

# Micro-typographic Extensions of pdfTeX in Practice

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## Abstract

pdfTeX provides two micro-typographic extensions: margin kerning (also known as character protrusion) and font expansion. While they have been available around for quite a long time and the samples showed interesting results, these features have not been much used in practice. The reason is that pdfTeX only provides very low-level support, so in order to use these features, a high degree of TeX knowledge was required. In this article I would like to share some experiences in using these extensions from the user’s point of view. Thus, I will not go into any technical detail—there are already papers that have done that job. My wish is that after reading this article, anyone can start using these extensions in practice without much difficulty. Therefore, I will try to look at these extensions from a practical point of view, and focus on things most useful for newcomers.

## Introduction

We briefly describe here the concepts of margin kerning and font expansion, collectively called the *hz* extensions, and what purpose they serve.

**Margin kerning** Margin kerning is the term used for slight shifting of certain characters at the margins so the margins *look* smooth. This technique is sometimes called *hanging punctuation*, as it is useful mostly for punctuation marks such as comma, period and the like. However, margin kerning is a more general concept, as it can be usefully applied to certain letters as well.

Margin kerning in principle is quite similar to general kerning. Kerning is the adjustment of space between certain letters to make the text look good, while margin kerning deals with space between letters and the margins of text. Hence, similar to kerning, margin kerning is also a question of taste: to one person margin kerning makes things look better, to another, it makes no sense. Still, this technique used to be quite common in traditional typography, and its disappearance probably has more to do with its difficult deployment in DTP systems than any change of taste.

Margin kerning is not something completely unknown to TeX users. It is possible to have hanging punctuation (margin kerning applied to punctuation only) in TeX using macros. However, there are certain limitations and problems; for instance, it requires all hanging punctuation marks to be (in TeX terms) active characters, and it doesn’t work for the hyphen character. To “hang” the hyphen, a font

with a special hyphen character is required. pdfTeX makes use of margin kerning much easier and better.

A sample text with and without margin kerning is shown in figure 1.

**Font expansion** Font expansion is the technique of expanding or shrinking a font very, very, slightly, in order to break a paragraph into lines in a better way. Of course a font must not be expanded or shrunk too much, otherwise the effect caused by font distortion will spoil everything. Using font expansion can lead to line breaking with:

1. fewer hyphenations,
2. fewer overfull and underfull boxes,
3. more nearly uniform interword spacing (fewer “rivers”).

Therefore, font expansion is useful when one wishes to get a more even color of page, or just to reduce the number of hyphenation or overfull/underfull boxes. Such needs are quite common in narrow-column typesetting. When it comes to automated typesetting, such small improvements can significantly reduce the manual work required to correct “problematic” cases.

A sample text with and without margin kerning is shown in figure 2. This entire article is also typeset with margin kerning enabled.

## Usability

The micro-typographic extensions of pdfTeX were originally developed for experimental purposes. As a result, the underlying concepts were designed to be general and flexible, so we could examine the effect

A father had two sons, of whom the eldest was clever and bright, and always knew what he was about; but the youngest was stupid, and couldn't learn or understand anything. So much so that those who saw him exclaimed: "What a burden he'll be to his father!" Now when there was anything to be done, the eldest had always to do it; but if something was required later or in the night-time, and the way led through the churchyard or some such ghostly place, he always replied: "Oh! no, father: nothing will induce me to go there, it makes me shudder!" for

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**Figure 1:** Text without (left column) and with (right column) margin kerning

of those extensions in many contexts. The drawback, however, is that in order to make use of those extensions, a certain degree of knowledge of T<sub>E</sub>X programming and font-related issues is required. This is especially true for font expansion, as it required the user to be able to generate so-called expanded TFM files. The lack of an easy user interface also discouraged the average user from trying margin kerning, although this is much easier to use than font expansion.

However, enough people have been interested in testing and using those new features, and hence there has been also some progress on the user interface as well as the implementation:

1. An important step for L<sup>A</sup>T<sub>E</sub>X users was the package `pdfcprot` by Carsten Schurig, allowing activation of margin kerning in an easy way.
2. In summer 2004 I added a feature called "auto expansion" for easy use of font expansion to pdfT<sub>E</sub>X. Now generation of actual expanded TFM's is no longer required, as pdfT<sub>E</sub>X can expand required TFM's on-the-fly in memory.
3. Not very long after the version with auto expansion had been released, a L<sup>A</sup>T<sub>E</sub>X package called `microtype` was created by Robert Schlicht, al-

lowing easy access to both margin kerning and font expansion. Furthermore, this package contains a rich collection of predefined settings of margin kerning for various fonts.

With the `microtype` package and an up-to-date enough version of pdfT<sub>E</sub>X, using micro-typographic extensions has become accessible to the average user, without having to deal with low-level commands and messy font issues.

### How to begin?

In order to make use of what will be described along, we need two things:

1. pdfT<sub>E</sub>X version at least 1.20a;<sup>1</sup>
2. the L<sup>A</sup>T<sub>E</sub>X package `microtype`, which is available from CTAN.

Instructions on how to upgrade pdfT<sub>E</sub>X or install a L<sup>A</sup>T<sub>E</sub>X package onto your system are system-specific and are not covered here. The best place to look or ask for them is probably a mailing list or a forum dedicated to the specific T<sub>E</sub>X system you are using.

<sup>1</sup> At least pdfT<sub>E</sub>X 1.20b is the recommended version at the time of writing this article; 1.20a still had some problems with *hz* extensions.

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**Figure 2:** Text without (left column) and with (right column) font expansion

Given that the two above requirements are met, we can already do something practical. A quick test can be done by making a copy of the standard file `sample2e.tex` and insert into the preamble one line, namely:

```
\usepackage{microtype}
```

Let's call the resulting document, with `microtype` loaded, `sample2ex.tex`. When you run pdfL<sup>A</sup>T<sub>E</sub>X on the document, you get a PDF file `sample2ex.pdf` that is *almost* the same as `sample2e.pdf` (the PDF you get without loading `microtype`). Let us focus on the differences.

1. First, the two files are quite different in size: `sample2ex.pdf` is much larger, because of the font expansion. You can check this if you open it in Acrobat Reader, for instance, and check for embedded fonts, you will see many instances of the same font with the `_Extend` tag appended.<sup>2</sup>
2. In `sample2ex.pdf`, certain characters slightly "protrude" out when at the margins, like the period, comma or double quotes (we don't have any hyphenation in this document to see how

the hyphen char would protrude). The effect of such "protrusions" is to achieve the visual effect that the margins look smooth. This is, in short, what margin kerning brings to you.

3. The two files have slightly different line breaks! The line breaking in `sample2ex.pdf` can be considered better, as there are fewer hyphenations than in `sample2e.pdf`. This is, in short, what font expansion brings. The effect of font expansion is more visible when applied to narrow column typesetting; in that case, typesetting without font expansion there results in problems of frequent hyphenations, overfull boxes or rivers.

And that's the essential part of what pdfL<sup>A</sup>T<sub>E</sub>X and `microtype` offers. If you like it, you can experiment more by loading `microtype` into some of your own documents, and maybe try a few options of the `microtype` package. Don't neglect the documentation, as `microtype` has very nice documentation, with good advice for new users.

### How to learn more?

The default settings of the `microtype` package are reasonable and safe for typical cases (and taste). However, the time may come when you wish to control

<sup>2</sup> Or you can use the tool `pdffonts` coming from the XPDF distribution. This tool lists embedded fonts in a PDF file.

the *hz* extensions according to your own taste. To this end, it may be useful to:

1. read the *microtype* documentation and try the options it offers;
2. read about *hz* extensions in the pdfTeX manual;
3. ask on the pdfTeX mailing list for advice.

### What about ConTeXt?

I asked Hans Hagen for a short introduction to the ConTeXt interface to *hz* extensions. The following text in this section comes from him.

In ConTeXt, margin kerning as well as font expansion are hooked into the font handling mechanism. This permits users to apply these features to any font and on each abstraction level of the font mechanism. We provide a few examples, to give you an idea of how it's done.

```
\setupfontsynonym [Serif]      [handling=hz]
\setupfontsynonym [SerifBold] [handling=pure]
```

This marks all Serif fonts as candidates for expansion, and all bold serifs for protruding. We can now load the Palatino typeface combination, using a predefined typescript:

```
\usetypescript [palatino] [\defaultencoding]
```

These Palatino fonts are enabled by for instance:

```
\setupbodyfont [palatino,10pt]
```

Both mechanisms will only be available when they are turned on:

```
\setupalign [hz,hanging]
```

This demonstrates that both features are also hooked into the alignment handler. They can be disabled by 'nohz' and 'nohanging'.

You can finetune expansion with:

```
\setupfonthandling [hz] [min=80,max=80,step=5]
```

In a similar fashion, one can finetune protruding, for instance for specific font shapes or for classes of glyphs. In the previous example we used the protruding alternative tagged as 'pure' but there are more variants.

A quick and dirty approach to enabling both features for all fonts is for instance:

```
\definefonthandling [default] [hz,pure]
\usetypescript [palatino] [\defaultencoding]
\setupbodyfont [palatino,10pt]
\setupalign [hanging,hz]
```

In the ConTeXt file 'hand-def' you can see what combinations are defined and what parameters can be set. Both features work for all font encodings supported by ConTeXt; defining your own preferences is not that hard and involves no TeX coding. Overloading and inheritance of features is provided.

The most important thing you need to keep in mind is that the font handling you wish to apply must be known to the font before the font is first used. This is a result of the way pdfTeX implements this feature.

### How to contribute?

If you use the *microtype* package and have determined your own settings for a particular font, please send your settings to *microtype*'s author. As well as the easy user interface, the package also offers a collection of settings for various typefaces. The more feedback the author gets, the richer the collection will be and the more pleasurable it will be to use.

Likewise, if you use ConTeXt, please send your feedbacks or suggestions to ConTeXt's author, so other ConTeXt users can share your experiences as well.