Chapter 2

The Anatomy of Typography

The alphabet is a series of elemental visual signs in a fixed sequence, representing spoken sounds. Each letter signifies only one thing: its elementary sound or name. The 26 characters of our alphabet can be combined into hundreds of thousands of words, creating a visual record of the spoken language. This is the magic of writing and typography, which have been called "thoughts made visible" and "frozen sounds."

Typography evolved from handwriting, which is created by making a series of marks by hand; therefore, the fundamental element constructing a letterform is the linear stroke.

The parts of letterforms

Over the centuries, a nomenclature has evolved that identifies the various components of individual letterforms. In medieval times, horizontal guidelines were drawn to contain and align each line of lettering. Today, letterforms and their parts are drawn on imaginary guidelines to bring uniformity to typography. All characters align optically on the baseline. The body height of lowercase characters aligns optically at the x-height, and the tops of capitals align optically along the capline. To achieve precise alignments, the typeface designer makes optical adjustments.

Capline: An imaginary line that runs along the tops of capital letters and the ascenders of lowercase letters.

Meanline: An imaginary line that establishes the height of the body of lowercase letters.

x-height: The distance from the baseline to the meanline. Typically, this is the height of lowercase letters and is most easily measured on the lowercase x.

Baseline: An imaginary line upon which the base of each capital rests.

Beard line: An imaginary line that runs along the bottoms of descender

Bowl: A curved stroke enclosing the counterform of a letter. An exception is the bottom form of the lowercase roman g, which is called a loop.

Ear: A small stroke that projects from the upper right side of the bowl of the lowercase roman g.

Link: The stroke that connects the bowl and the loop of a lowercase roman g.

Descender: A stroke on a lowercase letterform that falls below the baseline.

Arm: A projecting horizontal stroke that is unattached on one or both ends, as in the letters T and E.

Stem: A major vertical or diagonal stroke in the letterform.

Terminal: The end of any stroke that does not terminate with a serif.

Ascender: A stroke on a lowercase letter that rises above the meanline.

Leg: The lower diagonal stroke on the letter k.

Serifs: Short strokes that extend from and at an angle to the upper and lower ends of the major strokes of a letterform.

Counter: The negative space that is fully or partially enclosed by a letterform.

Spur: A projection smaller than a serif that reinforces the point at the end of a curved stroke, as in the letter G.

Spine: The central curved stroke of the letter S.

Eye: The enclosed part of the lowercase e.

Loop: See Bowl.

Apex: The peak of the triangle of an uppercase A.

Hairline: The thinnest stroke within a typeface that has strokes of varying weights.

Fillet: The contoured edge that connects the serif and stem in bracketed serifs. (Bracketed serifs are connected to the main stroke by this curved edge; unbracketed serifs connect to the main stroke with an abrupt angle without this contoured transition.)

Crossbar: The horizontal stroke connecting two sides of the letterform (as in e, A, and H) or bisecting the main stroke (as in f and t).

Shoulder: A curved stroke projecting from a stem.

Stroke: Any of the linear elements within a letterform; originally, any mark or dash made by the movement of a pen or brush in writing.

Tail: A diagonal stroke or loop at the end of a letter, as in R or

Proportions of the letterform

The proportions of the individual letterform are an important consideration in typography. Four major variables control letterform proportion and have considerable impact upon the visual appearance of a typeface:

the ratio of letterform height to stroke width.
the variation between the thickest and thinnest strokes of the letterform.
the width of the letters.
the relationship of the x-height to the height of capitals, ascenders, and descenders

The typographic font

A font is a set of characters of the same size and style containing all the letters, numbers, and marks needed for typesetting. A typographic font exhibits structural unity when all the characters relate to one another visually. The weights of thick and thin strokes must be consistent, and the optical alignment of letterforms must appear even. The distribution of lights and darks within each character and in the spaces between characters must be carefully controlled to achieve an evenness of tone within the font.

Lowercase: The smaller set of letters, so named because in metal typesetting these were stored in the lower part of a type case.

Capitals: The set of large letters that is used in the initial position.

Small caps: A complete set of capital letters that are the same height as the x-height of the lowercase letters. These are often used for abbreviations, cross-references, and emphasis.

Lining figures: Numbers that are the same height as the capital letters and sit on the baseline.

Old Style figures: A set of numbers that are compatible with lowercase letters; 1, 2, and 0 align with the x-height; 6 and 8 have ascenders; and 3, 4, 5, 7, and 9 have descenders.

Superior and inferior figures: Small numbers, usually slightly smaller than the x-height, used for footnotes and fractions. Superior figures hang from the capline, and inferior figures sit on the baseline.

Fractions: Common mathematical expressions made up of a superior figure, an inferior figure, and a slash mark. These are set as a single type character.

In some display faces, the font might include only the twenty-six capital letters. In a complete font for complex typesetting, such as for textbooks, it is possible to have nearly two hundred characters.

Ligatures: Two or more characters linked together as one unit, such as ff. The ampersand is a ligature originating as a letter combination for the French word et (and) in medieval manuscripts.

Digraphs: Ligatures composed of two vowels, which are used to represent a diphthong (a monosyllabic speech sound composed of two vowels).

Mathematical signs: Characters used to notate basic mathematical processes.

Punctuation: A system of standard signs used in written and printed matter to structure and separate units and to clarify meaning.

Accented characters: Characters with accents for foreign language typesetting or for indicating pronunciation.

Dingbats: Assorted signs, symbols, reference marks, and ornaments designed for use with a type font.

Monetary symbols: Logograms used to signify monetary systems (U.S. dollar and cent marks, British pound mark, and so on).

Optical relationships within a font

Optical adjustment is necessary to achieve visual harmony within a font since mechanical and mathematical letterform construction can result in serious spatial problems. Often, diverse forms within an alphabet appear optically incorrect.

Unity of design in the type font

Tremendous diversity of form exists in the typographic font. The 26 capitals, 26 lowercase letters, ten numerals, punctuation, and other graphic elements must be integrated into a system that can be successfully combined into innumerable words.

Historical classification of typefaces

An infinite variety of type styles is available today, including the entire array of classic typefaces that have been digitized. Some classification systems add a decorative, stylized, or novelty category for the wide range of fanciful type styles that defy categorization.

Digital technology has prompted the design and production of countless new typefaces whose visual characteristics defy standard classification. The visual traits of these hybrid forms may fall into more than one of the historical classifications presented on the preceding pages. The following is a classification system derived from the visual
features common to letters throughout the typeface kingdom.

Serifs

Serifs provide some of the most identifiable features of typefaces, and in some cases, they reveal clues about their evolution.

Weight

This is a feature defined by the ratio between the relative width of the strokes of letterforms and their height. On the average, a letter of normal weight possesses a stroke width of approximately 15 percent of its height, whereas bold is 20 percent and light is 10 percent.

Width

Width is an expression of the ratio between the black vertical strokes of the letterforms and the intervals of white between them. When white intervals appear larger, letters appear wider. A letter whose width is approximately 80 percent of its height is considered normal. A condensed letter's width is 60 percent of its height, and an expanded letter's width is 100 percent of its height.

Posture

Roman letters that slant to the right but are structurally the same as upright roman letters are referred to as oblique. Italic letters, which are based on handwriting, are structurally different from roman letters of the same type family. Italic letters with connecting strokes are called scripts. The angle of posture varies from typeface to typeface; however, a slant of approximately 12 percent is considered normal.

Thick/thin contrast

This visual feature refers to the relationship between the thinnest parts of the strokes in letters and the thickest parts. The varying ratios between these parts produce a wide range of visual textures in text type.

x-height

As it is based on the height of lowercase letters without ascenders or descenders, x-height can vary immensely in different typefaces of the same size.

Ascenders/descenders

Ascenders and descenders may appear longer in some typefaces and shorter in others, depending on the relative size of the x-height.

Stress

The stress of letters, which is a prominent visual axis resulting from the relationships between thick and thin strokes, may be left- angled, vertical, or right-angled in appearance.

The type family

A type family consists of a group of related typefaces, unified by a set of similar design characteristics. Each face in the family is individual, and each has been created by changing visual aspects of the parent font. Early type families consisted of three fonts: the regular roman face, a bolder version, and an italic. Weight, Proportion, Angle are its factors.

Relative font size units

The default size of text in most web browsers is 16 pixels. Sizes of any text, including the HTML tag which overrides the default size, can be changed by setting the CSS declaration property font-size. This value can be set for individual typographic elements like headings and paragraphs, or by containing elements like divisions or footers. The em unit specifies the size of type relative to the element in which the text is contained; 1em is 100% the font size. If no other font size is specified, a value of 1em is equivalent to the default 16 pixels. However, if a paragraph is contained in a footer element having font size specified as .75em, the paragraph with font size of 1em is now equivalent to 12 pixels.

The rem unit is another relative unit of typographic measure in a web browser. It is similar to an em, but with one important difference: rem stands for "root em," and instead of sizing text relative to font size of the element it is contained in, rems are always sized relative to the root element of an HTML page. Typically, the root element of a web page is the HTML tag, which again, by default, has a font size of 16 pixels, but can be overridden by setting the CSS declaration property font-size. A value of 1rem is 100% the font size of the root element no matter the value of the font size of any containing element. Just like the em unit, if no other font size is specified for the root element, a value of 1rem is equivalent to the default 16 pixels. However, unlike the em unit, if a paragraph is contained in a footer element having font size specified as .75rem, the paragraph with font size of 1rem is still equivalent to 16 pixels. The rem unit allows a designer to set a value for the root element and, no matter where text is located, to specify sizes relative to that value.

Font size on screen can also be specified by the percent (%) unit. Similar to the em unit, percentage specifies the size of type relative to the element in which the text is contained. If no other font size is specified, a value of 100% is equivalent to the default 16 pixels. But like the em unit, if a paragraph is contained in a footer element having font size specified as 75%, the paragraph with font size of 100% is now equivalent to 12 pixels.

Two less-used relative units are ch and ex. The unit ch is equivalent to the relative width of the zero character in the typeface, as specified by the font-family declaration property. A value of 1ch is equal to 100% the width of the number 0. As such, 1ch would be a greater value for an extended typeface than a condensed one. The unit ex is equivalent to the relative x-height of the font family specified for an element; 1ex is equal to 100% the x-height. Thus, 1ex would be a greater value for Helvetica, which has a tall x-height, than for Garamond, which has a lower x-heigh.