

# Picture Health: a Study on Function and Realism of Visuals in Medical Texts

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**Abstract.** Research has shown that health communication materials are generally hard to comprehend for the general public. It has often been suggested that adding a visual to the text increases comprehension. However, research on the effectiveness of visuals in (medical) texts has resulted in inconclusive findings, possibly due to different types of images used in these studies. Therefore, we conducted an experiment in which we varied the function an image has in relation to the text (image function) and the degree of reality that is depicted (image realism). The effects of these two variables were tested on emotional and cognitive aspects of learning. The results showed that texts without visuals were perceived less attractive. However, adding visuals to the text did not reveal any evidence for enhanced learning in any way, neither was the type of image of influence.

**Keywords:** Visualization; Image function; Image realism.

## Introduction

Research has shown that health communication materials are generally hard to comprehend for the general public (Houts, Doak, Doak & Loscalzo, 2006). Especially information describing spatial, temporal, and mechanical dimensions, inherent to this genre, is difficult to describe with words alone. A solution to make medical information more comprehensible is to add an image to the text. However, research on the effects of visuals in (medical) text has resulted in inconclusive findings (Houts, et al., 2006). A possible reason why the findings are so diverse, is that different images were used which varied in the function they had in relation to the text and the degree of realism they depicted.

According to several taxonomies which classify the functions images have in relation to text, images vary in their informative value (Carney & Levin, 2002). Some visuals add no additional information to text (decorative function), while others do (informative function). Research into the effects of different image functions resulted in mixed findings (Carney & Levin, 2002). A possible explanation for these mixed findings could be that informative images affect cognitive aspects of learning, such as recall and transfer, while decorative images affect emotional aspects of learning, such as motivation to read, which in turn fosters learning.

Images can also differ in the degree of realism they depict. Visuals can represent a real-world object in an abstract way (e.g. a simple black and white line drawing of a heart) or in a more realistic manner (e.g. a color photograph of a heart). Research into the effects of image realism has also resulted in mixed findings (Joseph & Dwyer, 1984; Scheiter, Cierniak & Gemballa, 2008). These differences may be explained by the Seductive Details Effect (Harp & Mayer, 1998). Realistic images could have a negative effect on cognitive learning aspects as they display many details, which are attractive, but also redundant to the main point of the text. However, realistic images could have a positive effect on emotional aspects of learning, as readers could find them more attractive than their abstract counterparts resulting in higher motivation to learn, which fosters learning.


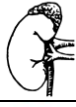




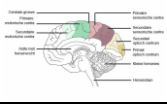
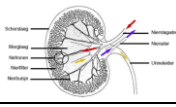
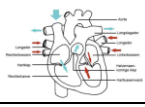


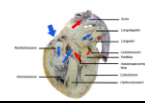
In short, medical texts could be made more comprehensible when visuals are used. However, not just any kind of image fosters learning. To disentangle the possible effects of image function and realism on emotional and cognitive aspects of learning, we conducted an experiment in which these image variables were manipulated.

## Method

### *Participants and design*

142 students participated (30 men, between 18-43 years old). They received €5.00 compensation for their participation and were randomly assigned to one of the experimental conditions. The experiment consisted of a 2x2 design with a control group with image realism (abstract, realistic) and image function (informative, decorative) as independent variables (see table 1). Participant read three texts (topics: heart, brain, and kidney) within one experimental condition.

Table 1: Overview of the experimental conditions.

Function	Realism	Example of the visuals		
Decorative	Abstract			
Decorative	Realistic			
Informative	Abstract			
Informative	Realistic			
No image	No image			

### *Dependent variables and procedure*

The dependent variables were cognitive (i.e. perceived comprehension, recall, and transfer) and emotional aspects (i.e. affective text appreciation and motivation to read) of learning. Perceived comprehension was measured with five semantic differentials on comprehensibility on a seven-point scale. Recall was measured using a terminology test, a sorting task, and a visual identification task. Transfer was measured using one multiple choice question. Affective text appreciation was measured with five semantic differentials on attractiveness on a seven-point scale. Motivation to read was measured using three Likert scale questions on a seven-point scale. Finally, prior knowledge was included as a covariate.

Participants received oral and printed instructions on the procedure of the experiment. Then, they filled out a questionnaire on demographics and prior knowledge. Next, participants read the three experimental texts. Subsequently, they filled out a questionnaire on text appreciation and motivation to read. Then, participants received a dummy task to increase the time span between reading the texts and answering recall and transfer questions. Participants were asked to solve two Sudoku puzzles and a

cross-word puzzle in five minutes. Finally, participants filled out a questionnaire containing recall and transfer questions.

## Results

The effect of image function was restricted to affective text appreciation ( $F(2,138)=4.48$ ,  $p<.05$ ,  $\eta^2=.06$ ). Pairwise comparison revealed that participants receiving texts without an image found the texts less attractive than texts with an decorative image ( $t(138)=2.49$ ,  $p<.05$ ,  $r=.21$ ), and texts with an informative image ( $t(138)=2.89$ ,  $p<.01$ ,  $r=.24$ ). No difference was found between decorative and informative visuals ( $t(138)=0.52$ ,  $p=.61$ ). The results varied between texts: effects of image function were only significant for the brain and kidney texts.

There were no effects of image realism except for affective text appreciation ( $F(2,138)=4.34$ ,  $p<.05$ ,  $\eta^2=.06$ ). Pairwise comparisons revealed that participants receiving texts without an image found the texts less attractive compared to texts with an abstract image ( $t(138)=2.69$ ,  $p<.01$ ,  $r=.22$ ), and texts with a realistic image ( $t(138)=2.68$ ,  $p<.01$ ,  $r=.22$ ). No difference was found between abstract and realistic visuals ( $t(138)=0.01$ ,  $p=.99$ ). The results varied between texts: effects of image realism were only significant for the brain and kidney texts. Finally, no interaction effects between image function and image realism were found.

## Conclusion

The results showed that image function and realism only had a limited effect on the learning outcomes. Texts including any kind of image were found more attractive than texts without an image. The limited integration between text and visuals might explain these results. Visuals were put at the end of the text, which could mean that participants did not spend much attention to the image. Also, no references to the image were made in the text, therefore the attention of the participants was not directed towards the image on relevant points in the text. Future research including online measures, like eye tracking, could examine how textual and visual information is integrated, and if integration of information is different for decorative and informative visuals as well as for abstract and realistic visuals.

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