

# Why Do Illustrations Promote Text Comprehension? Motivation Effect and Elaboration Effect

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## Abstract

This paper proposes a model that explains the utility of illustrations in promoting text comprehension comprising two effects, increasing motivation and deepening elaboration. We conducted two experiments using an existing evacuation manual to test the model. The first experiment confirmed that illustrations did significantly increase the participants' motivation to read the manual text. The second revealed that the more the participants gazed at the illustrations, the better they recognized the ones they actually had seen, and that the better the participants recognized the illustrations, the higher they recalled the text associated with the illustrations, possibly due to deeper elaboration of the text with the illustrations.

## Background

### Importance of disaster evacuation manual

- We require *self-made decisions* in surviving disasters.
- Appropriate self-made decisions require that people have *knowledge* in order to decide what to do to survive.
- A *disaster evacuation manual* is a primary source of knowledge.

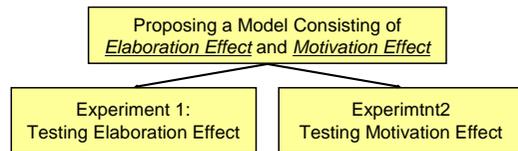


### The role of illustrations in manuals

- Illustrations are known to be effective for promoting comprehension of text.
- But it isn't clear how illustrations promote text comprehension.
- To develop an easy-to-understand evacuation manual, we should examine the cognitive process.

## Purpose

- Proposing a cognitive model that consists of motivation effect and elaboration effect to understand utility of illustrations in promoting manual text comprehension.
- Proposing an experimental method to evaluate motivation effect.
- Proposing an experimental method to evaluate elaboration effect.



Contributing to development of easy-to-understand manuals

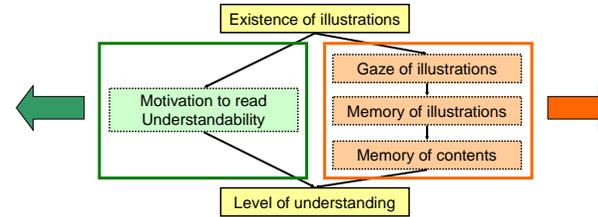
- The results of experiments help manual designers use illustrations effectively to improve manual text comprehension.
- Manual designers should consider use of illustrations:
  - when readers show low motivation
  - when readers need to acquire more thorough knowledge

## A Model of Utility of Illustrations in Promoting Text Comprehension

### Motivation Effect

- Motivation is derived from our daily experience.
  - Suppose that you grab a newspaper and find an article on the front page whose heading looks interesting. You may read it carefully or skim through it.
  - If an article includes an illustration, you may be tempted to read it.
- The illustration should help the reader to decide whether to read or not in a few seconds.

### Outline of the model



### Elaboration Effect

- Larkin and Simon (1987) reported why a diagram is so rich in information content, as many as 10,000 words, in their paper titled "Why a diagram is (sometimes) worth 10000 words."
- Though the purpose of illustrations is not exactly the same as that of diagrams, we assume that the learners should generate a representation of illustrations that helps them elaborate the text with which the illustrations are associated.
- We assume the following steps to stimulate the elaboration effect.
  - The learner gazes at the illustrations.
  - He/she generates a representation of the illustrations.
  - He/she generates a representation of the text-illustration pair, which is regarded as an elaboration of the representation of the text that would have been created without the illustration.

## Experiment 1: Testing Motivation Effect

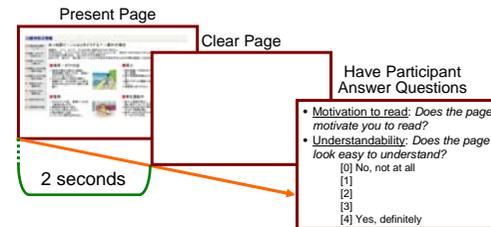
### Materials

- Illustrated Pages:** Revised disaster evacuation manual provided by Kawagoe city, Japan (<http://www.city.kawagoe.saitama.jp/bousai/index.html>).
  - The manual consists of eight Web pages.
  - Each page includes two to seven headings with explanatory text.
  - Each heading corresponds to some evacuation rule and has an associated illustration.
- Unillustrated Pages:** No illustration pages by removing illustration from the illustrated pages.



### Method

**Participants:** Thirty-four adults (6 females and 28 males; age 18 to 28)  
**Procedure:** The participants were allowed to *glance at the presented Web page for two seconds* and were then asked to answer the two questions.



### Results & Discussion

- Both the mean motivation-to-read score and the impression-of-understandability score for illustrated pages were significantly higher than those for unillustrated pages as revealed by t-test ( $p < .01$ )

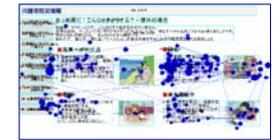
	Illustrated	Unillustrated
Mean scores (and standard deviations)		
Motivation to read	3.0 (.41)	1.8 (.46)
Understandability	3.3 (.33)	1.8 (.46)

The illustrated pages did motivate the participants more to read them within the mere two-second glancing period than the unillustrated pages did.

## Experiment 2: Testing Elaboration Effect

### Materials

- Illustrated pages in experiment 1
- 60 illustration cards for recognition test of illustrations
  - 30 old cards
  - 30 new cards
- Recall test sheet for recall test of contents
  - Consisted of eight questions required participants to remember and write particular sets of texts.



### Method

**Participants:** 23 adults (11 females and 12 males; age 18 to 26)  
**Procedure:**

- Seeing pages for ten minutes
  - Collecting gaze data with Tobii x50 eye-tracker
- Distracter task (arithmetic for a minute)
- Recognition test of illustrations
- Recall test of contents

### Results

- Participants gazed at each illustration 3.8 times on average ( $SD = 4.5$ ).
- The more the participants gazed at the illustrations, the better they recognized the ones they actually had seen as revealed by logistic regression analysis ( $p < .01$ )
- The better recognition memory resulted in higher recall scores of the text as revealed by t-test ( $p < .05$ )

Readers utilized illustrations to increase their level of understanding by deeper elaboration.

