To justify or not to justify?
Why bad typography may be harmful for your readers

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The program

**TUG 2011**: We proposed a program for “evidence based typography”. Let us verify the compositors’ belief by experiments. We measured:

1. Speed of reading: words per minute.
2. Comprehension on immediate test: results of a multiple-choice questionnaire immediately after reading.
3. Comprehension on delayed test: results of a multiple-choice questionnaire in 1 hour after reading.
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**Results so far:**

1. Sans serif and serif fonts have the same outcome.

2. Ragged-right non-hyphenated and justified hyphenated texts have close outcome—with slight advantage for the ragged-right.
Problems with ragged-right vs. justified experiment

Two differences: right edge and hyphenation.

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Suggestion

Let us try to separate these phenomena: justified unhyphenated text vs. ragged right unhyphenated text.

**TeXnical note**
How can you get justified unhyphenated text? You need to suppress hyphenation and allow bad spaces. With Babel:

\selectlanguage{nil}\sloppy

Without Babel:

\usepackage[none]{hyphenat}\sloppy
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Experimental setup

\[ n = 20 \text{ subjects (so far!)}. \text{ Cyrillic texts. Elderly inpatients, informed consent, no dementia, cerebrovascular disorders.} \]

Each reads text A and text B. Randomized controlled trial. (Randomized by a computer program).

Half receive text A sloppily justified, half receive it ragged right. We measure speed of reading, immediate and delayed test results.
Results: reading speed

\[ p = 0.01. \text{ Average difference } -32.3 \text{ words per minute.} \]
Results: immediate test

\[ p = 0.62. \text{ No difference.} \]
Results: delayed test

$p = 1$. No difference.
The number of participants was small, $n = 20$. Still, we have a striking results: bad lines are bad for reading. Why? Maybe large uneven spacing is bad for text reading?
Discussion

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**Practical recommendations**

1. If you have a good hyphenation algorithm, you may justify your text for æstetic reasons.
2. If you cannot hyphenate, do not justify!
3. \texttt{\textbackslash sloppy} is not your friend!
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An example: ACM classes.