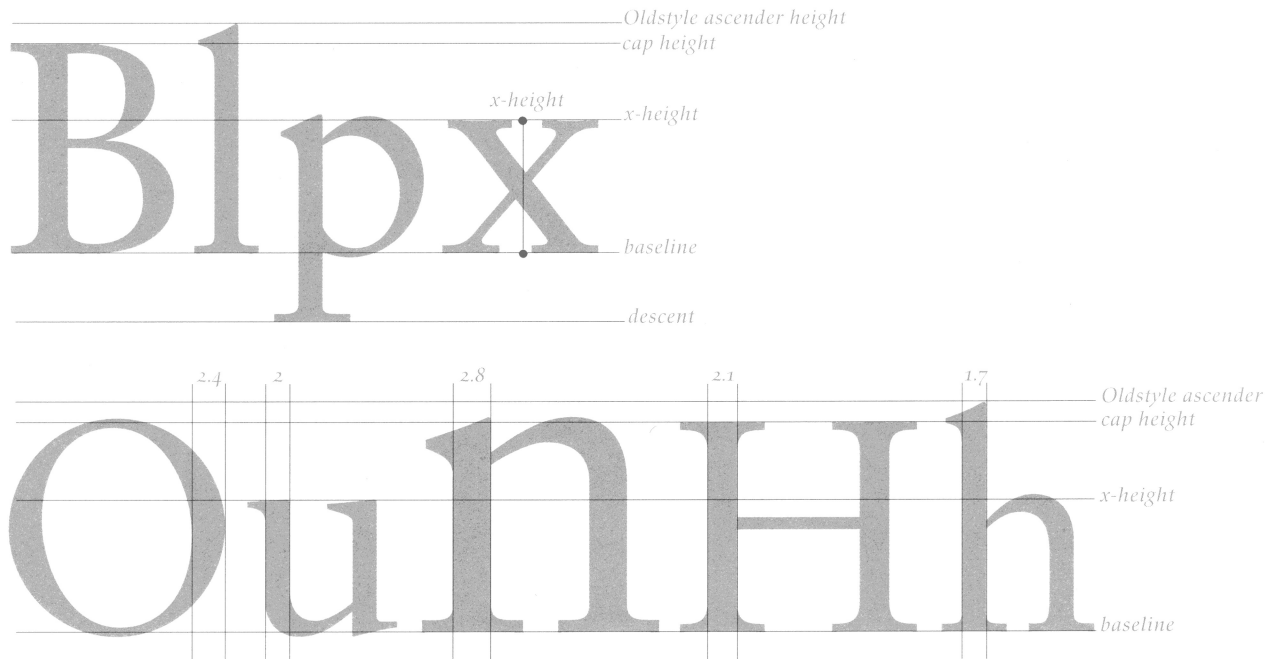# The Serif Letter

TYPE HISTORIANS suggest that serifs, the small thin extensions on the top or bottom of a letter's stem, developed with stone cutters' efforts to sharpen the corners of incised letters on Roman monuments. Modest serifs can be found in the early types of Sweynheym and Pannartz in Rome in 1467, and reached their ultimate refinement in the hands of Didot in France and Bodoni in Italy in the late 18th century. The latter types, Bodoni and Didot, which we term "Modern," have a further distinction: they are drawn with a vertical stress, opposed to the earlier forms which were produced by the actions of a broad-pen held at an angle, which produced a thick and thin letter with a diagonal stress.

Serif letters depend on approximately equal proportions with slightly less space between them for maximum legibility in text. Their thicknesses and proportions may vary enormously for display typography and advertising.

Serif letters are classified as roman after the classic roman letter, which means also that their repose is plumb. Italic refers to slope; the word has its origin in Italy where italics were based on writing hands of the day.

Serif letter fonts have the greatest usage in the Western world, where sans serifs, generically "block" letters, are used mainly for advertising and information graphics.

Oldstyle ascender height
cap height

x-height                    x-height

baseline

descent

**Blpx**

2.4    2    2.8              2.1              1.7

Oldstyle ascender
cap height

x-height

baseline

**OunHh**

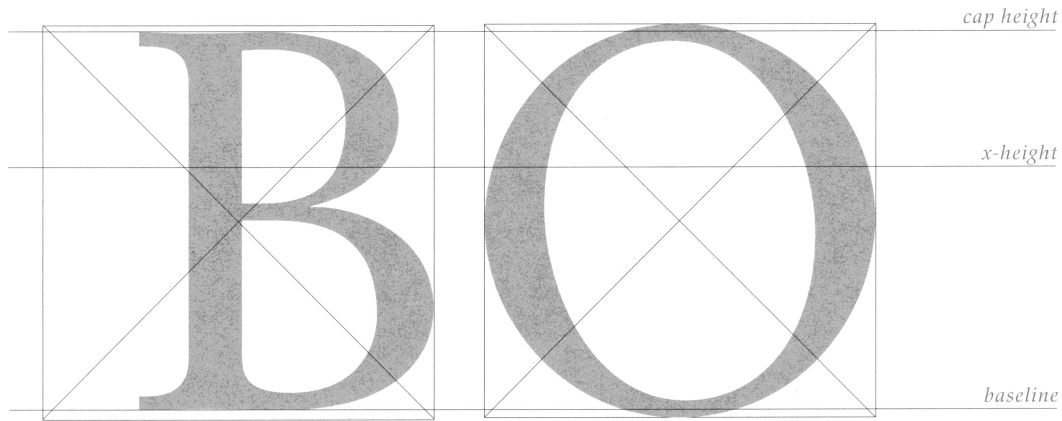*Sabon—Jan Tschichold, Stempel, 1964–67*

## x-Height

A FONT'S LETTERS rest on a base-line. The main body of a lowercase letter is measured by the x-height (the only lowercase letter with horizontal serifs top and bottom; the **k** has an ascender). The size relationships of lowercase to capitals differ, and depend on the designer's intentions. Sabon has a lowercase-to-cap ratio of .63:1. Today display fonts (14-point and larger) usually have a large x-height, which allows lines of type to be packed together for a strong statement. An approximate ratio for a display font is .6:1. There are a few text fonts with normal ascender height but with shortened descenders, because the top half of a line of type counts more for legibility than the lower half. This allows more lines to a page, with the added luxury of tall, legible ascenders and generous capitals.

## Straight & Curved Stems

FONT DESIGN relies on optical illusions. All stems, straight, curved, and diagonal, are drawn to appear optically the same thickness. A broad-pen held at an approximate 15-degree angle, will produce crescent-shaped curves that appear lighter in mass than a straight stem of constant thickness. To compensate, the curves must be widened so that they are optically the same thickness as the straight stems.

The vertical stems should be equal width, and all curved stems should appear to match them: **b**, **c**, **d**, **e**, **g**, **o**, **p**, **q**, **s**, **B**, **C**, **D**, **G**, **O**, **P**, **Q**, **R**, **S**, **2**, **3**, **5**, **6**, **8**, **9**, etc. There are no set rules to accomplish this. Mortimer Leach, in his classic book *Lettering for Advertising*, drew the curves one-third wider than the straight stems, but this relationship will vary depending on the width of the letters and the thickness of the thin strokes. Capital letters are bolder than lowercase because each capital contains more negative space,

which optically erodes the stem's thickness. If constructed with the lowercase stem thickness, the caps will appear to be lighter. The slightly heavier capital weight is useful to indicate a sentence beginning. Its added weight helps distinguish a capital **I** from a lowercase **l**: **Il**. The cap-to-lowercase weight ratio and the relationship of curved weight to straight stem weight are optically determined. The stem ratios vary from font to font.

cap height

x-height

baseline

*Sabon—Jan Tschichold, Stempel, 1964–67*

AHONQTU

BEFLPRS

ABCEGMNOS

*Trajan—A.D. 113*
*(Carol Twombly, Adobe, 1989)*
CLASSIC

ABCEGMNOS

*William Caslon—1722*
*(Carol Twombly, Adobe, 1990)*
OLDSTYLE

ACEGMNOS

*Giambattista Bodoni—1818*
*(Bodoni, Heinrich Jost, Bauer, 1926)*
MODERN

## Capital and Lowercase Proportions

OLDSTYLE AND MODERN are the two basic serif font proportions. A third may be added, the Classic, from which the Oldstyles are derived but it pertains mainly to the capitals, whose widths have greater variety. The lowercase widths are about the same in text fonts; it is the caps that are telltale. Oldstyle fonts are based on the concept of a square that the Romans devised: **A**, **H**, **O**, **Q**, **N**, **T**, and **U** are roughly a square; **B**, **E**, **F**, **L**, **P**, **R**, and **S** are about one-half the square's width, and the **M** and **W** are wider than a square: simple instructions for a stonemason chiseling letters.

Modern fonts attempt a sameness of proportion—not a mathematical scheme, but one with optically equal amounts of negative space within the letters—one for the caps and one for the lowercase. The lowercase **n** and **o** best illustrate the problem. A normally proportioned **o** will fit within a square; that is, all sides of the **o** will touch the square. If the counter of the **n** is drawn

**n** *counter width*        **n** *counter width*        **n** *counter width*

mno
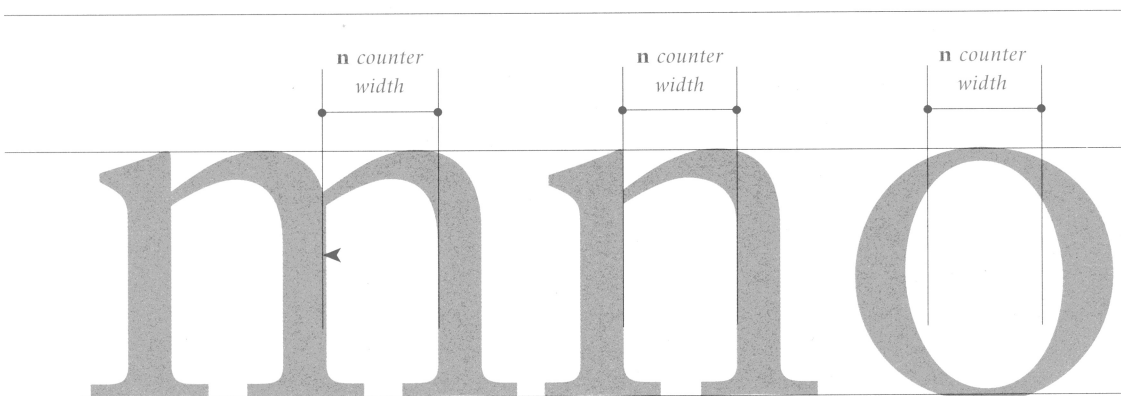
*Sabon*

to the same width as the **o**'s counter, the additional space supplied by its corners will create a greater volume. The **n** must thus be narrowed to appear the same volume. A slightly condensed **o** may be attached to a stem to produce the group **b**, **d**, **p**, **q**. The **c**, **e**, and **o** make up a group; **h**, **n**, and **u** are a third group. With the exception of **m** and **w**, the rest of the lowercase letters will fit with some ease into one of these groups.

The categories are general because each font has its own set of proportions determined by the designer. Some have been based on a grid and others are intuitive.

Serif length plays an important role in fit, but it is the relationship of letter width, stroke weight, and letter spacing that are the most important design features of any font, Oldstyle or Modern. They are the font's lifeblood.

b d p q
c e o
h n u
v x y
m w

*Letter groups of similar widths Sabon*

# X SM CPS

# x-height

*Sabon—Jan Tschichold, Stemple, 1964–67*

OLDSTYLE FIGURES

## x-height  1234567890

MODERN FIGURES

## Cap high  1234567890

*Sabon*

MODERN FIGURES

# 1234567890

*Bodoni—Heinrich Jost, Bauer, 1926*
*(Giambattista Bodoni, 1818)*

1
2
3
4
5
6
7
8
9
0

## Small Capitals, Modern, & Oldstyle Figures

SMALL CAPS are often combined with Oldstyle figures in "expert" fonts. Type designers vary the height of small caps, but their form is always wider in proportion than the regular caps, to match the negative area of the lowercase. If you enlarge them to regular cap height, you will find them to be a more generous weight. Typographers are fond of small caps; they are helpful in layouts where regular-sized caps would overpower other information. It is not always necessary to use them side by side with the lowercase. Letter-spaced, they are graceful.

Oldstyle figures are a very old idea. They originally sprang from the Levant and India. The Persians added the cipher (0). The 1, 4, and 6 can be dated to the third century B.C. in Hindi manuscripts. Claude Garamond tried his hand at them in a specimen dated 1545. They are designed to set with the lowercase and usually are a bit taller than x-height. Oldstyle figures are used today in the same manner as small caps: for less emphasis than modern, or aligning, cap-high figures. Oldstyle figures combine unobtrusively with text matter, though most are fitted to tabulate, and they are more openly spaced than the lowercase. They are fitted within an en, which compromises their proportions.

The Bodoni aligning figures (left) show a figure 1 with sidebearings that will create misspacings; a narrow 4; a wide 7. The 5 with an ogee crossbar has a different design concept than the 2 and 7. The horizontal strokes of the 2, 4, 5, and 7 reference calligraphy forms in which an angled writing instrument produces a heavy horizontal stroke. Metal typefoundries once offered a few hand-set fonts with normal-proportion figures to color the same as the lowercase.

# The Sans Serif Letter

THE WORD SANS is derived from the French and means "without." Sans Serifs are commonly known by the shorter term "sans," and sometimes "Gothic," or block letters; the latter usage may stem from a bold, squarish, and rustic font designed for the Berthold Type Foundry in 1908 by Heinrich Hoffmann. (See page 20 for a definition of serif letters.)

The Calendar of Thorikos (5th century B.C.), which appears on page 17, demonstrates how little some of the shapes of our alphabet have changed. Early sans serif letters were formed by the pointed stylus used to draw them on papyrus or inscribe them in clay tablets. As type forms, they emerged in England as far back as 1780 but were then known as Egyptians, a term that today is reserved for square-serif letters.

During the last part of the 19th century, sans serifs gained in popularity, from aggressive sizes of wood type to fanciful metal display versions. In more restrained drawings their proportions were almost equal, typified by Univers and Helvetica, the latter a modified 1890 font named Akzidenz Grotesk. In 1922, Jacob Erbar designed a sans serif for the Ludwig & Mayer Type Foundry (Erbar) that established the term German Sans, which he based on classical proportions, instead of the evenly proportioned 19th-century sans.

Classical roman letters are sometimes referred to as Quadrata, or square. The **O** fits within a square, and **B**, **D**, **E**, **F**, **P**, **R**, and **S** are approximately half as wide. The classically proportioned Futura, designed in 1929 by Paul Renner, gained in popularity over the original 1923 Erbar, and has since been one of the 20th century's most popular sans serifs fonts. It is available in digital form in a wide range of weights and proportions.
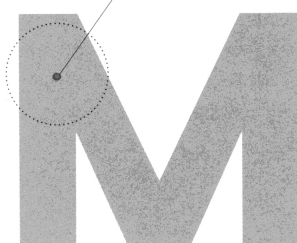
*Unless thinned, bowls
create mass at joins*

*Futura bold*
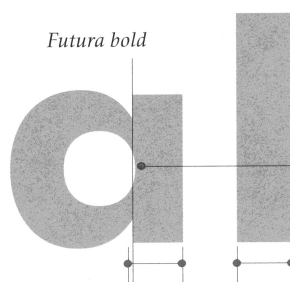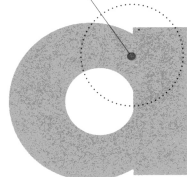
*Note that the **a**'s counter erodes
the vertical stem to prevent the
stem from appearing too bold*

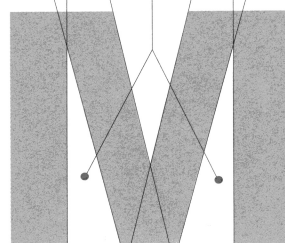***a**'s vertical stem is thinner
than basic stem.*

*Overlapped stems create
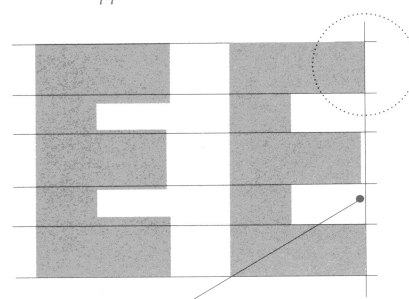large masses and make a
letter appear spotty*

*Minimum overlap permits
near-equal white space division*

*Equally weighted horizontal
stems appear too bold*

*Four mechanical stems*

*Univers 75—Adrian Frutiger,
D. Stempel Linotype, 1976*

*Middle arm is short
and optically centered*　　*Futura bold*

## Optical Adjustments

OPTICAL ADJUSTMENTS are
vital if a font is to have even color,
especially if the font is bold or
extra bold. Even color suggests a
lack of congested areas. There are
three types of joins that require
modification: a bowl to a stem
(**a**, **b**, **d**, **g**, **p**, and **q**), a diagonal
joined to a vertical stem (**N**, **K**) or
diagonal to diagonal (**M** and **W**).
The first **a** in the illustration above
is constructed mechanically with
constant thickness and has a taller
bowl to appear the same height
as the straight stem. Its constant
weight creates a dense area where
the curves join the stem.

At a large size the top and bot-
tom clefts of white space are barely
defined; if reduced to 8- or 10-
point size, all definition will be
lost, the junctures will fill, and the
character will be even denser. Type
designers solve this by thinning
the curve's horizontal thickness
as it rolls into a stem, exercising

care not to flatten the curve. The
Futura **a** shows that adjustment and
tapers at the x-height and baseline.
Note that the top and bottom bowl
curves are thinner than the center of
the vertical curve. This adjustment
is made to some degree on all hori-
zontal strokes, straight or curved.

The four mechanically drawn
**M** stems are equally weighted, and
appear bulky. Beside it, Univers 75
**M**'s diagonals are thinned and are
not completely overlapped at the
baseline. At cap height, the overlap
is even less. In many bold sans, the
vertical stems taper to the joining
point; the inner diagonals are par-
allel. These adjustments are vital
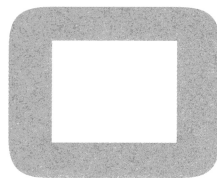if the letter is to color equally with
the font's simpler shapes.

A vertical stem rotated 90 de-
grees always appears bolder, and
in medium to bold and bolder sans
fonts the horizontals are thinned to
optically match the vertical stems
as illustrated in the cap **E**s above.
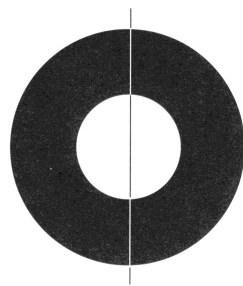
*mechanically drawn*
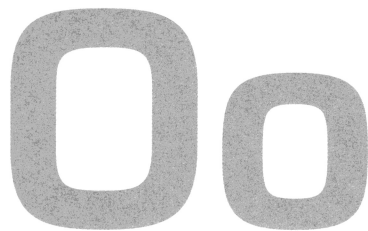


*Eurostile*

*1.*
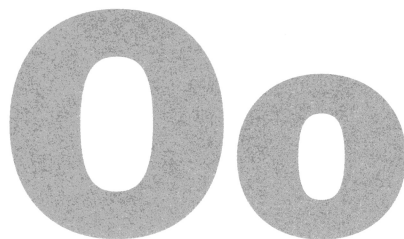


*Franklin Gothic*

*2.*



*Bank Gothic*

*3.*

## The Art of the O

AN **O** IS A DECEPTIVELY simple shape. It may be a circle, ellipse, oval, rounded square, rectangle, or triangle.  A circular **O**, while geometrical, does not appear to be of constant thickness; the horizontal curves seem bolder than the vertical curved sides. If an optically single-weight letter is desired, the top and bottom curves must be thinned to appear the same as the left and right vertical curves. When the bolder versions are drawn for a family, the letter is often wider and the contrast between the horizontal and vertical curves is increased; more weight is added to the vertical curves than to the horizontals.

The version of Franklin Gothic shown has pronounced squarish shoulders; even the lighter Helvetica has curves that turn abruptly. Adrian Frutiger drew the **O** and other round forms of his Univers with more shoulder to fill the space created by the loss of serifs. Despite their light weight, Gill Sans and Futura have curves that are thinned top and bottom—rotate this book 90 degrees to see the stroke width difference. In most lightweight fonts this adjustment is not made.

Adjustments must be made to balance the capital and lowercase size relationship. If a lowercase **o** is enlarged to cap height, it appears to have wider proportions than the lowercase, so type designers reduce the widths of caps. Note that the proportion of the Helvetica cap **O** is narrower than the lowercase, and the Futura extra bold uses the same scheme. Enigmatically, Eric Gill drew a visually single-weight capital, and then a decidedly two-weight, thick-and-thin lowercase.
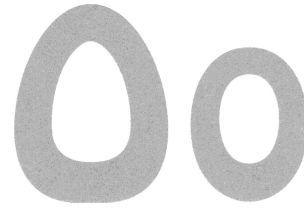
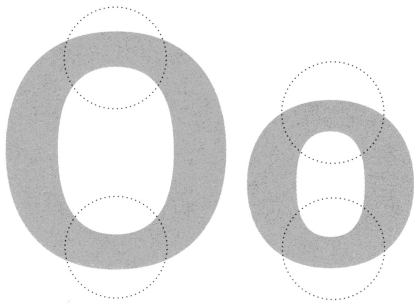There is no formula to direct the type designer.
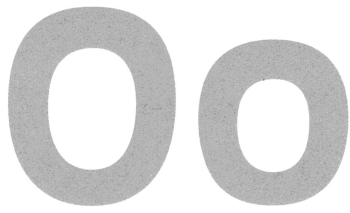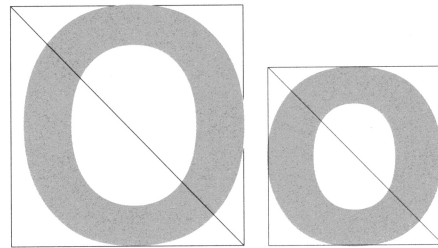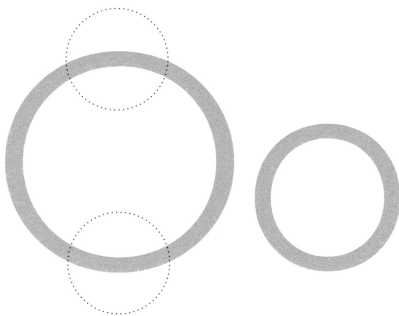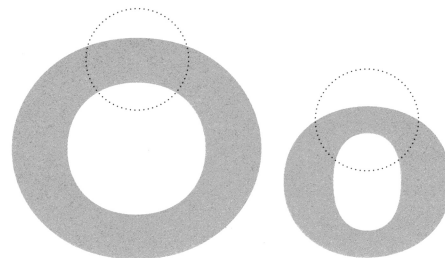
4.

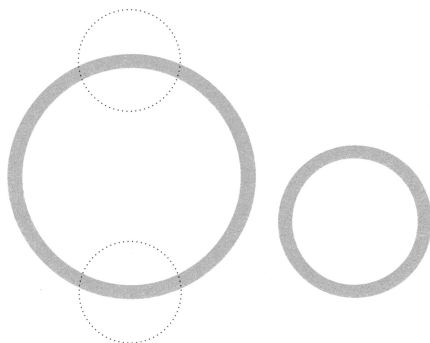*Antique Olive bold*

8.

*Hobo*
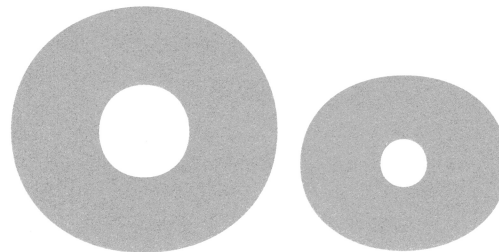
5.

*Univers 65*

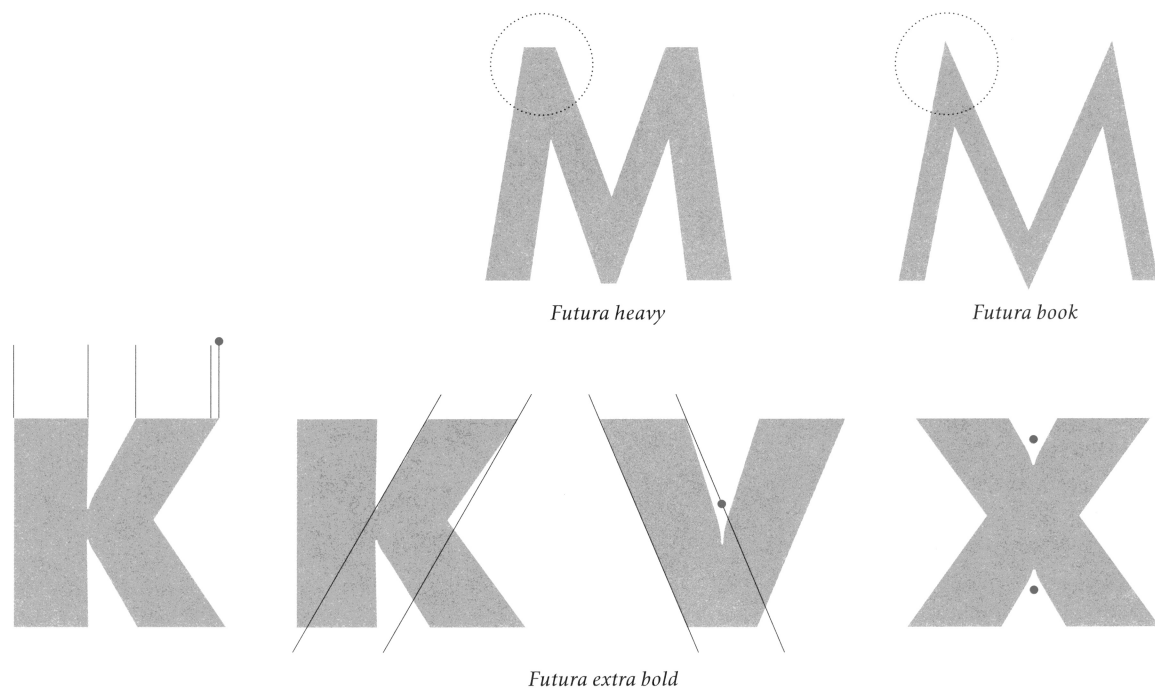9.

*Helvetica bold*

6.

*Gill Sans light*

10.

*Gill Sans bold*

7.

*Futura light*

11.

*Futura extra bold*

M M

*Futura heavy*          *Futura book*

K K K V X

*Futura extra bold*

## Diagonals

Of all the stems that make up a sans serif alphabet, none is more critical or troublesome than the diagonals, for both the lowercase and the capitals. Depending on the weight and proportion of the font, these must be thinned or tapered to color properly. Sometimes both adjustments must be made. Seldom are the lighter versions thinned.

Vertical stems of the N and M taper from the inside. Inner diagonals of the M, N, and W don't taper but are slightly thinner than the vertical stems. Tapering, diagonal stems are found on the A, K, R, V, W, X, and Y, and are wider at their tips than the vertical stems. Yet the overall mass of the diagonal is designed to optically match the vertical stems.

As a font becomes progressively bolder, the ploy of weight reduction becomes more obvious, particularly in display sizes, and decidedly so in the extra- and ultra-bold condensed versions. Nor must the diagonals overlap the verticals too much or else not enough white space can be introduced into the lower portion to balance the letter. Paul Renner solved the problem differently with Futura. He angled, or splayed, the sides of the M, which allows an almost equal division of white space within the letter.

To produce the bold weights, the pointed joins of the light versions A, N, V, and W must be chopped horizontally, but this lessens the identifying family characteristic. Note that white space has been forced into the center points of the V and X counters to prevent fill. Weight reduction alone seldom prevents the strokes from massing excessively; great care must be exercised to carefully control the overlaps and joins so that the font will not appear spotty.

## The Script Letter

SCRIPTS TYPES spring from our handwriting, a personal and reflective activity. Sadly, the computer has greatly diminished the activity. I like to define the style as connected letters, though many a font designed not to connect can be perceived as a script. A cursive quality best describes the style and is key to it.

There are many script fonts, some based on early chancery forms dating to the 15th century laden with opulent swash capitals and extravagant ending flourishes. The slope of script implies a degree of motion, while an upright form has a more quiet repose. The headings of this book are Hermann Zapf's masterly Renaissance swash italic that clearly reference the early chancery forms of Arrighi, Palatino, and Tagliente.

My Young Baroque, shown above, and on the following pages, is described by several names. Historians favor English Roundhand, and the British call the style copperplate from their custom of engraving the letters in reverse on copper. In the U.S. formal script and Spencerian script are favored, the latter after the 19th-century writing master Roger Platt Spencer.

There are linear scripts, one to teach children, and many from the 1920s and 1930s that we label Art Deco, plus brutal scripts that can evoke the ravages of war. Font design is an exercise in melding; there are even scripts with brush capitals and formally drawn lowercase letters.

*The left side of the basic stem curves and thins gradually from point of join to bottom turn. Note that the straight line C-D is longer than A-B, and that the joining hairline is tangent to the stem.*

basic stem · inverted basic stem

*a b f h*

*i k l m*

*n p q t*

*u w*
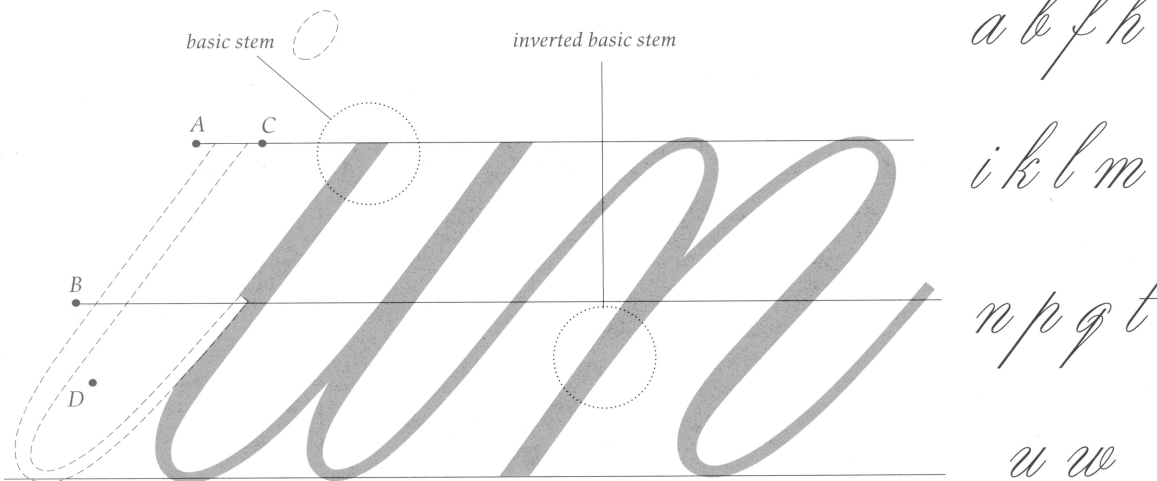
*Young Baroque—Doyald Young, ITC, 1992*

## The Basic Stem

THE BASIC STEM occurs ten or more times in most lowercase scripts, in normal and inverted positions; the **i**, **u**, and **n** are typical. It is a simple shape that decreases in width below where the preceding hairline joins. This point of join varies from font to font. The right side of the **i** has a longer straight line than the left side. Inverted, the shape forms the left side of the **n** and **m**. In hand-lettered versions, the radius of the baseline curve is drawn smaller for the tighter spacing required for straight-to-curve letterspacing than for straight-to-straight stems. Smaller radii are necessary for tightly spaced scripts and bold scripts. Traditionally, formal scripts carry a minimum amount of weight around the baseline curve. For consistency, the joins should align horizontally and, I think, look best and color evenly if the hairline join is tangent to the stem. This may vary from one-third to one-half the x-height. Angled joins create tension and interrupt the script's flow but may be necessary in a bold or tightly spaced line. Script fonts based on metal designs often use the original spacing, which depended on a letter's angle on a rectangular piece of metal type. As the angle of the type increased, so did the space between the letters, unless the letters were kerned, with the top right portion extended past the right-hand edge of the type, to rest on top of the next letter. As early as the nineteenth century, typefounders sought to overcome this by casting the letters on angle and offset bodies, and later, on wing bodies. All versions were troublesome: the kerns were fragile, and the angle and wing bodies required special spaces to begin and end the line. Some designers found this daunting and contented themselves with a more upright script, which can be spaced more snugly; Novarese's Juliet is one. To fill the space between the cap and the lowercase, Novarese introduced an arcing hairline that rests on the baseline and connects to the lowercase (*below*). Digital fonts are freed from these restrictions and kern extravagantly left and right.

Among Novarese's font designs are: Athenaenum, Augustea, Microgramma (with Butti), Fontanesi, Egizio, Garaldus, Slogan, Recta, Estro, Eurostile, Novarese, Cigogna (with Butti), and Stop.

*ABCDEFGHIJKL MNOPQRSTUVW*

*Juliet—Aldo Novarese, Nebiolo, 1955*

*A hairline designed to connect to a lowercase letter and fill unwanted space*

Hairline swash extensions
are used for embellishment

Bowls may be open as an
alternate character . . .

Loop is not a
continuous line
from the
preceding letter

Looped descender

. . . or bowl may be closed

Loops may be generous and
not connect to the following letter.
Hairline may be weighted

A B C D
E F G H
I J K L
M N O P
Q R S
T U V W
X Y Z
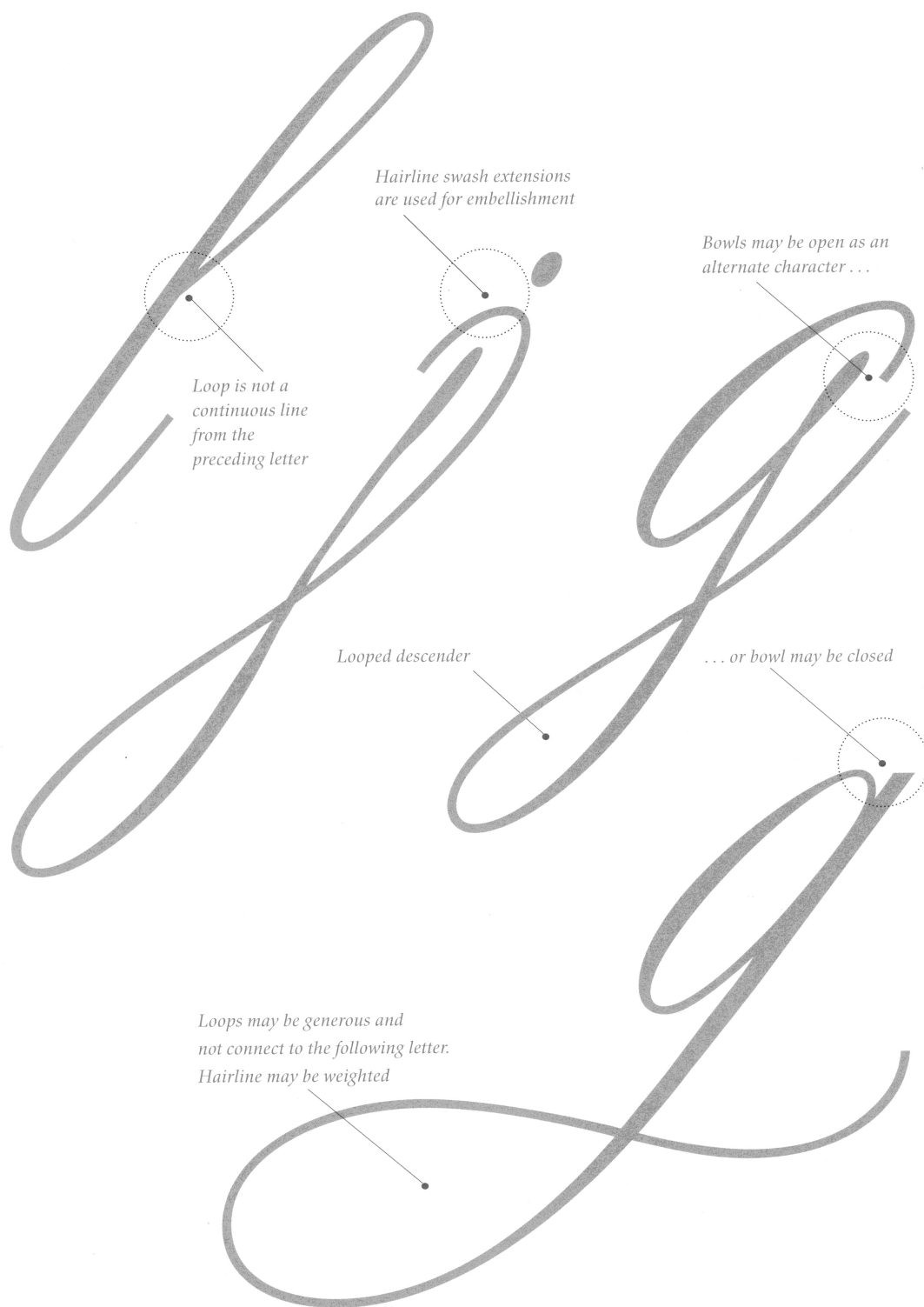
*Young Baroque—Doyald Young, ITC, 1992*
*Designed in the tradition of the English roundhand, popularized*
*by George Bickham in* The Universal Penman, *1743*

## Young Baroque

SCRIPT CAPITALS are related by proportion, then by the thickness and distribution of weight, but most importantly by loops, which can be either an ellipse or an oval. These can be drawn with the same degree of ellipse, or the same oval shape, or more interestingly, with a series of ovals. An ellipse is a circle in perspective, and an oval is an ellipsoidal shape. It can be symmetrical on a longitudinal centerline—to my eye, more pleasing. The ovals may vary in proportion, orientation, and size—all determined by one's personal esthetic. For example, Young Baroque's group of caps **B**, **P**, and **R** have less mass than the other caps, but relate because of the similarity of their ovals. A rule of thumb is to draw the loops or volutes with approximately the same volume, exercising care not to divide the shape equally (to avoid monotony) or to make small, distracting loops. Additional weight may be added to the loops, traditionally on a downstroke, but sometimes on the upstroke. There may be several different weights, a matter of personal choice.

I think the same scheme of loops drawn on a majority of caps is often monotonous: variation and surprise are the elements of delight. Many formal script types have small x-heights, roughly one-quarter of the cap height. Young Baroque's x-height is approximately one-third of the cap height. Words that have no descenders can be enlivened with the swashes of the **h**, **m**, and **n**, which function as descenders.

Because Young Baroque is designed as a display font with tight fit and a careful proportion/spacing ratio, it should not be used in small sizes. It is best used for only a name, personal stationery, or a few words to suggest quality and refinement, and to relieve gray masses of type.

abcdefghijklmnopqrs

tuvwxyzabbcdghhk

iklllmnprrssudwyz

*There are 29*
*alternate lowercase letters;*
*some are ligatures,*
*and are used for variation*
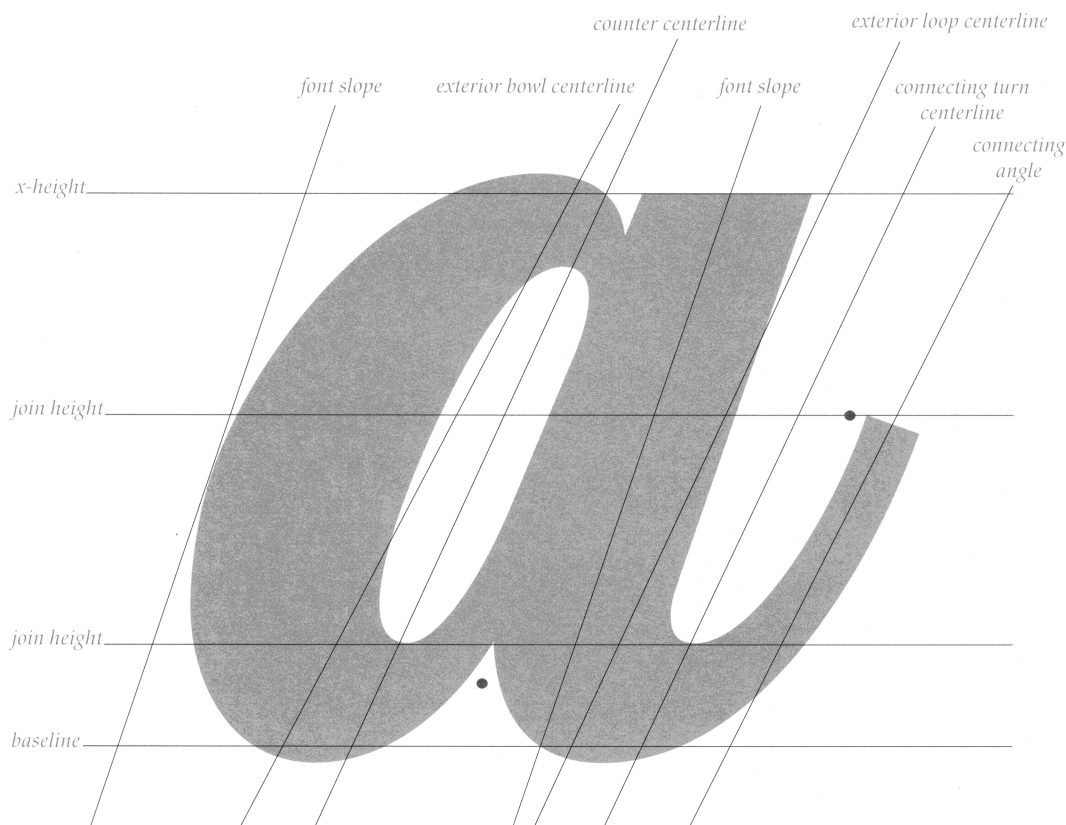*and to suggest a*
*handlettered quality.*

1234567890

‰ § & & / ‹ › ﬀ ﬁ ﬂ ﬄ ß

Ç ! ¿ œ ¬ ø å ſ ° æ ç —

~ · ‚ ˙ ¨ ´ ˙ ' " · · · «

*Carnival*
GREAT GRAPHICS START HERE.

*counter centerline*

*exterior loop centerline*

*font slope*    *exterior bowl centerline*    *font slope*    *connecting turn centerline*

*connecting angle*

*x-height*

*join height*

*join height*

*baseline*

*Home Run — Doyald Young, 2003*

## Home Run

TYPE DESIGN is based on many optical adjustments. More than any other style, script shapes must be adjusted so that they appear to lean in the same flowing angle.

For the **a**'s bowl to appear parallel to the stem, its angle must be increased. In handwriting there is a natural increase of pressure on a downward curved stroke, evidenced by the bowl's widening below lateral center. Both the exterior bowl's centerline and the looped turn of the stem at the baseline lean more so that a high join can be made to the following letter and a rhythmic flow held. Reverse curves are abundant in script fonts, and must lean more to visually match the font's slope. If the right side of the **n** is drawn with the established angle, the area nearest the baseline will appear too wide, angular, and more upright.

I think enclosed loops look best when the counter is a mirror-image teardrop. The condensed caps swash extensions are narrow shapes. This is determined by an extreme slope to their visual centerline.

ABCDEFGH
IJKLMNOPQR
STUVWXY&Z
abcdefghijkl
mnopqrstuvwxyz
1234567890

*Home Run—Doyald Young, 2003*

You're Brilliant.
We're Smart.
Imagine the Possibilities.

*m n u v w x y z*

*Young Baroque—ITC, Doyald Young, 1992*

*Detail from former blind-embossed Art Center College of Design diploma lettering created in the late 1960s.*

*This space is approximately one-and-a-half times greater than straight-to-straight stems*

*The additional hairline weight between the* **e** *and* **n** *that adds color is optional*

*in*

*Center*

## The Ogee Hairline

OF ALL FORMAL SCRIPT curves, the ogee hairline is one of the most beautiful. It is used to connect letters that are drawn with hairline beginnings that in italic fonts are known as pothooks: **m**, **n**, **u**, **v**, **w**, **x**, and **y**, and sometimes **p** (depending on its particular shape). In script type the hairline is formed by a letter's ending as it connects to the pothook that begins the following letter. The most graceful form of the hairline is one that leans slightly more than a font's established diagonal, though in condensed scripts the ogee hairline may parallel the font's diagonal. At half the x-height the hairline reverses itself and, at x-height, rolls into the weighted downstroke. A slight swelling may be introduced to the line to even the color, though the addition of thickness should be restrained. A rule-of-thumb spacing is to make the lettered ogee hairline divide a space that is one-and-a-half times greater than the space of two straight-to-straight stems. This looks good in a word that is composed of open letters (**c**, **e**, **r**, and **s**). If letters of double stem weights (**a**, **d**, **g**, **h**, etc.) predominate, the space is usually tightened.

*E. A. Adams, President & Founder*
*Don Kubly, Director*
*Art Directors*
*Doyald Young, Designer/Artist*

*Above—Blind-embossed*