Sharing Photos on Social Media: Visual Attention Affects Real-World Decision Making

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Abstract. This study tested the effect of visual attention on decision-making in digital environments. Fifty-nine individuals were asked how likely they would be to share 40 memes (photos with superimposed captions) on social media while their eye movements were tracked. The likelihood of sharing memes increased as attention to the text of the meme increased; conversely, the likelihood of sharing decreased as attention to the image of the meme increased. In addition, increased trait levels of agreeableness predicted a greater likelihood of sharing memes. These results indicate that individual differences in personality and eye movements predict the likelihood of sharing photo-memes on social media platforms.

Keywords: Decision-making · Visual attention · Eye tracking · Social media · Privacy

1 Introduction

Of the multitude of items that can be shared digitally, the meme is one of the most popular. The term "meme," coined by Richard Dawkins, describes a unit of culture that is transmitted and replicated, undergoing change and evolving in the process [1]. Sharing a meme is therefore a communicative process whereby one participates in "digital culture" [2]. The goal of the present study was to better understand the cognitive processes governing whether memes are shared. While there are many studies on meme-sharing in the context of political messaging [3], rhetorical expression [4], hashtag activism [5], and beyond, few studies have examined what psychological mechanisms influence sharing memes.

In the age of the virtual echo-chamber, behavioral research affirms that people share online content they agree with. For example, Macskassy and Michelson (2011) reported that among Twitter users, the model best suited to predicting retweeting behavior (i.e., reposting content shared by another user) was based on profile similarity [6]. Individuals were likely to repost information shared by like others. A meta-review of survey information and peer-reviewed studies similarly found that compared to journalists and media personnel, most lay users shared information that they agreed with and endorsed [7].

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Relatedly, Amon and colleagues (2019) found that participants reported sharing memes if they found them funny or the content personally relatable [8, 9]. In general, the "message" of the meme plays a primary role when deciding to re-share digital content.

A potential unexplored mechanism underlying meme-sharing is visual attention. A growing body of evidence links visual attention to decision-making. One well-replicated finding is that increased attention to an option boosts the likelihood of preferentially selecting that option [10, 11]. Similar phenomena are seen in studies with social stimuli. For example, looking longer at a stimulus (e.g., a face) predicts an increased likelihood of rating that stimulus as more attractive [12]. This finding extended to abstract objects, as well.

Yet, there is almost no research that examines the relationship between visual attention and decisions to share content online, though many studies use eye-tracking to explore online shopping behavior [13], online advertisement efficacy [14], the processing of images that accompany online articles [15], and engagement with (though not sharing of) certain kinds of memes [16].

In general, privacy considerations factor prominently in an individual's decision to share content online, particularly personal photos. Young adults are aware of the privacy violations and perils that come with photo sharing, engaging in self-preservation strategies to avoid becoming "the next meme" [17]. This appears acutely true for younger (under 35-years-old) individuals [18]. Young adults also advocate seeking consent from individuals in a photo before sharing it [17]; they will consider their own privacy when sharing photos of themselves and the privacy of their friends when sharing a group photo [19, 20]. However, once a photo transforms into a meme and is circulated widely, concerns about others' privacy may dissolve. Amon and colleagues (2019) prompted participants to think about the privacy of a meme's focal subject in a photo-sharing paradigm [8]. They found that while participants reported considering the privacy of the meme's focal individual, they still rejected the premise that sharing a meme impinged on another's privacy.

The current investigation was designed to address two questions. First, to what extent does visual attention predict the likelihood someone will share a meme? Second, do individual characteristics and personal privacy preferences predict meme-sharing behavior? To investigate these questions, we invited undergraduate students to the lab to view a set of photo-memes and rate the likelihood that they would share those memes on their preferred social media platform while recording eye movements. Specifically, we were interested in the relationship between the distribution of their visual fixations and their sharing decisions. We hypothesized that greater attention to the meme text would be associated with greater semantic engagement with the meaning of the text [21], and less concern with the privacy of the individual depicted in the photo. Accordingly, we predicted that these individuals would be more likely to share the meme. By contrast, we predicted that participants attending more to the meme image would be less likely to share that image. Here, we hypothesized that focusing more on the photo would be associated with humanizing the person or persons in the image and prompt the participant to consider that these individuals may not have given their consent to share their image [22]. In testing how personality might affect the likelihood of sharing photo-memes, our goals were more exploratory, and thus there were no specific hypotheses.

2 Method

2.1 Participants

Fifty-nine undergraduate students from a large midwestern university database took part in the study for course credit. Participants were 56% female, 18–26 (Mage = 19 years), and 78% White, 13% Asian, 7% Latinx, and 2% Black. All students had normal to corrected vision. Students were ineligible to participate if they had taken medication that could have impaired cognitive function within 24 h of participation.

2.2 Procedure

The university IRB approved all study procedures. Participants were tested individually. Upon arrival, a trained research assistant guided the participant through the consent process. They then explained to the participant that they would view a series of images and rate how likely they would be to share those images online; after which they would complete a short series of questionnaires. The participant sat in front of a computer monitor and rested their head on a chinrest to minimize movement. The research assistant guided the participant through calibration of the eye tracker, and then instructed them to focus on a fixation cursor for one-minute to record baseline pupil information. The photo-meme sharing task started promptly after the rest period, and upon completion, participants filled out two surveys on the computer. The entire procedure took approximately 45 min.

2.3 Photo Sharing Task

The photo sharing task was created using Tobii Pro Lab with E-Prime 3.0 integration. Participants viewed 40 memes pre-tested to range in valence from very positive, positive, negative, to very negative [8]. Each meme remained onscreen for 8 s (image slide), after which a 7-point Likert scale appeared below the meme, instructing participants to rate the likelihood that they would share the meme on social media from *1-Extremely Unlikely* to *7-Extremely Likely* (Likert slide). Participants responded via keystroke. They had unlimited time to decide if they were likely to share the meme.

2.4 Personality Measures

Big Five Inventory - 10 Item Short Form (BFI-10) [23]**.** The BFI-10 is an abbreviated 10-item version of the 44-item scale that reduces personality to five dimensions: neuroticism, agreeableness, extraversion, conscientiousness, and openness. Participants were asked, "How well do the following statements describe your personality?" and responded on a 5-point scale ranging from *Disagree Strongly* to *Agree Strongly.* Whereas previous studies validated the reliability of the shorter 10-item version of the BFI [24, 25], reliability for our sample was low (Cronbach's alpha = .50).

Privacy Questionnaire [8, 26]**.** A single-item privacy question asked participants, "Are you a private person who keeps to yourself or an open person who enjoys sharing with others?" using a 7-point scale ranging from *1-Very Private,* to *7-Very Open.*

2.5 Data Acquisition and Processing

Eye gaze data were collected using a Tobii TX300 Eye Tracker (Tobii Pro AB, Stockholm, Sweden) with integrated 23″ monitor (1920 × 1080 pixels) at a frequency of 60 Hz. Participants sat 60–70 cm from the monitor and completed a 5-point calibration with validation. Participants rested their heads in a chinrest to minimize movement. We used Tobii Pro Lab for offline analyses of gaze data. Areas of interest (AOIs) were drawn around the borders of faces, bodies, objects, the full meme image, lines of text, and the Likert scale that appeared below the meme during the Likert slide. The minimum threshold for a fixation was 100 ms. We excluded gaze data from one participant who had only 19% usable recorded data.

3 Results

We used SPSS 26.0 to conduct all statistical analyses. The dependent measure was total fixation duration to three specific AOIs: meme text, meme image, and the Likert scale (during the Likert slide, only). Total fixation duration represents the cumulative duration of all fixations within an AOI.

3.1 Descriptive Statistics

First, we examined the difference in attention to the components of the image and Likert slides. During the image slide presentation, participants looked more at the meme image ($M = 3.95$ s, $SD = .60$) than text ($M = 2.19$ s, $SD = .51$), $t(58) = 14.21$, $p < .001$, $d = 1.87$. While the Likert slide was on the screen, participants looked the longest at the Likert scale ($M = 1.08$ s, $SD = .45$), then the meme image ($M = .79$ s, $SD = .43$), and finally the meme text ($M = .29$ s, $SD = .19$), $F(2,114) = 81.38$, $p < .001$, $\eta p^2 = .588$. Average likelihood to share was $M = 3.42$, $SD = .81$, and ranged from 1.62 to 5.04 (Fig. 1).

3.2 Correlations

We computed Pearson's correlations between total fixation duration to meme text, meme image, and Likert scale; task performance measures (likelihood of sharing and reaction time to sharing decision); demographics (age, gender); personality traits (privacy and BFI); and the likelihood of sharing.

Correlations revealed that the mean likelihood of sharing (Likert scale score) was positively associated with mean response time, $r(58) = .28$, $p < .05$, total fixation duration to the meme text during the image slide, $r(58) = .29$, $p < .05$, and total fixation duration to the meme text during the Likert slide, $r(58) = .25$, $p = .055$. The decision to share was negatively associated with total fixation duration to the meme image during the image slide, $r(58) = -.29$, $p < .05$. There was no relationship between fixation duration to the Likert scale and likelihood of sharing, $r(58) = .11$, $p = .400$. There was a significant positive relationship between sharing and BFI agreeableness, $r(59) = .38$, $p < .05$. There were no other relationships between personality measures and likelihood of sharing.

3.3 Effects of Looking on Likelihood to Share Memes

To further discern the influence of attention on the likelihood of sharing memes, we conducted two stepwise hierarchical linear regressions. First, we calculated attention ratio scores for both image slide and Likert slide by dividing the total fixation duration to meme text by total fixation duration to meme image. Ratio scores above 1.0 indicated greater looking to the text than the image and ratios below 1.0 indicated greater looking to the image than the text. Mean ratio for the image slide was .55 and ranged from .26–.99; mean ratio for the Likert slide was .37 and ranged from .09–.86. Step 1 of each model contained the fixation ratio score (from either the image or Likert slide). Because correlations showed a significant relationship between BFI agreeableness and sharing, we added that trait to Step 2 of the model to see if it explained additional variance.

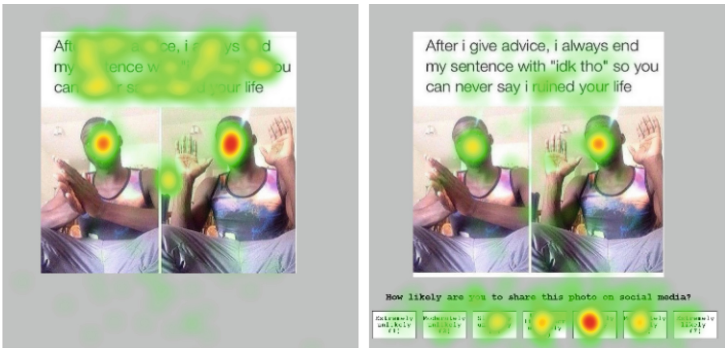

Fig. 1. Image slide (*left*). Likert slide (*right*). Heat map of gaze data averaged over all participants during a single trial. Attention is distributed between the lines of text and meme subject. Darker (*red*) colors indicate areas with greater total fixation time during the trial. (Color figure online)

Image Slide. The text-to-image ratio during the image slide and BFI agreeableness significantly predicted likelihood to share, $F(2,55) = 4.63$, $p < .01$, $R^2 = .15$. BFI agreeableness specifically predicted *increased* sharing, $\beta = .31$, $t(57) = 2.31$, $p < .05$. Ratio score also predicted increased sharing, $\beta = 1.35$, $t(57) = 1.99$, $p = .055$. Thus, as attention to text increased, the likelihood of sharing increased.

Likert Slide. The text-to-image ratio during the Likert slide and BFI agreeableness significantly predicted sharing behavior for memes, $F(2,55) = 4.97$, $p < .05$, $R^2 = .15$. Ratio score marginally predicted *increased* sharing, $\beta = 1.01$, $t(57) = 1.71$, $p = .093$; BFI agreeableness also predicted *increased* sharing, $\beta = .33$, $t(57) = 2.58$, $p < .05$.

The correlational results suggested that participants were less likely to share memes as attention to the meme image increased. To better understand what feature or features of the meme image were driving this pattern, we calculated change scores for each feature, e.g., we subtracted total fixation duration to the face of the meme subject from total fixation duration of the overall meme image. Findings revealed that only total fixation duration to the *face* correlated with likelihood of sharing, $r(58) = -.27$, $p < .05$.

As in the previous regression analyses, we computed a new attention ratio score, dividing fixation duration to the meme text by fixation duration to any faces of individuals in the meme image. Both BFI agreeableness and attention ratio score during the image slide significantly predicted likelihood to share, $F(2,55) = 4.63$, $p < .01$, $R^2 = .15$. BFI agreeableness, $\beta = .31$, $t(57) = 2.35$, $p < .05$, and the fixation ratio of text to face predicted *increased* sharing, $\beta = .60$, $t(57) = 2.08$, $p < .05$. Given that this finding is based only on attention to the face, it suggests that as attention to any faces in the image decreased (relative to attention to the text), sharing likelihood increased.

4 Discussion

This is one of the first studies to examine the role of visual attention on the sharing of digital content. We found that as attention to the text of a meme increased, so did the likelihood of sharing said meme (though over the course of a trial, attention to the image portion of the meme image was greater than attention to the text or caption). Understanding a meme, specifically one that has a photo with a caption, requires attention to the caption itself. The caption guides the viewer's interpretation of the photo; subsequently, the viewer can then evaluate if they think the caption suits the photo in the context of giving the meme a specific meaning and/or if it makes the meme humorous. We also know that more attention is often associated with greater favorability, as seen in forced choice paradigms in behavioral economics [10] and marketing studies of successful advertisements [27]. Therefore, we believe that increased attention to the caption reflected a more favorable reading of the meme, and supports past work showing people are more likely to share online content that they feel they relate to and find amusing [8]. We asked several post-experiment survey questions, one of which asked why participants did or did not share memes. The overwhelming response was that the meme was either funny or relatable, or both. This finding supports previous studies that users like and share content which they feel represents their own interests or an idea that they endorse. Thus, it is fair to deduce that the more time participants allocate to the text, the more they engage with the meaning or messaging of the meme.

Conversely, attending more to the meme image rather than the caption, was associated with a reduced likelihood to share. Our results showed that attention to the meme image was driven largely by increased fixation time to the face of the person or persons in the image. This reduction in sharing was perhaps a result of the automatic mentalizing that occurs when one looks at a human face [28]. Thus, the attention to faces could have resulted in the "humanization" of the meme subjects and increased concern for their privacy. However, attention to faces could also represent a disconnect from the meme's "message." Otherwise bored perceivers may have oriented to the most salient object on the screen, a human face, which preferentially captures attention [29]. Future analyses should examine the temporal distribution of gaze patterns during the image presentation to see if more time spent at the end of the trial on meme subjects and/or their faces affects sharing decisions.

Interestingly, we found a relationship between sharing likelihood and agreeableness, though no other personality traits nor personal privacy preferences. Generally, people with high levels of agreeableness tend to seek social acceptance as well as show genuine

sympathy with others and have high levels of prosocial motivation [30]. For these individuals, sharing memes may be a means of demonstrating sociability. A study on social attention found that high levels of agreeableness were associated with increased fixation time to the eyes of social stimuli [31]. This finding would appear counter-intuitive to our gaze findings, however. Attention to social stimuli (meme target faces, specifically) was negatively related to sharing, and we saw no relationship between agreeableness and total fixation to meme image. However, given the low reliability of the BFI measure we believe these results should be interpreted with caution.

This is the first study of its kind to examine how visual attention affects photo-meme sharing behavior. Future studies are necessary to replicate our results; namely, that engagement with a meme's caption drives decisions to share content, and that focusing on the people in a photo-meme may have a deterrent effect. Nevertheless, this is an important step in understanding how our cognitive and perceptual processes influence decision-making in real-world digital environments.

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