Journal of Neurolinguistics 35 (2015) 25–38

Contents lists available at ScienceDirect

Journal of Neurolinguistics

journal homepage: www.elsevier.com/locate/jneuroling

Neural correlates of second language reading comprehension in the presence of congruous and incongruous illustrations

Sungmook Choi [a, 1], Jang-Woo Park [b, 1], Yang-Tae Kim [c, 1], Jung-Hyun Hwang [d], Jeehye Seo [b], Sung-Uk Jin [b], Yoonhyoung Lee [e], Hui Joong Lee [f], Jongmin Lee [f], Minho Lee [g], Yongmin Chang [b, f, h, *]

[a] Department of English Education, Kyungpook National University, Daegu, South Korea
[b] Department of Medical & Biological Engineering, Kyungpook National University, Daegu, South Korea
[c] Department of Psychiatry, School of Medicine, Keimyung University, Daegu, South Korea
[d] Department of Neurosurgery, Kyungpook National University School of Medicine, Daegu, South Korea
[e] Department of Psychology, Yeungnam University, South Korea
[f] Department of Radiology, Kyungpook National University School of Medicine, Daegu, South Korea
[g] School of Electronic Engineering, College of IT Engineering, Kyungpook National University, South Korea
[h] Department of Molecular Medicine, Kyungpook National University School of Medicine, Daegu, South Korea

ARTICLE INFO

Article history:
Received 17 October 2014
Received in revised form 14 January 2015
Accepted 10 February 2015
Available online 3 March 2015

Keywords:
Reading comprehension
Illustration
Functional magnetic resonance imaging (fMRI)
Language
Neural correlate

ABSTRACT

To determine the neural underpinning of text-illustration effects, functional magnetic resonance imaging (fMRI) was performed using 45 short passages in English with text only and with text-congruous and text-incongruous illustrations. Compared to text alone, text accompanied by congruous illustrations elicited increased activation in brain areas implicated in attention, motivation, and reward, suggesting that text-congruous illustrations can improve reader's attention and motivation to read text, which in turn may promote reading comprehension. Furthermore, in a comparison of effects between text-congruous and text-incongruous illustrations, the results indicated that illustrations

* Corresponding author. Department of Molecular Medicine, Kyungpook National University School of Medicine, 130 Dongdeok-ro, Jung-gu, Daegu 700-721, South Korea. Tel.: +82 53 420 5471; fax: +82 53 422 2677.
E-mail address: ychang@knu.ac.kr (Y. Chang).
[1] These authors contributed equally to this manuscript.

http://dx.doi.org/10.1016/j.jneuroling.2015.02.001
0911-6044/© 2015 Elsevier Ltd. All rights reserved.

that are inconsistent with the content of the text may reduce readers' attention to and motivation for reading text and thus interfere with reading comprehension.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

Illustrations are prominent in most contemporary textbooks and now appear on nearly every page of all textbooks and sometimes take up a larger portion of a page than the text itself (Brookshire, Scharff, & Moses, 2002; David, 1998). For example, a tremendous increase was observed in the number of pictures in history textbooks of the 1980s, compared to those of the 1960s (Smith & Elifson, 1986). As popular aids to learning, text-congruous illustrations are assumed to serve several positive functions, such as enhancing readers' interest and motivation to read various materials, including textbooks (Levin & Mayer, 1993; Peeck, 1974).

Text-congruous illustrations also serve to facilitate reading comprehension of first (L1) and second (L2) language readers because they set the stage and provide them with rich contextual clues (O'Keefe & Solman, 1987; Omaggio, 1979). In a related vein, text-congruous illustrations are helpful to readers in development of mental models because they provide readers with clues about which information they should keep activated for further processing (Glenberg & Langston, 1992). Two review studies (Carney & Levin, 2002; Levie & Lentz, 1982) and more recent empirical studies (Mayer, 2009; Sung & Mayer, 2012) confirms the belief that adding congruous pictures to text can promote reading comprehension and learning from text. To illustrate, Sung and Mayer (2012) investigated how adding relevant (i.e., text-congruous) pictures to text affect reading comprehension as measured by a recall posttest. Participants were Korean undergraduate students in Korea (80 men and 120 women). They were instructed to read (a) a baseline text (no pictures) about distance education or (b) a baseline text augmented with relevant pictures. They then were instructed to recall the key ideas of distance learning. According to the results, participants in the relevant condition recalled significantly more key ideas than their counterparts in the baseline text condition, reflecting a medium-to-large range effect size ($d = .79$).

However, text-incongruous illustrations have been shown to impair reading comprehension and learning (Harp & Mayer, 1997; Levie & Lentz, 1982; Levin, 1989; Peeck, 1974; Sung & Mayer, 2012). For instance, Peeck (1974) demonstrated that text-incongruous illustrations hindered the reading comprehension of first and second graders. Similarly, Harp and Mayer (1997) examined the effects of adding seductive (i.e., text-incongruous and highly interesting) pictures on reading comprehension of seventy-four college students. The experimental text described the process of lightning, whereas the seductive pictures were photos contained images of lightning striking an airplane. According to the results, students in the baseline condition significantly outperformed their counterparts in the seductive condition who read the same text containing irrelevant seductive pictures.

For illustration of the facilitating effects, the dual coding hypothesis proposed by Paivio (1986) is one of the most commonly cited mechanisms (Paivio, 1986). According to this hypothesis, exposure to both verbal and pictorial information leads to construction of separate representations, which are connected in memory. In addition, when this information is presented in two modalities it is much easier to recall than that in only one modality because both verbal and pictorial representations provide redundant retrieval routes. The other mechanism suggested is related to the fact that illustrations increase attention and motivation to read the text, which may serve to organize verbal information in a way that it will be concrete and comprehensible (Levin & Mayer, 1993; Peeck, 1974). In a related vein, Mayer (2009) proposed the multimedia principle which states that text-congruous pictures encourage learners to make connections between the text and corresponding part of the pictures, resulting in better learning, whereas text-incongruous pictures may impair leaning by seizing learners' attention, thereby leaving fewer attentional resources available for creating a coherent mental representation of the text.

Download English Version:

https://daneshyari.com/en/article/7268787

Download Persian Version:

https://daneshyari.com/article/7268787

Daneshyari.com