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What you see is what you remember? Depictions of historical figures influence memory for historical facts

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ABSTRACT

We investigated whether the characteristics of pictures affect memory for verbal learning materials. In the learning phase, participants watched a slideshow about historical figures that were depicted as more or as less powerful. The slideshow included spoken information that was more prototypical for either powerful or powerless people and thus semantically congruent (e.g., depiction and verbal information rated as powerful) or incongruent with the pictures. Congruency resulted in more errors when participants had to reject incorrect items in a memory test. There was no effect of congruency on verifying correct items. This pattern was observed for a slideshow that included one picture for each historical figure (Experiment 1) and for a slideshow including additional pictures (Experiment 2). Hence, both experiments provide corroborating evidence that pictures affect learners' memory for verbal learning materials. These findings are relevant for instructional practice with regard to the design of learning materials and test items.

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1. Introduction

With the digital dissemination of educational content, learners these days are frequently confronted with audiovisual materials, such as animations or videos. In the domain of history, these materials include both authentic contemporary sources, recent documentaries (Knopp, 2008, 2010), and fictional historical TV dramas (Stoddard & Marcus, 2010). Scholars from history have long emphasized that there is no possibility of giving an “objective” or neutral account of a historical event or person, but that historical accounts come in the form of a historical narration instead, which inevitably purports certain viewpoints and beliefs of the narrating instance (Wineburg, 1991; van Drie & van Boxtel, 2008). Accordingly, historical documentaries and fictional historical TV dramas often promote a certain interpretation of a historical figure. This interpretation is not only fostered by verbal statements or the narrative plot, but also by use of persuasive visual techniques such as camera angle or camera distance (Bucy & Newhagen, 1999; Kraft, 1987; Meyers-Levy & Peracchio, 1992).

Even though educational researchers do not dispute that awareness of interpretive techniques is a central component of historical literacy when analyzing sources (Merkt & Sochatzy, 2015; Wineburg, 1998; van Drie & van Boxtel, 2008), research on how the interpretation of pictorial information actually affects the mental representation of verbal statements is scarce. More specifically, whereas many studies in multimedia research have demonstrated that adding pictures may support learning and comprehension of verbal explanations (Butcher, 2014; Eitel, Scheiter, Schüler, Nyström, & Holmqvist, 2013a) and that adding pictures in testing situations reduces item difficulty (Lindner, Eitel, Strobel, & Köller, 2017), the notion that the learners' interpretation of pictorial information may promote selective processing of verbal content has received less attention. In two experiments, we show that pictures of historical figures portraying them either as powerful or powerless have an influence on the participants' memory for power-related verbal statements about historical figures. In this way, we are able to provide new insights that are relevant for the domain of learning and instruction, both in terms of selecting pictures that are intended to support learning and in terms of selecting pictures that are included in test items. More specifically, if one's interpretation of pictures actually does affect how (s)he processes verbal information, instructors should be well aware of these effects in order to

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avoid inducing biased processing or biased retrieval of verbal information by adding pictures to learning materials or to test items, respectively.

1.1. Interpretation of pictures

Pictures are capable of evoking affective and evaluative reactions (e.g., Baumgartner, Esslen, & Jäncke, 2006; Lang et al., 1998). Being well aware of this observation, producers of media messages intentionally design pictorial information in a way that it evokes certain viewer reactions and supports corresponding interpretations, attitudes, and beliefs (Bordwell, 1985; Messaris, 1996). For instance, techniques such as camera angle and camera distance are used to make protagonists appear more powerful or to increase the viewers' identification with the depicted person (Bucy & Newhagen, 1999; Kraft, 1987; Merkt & Sochatzy, 2015; Meyers-Levy & Peracchio, 1992).

With regard to camera angle, analyses of several corpora of public photographs showed that powerful individuals tend to be portrayed from below, while powerless people tend to be shown from above (Giessner, Ryan, Schubert, & van Quaquebeke, 2011). Also, the participants were more likely to choose pictures from below for booklets that portrayed persons that were high versus low in power (Giessner et al., 2011). On the part of the viewer, several studies demonstrated that pictures taken from low angle viewpoints, compared to high angle viewpoints, result in more positive attitudes and in judging persons and objects to be more dominant and powerful (Kraft, 1987; Meyers-Levy & Peracchio, 1992; Mignault & Chaudhuri, 2003). These effects seem to be most pronounced under circumstances that favor heuristic processing (Meyers-Levy & Peracchio, 1992).

Further, variations with regard to camera distance have been demonstrated to affect viewers' involvement with a person and the perceived dominance (Bucy & Newhagen, 1999; Trébicky, Fialová, Kleinser, & Havlicek, 2016). Finally, requisites and costumes as part of mise-en-scene may also be used to emphasize the status of a person (Bordwell & Thompson, 2010).

To sum up, variations in the composition of a picture have been shown to influence how viewers interpret a depicted scene or how they rate the depicted characters in terms of dominance and power (Kraft, 1987; Meyers-Levy & Peracchio, 1992). Accordingly, it is evident that the aforementioned visual techniques can be used to intentionally manipulate the audience into forming certain impressions regarding historical figures or events (Sacchi, Agnoli, & Loftus, 2007). Whereas a deceptive use of pictures is evident in propaganda, the very same techniques are also used in portrayals that are designed for educational or edutainment[1] purposes, for instance in the TV documentary "The Germans" (Knopp, 2008, 2010).

While the studies on visual techniques have predominantly worked with stimuli that were purely visual in nature, documentaries typically combine visual portrayals of historical events and figures with audio narration. Given this observation, the question arises to what degree the interpretation of pictures may in fact influence the recipients' processing of verbal statements in audiovisual representations of historical figures. More specifically, we investigated whether the presence of pictures representing more (or less) powerful historical persons affects learners' memory of congruent or incongruent verbal statements. Hence, in the following section, we will describe how audiovisual information is processed and how pictures may affect the processing of verbal statements.

1.2. Processing audiovisual information

Audiovisual representations rely on a combination of visual and verbal statements that learners need to integrate in order to construct a coherent mental representation (Mayer, 2014; Schnotz, 2001). The cognitive theory of multimedia learning (CTML, Mayer, 2014) offers a theoretical framework for learning with audiovisual representations. Building on the dual coding assumption (Paivio, 1986) and Baddeley's model of working memory (Baddeley, 1992), it is assumed that information is processed in two different channels. Whereas the theory lacks a final clarification about whether the distinction between these channels is on a sensory (visual vs. Auditory, Baddeley, 1992) or on a representational level (verbal vs. Pictorial, Paivio, 1986), both of these distinct theoretical approaches agree that spoken verbal statements and pictorial information are initially processed in two different channels (Mayer, 2014). Within each of these channels, relevant information is first selected and then organized in a verbal or pictorial representation. These separate representations for verbal and pictorial information are then integrated into a common mental representation. Accordingly, pictorial information can affect our mental representation of verbal statements (Arndt, Schüler, & Scheiter, 2015; Eitel et al., 2013a; Eitel, Scheiter, & Schüler, 2013b; Glenberg & Langston, 1992; Larkin & Simon, 1987; Schüler, Arndt, & Scheiter, 2015).

The effects of pictorial information on the processing of verbal information are well documented, starting as early as during the reading process. According to Glenberg and Robertson (2000), readers construct meaning taking into account the objects' perceptual characteristics and affordances. This process seems to happen online when readers are confronted with novel sentences (Chwilla, Kolk, & Vissers, 2007). Research investigating this perceptually grounded approach to reading has demonstrated that pictorial information showing relevant objects in shapes and orientations that mismatch the implied shapes and orientations of the same objects in sentences does indeed complicate the reading process, as reflected in longer reading times (Wassenburg & Zwaan, 2010) and increased brain activity (N400 event-related potentials; Coppens, Gootjes, & Zwaan, 2012). Also for sentence verification tasks, reaction times were longer and N400 event-related potentials were larger when an action shown in the pictorial information did not match the action presented in the sentence (Knoeferle, Urbach, & Kutas, 2011). Taken together, these studies imply that pictures affect the comprehension of verbal information at early stages.

It may be argued that pictures provide a semantic context that influences how we process information. In line with this argument, Dasgupta and Greenwald (2001) observed that pictures of admired exemplars of minorities (i.e., Blacks) or disliked exemplars of majorities (i.e., Whites) provided a context that attenuated racial stereotypes. Comparably, short video clips providing learners with positive or negative stereotypic situations involving black people provided a context that affected participants' attitudes towards blacks (Wittenbrink, Judd, & Park, 2001).

Whereas the cited studies focus on online reading and comprehension processes, other research has addressed how pictures affect the mental representation of verbal information. For example, it was shown that photographs illustrating a news report may induce bias (Gibson & Zillmann, 2000; Grimes & Drechsel, 1996). For example, in the study by Gibson and Zillmann (2000), a news report on tick diseases was either illustrated by photos of ticks, of black children, of white children, of a mixture of photos of

[1] Edutainment refers to media that is intended to be educational and entertaining at the same time (Oxford Dictionary, https://en.oxforddictionaries.com/definition/edutainment).

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