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Typography and readability

There are many different typographic factors that affect
the readability of printed text. Among them are choice of typeface,
font size, line length, line spacing and column setting.

Typography means the design and layout of a printed page and especially the setting and arranging of type on the page. It has a major impact on how inspired we are to read a text and how far into it our interest carries. Well-designed typography can also contain visual references to the contents and intended readership of the text.

Although typography also creates images in a reader's mind, its key purpose is to render the text into a pleasant, easy-to-read and even attractive form. Readability is affected by a great number of typographic factors. Probably the first of them to cross a layman's mind is sufficient font size, which is important of course, but not very helpful if the other factors are not purposefully taken into account.

Choice of typeface

When we start to determine the final, publishable typography for a text, the first choice concerns the typeface. Common typefaces can be roughly divided into two main groups: Serif and Sans Serif.
Serif a typeface in which the lines appear in two thicknesses, the ascenders are thin and the descenders thicker. Serif is also characterized by serifs, small, horizontal features at the end of strokes of letters.
Sans Serif in turn does not comprise serifs and the lines are basically of the same thickness.

antiikva groteski

Serif typefaces have been used in printed matter since 1470, almost as long as printing technology has existed. They have undergone different stylistic stages but their basic form is still the same as 500 years ago. We can today choose from several different Serif faces which have stayed practically unaltered for hundreds of years; they have only been adjusted slightly to match the changing needs of typesetting and printing technology.

The first Sans Serif typefaces did not appear until in the mid-19th century, and they gradually entered common use in the course of the 20th century.

The eternal question is whether Serif is more easy to read than Sans Serif. It is commonly considered so, but we are also more used to it: we naturally read more fluently the font types or styles that we see often and have become accustomed to. Serif is still more commonly used than Sans Serif and the usual choice for publications that contain long texts, such as newspapers and books.

Moving on from the long and eventful history of typeface, an easy-to-read typeface can be characterized as follows:

1) Too much variation of thickness should be avoided in Serif fonts. The contrast of the thin and thick lines makes the text appear restless and blurred to the eye. For this reason it is preferable to use 16th century old serifs and their later adaptations (e.g. Garamond, Minion, Bembo and Sabon), and to avoid 18th century modern serifs (Bodoni, Didot). The much used Times is closer to the group of old serifs, but in it the variation of thickness is already somewhat greater.

Minion Times New Roman Bodoni

2) The typeface should not be too narrow. The word "condensed" at the end of a typeface name indicates a more narrow version of the face. Narrow typefaces make the text appear as too dense and crowded. The letters are difficult to distinguish from one another and the reading process slows down.

Myriad Regular Condensed

3) The typeface must not be too thin. The names Light and Extra Light refer to very thin letters. If they are printed on white, coated paper, there is no pleasing contrast to the eye, as the letters remain too faint. Especially in poor light they can be very tedious too read.

Helvetica Neue 25 Ultra Light
Helvetica Neue 35 Thin

4) Unusual shapes have a negative effect. The more a font type differs from the accustomed Serif or Sans Serif typefaces, the slower it is to read. Shape can differ in a number of ways: a font can be unusually wide, strictly geometric or so strongly stylized according to some typeface style that the basic shape of the letters becomes unclear. For fluent reading, the letters have to appear clearly distinguishable from each other and in a form in which they can be quickly identified without having to stop to think.

Modular Eurostile Kabel

So that the letters can be fluently identified, it is good to avoid unnecessary use of uppercase letters in, for example, headings. Uppercase letters form a uniform string of equal height, out of which the letters are hard to distinguish. The shapes of letters vary considerably more in text typeset in lower case, which makes it appear much more alive.

Font size

This article deals chiefly with the readability of the body text. The body text means a long, consistent text entity where the point size is usually 9–12. The point is an old inch-based typographic unit of measure. One point was standardized at 0,353 millimeters in 1985, around the breakthrough of modern publishing technology.

The body text can also be smaller than 9 points if the typeface is well readable.

There is no universally applicable guideline for font size. Choices in this respect depend on such aspects as column width, clarity and proportions of the typeface and the age of the intended readers.

As one common saying regarding font size goes: Amateurs use too big font sizes and professionals too small. It is clear that 12 points, which is the default size in word processing programs, is too big for normal printed material – with the exception of publications for special groups. On the other hand, especially young graphic designers often use an unnecessarily small font size. 8 points can be enough for the person who has designed the typography but not for a reader who is 30 years older. The task of the graphic designer is not to test how small a print the readers can read but to make the reading experience as pleasant as possible. The use of too small a font size may also indicate that the designer doesn't consider the text and its careful layout important but sees it rather as an uninteresting module that ought not to interfere with the pictures and other graphics in the publication.

Newspapers border, for practical reasons, on the lower limits of font size in body text. When Finland's leading daily newspaper, Helsingin Sanomat, reformed its layout in 2000, it changed its typeface and point-size. A point-size of 8,6 was used in the first following issues, but the readers protested that it was too small, and the point-size was increased to 9,1.

In books the point-size of body text is usually 9,5–11.

The choice of font-size is further complicated by the varying x-heights of different typefaces. X-heights mean the height of lower case letters with no upper or lower extensions. Examples of these are the letters a, m, n, u and the proverbial x. Even if two different typefaces are used in the same point-size, say 10, they can clearly appear to be of different size. The reason for this is that the measure in points determines the height of uppercase letters rather exactly, but does not take into account the height of the lower case letters relative to uppercase letters. Small x-height can make the text appear smaller than the point-size would indicate, and the font-size has to be increased.

Adobe Garamond 12 pt Minion 12 pt Stone Serif 12 pt

The x-height is however determined by the original designers of the typeface according their specific purposes. Of the common serifs, Adobe Garamond has a small x-height. Stone Serif, Lino Letter and Trump in turn have large x-heights.

Line length

Reading takes place in small leaps so that the eye picks put 5–10 characters at a time. According to studies measuring the movement of the eye, speed reading that would record text in a photographic manner is physiologically impossible.

55–60 characters (including spaces) per line is usually considered an appropriate line length, allowing the eye 6–12 quick stops on each line. 35–40 characters per line is considered the minimum: narrower lines would cause the reader to have to switch from line to line unnecessarily often, and they also cause problems with the way justified columns appear (see chapter on column settings). For practical reasons, the minimum with newspapers is even lower, approximately 30 characters per line. Correspondingly, 90 characters per line is considered the maximum limit. This limit is approached in some wide-column books and, for example, wall texts in exhibitions.

Line spacing

As was indicated above, the parameters for line length are rather broad. Consequently, it is important to adapt the line spacing according to the applied line length. Line length and line spacing are inseparable: when one changes, the other has to be changed too. The rule of thumb is that long lines (wide columns) require bigger line spacing than short ones. There are two reasons for this: a wide column with narrow line spacing looks very dense and heavy and is not inspiring to read. Secondly, additional line spacing is needed to help the readers so they can move on easily enough from a long line to the next one.

In a medium-wide column (55–60 characters) it is common practice to use a line spacing that is 2–3 points larger than the font size. For example, in 10-point text the line spacing could be 12–13 points (typographically marked as 10/12 or 10/13). If the lines are long, a 14-point line spacing might be needed. Similarly, with narrow columns, an 11-point line spacing is enough for 10-point text.
If a large line spacing is used in a narrow column, the lines sort of detach from each other and the visual consistency of the column falls apart. Even a line break requires an unnecessarily large leap.

Apart from column width, the choice of line spacing is effected by the x-height of the typeset, as discussed above. If the x-height is large, a slightly larger line spacing – e.g. by 1 point – is also needed. Otherwise the taller lower case letters take up too much of the free space between the lines and the column starts to appear heavy and stark.

Character and word spacing

Problems with character and word spacing concern justified text. Wrong spacing and spacing that changes from line to line are common problems here. They disturb both the readability and the visual appearance of the text.

In justified text the lines are forced to be equally long even if the contents of each row are different: the number of letters and word spacing varies between the lines and some letters are wider than others. The lines are aligned by using the empty space in them, the location of which has to be defined for the publishing software.

The basic idea is that the character spacing – i.e. the distances of the letters, numbers and other keyboard characters from each other – has to remain consistent throughout the text. That is why variation in character spacing has to be set between very narrow parameters with the typographic settings of the publishing software. The objective is the original character spacing designed for the typeface, which is usually expressed as 100%. The parameters are set at e.g. –1 % (compression) and +1 (expansion).
This variation is so small that even a more perspective reader would not be likely to notice it.

As the empty space created on some of the lines has to be directed somewhere, the best place for it is the spaces between the words. They exist there anyhow, so a small variation in them is not as disturbing as variations in character spacing.

The default value is set also here at 100%. Since the publishing software are usually made in the United States, the value has been set to suit the English language. In Finnish language the words are longer, so it doesn't hurt to use a slightly larger word spacing. The optimal value could be, for example, 105%.
The minimum value could be 95% and the maximum value 135%. Thus the extra empty space appears as slightly bigger word spacing.

Even the best settings don't help in every situation. If you are working on justified text with 30 characters per line, precisely even word spacing is simply impossible.

There are four types of columns: justified, unjustified left-aligned (right ragged), unjustified right-aligned (left ragged) and centered text. The first two types are suited for normal body text.

Justified columns are most commonly used, but they produce word spacing problems with narrow columns. The fewer characters there are on a line, the fewer the spaces between the words. If a suitable place to hyphenate is not found at the end of the line, empty space is left on the line and it accumulates in the fewer word spacings of a narrow column. This problem is especially pronounced with the Finnish language which contains lots of long, four-syllable words. So creating a neat looking justified column in Finnish-language text can require lines of up to 50 characters when English-language text, for example, can be hyphenated neatly in lines of only 40 characters.

Unjustified left-alignment can be a viable option, especially when using narrow columns. With unjustified columns all the word spacings remain the same because the extra space that may be created always appears at the end of the line. Unjustified columns do however require some more typographic fine-tuning than justified columns: inappropriate hyphenations have to be singled out since they become even more apparent with ragged text. Special attention also has to be paid so that there aren't too many consecutive lines that end in a hyphenation (recommended maximum is three lines) and that the ragged edge varies smoothly from line to line. The ends of the lines should not contain big gaps by the margin of the column and the column should not take on either a tapering or widening form.

Unjustified right-aligned columns are much more difficult to read: the reader has to seek out the beginning of each line from a different place. Bad hyphenations are also highlighted when they appear at the beginning of a line. These types of columns are in fact only appropriate in short texts such as ingresses and captions.

Centered columns are not meant for long body texts, but are used, for example, in invitations consisting of only a few lines. Designing nice looking centered columns and dividing the text naturally between the lines takes up a lot of time, as they do to read it any longer form.

Indents

Paragraph changes need to be indicated somehow. With printed text this is done by indenting the first line of a new paragraph – not by using an extra line spacing. Empty lines break up a normal text column and take up space unnecessarily. There are exceptions though – empty lines can be expediently used instead of indents when the text contains for example instructions or other itemized elements that should be featured as clearly as possible. However, indents and empty lines should never be used in the same text to indicate paragraph changes.

Usually an appropriate indent for the body text is 3,5–5 mm. Traditional typographic guidelines define the size of the indent according to the point size and line spacing. If the size of the text is 10 points and the line spacing is 12 points, the indent should be 3,5–4,2 mm. Indents of well over 5 mm are used quite commonly, but they are in no way useful, on the contrary: indents that are too long leave unnecessary, ugly gaps in the text.

The first paragraph of a text should not be indented, nor the first paragraph following a subhead.
There is no reason to do so because the change of paragraph is obvious to the reader anyhow.

Column spacing

The column spacing has to be defined if two or more columns are used in a publication. The most common and appropriate spacing for medium-wide columns is 5 mm. A couple of millimeters more can be left between especially wide columns. 4 mm is enough with narrow columns, such as the ones used in newspapers.

It is important that the different spacings in typography grow logically, in the actual reading direction: the smallest spacing, i.e. the character spacing, is hardly visible, the word spacing is clearly bigger and the line spacing is even bigger. The last and biggest leap is to the columns, and this is indicated with sufficient column spacing.

Subheads

Subheads serve as small breathers for the readers in the reading process and steer them in the text. Typographically, the subheads have to be clearly distinguished from the body text, but they shouldn't be excessively highlighted either. A sufficient highlighting can be attained by changing the font (e.g. semi-bold Sans Serif in the subheads) or by extra spacing: extra space is left above and under the subhead, with more space left above. If the subheads are placed densely so that no extra space is left underneath them, it is enough to use one empty line above them.

If a publication uses more than one level of subheads, it is important to design their typography carefully and to deploy it logically and thoughtfully. The problem often is that higher-level subheads tend to grow into unnecessarily large size and they appear awkward and ugly. It is not recommended to use more than two different levels of subheads, a more complex heading system than that is difficult to design into perspicuous form and the subhead doesn't stay well in a reader's mind.

The same rule applies to the line break in subheads as to main headings: hyphenation should be avoided. If hyphenation has to be used, the best pace to do it is at a compound, at the break between the words it combines. It is important to also consider what the word that ends the line is before the subhead is divided into a second line. The idea is to keep together contextually connected words so that the meaning of the subhead is not lost in the line break.

> Not like this:
> Seven championships and three
> second places
>
> But like this:
> Seven championships
> and three second places

Margins

Margins do not expressly affect the readability of a text but they do contribute to the atmosphere that is born on the pages of a printed publication. Narrow margins make the pages look cramped and wrong proportioning between the columns disturbs the balance of a page.

Two main principles apply to standard publications: firstly, the lower margin should be larger than the top margin so the text won't look like it floods to the bottom of the page. Secondly, the outer margins

should be larger than the inner margins so the double page spread remains in full form and is not broken between the pages. This principle is especially applied in book typography.

The line spacing used in a publication also affects the margins: relatively small margins are enough for densely spaced lines while large line spacing calls for wide margins.

Paper

The remaining factors (paper, printing ink) do not directly concern the typographical design, but they do affect how the typography is reproduced in printed form.

The quality of the printing paper influences the final reproduction of the text in at least three different ways:

1) Coated and uncoated paper reproduce the text in slightly different ways. With uncoated paper the text is thickened a little because the printing ink is absorbed under the surface of the paper. This occurs most notably with newsprint and sometimes also with uncoated book paper (Lessebo, Munken). A slight increase of thickness is usually only beneficiary, since the thinner letter types gain some momentum with it, while letters of normal thickness do not expand to any excessive degree. With strongly coated paper the text hardly thickens at all and is reproduced extremely sharp. The slim letter types appear even disturbingly thin.
2) The color tone of the paper can have an affect on how pleasant the text is to read. Highly bleached paper only causes an unnecessarily strong contrast with black print. The effect is even worse when the paper is glossy and thus reflects in-coming light. Matte or uncoated natural white or slightly yellowish paper grades are more pleasant to read.
3) The opacity of paper determines whether the text of the previous or next page spread shows through the other side. Paper manufacturers and wholesalers express the opacity paper in percentages: the greater the percentage the higher the opacity.

Opacity improves in all paper grades as the surface weight (g/m2) increases. 95% opacity can already be considered quite adequate. Problems with transparency appear when the opacity falls under 93%.

Paper grades can be divided by composition into mechanical paper (containing groundwood) and free sheet paper (made of chemical pulp). Mechanical paper has better opacity but it has some disadvantages too: the paper yellows and turns brittle in time. Mechanical paper grades are not a good choice for long-lived printed matter, such as books.

Printing ink

The last factor in ensuring good readability is sufficient imprint. Black text should be black and not gray. This is monitored during the printing process by measuring the density. There are specific standard densities for both coated and uncoated paper grades that are important adhere to. Higher density (stronger black) can be achieved with coated paper than with uncoated paper, but a sufficient degree of black can be attained with all paper grades. Sometimes the density can even grow too high; this in turn causes excessive bloating of the letters and problems with the drying of the ink.

Typography of plain-language publications

Plain-language publications should follow the guidelines in this article with the following distinctions:

* The letter size is usually a little bigger in the body text
* An empty line is usually left between the paragraphs (in which case new paragraphs are not indented)
* The text is typeset so that it is always left-aligned. Hyphenations are not used unless it is necessary to break a long compound word into two lines. Contextual entities should appear on the same line.
The sentences are divided between the lines so that they start at the beginning of the line whenever possible. The text should not however appear too restless (see instructions in article).
The final line breaks should be determined when the publication is made up into its final form.
* The lines usually contain 50–60 characters (including spaces).

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