

종이책과 전자책의 매체적 특성과 콘텐츠가 독서 집중도에 미치는 영향

The Effect of Media Attributes and Contents on Level of Concentration when Reading books

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1. Introduction

Once new technologies are adopted in our lives, they soon become familiar to us and are no longer ‘new’. However, in the case of books, they have been the most durable media that for the delivery of all sorts of information from one place to another throughout history. In spite of the development of the digital library and electronic books, frequent book readers favor print books for their physical properties, which give sensual pleasure. In this study, we focused on comparing levels of concentration by tracking the brain activity while people were reading E-books and print books with different categories of contents. Based on the results of brain activity and self-reporting, this study gave a clear basis to explain the emotional difference between the two media along with contents. We expect to provide empirical evidence in building a new approach for designing electronic books.

2. Objective

The purpose of this study is to investigate people’s reaction to E-book in comparison with that to print book long with contents through detecting their brain waves as well as surveying the subjective opinions.

3. Method and Materials

The physiological state of participants who were reading a book was detected by Electroencephalography (EEG hereinafter), which is a measure of brain waves. An Emotiv Beta EPOC kit was used to measure the brain waves. The E-

book used in the experiment was the BOOKCUBE (B-815). There were a total of twenty participants with mix backgrounds; eleven female, nine male, whose average age was 24.1(SD=2.2). The experiment consisted of six short sections focused on different media and content. Each participant was asked to read a given book for 160 seconds and, at the same time, their brain waves were recorded. After each recording section, a recall test was given in which participants were asked to fill out what they had read. This test was intended to be used as a reference beside the brain wave recording and interview results. Finally, an interview was conducted after the whole experience.

3.1. Stimuli

There were three categories of contents: Literature, non-literature and academic papers. In each category, the two „different“ types of content were used and all six types of content were distributed in random orders so as to prevent systematic and personal biases. For literature, two Japanese novels were selected. Literature was examined to see whether there exists an emotional disagreement when reading lyrical literature in the two different media. Non-literature was the category in which we could see the effect of media when reading texts that are naturally related with learning, and thus two different philosophy introductions were chosen for the experiment. Academic papers were the category that in which we were able to see the effect of the two media when participants were trying to get academic information through published papers, and two different papers

published at an industrial design conference were used.

4. Results

As the SMR waves are produced during attentive situations or during concentration on cognitive activities, the ratios of SMR waves (12~15Hz) to the entire range between 3.5~50Hz were used to detect the level of concentration.

4.1. Result of Brain Waves

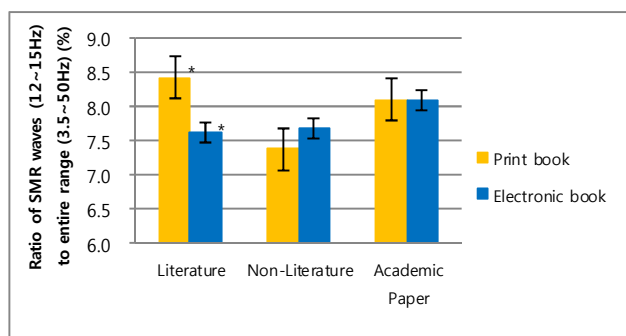


Figure1. Ratio of SMR waves (12~15Hz) to entire range (3.5~50Hz), illustrating the differences among the three categories of content along with media. Bars: +/-SD. (*p<0.05) (N=18)

In order to verify the effect of media along with type of content on level of concentration, a two-way within-group ANOVA was performed. The results show that the main effect is not significant either for content [$F(2, 34) = 3.183, p = .054$] or for media [$F(1, 17) = .428, p = .522$]. Moreover, the interaction effect did not reach statistical significance, either [$F(2, 34) = 2.534, p = .094$]. However, the media effect was significant while participants were reading literature [Paired-sample t-test, $t=2.774^*, p = .013$].

4.2. Result of Recall Tests

The Figure 2 illustrates the results of recall test, showing the number of answers given in each case. The highest score was obtained after the participants read literature in print book form followed by academic papers in the form of electronic books. Besides, the results of the paired sample t-test for the recall test

yielded a significant difference in the genre of literature. This replicates the tendency presented in the result of brain waves.

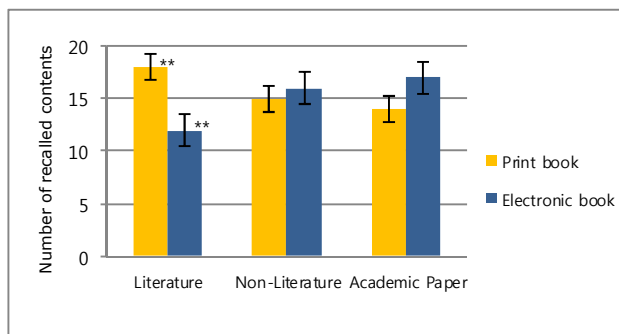


Figure2. Quiz results from the Recall test. Bars: +/- SD. **p<0.01 (N=18)

5. Conclusion

Even though E-books were comfortable to read, especially for the genre of literature, people could not fully concentrate and empathize with the content. On the other hand, participants never preferred reading academic papers through the medium of the E-book, but results of the EEG and recall tests showed insignificant difference between the two media. This suggests that there will be an opportunity for the E-book market to expand into content of academic papers and textbooks. Furthermore, it is a challenge for E-book developers to come up with a novel solution in delivering content in the genre of literature. Further study on color, material, font and style will be included in the design development process.

Reference

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