Effects of Irrelevant Sounds on Text Comprehension and Memory after Reading Silently and Orally

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Abstract
This study investigated the effects of background sounds on reading comprehension and text memory. Thirty-two participants were asked to read paragraphs either silently or orally during the presence of irrelevant sounds: silent control condition, instrumental music, a foreign language song, and a native language song. The background sounds interfered with the text memory but did not interfere with the text comprehension.

Introduction
When we read text, does background music interfere with our reading comprehension? There is a substantial body of research showing an “irrelevant speech effect” on some types of task performance. The irrelevant speech effect refers to the impairment of the task performance, especially that of serial recall, when the task is performed in the presence of a speech stimulus that is irrelevant to the task.

Salame and Baddeley (1982) found that only speech, regardless of its meaningfulness, disrupts the task performance and interpreted the irrelevant speech effect on serial recall as indicating that speech interfered with the phonological representations that are needed for performing memory tasks.

On the other hand, in the case of a reading comprehension task, only meaningful irrelevant speech interfered with the task performance (Martin, Wogalter, & Forlano, 1988; Oswald, Tremblay, & Jones, 2000). These diverse effects could indicate that the effect of the meaning of the irrelevant speech depends on the level of meaning prevailing in the primary task (Banbury, Macken, Tremblay, & Jones, 2001). While serial recall is relatively devoid of meaning, reading comprehension involves meaning, and the effect of the meaning of the speech will be manifested only in the reading comprehension task.

In this study, the effects of some patterns of background sound on text memory and reading comprehension were examined. The task of reading comprehension involves mean ing, while literally memorizing the sentences in the text involves relatively little meaning. To manipulate the meaningfulness of the irrelevant speech, instrumental music without lyrics, a song in a foreign language which the participants can not understand, and a song in native language were used.

In addition, the reading modes were manipulated. In the studies examining the irrelevant speech effect on reading comprehension, the readers were required to read the written materials silently. However, we can also read materials orally. When reading aloud, the reader’s own speech is fed back. This influence of the feedback on the irrelevant speech has not been adequately examined.

Method
Participants
A total of 32 graduate students took part in the experiment. All were native speakers of Japanese. They were randomly divided into two groups: a silent reading group (n = 16) and an oral reading group (n = 16).

Material
Paragraph Reading Task The stimulus consisted of 24 paragraphs. The contents of the paragraphs were essays, articles, and fairy tales. Each paragraph consisted of about 270 letters and was followed by 12 question sentences. The question sentences consisted of six memory question sentences and six comprehension question sentences. Each of the memory question sentences was a sentence that was identical with part of the corresponding paragraph (true sentence) or a sentence in which the order of phrases was partly changed from the sentence in the corresponding paragraph (false sentence). Each of the comprehension questions was a paraphrase of the sentence in the corresponding paragraph (true sentence) or a sentence that involved irrelevant information to the corresponding paragraph (false sentence).

Background Sounds The background sound conditions consisted of a silent control condition and three sound conditions: (1) instrumental music, (2) singing in Korean, which was a foreign language to the participants in this study, with instrumental accompaniment, and (3) singing in Japanese, which was the native language for the participants in this study, with instrumental accompaniment. Three patterns of the “Saigo no Ame” song (United Asia Entertainment Co. Ltd.) were used for the sound conditions because of their uniformity in terms of musical style, pitch range, melodic contours, and rhythmic patterns. The singer for the Korean condition was identical with that for the Japanese condition.

Procedure
The paragraphs were presented one sentence at a time at the center of the monitor. Participants were required to read
the presented sentence at their own pace and when they had finished the sentence, to press a key to present the next sentence. After the last sentence was finished, the memory question sentences were presented one at a time. Participants were asked to judge whether the sentence was identical with part of a sentence in the corresponding paragraph. After completing the six memory question sentences, the six comprehension question sentences were presented one at a time. Participants were asked to judge whether the contents of the sentence were consistent with the contents of the corresponding paragraph. The order of presenting the question sentences was randomized.

Participants in the silent reading group were asked to read the paragraphs silently, and those in the oral reading group were asked to read the paragraphs orally. Both groups were asked to read the question sentences silently.

The background sounds were presented over a set of head phones that participants wore throughout the experiment. They were instructed to try to ignore the sound and were assured that they would not be tested on its contents in any way. The background sounds were presented from the start of the paragraph to the completion of the last question sentence in the experimental condition.

Results

Performance in the memory question sentences

The mean percentages of correct responses in the memory questions for all participants in each condition are presented in Figure 1. These data were subjected to a 2 x 4 ANOVA to examine the effects of reading modes (silent and oral reading; between-participants) and background sounds (quiet, instrument, foreign language, and native language; within-participants) on recognition of part of the paragraph. The effect of background sounds was obtained ($F(1, 30) = 3.24, p < .05$). It revealed that the performance in the quiet condition was higher than those in the other three conditions. The difference in the performance in the three music conditions was revealed to be negligible. The effect of reading modes and interaction were not significant ($p > .70$).

Discussion

The effects of background sound on text memory were obtained. In addition, instrumental music, a foreign language song, and a native language song interfered with the performances at the same level. It suggests that the text memory is susceptible to background sound, regardless of whether the sound consists of speech or involves some meaning. On the other hand, in this study, background sounds did not interfere with the performances in the comprehension question sentences. The effects of reading modes on the text memory and comprehension were also not obtained. These effects need to be reconsidered by changing or modifying the task which used to examine the reading comprehension or the experimental procedure.

References


