

# Effects of Irrelevant Symbols in Text on Word Recognition and Saccadic Programming during Reading

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## Introduction

Many experiments have studied the role of spaces between words in text by filling them with irrelevant symbols (*e.g.*, digits, gratings, x's). This practice is based on the assumption that these fillers occlude spaces without disturbing word recognition appreciably. Epelboim, Booth & Steinman (1996) pointed out that there is no empirical evidence to support this assumption and proposed a series of controls that must be performed before the role of spaces and fillers in reading can be evaluated. Recently, we performed these controls and found that texts in all conditions in which words were surrounded by fillers were read slower than normal texts, as long as the fillers shared common features with letters of the text (digits, irrelevant Latin letters and Greek letters). See Epelboim, Booth, Ashkenazy, Taleghani & Steinman (1996) for details. Reading was as slow when words were surrounded by fillers (1like2 8this6), as when fillers replaced spaces (1like2this6). The fact that reading text with fillers, even when spaces were preserved, was slower than reading normal text showed that fillers slowed reading by disturbing word recognition, not simply by occluding spaces. This means that prior experiments that used the filler technique did not provide useful information about the role of spaces in normal text.

We have continued our investigation of fillers and spaces by measuring the reading eye movements in a number of these conditions. Our preliminary findings are reported here.

## Method

Eye movements of 3 subjects were recorded, with exceptional precision and accuracy, as they read H. G. Well's "War of the Worlds" aloud. Greek letters were used as fillers. There were 6 text conditions:

1. **Normal:** "This is an example";
2. **Before:** " $\alpha$ This  $\tau$ is  $\pi$ an  $\delta$ example";
3. **After:** "This $\mu$  is $\theta$  is $\sigma$  and $\delta$  example $\phi$ ";
4. **Surround:** " $\pi$ This $\theta$   $\alpha$ is $\sigma$   $\mu$ an $\phi$   $\tau$ example $\alpha$ ";
5. **Filled:** " $\delta$ This $\pi$ is $\alpha$ an $\sigma$ example $\theta$ ";
6. **Unspaced:** "Thisisanexample".

## Results and Discussion

Text condition had no effect on % regressions, or on where reading saccades landed within words. However, texts containing fillers were read slower than normal texts and more saccades/line were made in filler conditions than either in **Normal** conditions, or, for 2 of 3 subjects, in **Unspaced** condition. Observed differences in eye movement patterns can be accounted for by a global adjustment to only 1 eye movement parameter, *viz.*, saccade size, made on the basis of the global appearance of the text. No evidence was found that the presence of fillers or the absence of spaces required new strategies for programming individual saccades, suggesting that word recognition and global strategies are more significant in saccadic programming than the local features of the text.

## References

- Epelboim, J., Booth, J. R., Ashkenazy, R., Taleghani, A. & Steinman, R. M. (1996). A comparison of fillers and spaces in text: Evidence for the importance of word recognition. *Invest. Ophthal. and Vis. Sci. (suppl.)*, 37.
- Epelboim, J., Booth, J. R. & Steinman, R. M. (1996). Much ado about nothing: the place of space in text. *Vision Research*, 36, 465–470.
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