

The background of the slide is white and filled with a random distribution of small, colorful geometric shapes. These shapes include triangles, squares, and rectangles in various colors: red, blue, yellow, and green. Some shapes are solid, while others are outlined. They are scattered across the entire page, creating a festive or abstract pattern.

# Does pdf $\text{\TeX}$ make things better?

Hans Hagen — Pragma ADE

(March 8, 1999)

# It's about ...

Typesetting paragraphs

Adjust or not adjust, ...

Two methods

Adjust spacing in double columns

Adjust spacing with emergency stretch

Look what happens

Only horizontal scaling

Fine tuning

Some observations



# Typesetting paragraphs

$\text{T}_{\text{E}}\text{X}$  is pretty strong in typesetting paragraphs, and instead of looking at individual lines, it treats such a paragraph as a whole. When typesetting a paragraph,  $\text{T}_{\text{E}}\text{X}$

- ▶ tries to break lines without breaking words
- ▶ permits hyphenation within certain constraints
- ▶ stretches inter word spacing

As a bonus pdf $\text{T}_{\text{E}}\text{X}$

- ▶ can fool the reader by changing glyphs

and thereby improves the grayness of the typeset page.



# Adjust or not adjust, . . .

We can improve the look and feel of a typeset paragraph by slightly adjusting the shape of the glyphs:

- ▶ using glyphs with different width for similar characters
- ▶ stretching the horizontal ‘curves’ of glyphs
- ▶ scaling the glyphs in the horizontal direction
- ▶ moving interpunction and quotes into the margins

Herman Zapf’s method is mainly based on using a discrete set of glyphs for similar characters, while Hàn Thê Thàn’s pdf $\TeX$  applies (discrete) horizontal scaling. At TUG98 Miroslava Misáková presented a combined strategy, using METAFONT to generate glyphs.



# Two methods

Currently PDF<sub>T</sub><sub>E</sub>X has two strategies built in. The first one does not influence the paragraph building. It simply stretches or shrinks lines that are under- or overfull.

The second method is interwoven with the paragraph builder and helps <sub>T</sub><sub>E</sub>X to find better line breaks, by offering alternative horizontal glyph scaling.

Both methods show the best results when used with multiple master fonts, but traditional type 1 fonts are handled pretty well too.

In the next examples the **colored text** is adjusted and layed over the ‘normal’ text. The first sample shows what happens when `\pdfadjustspacing` is set to 1, the other two show the results of setting it to 2.



# stretch 0 shrink 0 step 5



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# stretch 30 shrink 30 step 5



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# stretch 35 shrink 35 step 5



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# stretch 40 shrink 40 step 5



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# Adjust spacing in double columns

Adjusting the spacing (or actually the glyphs) makes most sense in multi column mode. The mechanism is invoked by saying for instance:

```
\font\tenrm=cmr10 stretch 30 shrink 20 step 10
```

This means that the width of a glyph in this font be increased by at most 3‰ or diminished by at most 2‰. because steps of 1‰ are taken, 7 different widths are possible. Individual glyphs can be influenced by setting its `\efcode`.

On the next pages, the top half of the screen shows the normal case, while the bottom half shows the adjusted text.



# stretch 5 shrink 5 step 5



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# stretch 10 shrink 10 step 5



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# stretch 15 shrink 15 step 5



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# stretch 20 shrink 20 step 5



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# stretch 25 shrink 25 step 5



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# stretch 30 shrink 30 step 5



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over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synopsisize, winnow the wheat from the chaff and separate the sheep from the goats.

over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synopsisize, winnow the wheat from the chaff and separate the sheep from the goats.

integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synopsisize, winnow the wheat from the chaff and separate the sheep from the goats.



# Adjust spacing with emergency stretch

Adjusting works best when `\emergencystretch` is set to for instance `1em`. In many cases multi column typesetting can't do without.

```
\emergencystretch=1em
```

Although this visual optimization is supposed to be used with high resolution printers, low resolution printing cq. viewing also shows the difference.

Again, on the next pages, the top half of the screen shows the normal case, while the bottom half shows the adjusted text.



# stretch 5 shrink 5 step 5



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rize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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gate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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gate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.



# stretch 10 shrink 10 step 5



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rize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggre-

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choose, categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, ag-

gregate, outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.





# stretch 15 shrink 15 step 5



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scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate,

outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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choose, categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate,

outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.



# stretch 20 shrink 20 step 5



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rize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

We thrive in information-thick worlds because of our marvelous and everyday capacity to select, edit, single out, structure, highlight, group, pair, merge, harmonize, synthesize, focus, organize, condense, reduce, boil down, choose,

categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate,

outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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rize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.



# stretch 25 shrink 25 step 5



We thrive in information-thick worlds because of our marvelous and everyday capacity to select, edit, single out, structure, highlight, group, pair, merge, harmonize, synthesize, focus, organize, condense, reduce, boil down, choose, catego-

rize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate,

outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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rize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, outline,

summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.



# stretch 30 shrink 30 step 5



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scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

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categorize, catalog, classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate,

outline, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

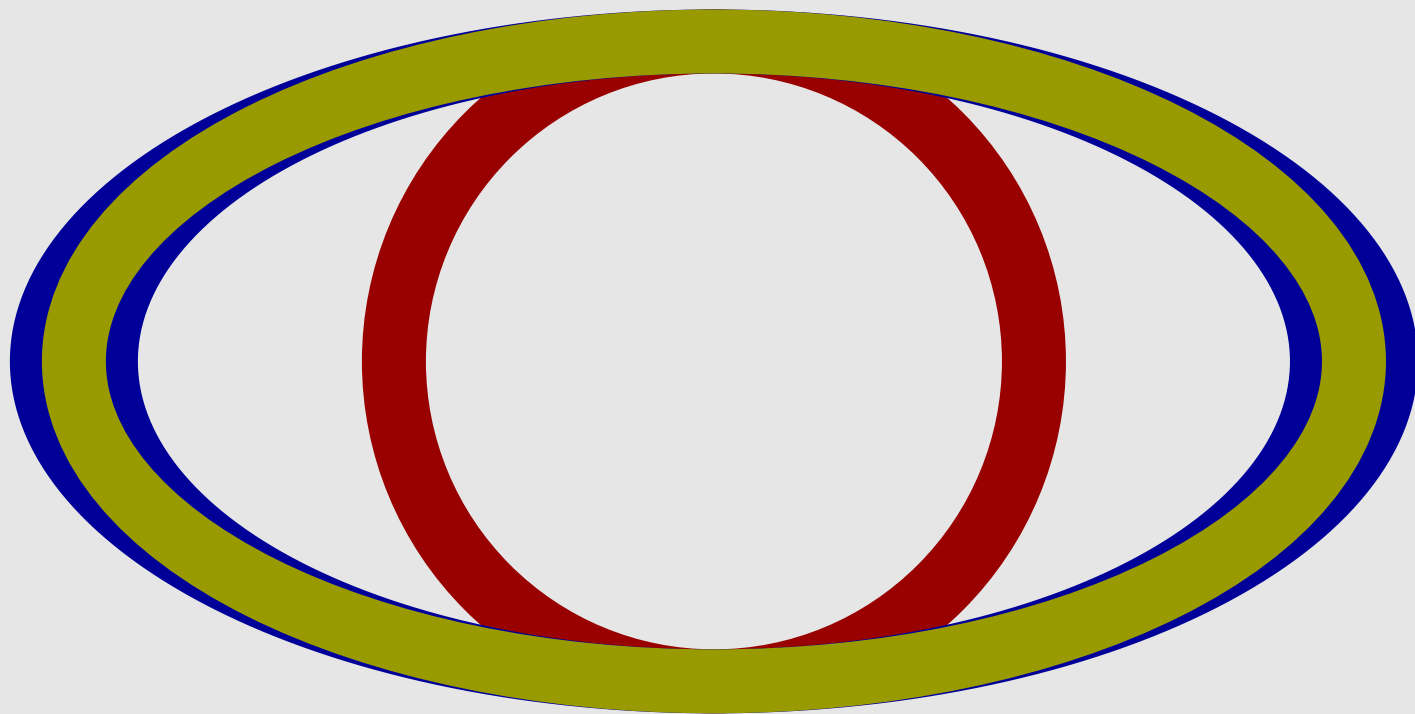
We thrive in information-thick worlds because of our marvelous and everyday capacity to select, edit, single out, structure, highlight, group, pair, merge, harmonize, synthesize, focus, organize, condense, reduce, boil down, choose, categorize,

scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, outline,

summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.



Look what happens



# Only horizontal scaling



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scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, out-

classify, list, abstract, scan, look into, idealize, isolate, discriminate, distinguish, screen, pigeonhole, pick over, sort, integrate, blend, inspect, filter, lump, skip, smooth, chunk, average, approximate, cluster, aggregate, outline, summarize, itemize,

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

line, summarize, itemize, review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.

review, dip into, flip through, browse, glance into, leaf through, skim, refine, enumerate, glean, synthesize, winnow the wheat from the chaff and separate the sheep from the goats.



# Fine tuning

Some glyphs are more sensitive to (even small) changes than others. Therefore PDF<sub>T</sub>E<sub>X</sub> permits you to influence stretching at the glyph level.

```
\efcode'W=500
```

```
\efcode'e=1250
```

This means that the **W** gets less than average stretch and shrink, while the **e** gets some more. Glyphs with many straight vertical lines are visually more sensitive to scaling than horizontal lines and curves.

The next examples show the consequences of setting the `\efcode`'s to values other than the default of 1000.



# Stretch 90 - Expansion Codes

We thrive

We thrive





Stretch 90 - Expansion Codes: W=0 e=0

We thrive

We thrive



Stretch 90 - Expansion Codes: W=0 e=0 h=0

We thrive

We thrive



Stretch 90 - Expansion Codes: W=0 e=4000

We thrive

We thrive



Stretch 90 - Expansion Codes: W=8000 e=0

We thrive

We thrive



# Some observations

- ▶ for centuries there have been examples of mixed width fonts
- ▶ once upon a time lead lines were simply squeezed upto, 1%
- ▶ there are examples of additional space saving ligatures
- ▶ in handwriting one can slow down and/or speed up
- ▶ there are  $\text{T}_{\text{E}}\text{X}$  based optimizations on a per line/paragraph basis
- ▶ thereby one can stretch a ragged right or right aligned line
- ▶ but now  $\text{pdfT}_{\text{E}}\text{X}$  can apply discrete horizontal scaling
- ▶ in general 5% is about the maximum amount to stretch

