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DYNAMIC TEXT LAYOUT ALGORITHM PROVIDES BEST COMPREHENSION GAINS

A leading researcher in the cognitive sciences and reading comprehension at the University of Memphis has invented a better and more flexible way to layout text for improved comprehension with less reading time. The invention applies to a new way to provide line breaks in text using the strength of the semantic relation between words in a sentence. Text is usually formatted such that a line of text is randomly truncated at the end of the line. The line end is determined by the size of the page or screen and its right margin. Research has shown that randomly breaking the line disadvantages online comprehension (reading time) and offline comprehension (memory) from the text. The invention uses semantic relationships between words to determine when to move to the next line. The algorithm has experimentally demonstrated to provide important advantages over traditional (random) line breaks and other proposals for line breaks.

APPLICATIONS

- Ideal for publishing houses that want to provide their readers with different text formats
- Provides publishers with a tool that adjusts line breaks according to the reader's ability
- Provides publishers with a tool that helps their readers with text layouts according to text type, reading skills, visual abilities, reading device
- Electronic reading devices will immediately provide optimal layout given width restrictions of the display screen (45-50 characters in iPhones and iPods for example)

ADVANTAGES

- Can be adjusted to reading level
- Can be adjusted to text difficulty
- Can be used with all (European) languages
- Proven to yield the fastest reading time and the highest comprehension scores when compared with traditional text presentation, random early line breaks, and syntactic linz breaks

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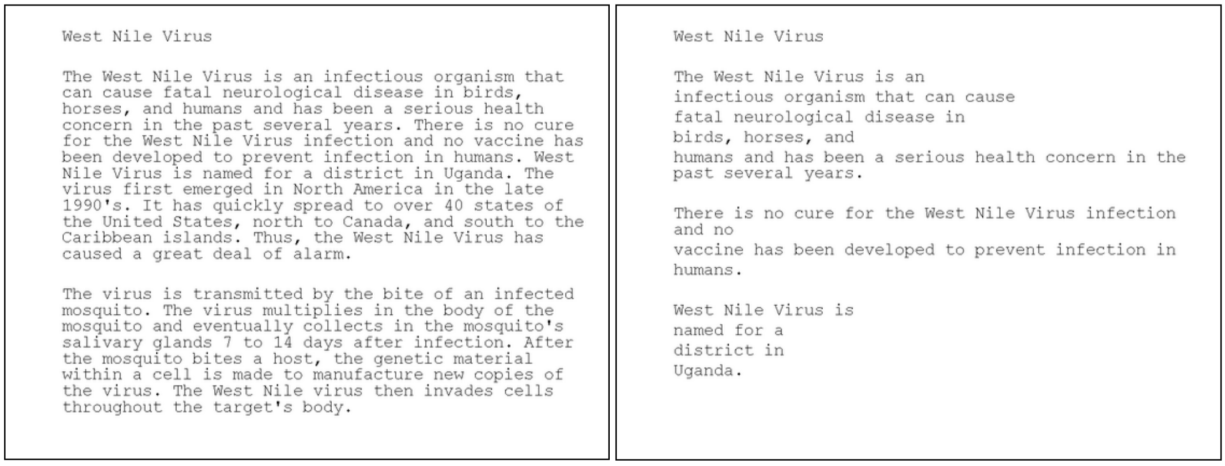
- Algorithm is based on extensive research in psycholinguistics
- Fast operation on electronic devices or electronic typesetting
- Operates error-free because it is not based on the sophistication of the computational technique but on the richness of natural language
- Can be tailored for particular registers (e.g. specialized medical discourse)
- Algorithm can be dynamically adjusted to accommodate different genres, topics, and readers
- Ideal for expert readers, novice readers, and for those with reading difficulties: the system adjusts the text format according to the readers' needs

TECHNOLOGY

A computer algorithm analyzes text, and applies line breaks according to reader parameters, which can be adjusted based on user preferences such as application, audience, and/or text preferences. Feedback from the analysis consists of the text with line breaks inserted at non-random points. Rather than using standard random line breaks (determined by page or screen layout), or relying on syntactic units (determined by sentence structure) the algorithm inserts line breaks according to meaningful relationships between words, using word order frequencies from general language, thereby allowing for more dynamic line breaks yielding online and offline comprehension benefits. Eye tracking studies have shown that fixation times and regressive eye movements are significantly lower, while comprehension results are significantly higher in the semantic computer algorithm than in alternative methods of line breaking.



West Nile Virus

The West Nile Virus is an infectious organism that can cause fatal neurological disease in birds, horses, and humans and has been a serious health concern in the past several years. There is no cure for the West Nile Virus infection and no vaccine has been developed to prevent infection in humans. West Nile Virus is named for a district in Uganda. The virus first emerged in North America in the late 1990's. It has quickly spread to over 40 states of the United States, north to Canada, and south to the Caribbean islands. Thus, the West Nile Virus has caused a great deal of alarm.

The virus is transmitted by the bite of an infected mosquito. The virus multiplies in the body of the mosquito and eventually collects in the mosquito's salivary glands 7 to 14 days after infection. After the mosquito bites a host, the genetic material within a cell is made to manufacture new copies of the virus. The West Nile virus then invades cells throughout the target's body.

Figure 1. Typical lines breaks in a text (left) and dynamically created line breaks in a text (right).

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THE INVENTORS

Dr. Max M. Louwerse is a Full Professor in the Department of Psychology and in the Institute for Intelligent Systems at the University of Memphis and is Director of the Institute for Intelligent Systems at the University of Memphis. He received a Ph.D. in linguistics from the University of Edinburgh in Scotland. He studied and taught at the University of Florida, and was a postdoctoral fellow before becoming faculty in the Department of Psychology at the University of Memphis.

Dr. Max M. Louwerse

Dr. Louwerse has over 90 publications in psychology, linguistics, and cognitive science, and has received awards for his teaching and research. His interests cover a wide range of topics in interdisciplinary research related to computational psycholinguistics, including discourse comprehension and production, multimodal communication, symbolic and embodied cognition, mental representations, and medical informatics. He has been Principal Investigator on NSF and NIH grants on multimodal communication and medical informatics, and Principal Investigator and Senior Researcher on federal grants on coherence metrics, speech recognition, emotion sensing, and intelligent tutoring systems.

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