



The effect of human engagement depicted in contextual photographs on the visual attention patterns of adults with traumatic brain injury



Amber Thiessen^{a,*}, Jessica Brown^b, David Beukelman^c, Karen Hux^c

^a Department of Communication Sciences and Disorders, University of Houston, 114 Clinical Research Services, Houston, TX 77004, United States

^b Department of Speech-Language-Hearing Sciences at the University of Minnesota, 164 Pillsbury Dr. SE, 115 Shevlin Hall, Minneapolis, MN 55455, United States

^c Department of Special Education and Communication Disorders, University of Nebraska-Lincoln, 301 Barkley Memorial Center, Lincoln, NE 68583, United States

ARTICLE INFO

Keywords:

Traumatic brain injury
Eye-tracking
Contextual photographs
Engagement

ABSTRACT

Photographs are a frequently employed tool for the rehabilitation of adults with traumatic brain injury (TBI). Speech-language pathologists (SLPs) working with these individuals must select photos that are easily identifiable and meaningful to their clients. In this investigation, we examined the visual attention response to camera- (i.e., depicted human figure looking toward camera) and task-engaged (i.e., depicted human figure looking at and touching an object) contextual photographs for a group of adults with TBI and a group of adults without neurological conditions. Eye-tracking technology served to accurately and objectively measure visual fixations. Although differences were hypothesized given the cognitive deficits associated with TBI, study results revealed little difference in the visual fixation patterns of adults with and without TBI. Specifically, both groups of participants tended to fixate rapidly on the depicted human figure and fixate more on objects in which a human figure was task-engaged than when a human figure was camera-engaged. These results indicate that strategic placement of human figures in a contextual photograph may modify the way in which individuals with TBI visually attend to and interpret photographs. In addition, task-engagement appears to have a guiding effect on visual attention that may be of benefit to SLPs hoping to select more effective contextual photographs for their clients with TBI. Finally, the limited differences in visual attention patterns between individuals with TBI and their age and gender matched peers without neurological impairments indicates that these two groups find similar photograph regions to be worthy of visual fixation.

Learning outcomes: Readers will gain knowledge regarding the photograph selection process for individuals with TBI. In addition, readers will be able to identify camera- and task-engaged photographs and to explain why task-engagement may be a beneficial component of contextual photographs.

1. Introduction

Speech-language pathologists (SLPs) and other rehabilitation professionals regularly employ contextual images—that is, images depicting objects in natural, holistic environments (Hux, Buechter, Wallace, & Weissling, 2010), to act both as tools for the assessment

* Corresponding author.

E-mail address: althiess@central.uh.edu (A. Thiessen).

<http://dx.doi.org/10.1016/j.jcomdis.2017.07.001>

Received 22 August 2016; Received in revised form 3 July 2017; Accepted 17 July 2017

Available online 30 July 2017

0021-9924/ © 2017 Elsevier Inc. All rights reserved.

(e.g., standardized and informal testing) and treatment of cognitive-communication deficits (e.g., memory books, speech generating devices) associated with severe traumatic brain injury (TBI; Carlomagno, Giannotti, Vorano, & Marini, 2011; Hanson, Yorkston, & Beukelman, 2013; Hux, Wallace, Evans, & Snell, 2008; Wallace, 2010). Given the important roles contextual images play in the rehabilitation process and the unique cognitive deficits experienced by individuals with TBI (e.g., attention deficits), it is essential that careful consideration be made when selecting and designing these images. Specifically, attention must be given to the effects of various design features on cognitive processing and interpretation to ensure that the images selected are as meaningful and transparent as possible.

To this end, researchers have begun to examine the preferences and identification patterns of individuals with TBI to contextual images (Brown, Hux, Knollman-Porter, & Wallace, 2016; Thiessen, Brown, Beukelman, Hux, & Myers, 2017; Wallace, Hux, & Beukelman, 2010). These investigations reveal that adults with TBI prefer contextual photographs to icons and photographs void of context for the representation of certain message types (Thiessen et al., 2017). In addition, increased context has been shown to result in greater identification accuracy for photographs (Wallace et al., 2010). However, individuals with TBI may not be as adept in utilizing background context to answer questions related to image content or theme as their peers without neurological conditions (Brown et al., 2016), and they tend to require increased time to process high-context photographs as compared to low-context photographs (Wallace et al., 2010).

Contextual photographs may well be a viable choice for message representation in the cognitive and communication supports of adults with TBI; however, care must still be taken to ensure that the content depicted within these photographs is meaningful to those who employ them. As such, identification of design features that improve the transparency and usability of contextual photographs is needed. Research to determine how image design features influence the perception, interpretation, and use of contextual photographs will assist in making this determination. As such, methods must be sought to objectively examine the responses of individuals with TBI to various design features.

Eye-tracking technology is becoming an increasingly viable tool for examining the effects of various image design features on cognitive processing. Because it allows for the accurate and objective examination of viewers' visual attention patterns to image regions (Rayner, 2009), eye-tracking has had a relatively prominent presence in the cognitive sciences and psychological research for decades (Buswell, 1935; Duchowski, 2002; Yarbus, 1967). Given the strong relation between visual attention and cognitive processing (Just & Carpenter, 1976), examination of the location, duration, and order of visual fixations on specific image regions could shed light on the cognitive processing of images without the need for verbal explanation (Rayner, 2009). For example, visual fixation has been shown to positively correlate with the relative importance, visual interest, and informativeness of image regions (Jacob & Karn, 2003; Poole & Ball, 2006). Specifically, image regions that are more rapidly fixated upon or that receive lengthier fixations are typically rated as more informative, appealing, or interesting to viewers (Buswell, 1935; Rayner, 2009; Yarbus, 1967). Therefore, examining which elements depicted within contextual images most readily capture visual attention or are overlooked, could serve to inform the image design and selection process.

Although direct examination of the visual attention response patterns of individuals with TBI is desired, consideration must be given to relevant research findings regarding the visual attention patterns of adults without neurological conditions. It has been argued that contextual images, by design, provide a certain level of support for viewers who are engaged in visual processing tasks (Biederman, 1981; Biederman, Mezzanotte, & Rabinowitz, 1982). Specifically, because contextual images depict real-world environments, viewers without neurological conditions tend to use their world knowledge to guide their search and identification process (Neider & Zelinsky, 2006). As such, during visual search tasks, viewers tend to rapidly focus on image regions in which targets appear in real-world settings (e.g., looking for birds in the upper half of a contextual image).

In addition to using their world knowledge to guide image viewing, adults without neurological conditions tend to fixate most on visually informative image regions (Antes, 1974; Buswell, 1935; De Graef, Christiaens, & d'Ydewalle 1990; Henderson, Weeks, & Hollingworth, 1999; Loftus & Mackworth, 1978; Mackworth & Morandi, 1967; Yarbus, 1967). Ratings of an image region's level of informativeness tend to be dependent upon the task (e.g., search, description; Yarbus, 1967); however, one specific element that consistently captures viewers' attention is human figures (e.g., Fletcher-Watson, Findlay, Leekam, & Benson, 2008). This factor remains consistent regardless of their size and position within contextual photographs (Wilkinson & Light, 2011). As such, it is likely that people find human figures to be informative during contextual photograph processing regardless of task.

Human figures depicted in contextual photographs act as a guide to illustrated objects and/or photo regions. Specifically, when human figures presented in contextual photographs are touching and looking at an object (i.e., task-engaged), the number of visual fixations on the touched/viewed object tends to increase as opposed to when they are looking forward toward the camera (i.e., camera-engaged) (Fletcher-Watson et al., 2008). These results indicate that adults without neurological conditions can be guided by depicted engagement cues to visually fixate on objects that may otherwise receive little visual fixation time. These findings are not unique to adults without neurological conditions. A recent series of studies examining the effects of two types of human engagement represented in contextual photographs—that is, camera- and task-engagement, have been conducted on adults with aphasia (Thiessen, Beukelman, Ullman, & Longenecker, 2014; Thiessen, Beukelman, Hux, & Longenecker, 2016). Camera-engaged photographs contain one or more human figure(s) who are looking forward toward the camera with their hands in a neutral position. These figures are neither looking at nor touching objects presented in the photograph context. Task-engaged photographs contain one or more human figures who are both looking at and touching an object depicted in the background of a photograph. Participants in both of these studies viewed camera- and task-engaged photographs on an eye-tracker monitor during a free-viewing task. Results indicated that adults with aphasia responded to task-engagement cues in a similar manner as their peers without neurological conditions by increasing visual attention on objects in which human figures are touching and looking.

Although the existing literature indicates that task-engagement cues presented in photographs have a guiding effect on the visual

Download English Version:

<https://daneshyari.com/en/article/5039071>

Download Persian Version:

<https://daneshyari.com/article/5039071>

[Daneshyari.com](https://daneshyari.com)