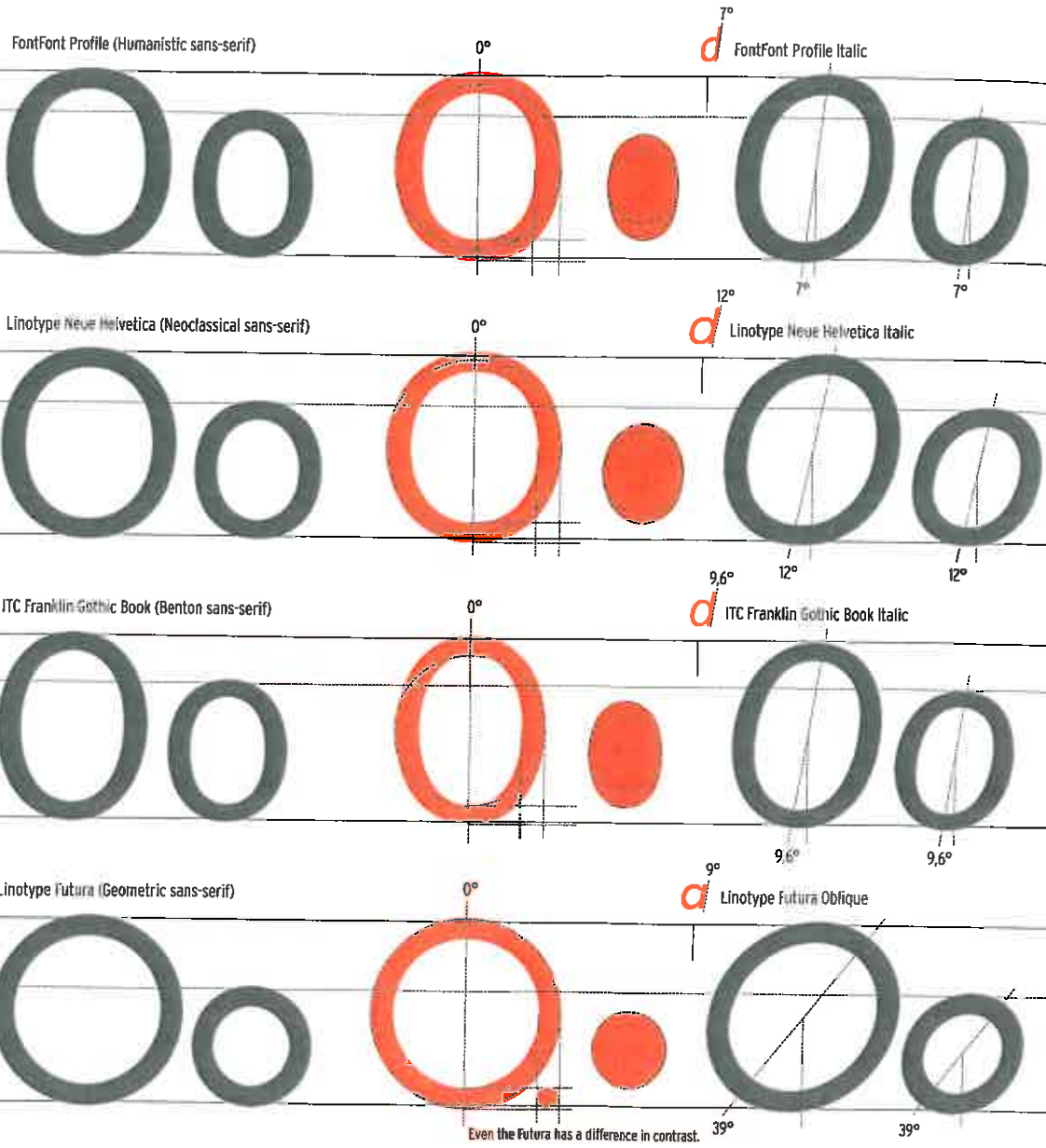
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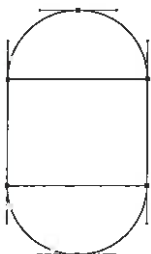
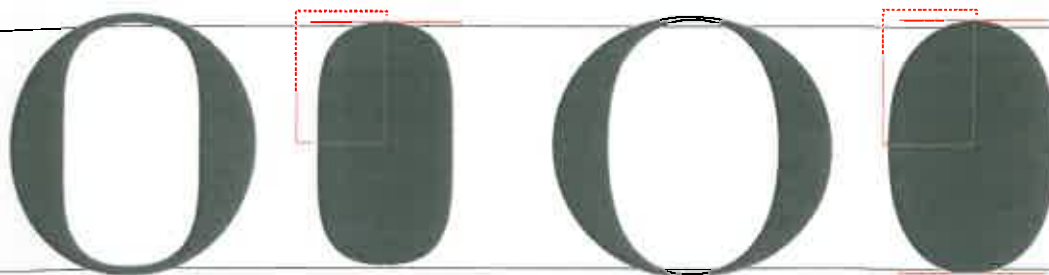


**The letter 'O'** This letter appears simple in construction. Looking at Futura, this could quite easily be true, but even the construction of this version is not exactly geometric. The circles and ovals have been visually corrected in the 'corners' and curves.

An enormous number of subtle variations can be made to the form of the 'O'. The construction of the curves should be completed very carefully. A number of visual corrections must be taken into account with the curves. If the form is constructed from a rectangle and semi-circles, such as is more or less the case with the counter of this Bodoni, a so-called bone effect can occur. This gives the impression that the left and right sides of the rectangle curve to the inside and that the middle is slightly hollow, just like a bone that is thinner in the middle. This same form of visual illusion is generally also applicable to similar forms in type design.

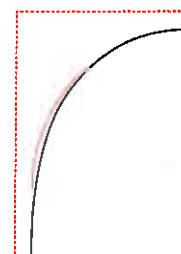
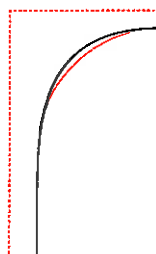
Bauer Bodoni (Didone)

URW Firmin (Didone)



Counter Bodoni

Counter Firmin



Left the clean geometric design of rectangular and semi-circles and right in adapted form.

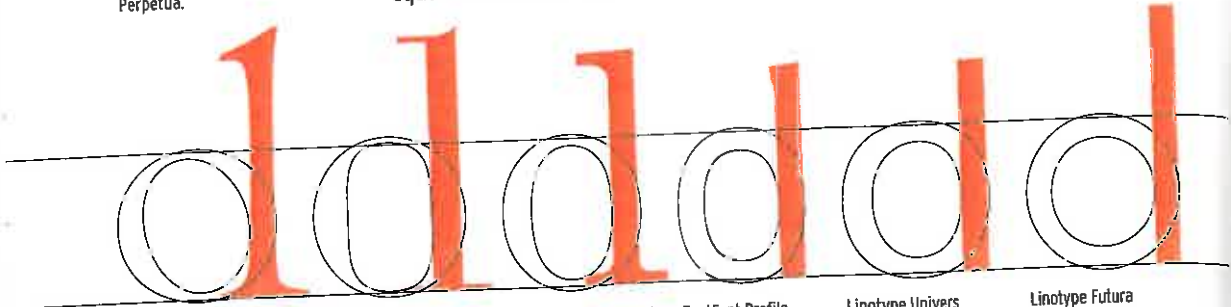
In red, the clean geometric quadrant.

Rounded left and right sides of the counter of a letter minimise the bone effect. As is shown above, it remains visible in this Bodoni, but the rounded outer form of the letter provides visual compensation. Firmin (an allusion to the punchcutter Firmin Didot) is actually more balanced in form but is also much wider. A visual correction can be quite extreme without being conspicuous, as is the case here with the counter of the Firmin 'O', which extends below the baseline and above the x-height. The design of the lowercase 'o', more specifically the thickness of the curve, defines the maximal thickness of the curved parts of the other characters in the typeface. It is defining for curves, arches and bowls.

# EIE EIE

It seems like the letter 'I' is formed from the stem of the 'E'. This is not usually the case. Above left is the Rockwell and right is the Perpetua.

**The letter 'I'** Just as the letter 'o' is defining in the form of the curves in a type design, so is the lowercase 'l' defining in the thickness of the stem. Just as with the curves, it does not follow that everything with a similar form is equal in thickness, but it is a starting point for similar forms.



Monotype Centaur  
(Humanistic)

Bauer Bodoni  
(Didone)

LT Century Schoolbook  
(Slab-serif)

FontFont Profile  
(Humanistic sans-serif)

Linotype Univers  
(Neoclassical sans-serif)

Linotype Futura  
(Geometric sans-serif)

The examples above show that there are numerous options for the design of the top serif of the ascender and the proportions of the x-height. The letter 'l' forms the basis for many letters, making the design of this letter very important for the overall look of a typeface.

**The letters 'c' and 'e'** When the proportions, contrast, maximal curve thickness and thickness of the stem have been defined, the related forms can then be designed. The logical steps from the 'o' are the 'c' and 'e'. These letters, because of the openings at the side, should be drawn narrower. The heavy upper half of the 'e' is in some typefaces, such as Centaur, Baskerville and Garamond, counterbalanced by applying a stronger emphasis to the bottom of the curve. The straight, classical character of Bodoni also serves as an example here. The upper counter, the closed space within the 'e', can be drawn almost symmetrically, but this is not normally the case. The overlapping illustrations below show that each shape has its own elements used to bring the individual letter into balance while ensuring the form of the letter is in keeping with the whole typeface.



Monotype Centaur  
(Humanistic)

Bauer Bodoni  
(Didone)



Linotype Century Schoolbook  
(Slab-serif)

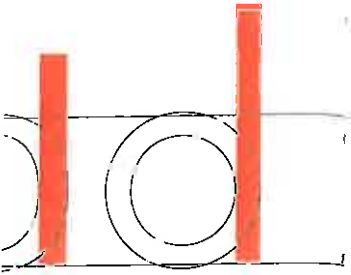
FontFont Profile  
(Humanistic sans-serif)

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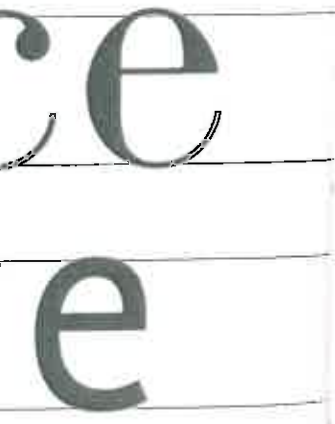
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(Geometric sans-serif)

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also serves as an example  
'e', can be drawn almost  
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ed to bring the individual  
ter is in keeping with the



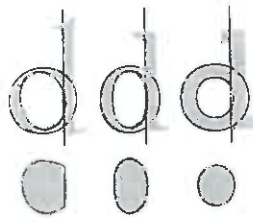
The terminals of the 'c' are the most varied in shape, ranging from the clearly visible form of an old-fashioned pen stroke to the clean lines of a teardrop shape. From left to right: Centaur, Garamond, Baskerville, Bodoni, Glypha, Angie and Lucida Sans.



Above the lowercase 'e' of Stempel Garamond and of Gill Sans in regular and italic. Below: the capital 'C' in italic and regular superimposed. Left: Stempel Garamond with an italic that is visibly different from the roman, and right: Rotis whereby the roman is similar in appearance to an italic as it leans forwards slightly.

The lower terminal of the 'c' is different in almost every typeface. As a guideline for the maximum thickness of the terminal, it should never be larger than the maximum thickness of the curve in the letter, whether it has a square or droplet form. The heavy tip of the curve has the function of reducing the appearance of the large inner space of the 'c' so that it better fits in with the other letters and gives a more neutral grey tone. The capital 'C' is similar to the lowercase version but is drawn slightly slimmer. The lowercase 'e' does not have serifs and its basic form is in principle the same for serifed and sans-serif types. The variations can be found in the thick-thin contrast, in the form of the counter and the cross bar. The position of the cross bar can vary from approximately the middle to very high, which in turn results in a smaller upper counter. As shown here to the left, the italic version, especially with serif typefaces, often stems from the origins of this style, namely handwriting. Of course characteristics are included to create clear similarities in form between roman and italic. Just as in the early days when italics were designed and used as efficient types, the cursive is usually narrower than the roman.

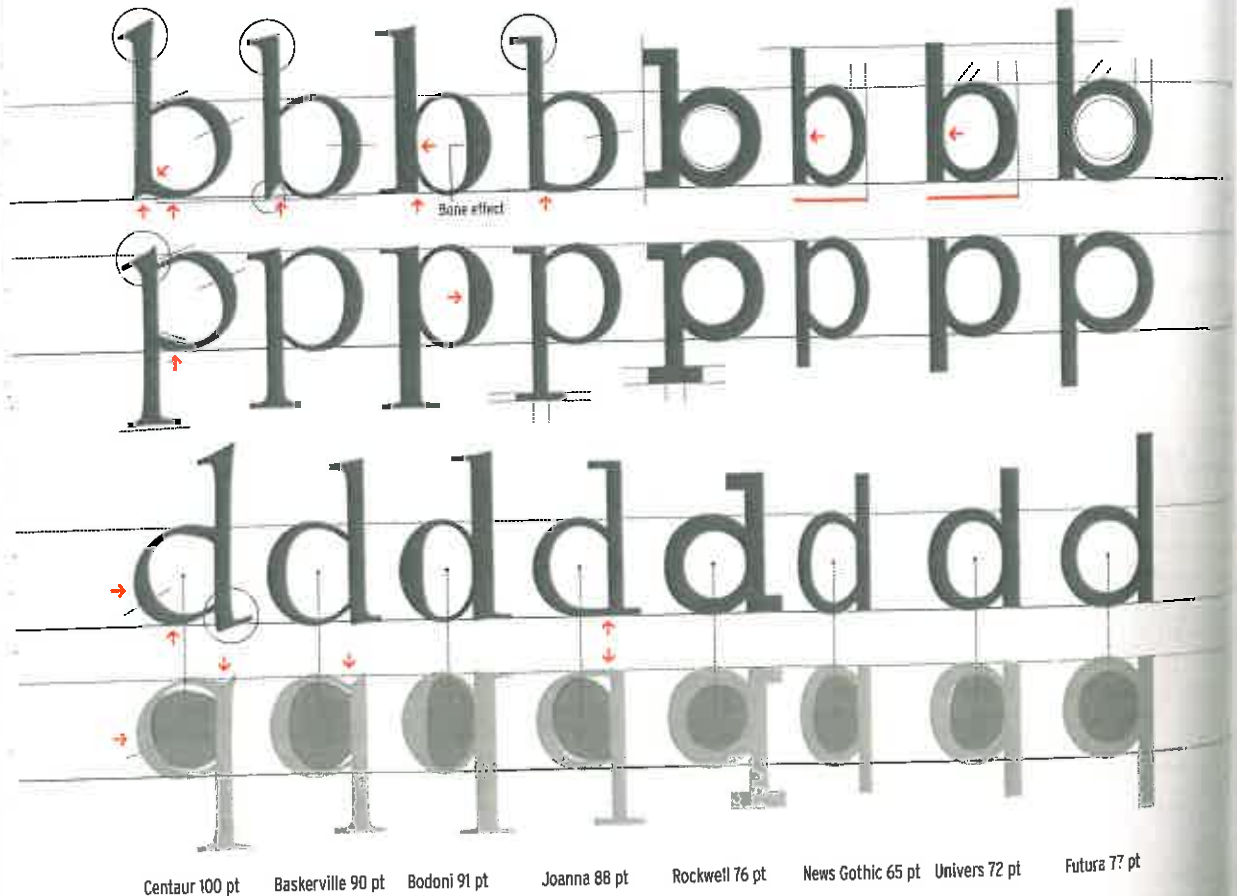




In Centaur (left), the counter of the letter 'd' is flattened against the stem. With Century Schoolbook (middle) the counter seems almost the same as the 'o' (grey shape below). In Memphis Bold (right) they are the same. In the letter, the counter cuts into the stem.

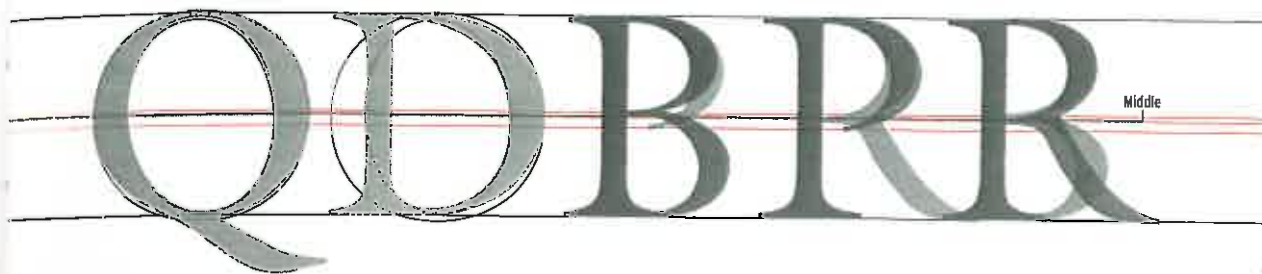
In the overview below, the characters appear to be mirror images of each other. Wrong! With Bodoni it seems as if two letters have been merged into one, while with the Joanna each letter has its own characteristic shape.

**Rounded letters with a stem** Four letters of the alphabet – the 'd', 'p', 'b' and 'q' – appear quite simply to be a blend of the 'o' with a vertical stem. The 'p' looks like a rotated version of the 'd' and likewise the 'q' a rotated 'b'. But this could not be more wrong. Even the most geometric typefaces contain subtle differences. The greatest differences can be seen in the seriffed types. The design challenge with these letters is in the connection between the curve and the stem. Depending on the typeface, triangular notches (ink traps) may appear at the joins between curves and stems, to prevent ink spread and preserve the shape of the letters when printed at small sizes or on absorbent papers. This is why notches are sometimes made deeper than is aesthetically desirable. Alternatively, attempts can be made to avoid these notches during the design phase by creating a right-angled connection between the curve and the stem, as can be seen in a number of typefaces. Similarly, a counter may have a flat side where it meets the stem yet still remain curved in shape. In this case the straight line of the stem must remain visible and the curve should not visually intrude too far into the stem. In heavier styles, the more generous forms make visible compromises necessary.



Centaur 100 pt    Baskerville 90 pt    Bodoni 91 pt    Joanna 88 pt    Rockwell 76 pt    News Gothic 65 pt    Univers 72 pt    Futura 77 pt

Q d b p q



ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

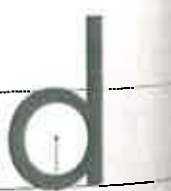
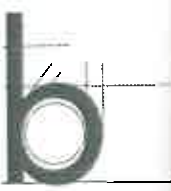
ITC Galliard Roman and italic

Galliard has a very pronounced italic. This typeface is an adaptation of designs by Robert Granjon from the sixteenth century. At that time it was normal that the roman and the italic were two completely different typefaces and not made from the same basic design. The italics of Beskerville, Bodoni and Joanna are shown below.

*d p d q*  
*d p d q*  
*d p d q*

The capital 'D' can roughly be seen as a combination of the forms of the capital 'E' and 'O'. In order to visually bring the letter 'D' in balance with the 'O', it is drawn slightly narrower so that the counter of the letter appears of equal size. Although relatively simple shapes, different typefaces show the great many ways in which the curve can be joined with the stem. The capital 'B' also shares little in common with its lowercase letter but just as the 'D' is combining forms that are coming from the 'E' and the 'O'. The slant of the axis in the curves follows the 'O', just like the 'D'. The letters 'P' and 'R' follow the shape of the 'B' whereby, as is so often the case, visual corrections are applied. It is clear that the letter 'Q' is an 'O' with a tail, yet here too we often see surprising differences in shape. As shown in the diagram above, slight differences can be made to the shape of the curve. In general terms, the same characteristics apply to sans-serif types, although the low contrast often requires alterations to the point of intersection of curve and stem. Italic letters are often narrower than the romans they accompany but there are also examples that have the same width as the romans.

; 'p', 'b'  
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rotated 'b'.  
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Futura 77 pl



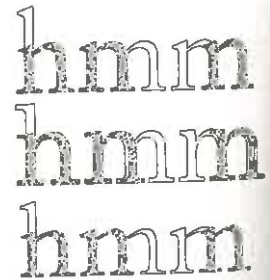
**Letters with 'legs'** There are four letters which are directly related to each other because they all stem from one letter: the 'n'. These are the letters 'n', 'h', 'm' and 'u'. The letter 'r' can also be included in this group because in general terms, it can be seen as a cut-off 'n', in the case of the sans-serifs at least. In serifed types a terminal shape is added to the end of the top stroke. This may have various forms, as in the 'c'. The reason for this is that the 'r' has an uneven distribution of white space, which can disrupt the flow of a body of text, so the terminal has to be designed to avoid a gap. As already mentioned, the type designer attempts to give each letter an equal grey tone. As already mentioned, the type designer attempts to give each letter an equal balance between black and white, and may employ strategies such as narrowing the space occupied by the 'r', making the curved part heavier, or applying a characteristically heavy terminal matched to the forms in 'j', 'a', 'c', 'f', 'g' or 'y', in order to provide a visual uniformity in the typeface as a whole.

In Centennial shown below, the counter space of the 'n' and 'h' have the same shape. This is also true for the width and the curve of the 'u', but then rotated. Those of the 'm' are narrower.

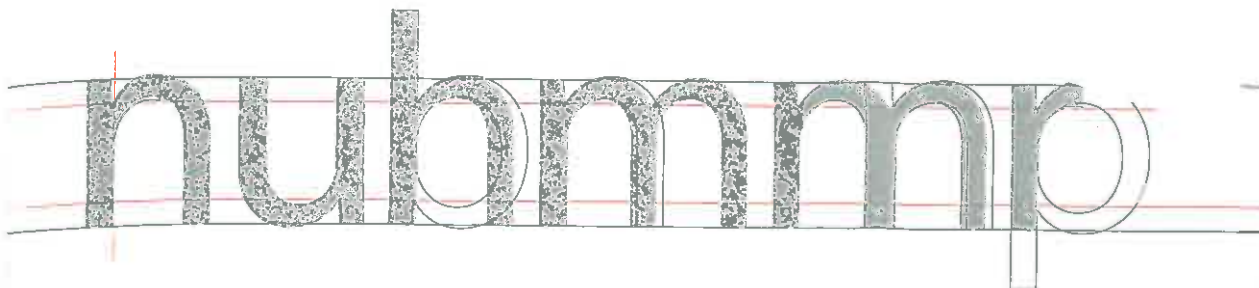
jacfgry  
Emigre Filosofia



Just like the letters shown on the previous pages with a stem and curve, the 'd', 'p', 'b' and 'q', the letters with 'legs' discussed here also contain an ink trap at the point where the curve meets the stem. The notch can be made more pronounced in order to limit the effects of ink spread during the printing process. As mentioned earlier, the 'n' is the starting point in the design of these letters. Firstly the optical grey tone and the white space within the curve of the 'n' are usually fine-tuned to fit in with the 'o'. Then the letter 'h' is sometimes made slightly wider and is given an extended stem with an upper serif that is similar to that of the 'b' and 'l'. Conversely, the legs of the letter 'm' may be drawn closer together than with the 'n' so that the final width of the letter remains in balance and to ensure that it fits well into a body of text. The letter 'u' could be seen as a rotated version of the 'n' whereby the serifs are similar in character to the serif on the ascender of the 'h'. The similarities between the 'n' and 'u' are more apparent with sans-serif typefaces, whereby the 'u' is often literally a rotated 'n', as shown in Adobe Myriad at the top of the right-hand page.

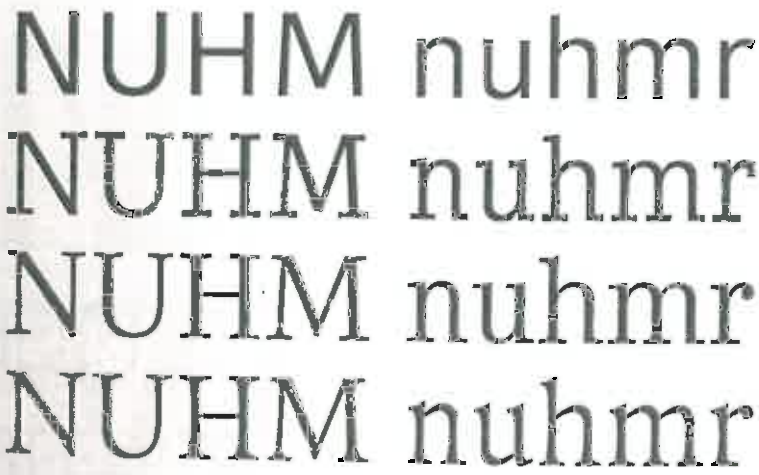


This diagram, showing respectively Stempel Garamond, Linotype New Century Schoolbook and Monotype Bembo, illustrates the significantly different visual choices made.



This is a clear example of how the uniformity of sans-serif typefaces is greater than serifed types. As such, the width of the 'n' is equal to the width of the 'h' and the 'u' is slightly narrower. There are also minimal differences in the junctions. The terminal of the 'r' is heavier. The set width of the sans serif letter 'r' is generally also narrower than with serifed types. The second notch of the 'm' is set deeper than the first. The capitals 'N', 'U', 'H' and 'M' contain fewer similarities in shape than the lowercase letters. The capital 'R' is discussed on page 105 as it contains more similarities with the 'B' and the 'P'.

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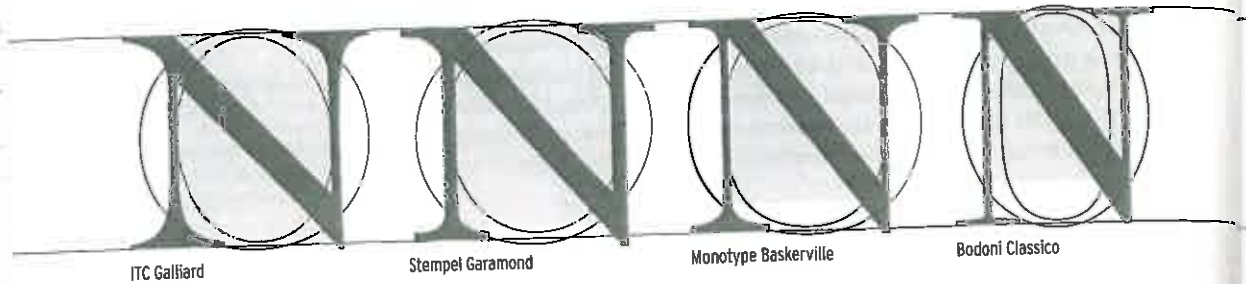
Linotype Compatil is a perfect typeface for annual reports and fits into the relatively new trend of using a single basic shape to design typefaces that fit into different classification groups. Compatil is one of the most extended examples with four variants. As shown here, they are designed with the same width and one can replace the other without disrupting the length of the text. From top to bottom: Compatil Fact, Letter, Text and Exquisite.



showing respective  
ramond, Linotype  
Schoolbook and  
nbo, illustrates the  
different visual

Characteristic features are two thin stems and the diagonal. In more classical typefaces, the 'N' and the 'O' are drawn inside the square, just as with Roman inscriptions.

The capitals of the lowercase letters shown on the previous two pages are very angular. The influences of Roman inscriptions are clearly visible here. The letter 'N' combines two vertical stems with a diagonal. The most significant difference to other two-stemmed letters is that the stems are both thinner, while in most other cases a thick and a thin stem are combined. Sometimes the two triangular shapes of the 'N' are of equal size and sometimes the lower of the two is larger than the upper.



ITC Galliard

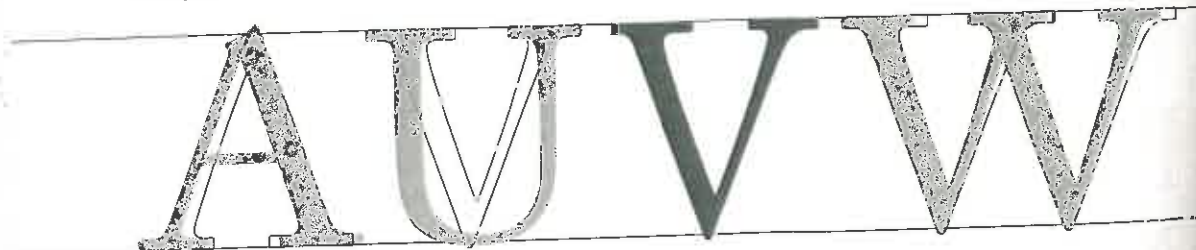
Stempel Garamond

Monotype Baskerville

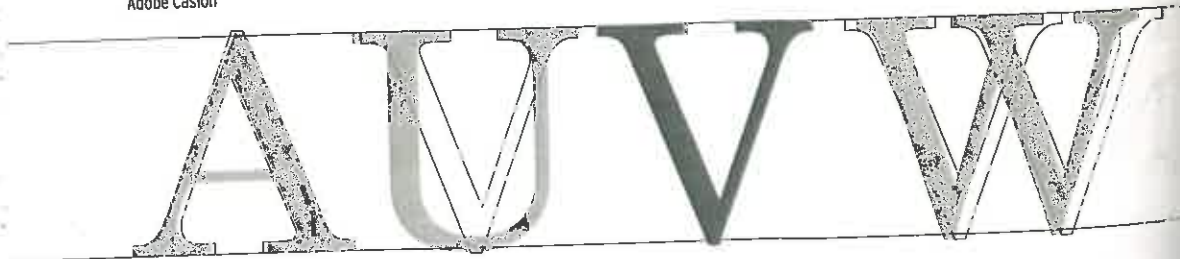
Bodoni Classico

A number of letter shapes have similarities with the letter 'V', which has been rotated and placed over the 'A' shown below. The 'V' should theoretically be drawn slightly narrower than the 'A' because the bar makes the counter smaller, but this is not always the case as can be seen in the diagram.

The letter 'U' did not exist in Roman times and was later added to our alphabet. Its rounded shape is influenced by the handwritten uncial and half uncial. The 'U' stems from the Roman 'V' which represented the u-sound. As such the 'V' changed from vowel to consonant and the 'U' took on the role of a vowel. In contrast to the 'N', the stems of the 'U' are of differing thickness. The 'U' is usually equal in width to the 'V'. The 'W', as its English name 'double-u' and French name 'double-v' suggest, is actually a ligature of a double 'V'.



Adobe Caslon

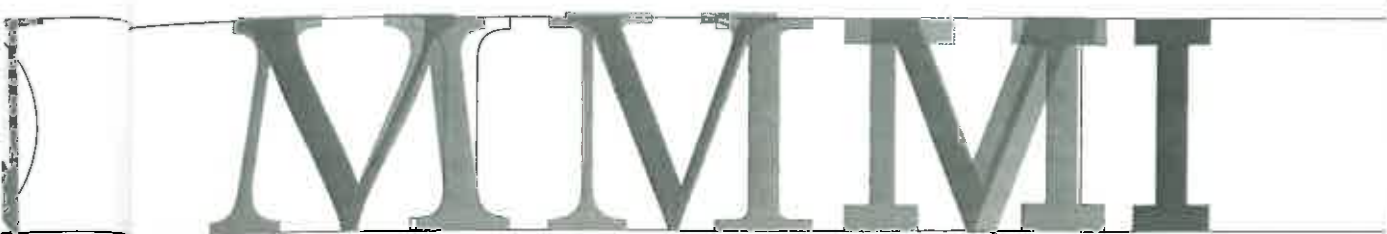


Linotype Century Schoolbook

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letter  
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Although it appears as if an 'M' can be constructed with a little cut-and-paste work, subtle corrections are also required here. The apex of the 'V' often extends below the baseline and this is not necessary for the 'M'. The upper serifs of the 'M' are also different.

The 'M' is in principle a combination of a 'V' with a stem added on either side. The left stem is more slender than the right-hand one. They can be drawn vertical or with a slight slant. Slanting stems give the most classical form, stemming directly from ancient Greek inscriptions. A disadvantage is that the letter becomes wider. Traditionally, the horizontal linear equivalent of any given font size was called an em-quad and used to make indents in text. It is a reminder that the 'M' ('em') is often just as wide as the height of the typecast body.



Monotype Plantin

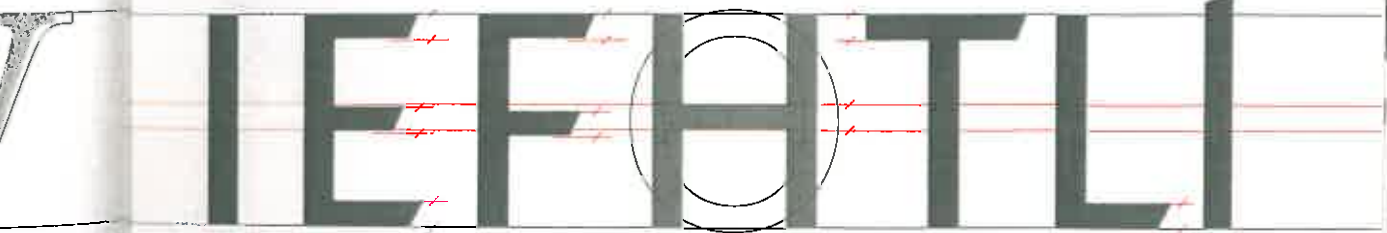
Linotype Century Schoolbook

Monotype Rockwell

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With sans-serif types, the central bar of the 'E', 'F' and 'H' is often placed at the same height and is the same thickness, but a closer look shows that this is not always the case. With Quadraat Sans by designer Fred Smeijers, both the position and the thickness of the bar have been carefully designed. The slanting terminal of the lowercase 'l' extends above the capital height.

The 'Y' can be seen as a squashed 'V' placed on top of a stem (see pages 116/117). The 'H' has a number of soul mates, including the 'E' and the 'F', which also include a central cross bar. The 'I', 'L' and the 'T' can also be included here. As a design element, the 'H' is not a complicated letter: two stems of equal thickness with a cross bar. The bar is placed slightly higher than the centre in order to bring balance to the letter. The last letter shown below is the often-confused lowercase 'l', but slightly altered in form. The figure 'l' can also be a source of confusion, especially with Gill Sans for which Monotype released 'Gill Alternative One' variant as a solution.



Quadraat Sans



News Gothic

MT Gill Sans (the regular 'l' followed by the alternative version) Linotype Syntax



Bell Centennial

Linotype Clarendon

EF Swift

**Three outsiders** The 'a', 's' and 'g' are letters requiring a depth of knowledge and skill from the type designer. Not only to design them in line with the rest of the typeface but also because the curves must be balanced and fluent. While geometrically rounded shapes form a good basis for the design of the letters 'o', 'e' and 'c', these letters are more complicated than a simple circle. Design elements similar to the other letters should be incorporated into these letters. The shoulders of the 'c' and 'a' can, for example, have essentially the same outer form and the terminal of the 'r' can provide reference points for the ear of the 'g'. The thick-thin contrast must also be in line with the rest of the typeface. These letters do not contain any elements that can be directly copied from other letters yet they must still fit in with the rest of the typeface and flow within a body of text. Useful sources of inspiration are the similar 'old' typefaces. This is also true for the 'g' which can be drawn using two different constructions: the two-storey version with a rounded base form with a loop underneath and the simplified form with a tail curving to the left underneath such as used in most italic types.

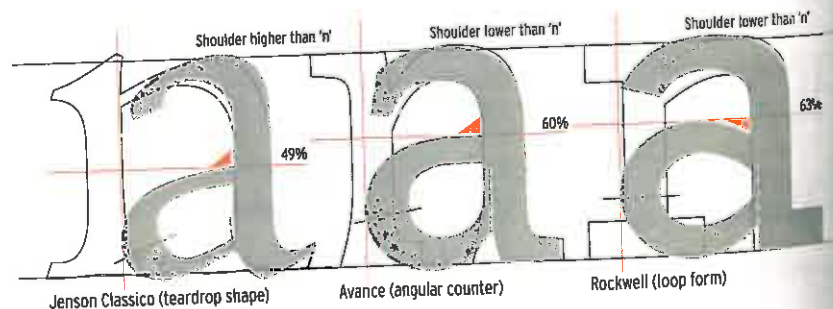
g g

The 'g' of the two typefaces used in this book to set the body text and captions respectively. The first is Profile and the second InterstatePlus. The first has the two-storey shape and the second is a simpler shape which stems from handwriting. The second is less likely to result in ink spread at (very) small font sizes.

Note also the similarities in the 'Hague' typefaces, TheSerif (Lucas de Groot) and Caecilia (Peter Matthias Noordzij).



The 'a' consists of a bowl and curves. The closed bowl is slightly higher than the middle of the letter. The connection of the bowl with the stem can be formed in many ways. The classic form, such as with the Centaur and the Garamond, is that the tear-shaped bowl joins the stem in a diagonal line. Other typefaces such as TheSans and Swift, consist of a bowl which joins the stem almost at a right angle. The tear-form is still visible in TheSans but gradually disappears with Swift. The bowl can in some cases, such as with Melior, appear almost rectangular. A third variety are the typefaces that have a kind of loop joined to the stem whereby notches are formed above and below the loop (Rockwell). The open curve of the 'a' is generally narrower than the closed bowl. The end point of the open curve can be a serif but can also be a sharp terminal such as is the case with many sans-serif types. An occasional typeface, such as Futura, uses an unusual 'a' in the roman style which is more commonly used in italics and extra bold styles. The capital 'A' is simply said an inverted 'V' with a cross bar, although there is of course some modification necessary, even with a monoline typeface like Futura. The previous pages show how closely these shapes are related.



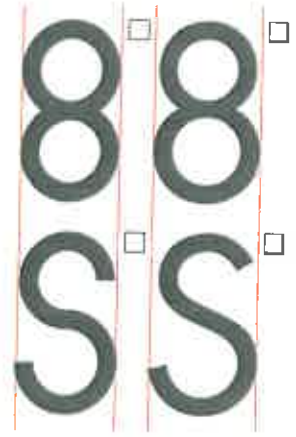
59

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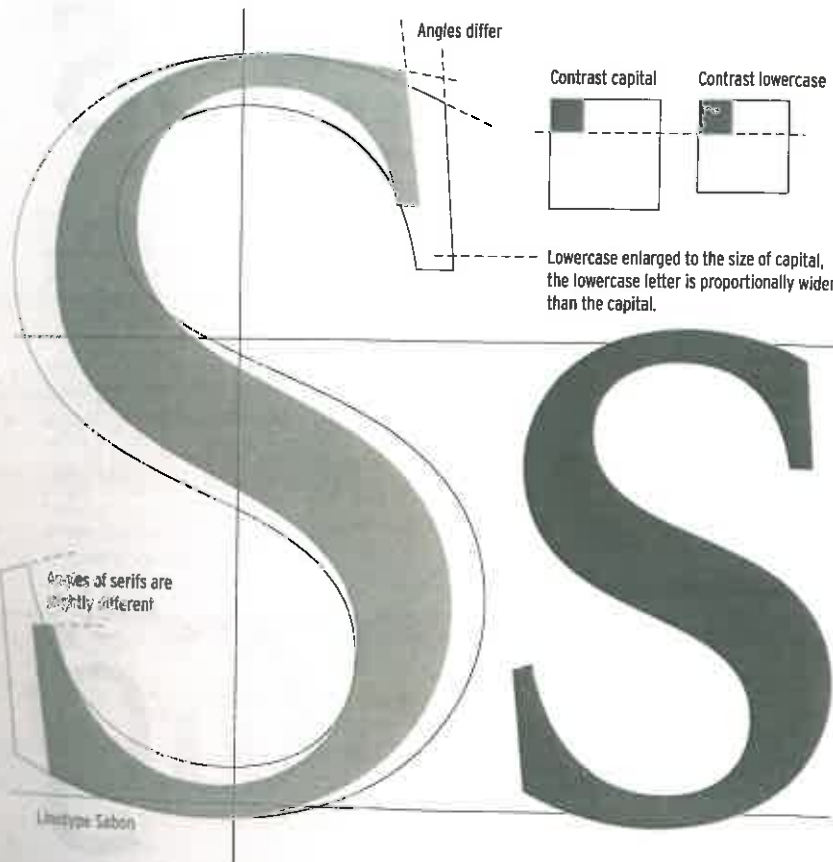
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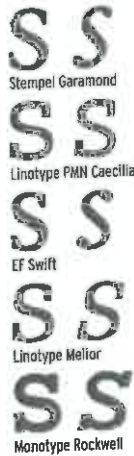
The 's' contains no straight lines. The roman can be drawn by starting with two circles, one above the other, the lower slightly larger than the upper. The letter therefore has a foundation and as such has better visual proportions. This can be compared to the crossbar of the 'H' and the 'E' which are placed slightly above the centre of the letter. Removing the lower right-hand quarter of the upper circle, and the upper left-hand quarter of the lower circle, creates a very simple 's' shape. Dragging the ends of the lines to the outside and creating a more fluent line in the centre creates the beginnings of a real 'S'. From this basic form, thick-thin contrast can be added and the serifs designed if required. Even Futura shows some contrast between thick and thin, shown in the contrast squares in the illustration to the right. The end points should not curl too far back towards the curves because this will have the effect of the 'S' visually resembling the figure 8, especially from a distance. The 's' has a tendency to lean forwards or backwards (see the illustration to the right). The form of the capital 'S' is an enlarged version of the lowercase letter. The capital is usually relatively lighter.



Above left are two identical circles, below left the lower circle is larger than the upper and a quarter of each circle removed. To the right the '8' and the 'S' of Futura. The squares show the difference between the thickest and the thinnest parts of the strokes.



Above is the 's' of Centaur (left) and Fournier (right). The Centaur 's' seems to slant to the right while the Fournier 's' tends to the left. In Centaur, the stroke of the pen is visible while Fournier is clearly more constructed. Left is the 'S' of Sabon, with narrower proportions than the lowercase version. This is not always the case. The lowercase 's' sometimes has the same proportions as the capital and is sometimes relatively wider. It is usually inherent to the design of the typeface and the designer's philosophy. The 's' of Didot, designed according to classical principles, is proportionally of equal width as the capital 'S' (not illustrated).



Although the regular 's' is relatively easily constructed, the italic version requires rather more finesse to achieve balance in the curves and the blend of contrast. In Griffio (bottom left) the contrast of the italic is less, giving it a lighter appearance. Designer Peter Verheul calls the cursive version of his typeface Sheriff (bottom right) an Italian because even he is of the opinion that the slanted version is not a true italic but also not an oblique. A real italic, in his opinion, is drawn with upstrokes as if it were written with a pen. An oblique on the other hand is always a slanted version of the roman. In general, the term 'italic' has a much wider interpretation. These differences can be seen in the examples shown to the left. The italic 's' of the Garamond has similarities in form to the roman but clearly has different serifs and was, like italics accompanying Venetian romans, actually added later to the regular version. Other italics, such as that of the Rockwell, are clearly slanting versions of the roman.

The lowercase 'g' but even more noticeable differences in the Centaur and in general Venetian types, it that the italic is a face which was fat roman. Joanna Italic completely differed used in text and is narrow. The italic I and classical and f roman as closely a Eureka is a different the italic seems to the character of a but actually remain the roman.



In contrast to the 's', the capital version of the 'G' and the lowercase version are constructed in completely different ways. The two-storey version of the 'g' is a beautiful and complicated construction. It consists of a small 'o' with an 'ear', and below this a loop which can be drawn either open or closed. The 'o' is a smaller version of the lowercase letter (approximately 60-70%). The loop can vary widely in nature between different typefaces. As such, the relative proportions of the small 'o' and the loop can be large or small, the loop can be open or closed and it can be rounded or flat. The ear brings balance to the letter and is an essential design element. It compensates the hanging of the loop on the 'o' as a kind of balance organ. The simplified version of the 'g'

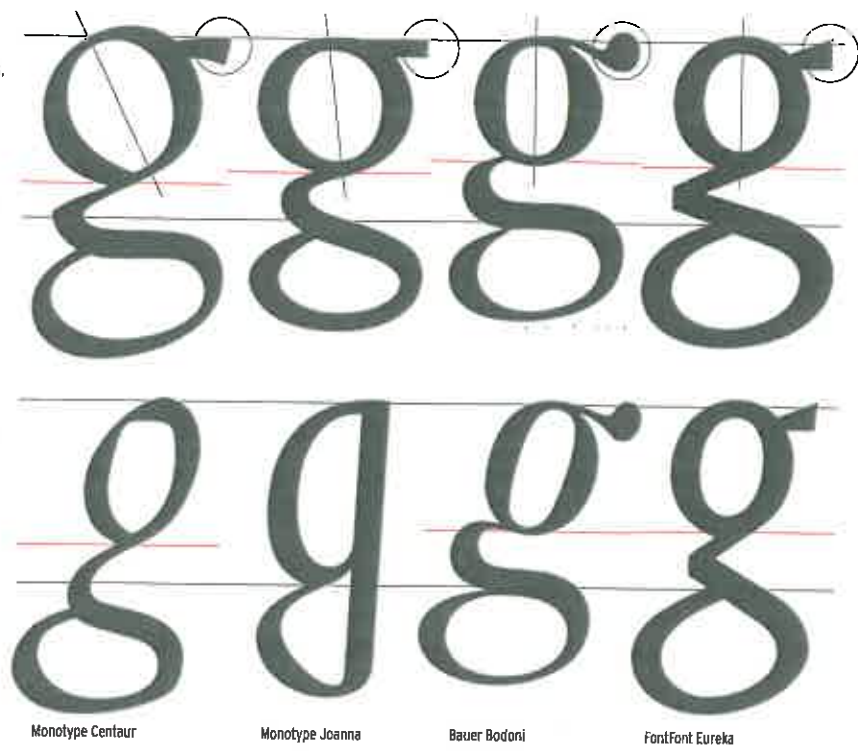
The capital 'G' appears to be family of the 'C' and the lowercase 'g', due to its wealth of shapes, is often called the most beautiful letter of the alphabet. Centaur contains traces of handwriting in the 'g', certainly in the italic. Baskerville has a more similar roman and italic but the italic is clearly narrower. Quay has a business-like 'g' and the width of the italic is similar to the roman.

The 'C' fits closely v although the widths are fractionally different design of the vertical. Its spur can vary greatly typefaces. The sans-serif are the most simple been used in Quadra



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The lowercase 'g' has many forms, but even more numerous are the differences in the italics. With Centaur and in general with the Venetian types, it is well known that the italic is a separate typeface which was later added to the roman. Joanna Italic looks like a completely different type when used in text and is extremely narrow. The Italic Bodoni is hard and classical and follows the roman as closely as possible. Eureka is a different case. Here the italic seems to revert back to the character of a Venetian type but actually remains quite true to the roman.

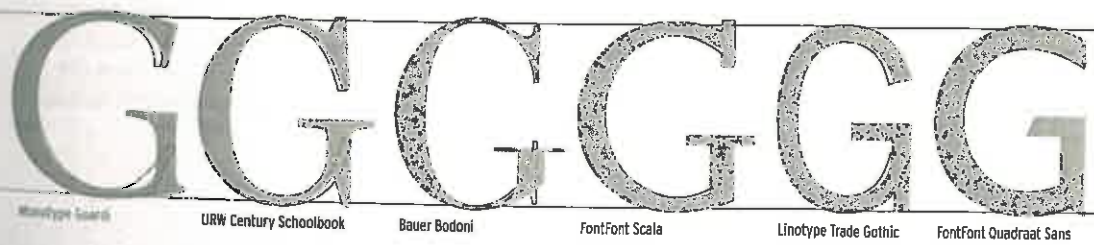


Monotype Centaur      Monotype Joanna      Bauer Bodoni      FontFont Eureka

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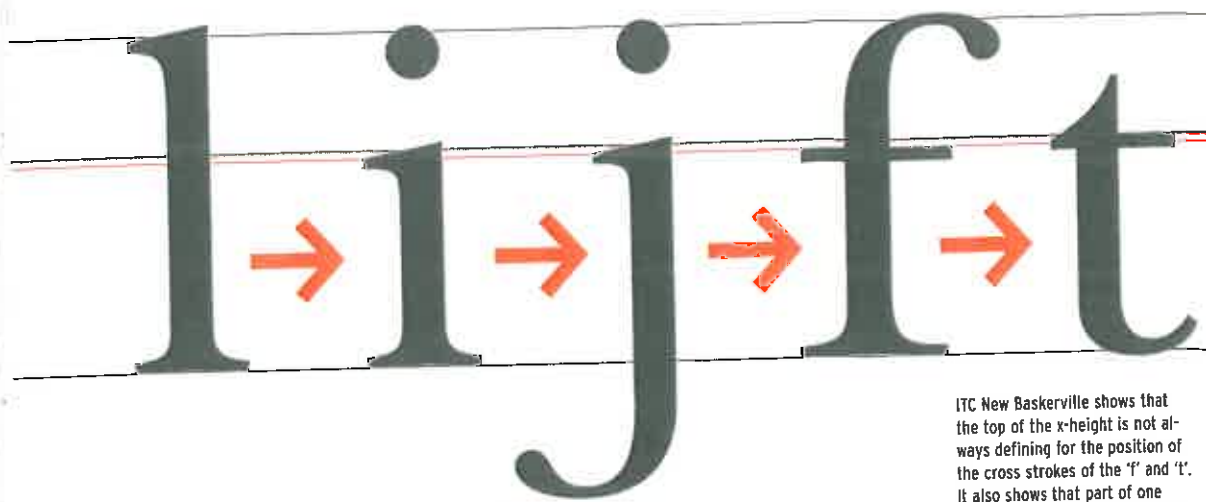
The 'C' fits closely with the 'G', although the widths and curves are fractionally different. The design of the vertical stroke and its spur can vary greatly between typefaces. The sans-serif types are the most simple. A slant has been used in Quadraat Sans.

which resembles a 'q' with a curved tail instead of a straight one, is closer in form to the group containing the 'd', 'p', 'b' and 'q'. This version of the 'g' is a defining feature of the neo-grotesque sans serif typefaces of the mid 20th century (Helvetica, Univers), while earlier grotesques from the beginning of the 20th century (Berliner Grotesk) and America (Franklin Gothic, News Gothic) and newer humanistic sans-serifs (Scala, Profile) use the two-storey version. The simplest version of the 'g' stems from handwriting and is therefore mainly seen in italic styles, even when the roman style uses the two-storey version of the 'g'. The capital 'G' is closely related to the 'C'. The short vertical stroke of the 'G' usually has the same line thickness as the stem of the 'I'.



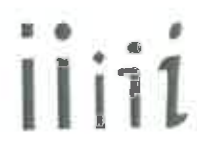
Monotype Baskerville      URW Century Schoolbook      Bauer Bodoni      FontFont Scala      Linotype Trade Gothic      FontFont Quadraat Sans





**One-legged letters** The 'l', 'i', 'j', 'f' and 't' are letters with a single stem. In terms of construction they are not generally very problematic. The 'i' is a shortened 'l' with a dot, the 'j' is an 'i' with a tail. The dots usually line up with the cap height, except when the typeface has a much smaller x-height in relation to the capital, in which case the dots are positioned lower. The dots are visually equal in width to the stem, which means that the total width of a circular, diamond-shaped or even square dot is actually larger. This helps with the positioning and size of the letter, especially if the letter has an upper serif. The descender of the 'j' can be simple and short or it can contain a flourish similar in form to the ear of the 'g' and the terminal of the 'r'. The 'f' could be a 'j' rotated 180 degrees with a cross bar, and this is actually the case with some typefaces. Other types use a clearly different curve and extension. The 'f' and the 't' also contain similarities. Both have a cross stroke which is usually placed at the x-height. Yet there are exceptions. The cross strokes of the 't' and the 'f' in New Baskerville (not Monotype Baskerville!) sink slightly lower than the x-height.

ITC New Baskerville shows that the top of the x-height is not always defining for the position of the cross strokes of the 'f' and 't'. It also shows that part of one letter may be repeated in another. The upper serifs of the first three letters, for example, as well as the descender of the 'j' which can be seen rotated 180 degrees as the curve of the 'f'. The ascender of the 't' is usually narrower, and therefore different, but contains similarities in form.

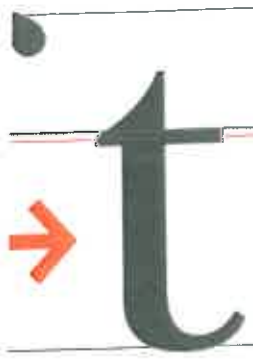


Different dots on the 'i'. From left to right: Akzidenz Grotesk, Futura, Priori Sans, Sauna, Quadraat Italic. All typefaces are set at 56 pt.



Ligatures of the DTL Fleischmann whereby more ligatures are available in the alternate style than simply the 'fi' and the 'ft'. The red versions show the ligatures with a 'long-s', a classic representation of the lowercase 's'. The 'fö', 'fß' and 'fö' ligatures of the Fleischmann (not shown) are also especially clever.

Although so-called ligatures exist for numerous letter combinations, a few commonly used combinations such as the 'fi' and the 'ft' have been included in the standard keyboard of the Mac. These combinations of characters do not present a conflict with the sans-serif typeface used to set this text, but it is a different case with seriffed types. Here, the terminal of the 'f' can touch the dot of the 'i' causing an unattractive overlap. More ligatures are often included in alternate styles.



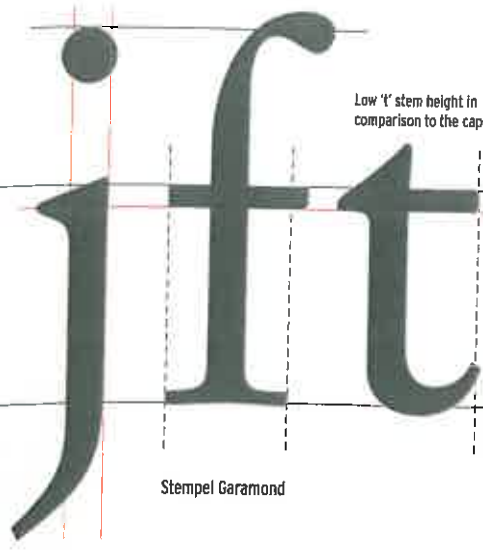
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Different dots on the 'i'. From left to right: Akzidenz Grotesk, Futura, Priori Sans, Sauna, Quadraat Italic. All typefaces are set at 56 pt.

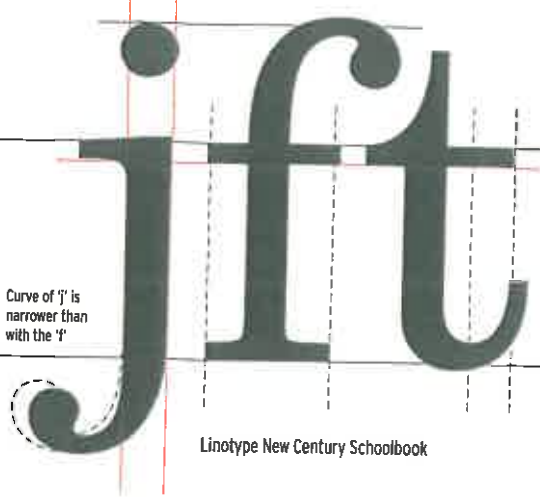


combinations, a few 'ft' have been included in this set of characters do not set this text, but it is a of the 'f' can touch the figures are often included



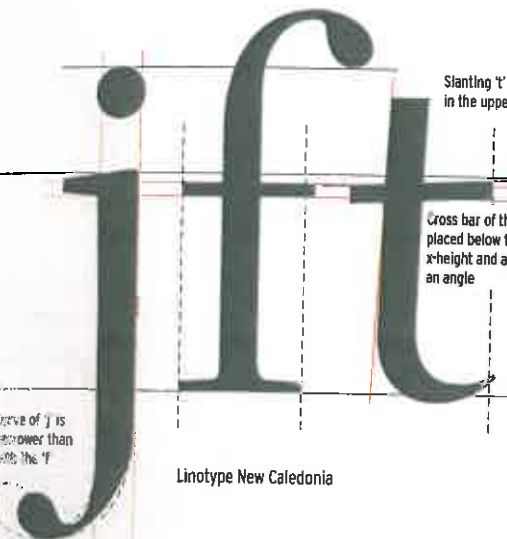
Stempel Garamond

Low 't' stem height in comparison to the cap-height



Linotype New Century Schoolbook

Curve of 'j' is narrower than with the 'f'

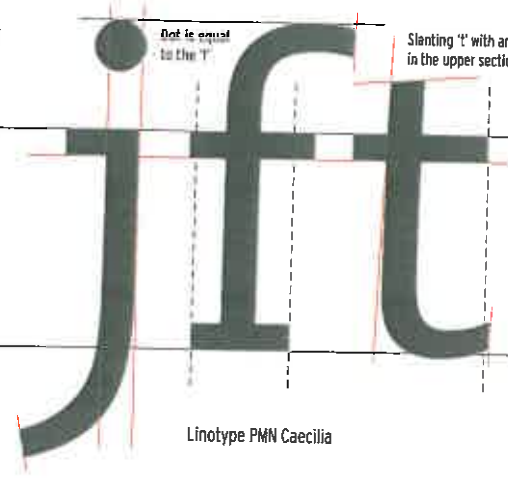


Linotype New Caledonia

Slanting 't' with an offset in the upper section

Cross bar of the 't' placed below the x-height and at an angle

Curve of 'j' is narrower than with the 'f'

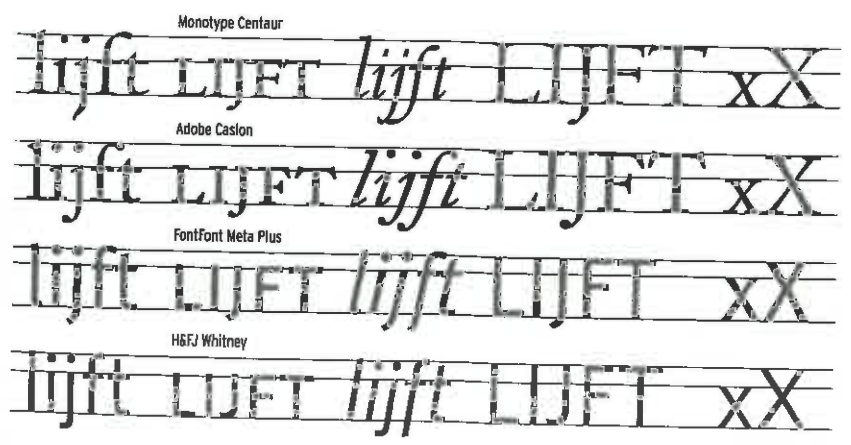


Linotype PMN Caecilia

Dot is equal to the 't'

Slanting 't' with an offset in the upper section

Four typefaces (right) with roman, small capitals, italic and roman capitals respectively.

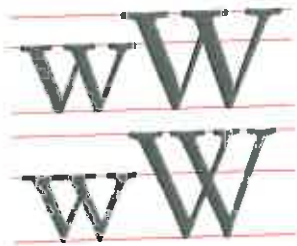


Monotype Centaur

Adobe Caslon

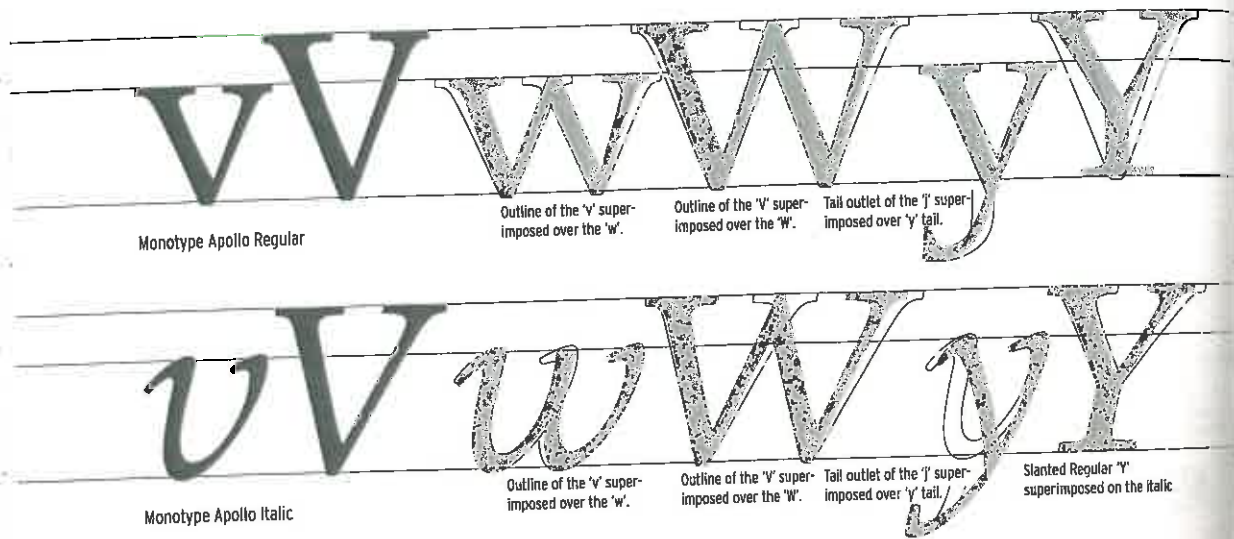
FontFont Meta Plus

H&FJ Whitney



The lowercase 'w' and the capital 'W' do not always have the same shape and construction. Stempel Garamond (below) even has linked serifs and no overlapping 'v' shapes. With DTL Fleischmann (above), both have serifs in the middle, while the Apollo shown below does not.

**V-shaped letters** It is clear to see that the forms of the 'w' and the 'y' share similarities of construction with the 'v'. The construction of the capitals in this group is also the same. Only the lowercase version of the 'y' includes a tail and the uppercase requires a few adjustments to integrate the stem into the design. The tail of the lowercase 'y' is often a lengthening of the right-hand diagonal and the stem of the capital 'Y' is usually vertical. The 'w' is actually a ligature of a double 'v', as its English name 'double-u' and French name 'double-v' would suggest. The 'v' forms of the 'w' are made narrower in order to avoid the letter being far too wide in comparison to the other letters in the typeface. The capital 'V' is an 'A' rotated 180 degrees and without the bar. Visual adjustments are also required here as the counter space is given form by the cross bar. These letters are generally also not problematic and can contain similarities in shape to the 'A' and the 'U'. These have been discussed earlier with the letter 'U'.



Although the letter 'v' has a simple construction, the resulting shape can have a great influence on a number of related letters. In many typefaces, the capital 'V' is of equal width to the 'U' and in almost all renaissance, baroque and neoclassical typefaces, the 'V' is drawn asymmetrically with a thicker stem on the left and a thinner to the right. Its construction originates from handwriting whereby all downstrokes are thicker and upstrokes thinner. The position of the pen used for the handwriting also plays a role. The general opinion is that while reading, the eye is better guided from left to right by the rhythm of thick to thin. Only the slab-serifs such as Rockwell or Serifa use two symmetrically thick stems. Sans-serif typefaces generally use less thick-thin contrast, even the humanistic sans-serifs.

Although the so-called slanting of a roman typeface is not normally considered standard practice in the design of typefaces, the similarities between a slanted version of a regular 'Y' and the italic 'Y' are great. To prevent a letter 'falling over' the right-hand diagonal of the italic is set more vertical. The letter 'w' is generally clearly visually narrower than the 'v'.

v' and the 'y' share  
 f the capitals in this  
 'y' includes a tail and  
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 ith the letter 'U'.



Omnibus Jenson Classico



ITC New Baskerville



Middle section is different to that of the capital



Monotype Joanna

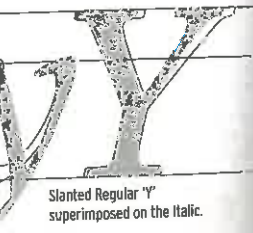
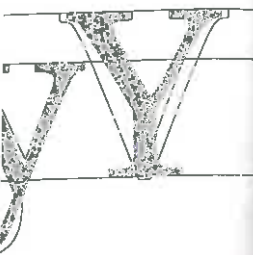


Apexes of capital 'V' and 'W' are sharper

Slanting terminals



Monotype Syntax



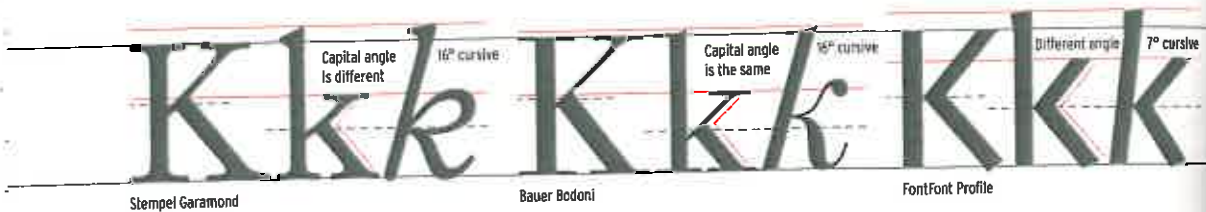
Slanted Regular 'Y'  
 superimposed on the Italic.

Although the so-called slanting of  
 roman typeface is not normally  
 considered standard practice in  
 the design of typefaces, the simi-  
 larities between a slanted version  
 of a regular 'Y' and the italic 'Y'  
 are great. To prevent a letter 'val-  
 ling over' the right-hand diagonal  
 of the italic is set more vertical.  
 The letter 'w' is generally clearly  
 visually narrower than the 'v'.

# KZXkzx

The Bell Centennial was constructed specifically for use in telephone books with highly absorbent paper. The clearly visible ink traps ensure that the characters do not become distorted by ink spread. Useful is that the left-hand style is called 'Listing' and extends below the baseline as standard. As such, a fixed positioning and size difference has been programmed into the typeface itself and does not have to be manually altered when setting the text. The style to the right is called 'Address'. The construction of the 'X' is also designed with the avoidance of ink spread in mind, hence the extreme staggering of the diagonals.

**Diagonal in lowercase and capital** This group includes the letters 'k', 'z' and 'x'. The letter 'k' is a complex combination of inner and outer forms. It begins with a vertical stem against which two diagonals come together. The visual midpoint of the capital 'K' is almost always where the diagonals meet. With the lowercase 'k' it is the visual midpoint of the x-height. How the diagonals come together is extremely varied. It can be a point, sometimes a horizontal line, sometimes with displacement of the lower diagonal. Most designers prefer this join to be the same for both the lowercase and capital letter. The lower diagonal is usually heavier than the upper and so forms a strong leg upon which the construction stands. With sans-serif typefaces the two diagonals tend to be of equal visual thickness. The diagonals can also be arched. A characteristic feature of the 'k' is the visually 'busy' central area, which can lead to ink spread in smaller font sizes, especially when printed on newspaper or other uncoated kinds of paper. Some typefaces designed for use in newspapers or telephone books have extra deep incisions at the junctions of strokes such as at the middle of the 'k' and 'x' (especially in the condensed and bold styles), which function as ink traps.



Stempel Garamond

Bauer Bodoni

FontFont Profile

The letter 'z' has a simpler construction than the 'k'. Two horizontal lines linked by a diagonal. The lowercase version is almost always a smaller representation of the uppercase, but several visual corrections are needed in the boldness and proportions. The corner of the diagonal is often different in the lowercase than with the capital. The lowercase 'z' of humanistic typefaces has somewhat calligraphic properties, visible in a decorative terminal to the strokes or in a curve of the line resembling the stroke of a pencil. From a calligraphic angle, the diagonal connecting line between the two horizontals should be thinner.

The design of the italic versions of both the 'k' and the 'z' can be very different, sometimes because the letter spacing of a basic serif would be too large and sometimes because the italic was traditionally a completely different typeface. The diagonals of the capitals and lowercase letters are usually not placed at the same angle.



Monotype Italian Old Style

ITC New Baskerville

FontFont QuadraatSans



Centaur

Didot

Caecilia

Trade Gothic

Univers

Futura

Although the Frutiger at to consist of equal thickness actually be the middle consists of different in relation in rel

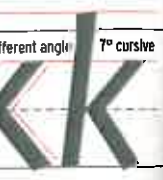
Upper half feet lower aperture

Middle Point of intersection above the middle

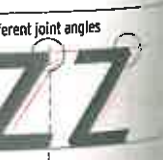
Bauer Bodoni

The 'x' is there are and only the 'x' appears both serif illusion thinner drawing top half above this is drawn the upper placed deriving lower section in construction intersect

s 'k', 'z' and s. It begins 'he visual meet. With : diagonals horizontal :signers prefer. The lower eg upon diagonals :hed. A charh can lead to paper or other papers or kes such as old styles),



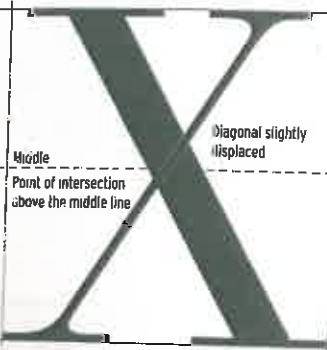
the italic versions and the 'z' can be , sometimes because ing of a basic serif large and sometimes italic was traditionally different typeface of the capitals and lers are usually not same angle.



Although the 'X' of the sans-serif Frutiger at first glance appears to consist of two diagonal strokes of equal thickness, the strokes actually become narrower towards the middle and the construction consists of four separate strokes, different in weight and placed irregularly in relation to each other.

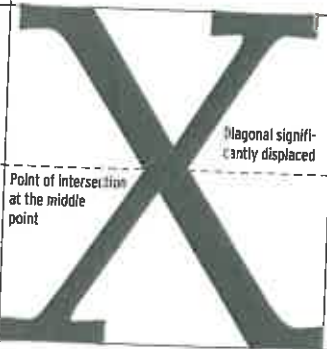
In general, type designers prefer to use a thicker diagonal as this brings the grey tone of the letter more in balance. The lower horizontal line of the 'z' is a little wider than the upper line so that the letter 'stands' steady. In most designs the 'z' leans slightly to the right because the upper horizontal stroke is positioned a little to the right of the centre of the lower horizontal. The corners where the diagonals meet the horizontal lines can be sharp, rounded or angular. In serifed typefaces, the serifs used here are similar to those of the 'L', 'E' and 'T'. Just as is the case with the 'E', the upper serif is smaller. There are also similarities in form between the diagonals of the capitals and the 'V', 'W', 'M' and 'N'. This is particularly visible with the sans-serifs. This is not the case with the lowercase letters because the 'l', 'e', 't', 'm' and 'n' differ in form to the capitals.

Upper half leans to the right, different serifs, lower aperture larger than the upper



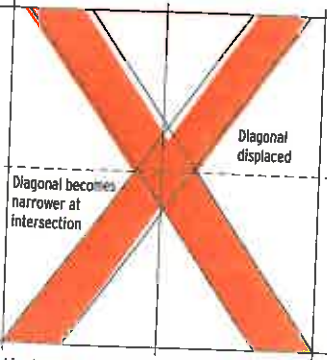
Bauer Bodoni

Upper half leans to the left, different serifs, lower aperture larger than the upper



Linotype Compatil Letter

Upper half centred, complex construction, lower aperture larger than the upper



Linotype Frutiger

The 'x' is a separate case because it consists only of diagonals. In principle there are two diagonals, but these are often staggered, as with Frutiger, Avenir and Univers – not coincidentally all by the hand of Adrian Frutiger. Although the 'x' appears quite simple in construction, it is surprisingly difficult to design, both serifed and sans-serif versions. If a thin and a thick line cross, a visual illusion is created whereby the lines appear staggered. To avoid this effect, the thinner diagonals of serifed types are shifted slightly. To avoid the 'x' appearing top heavy, the point at which the diagonals meet is positioned slightly above the vertical middle point of the letter and/or the upper part of the letter is drawn a little narrower than the lower section whereby the white space of the upper part is smaller than the lower. There are two variations for the vertical placement of the upper and lower sections of the letter. With the version deriving from calligraphy, the letter leans a little to the left and the upper and lower sections line up on the left side. The second version is more symmetrical construction, with the upper section placed centrally in relation to the lower section. The 'x' also often includes a narrowing of the line at the point of intersection of the diagonals.

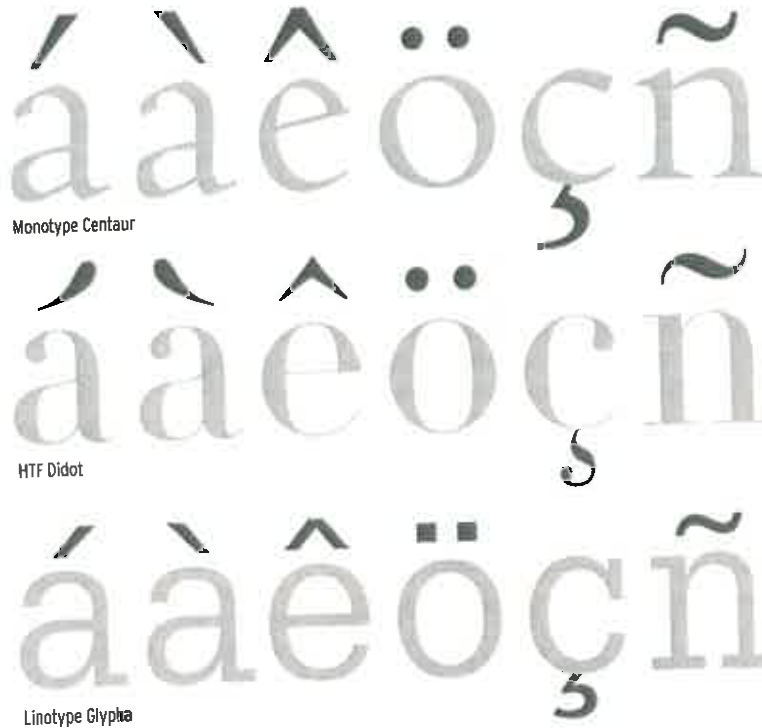
The italic style often contains surprising differences in form, especially with serifed types. Below are the lowercase versions of Adobe Garamond and Bauer Bodoni.





The upper 'at sign' is from Adobe Garamond, left the roman and right the identical italic. Second is Proforma, which does have a different italic version. At the bottom is Alega, again with an identical italic version.

**The other characters** The letters of the alphabet have been globally discussed on the previous pages. It will have become clear that only the regular style has been examined, and where necessary the italic style. The most important message is the understanding of the construction of the different characters and their mutual relationships. It had been possible to discuss also the problems relating to the bold, condensed, extended and light styles, but that would go beyond the purpose of this book. Since the introduction of the computer, numerous existing typefaces have been extended to include additional styles for swash letters, small capitals, various series of figures and even pictograms that are made in the specific style of a typeface. Apart from these separate styles, a font includes a number of ligatures, fractions, symbols, punctuation marks and diacritics as standard (see the character set on p. 144). A few examples are shown on these pages. Most of them are designed based on the existing letterforms in the typeface. With the arrival of the digital era, there are many more choices, particularly with figures, which is particularly useful in the typography of annual reports and other financial publications, where old style figures can be used in the body text and tabular figures in the tables and lists. The extra symbols are often a source of enjoyment for the type designer. Jan Tschichold – graphic designer, teacher and publicist – wrote a book, for example, about the variations in form of the & symbol, but the @ symbol also receives a lot of attention since the introduction of e-mail. The reason using this existing symbol for e-mail purposes was that it barely was used before for other applications.

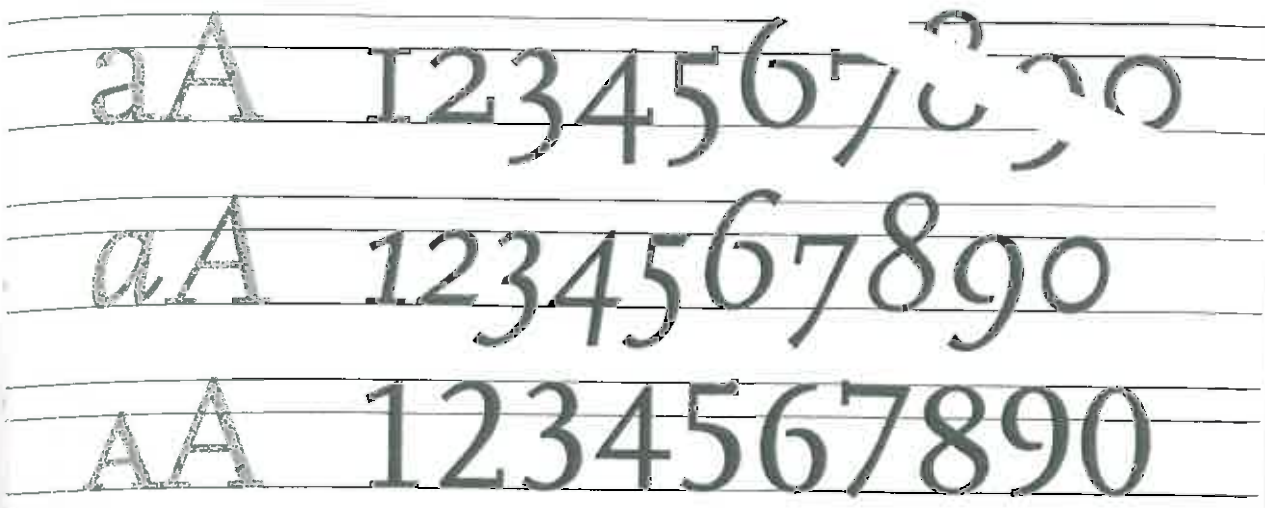


Diacritics are marks placed below or above a letter that indicate how a word should be pronounced. Left are the most commonly used symbols. The acute accent (right) and the grave accent (to its left) are used to apply emphasis or as pronunciation indicators. The circumflex is generally used in borrowed French words (such as crêpe). The dieresis is used to indicate two successive vowels that should be spoken as two separate syllables. In German the same glyph is called an umlaut, which indicates a change in vowel sound. The cedilla is again used mainly in words borrowed from French (such as façade) and the tilde (as in El Niño) is not used in English.



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Scala by Martin Majoor was in 1988 one of the first digital typefaces that, for reasons of practicality, included old style figures as the default. The lining figures (lower line of the upper diagram) can be found in the small capitals style (Scala-Caps).

**Figures as components of a typeface** Figures are important components of a typeface. If numbers are used often in a body of text, they can have a significant influence on its legibility. A general trend in typefaces designed specifically for editorial or publication design, especially annual reports, has been the inclusion of up to eight sets of figures; lining (same height as cap height), non-lining (old style figures or OSF, where heights and placement match lowercase), tabular lining (spaced centrally within a set measure for vertical columnar alignment), tabular non-lining (spaced centrally within a set measure for vertical columnar alignment), superior (superscripts for ordinals and footnotes), inferior (subscripts for ordinals and footnotes), numerator (superscripts for making proper fractions), denominator (subscripts for making proper fractions). In earlier Postscript Type 1 and TrueType formats, inherent limitations in the font format meant that these fractions, small figures, tabular and OSF figures were usually supplied as part of a separate 'expert' font. Since the advent of OpenType typefaces they are usually included in a single 'std' or 'pro' font, but often require a certain amount of 'hunting and pecking' through the glyphs palette in the page-layout applications to find and use appropriately.

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1234567890/1/1234567890/1

1234567890

1234567890

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Left is the extended figure set of Profile with above the specially designed small figures for use in notes, fractions, superscript and subscript figures (note the number '1' without serifs useful for fractions). As well as the proportional old style figures for the text, there are also mono-spaced old style figures available which can also be used as tabular figures. The number '1' has an altered design to avoid undue white space around the letter. To the left is an example of how these figures align. At the top are the tabular lining figures, in the middle the tabular old style figures, and below are the proportionally-spaced (default) old style figures.



Xx 1234567890 123

The previous paragraph discusses the different kinds of figures from the viewpoint of the user. It goes without saying that the so-called Arabic figures have been discussed, not Roman numerals. In general, the latter are considered useless for calculations. Their use is therefore limited to more stand-alone applications such as classically designed clock faces, in books as page numbering in the foreword, chapter numbering and the year of publication and in names such as Louis XIV. Roman numerals are made up of regular capitals or, often considered more aesthetically pleasing in a body of text, small capitals. In the chapter 'The Letter Family', the origins of Arabic figures are described at length and the construction of Roman numerals is analysed.

The Adobe Caslon (above) shows that the lining figures are designed slightly smaller than capital letters. The old style figures have the same x-height as the lowercase letters in this typeface.

In the mid sixteenth century, the use of Arabic figures began to spread through Europe, partly due to the introduction of the printing press. The figures were used universally for a long time and did not belong to a particular typeface, similar to the difference between the roman and italic styles at the beginning of the era of printing with cast metal type. Gradually, typefaces were extended with matching italics and figures designed specifically for the typeface. The first figures to be specifically designed as an integral part of a typeface were made around 1522, according to type historian Hendrik D.L. Vervliet. Some sources say that it was Claude Garamond who used them for the first time. They were intended for the body text and had ascenders and descenders, the so-called old style figures. In general these are drawn slightly larger than the x-height of the lowercase letters. Only the figures 0, 1 and 2 are small characters, and the rest of the figures have ascenders or descenders.

The old style figures of the *Quadraat* (below) include the classically designed Roman '1'.

0 1 2 3

12345  
1234567  
123456789

Figures are an important element of signage including the N (former American series) from which Interstate and Germany DIN 14 which FF DIN by (below).

The diagram below shows Text (top) with drawn smaller letters and lowercase, whereby extend above a (bottom) has a character whereby '2' are of equal normal old style.

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Figures are an important component of signage. Many countries, including The Netherlands, use the (former) American typeface (FHWA-series) from which both the regular and condensed versions of Interstate are derived (top two). In Germany DIN 1451 is used, upon which FF DIN by FontShop is based (below)

The diagram below shows Miller Text (top) with capital figures drawn smaller than the capital letters and larger than the lowercase, whereby the '6', '7' and '9' extend above and below. Solex (bottom) has a more hybrid character whereby only the '0', '1' and '2' are of equal size just as with normal old style figures

Lining figures only exist since the eighteenth century as a result of the Industrial Revolution. They are generally designed a little lighter and smaller than the capital letters so that they are less obvious in a text. The initial opinion was that capital figures were more legible because they were more obvious within a text, but research later proved that this is not the case and that old style figures are more legible. This is one of the reasons that old style figures are included more often in new typefaces, especially in the regular style. Some typefaces have four different series of figures, split into figures for within a text and the monospaced or non-proportional tabular figures. For both versions there are old style figures and lining figures available. The lining figures are identical to each other, with the exception of the '1' in most of the sans-serif types. This is often given serifs to limit the amount of optical white in the monospaced version. The same is true for the old style figures (which are of course different than lining figures), again with the exception of the '1' which sometimes has serifs like those of a Roman numeral 'I'. A different form is in the making with hybrid figures which have shorter ascenders and descenders and are shorter than normal lining figures but taller than the x-height. Examples are Miller by Font Bureau, Solex by Zuzana Licko for Emigre and ITC Biblon by František Storm. Georgia, designed by Microsoft, included hybrid figures in its first version, but they were replaced by old style figures in the final version. Bell Gothic has so-called three-quarter figures, which are smaller than the capitals but which are all of equal height.

Xx 1234567890  
Xx 1234567890

The font Centennial is a typeface designed specifically for the telephone book. Its name, the sizes and alignment of the basic fonts are based on this.

Address	Name & Number	Sub-Caption	Bold Listing
1234567890	1234567890	1234567890	1234567890

01 0I  
 01 0I  
 01 0I  
 01 0I

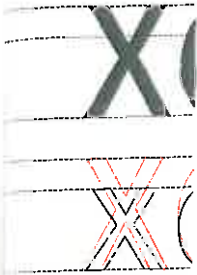
From top to bottom: Adobe  
 Garamond, Gill Sans, Myriad Pro,  
 Monaco.

Everyone is familiar with the confusion that arises when the figure zero appears in a serial number or licence code consisting of figures and capitals. The difference is usually quite clear with seriffed type, as the capital 'O' is wider than the figure 'o' and often has a different angle in the thick-thin axis. This contrast is less with sans-serif typefaces, which means the only difference is the width of the character. Solutions incorporating a slash into the design or a different form do exist but give rise to other associations (such as with the 'Ø', the slashed capital 'O' common to many Scandinavian languages). The figure '1' is a separate case because it is so narrow. Here, the confusion usually occurs with sans-serif typefaces because the '1', 'l' and 'I' are all very similar. Gill Sans by Monotype and Strada by FontFont are perhaps the best examples of this. The figure '1' has two more variations with old style figures. The version most closely resembling a Roman numeral is usually seen in the galdes such as the Garamond, for example.

The number '2' of the small version and the capital are equal in size to the zero of each version. The construction of the old style figures is closely related to the lowercase letters. The '2' shares similarities with the 's', 'c' and 'a'. The '3' and the '5' contain open bowls which are very similar. The '3' usually has two open bowls but it is also sometimes drawn with the upper bowl replaced by a 'z'-shaped upper section. Terminals of the curved strokes and straight lines may have the same serif or teardrop shape, the central elements are seldom decorated.

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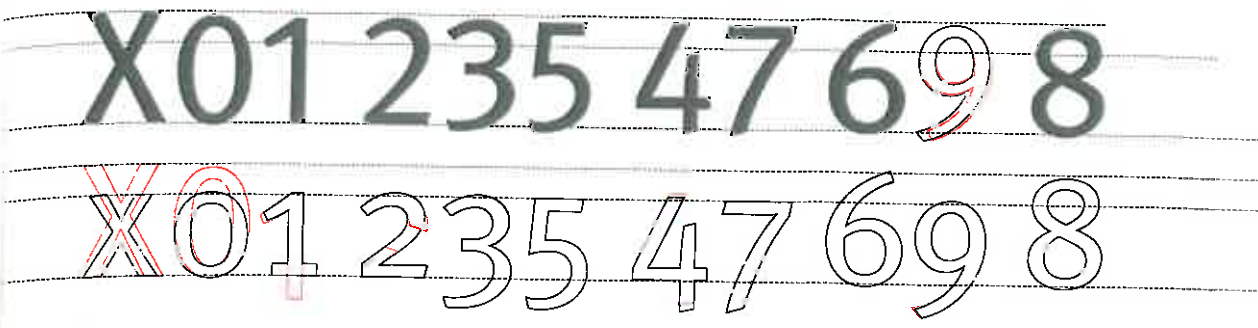
The Formata (above) shows an example of the typical z-shaped '3'. The curved bowl is similar to that of the '5'. Below is the Quadraat by Fred Smeijers.



The tabular figure style figures of differences in f subtle. In the '0' line) has been r and superimpo This is the sam to it. In the line lar figures in re superimposed i figures The '1' to highlight the the lower and t the tabular figur used to show s curve and the l

4 5 6 7 8

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The tabular figures and the old style figures of Meta show that differences in form can be very subtle. In the top line the '6' (red line) has been rotated 180 degrees and superimposed with the '9'. This is the same '6' shown next to it. In the line below the tabular figures in red have been superimposed with the old style figures. The '1' has been moved to highlight the differences. Only the lower and upper sections of the tabular figure '2' have been used to show similarities in the curve and the base.

There are many variations of the '4'. It can have an open or closed form, but the lining and old style '4' usually have the same shape. In general the descender of the old style '4' is shorter than the lining version. The basic form is a triangle, which makes it a rather difficult figure to bring into balance, especially in relation to the other figures. The same is true for the '7' which is also open in shape and contains a diagonal. With its open shape there is a large amount of space around the letter. The '6' and the '9' are sometimes the same character rotated 180 degrees in relation to each other. The counter of the '6' is usually larger than that of the '9', especially with old style figures. The combination of counter and curve should be visually well balanced. The ascender of the 6 and descender of the 9 in a seriffed face often curve back and end in the form of a teardrop. One of the most unusual shapes is the '8' which, in geometric type-faces such as Futura, appears to be constructed of two equal, round shapes. The top one is in fact always smaller. The second variant is a version stemming from calligraphy. The lines of the '8' are often narrower at the point of intersection (see *Quadrat* at left).

This chapter surveys only the very tip of the iceberg representing the work of a type designer. It is intended to provide a glimpse of the depth and complexity of the countless possibilities available in the letterforms themselves.

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