The Influence of Pop-Culture on Misattribution of Memory

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Abstract

Social media platforms provide a source for transmitting information that can become widely accepted. However, in this process of transmission, information becomes susceptible to distortion. In this study, we assessed people's semantic (i.e., prior expectations) and recognition memory for pop culture content, as a function of confidence and perceived information source. In Experiment 1, we investigated semantic memory for ubiquitous movie quotes (e.g., the famous Star Wars quote "Luke I am your father"). Notably this quote is incorrect, but we found that a majority of participants accepted these lure quotes as true with high confidence and indicated they had experienced the original source. In Experiment 2, participants viewed the original movie sources before a recognition test of the quotes. We found that while there was some improvement, people still preferred the lure quote with high confidence. We discuss the findings in terms of the strength of people's prior expectations when reconstructing events from memory.

Keywords: Semantic memory, recognition memory, source attribution, pop culture, confidence ratings.

Introduction

Social media platforms such as Reddit, Facebook, and Twitter are popular outlets to discuss a broad range of topics including people's memories of favorite movies, movie quotes, and scenes. Recently a viral online forum topic focused on people who recalled watching a movie dating back to the '90s called 'Shazaam,' which starred the actor Sinbad playing the role of a genie ("People Claim to Have Seen", 2016). Interestingly, there is no record of a movie called 'Shazaam,' and Sinbad himself denies the movie ever existed. This raises the question: how could so many people feel so strongly about a shared false memory of watching a movie that never was? While misremembering a movie might be harmless, imagine being misinformed about a real-world event—such as falling prey to fake news about politics or terrorist attacks. In this paper, we assess people's semantic (i.e., prior expectations) and recognition memory for pop culture content, as a function of their confidence and perceived information source.

There are a number of cognitive mechanisms that might underpin this behavior. One explanation might be that people are falling victim to "the social contagion of memory", which occurs when one person's recollection of events influences and shapes another person's recollection (Roediger, Meade, & Bergman, 2001). People integrate the false information with their true source representation. In this case, the contagion becomes exacerbated online as people's personal recollections are being influenced by the recollections of people from around the world in an instant, thus allowing these false memories to be shared and spread.

Take the game of telephone as an example. It begins with one person whispering a message to the person next to them, and so on. Oftentimes, the last message is significantly different from the original. The transmission for any individual in the chain would become a question of reconstructing the noisy information from memory (Xu & Griffiths, 2009).

These same factors also have implications for everyday memory such as singing the wrong song lyrics or misquoting common phrases and movie lines. As illustrated by the shared internet memory of 'Shazaam,' many of our memories for ubiquitous and pop culture concepts are not learned through first-hand experience with the original source—such as learning a quote directly from a movie—but rather are the result of information being passed from one person to another. In this case, the information transmitted takes on an abstracted nature.

Such distortion can happen in three different ways: assimilation, leveling, and sharpening (Bartlett, 1932). Assimilation occurs when details of the information are altered in memory to reflect one's own culture. Leveling occurs when information that is deemed non-essential is left out, reflecting a 'gist' representation of the event rather than the details. Sharpening occurs when the order of some details is changed. This illustrates how the reconstructive process can influence the transmission of information, leading to an event being slightly altered with each retelling to reflect the biases of the people participating in the transmission process.

While assimilation, leveling, and sharpening can result unintentionally from either the person transmitting the information or the person encoding the information, it is also possible to intentionally distort the shared information. This has been apparent in many experiments involving eyewitness testimony. Repeated exposure to suggestion, specifically, has been found to alter recall for a previous event (e.g., Loftus & Palmer, 1974). When shown a video of a car stopped at a stop sign and asked questions containing misinformation, such as "did the car stop at the yield sign," most participants responded in the way suggested by the misleading interview question, rather than what they had witnessed in the video (Loftus, Miller, & Burns, 1978; Loftus & Palmer, 1974; Mitchell & Zaragoza, 1996). It has been suggested that when misleading information is presented, it is introduced into the representation for the event and causes an alteration of that representation (Loftus, Miller, & Burns, 1978). This

illustrates a reconstructive process similar to that of the telephone game leading to biases in memory.

One possible hypothesis to explain this willingness to accept misinformation as part of the original event is source misattribution, where people incorrectly attribute the source of the memory (e.g., Schacter, 2001). According to the source monitoring framework, participants fall prey to misinformation because they have confused the source of the original information with the source of the misinformation (e.g., Johnson et al., 1993; Lindsay, 1994; Lindsay & Johnson, 1989).

In addition to confusing the source of information, people tend to express high levels of confidence in their memory, whether it is accurate or not (Bacon, 1979; Mitchell & Zaragoza, 1996). People are equally confident when reporting false information about an event that they heard from a secondhand source, as when they are correctly recalling the event as they experienced it (Mitchell & Zaragoza, 1996). Higher confidence has also been reported for more familiar statements (those that have been heard before), regardless of the accuracy of those statements (Hasher, Goldstein, & Toppino, 1977). This suggests that confidence in memory is not directly related to the accuracy of that memory.

Each of these cases demonstrates how memory is a constructive process, prone to distortions from factors including intrusions from semantic memory, source misattribution, and misinformation. Although there is extensive literature on false memories and source misattribution across a number of domains, one domain that has not been widely studied is memory for ubiquitous concepts, specifically the type that would be prone to influences from popular culture. Therefore, we were interested in evaluating people's semantic memory (i.e. prior expectations) for pop-culture content and how their semantic memory influences recognition memory for this content. We tested semantic and recognition memory for well-known quotes that tend to be misrepresented in popular culture, specifically focusing on how pervasive the misremembering of popular incorrect information is, what source people attribute the information to, and how confident they are in their responses. We compared these ubiquitous quotes to performance on common graphics such as the Apple logo, which are less likely to undergo transmission distortion.

In Experiment 1 we assessed participant's semantic memory and attribution of the source of the information, but we did not test recognition memory given the true source information. In Experiment 2 we investigated recognition memory for the original source of the ubiquitous information, in order to compare it to the semantic memory in Experiment 1. We hypothesized that selections of the incorrect popular lure quote would be made with high confidence, and that the likelihood a selecting the lure quote even after studying the video would be similar to the likelihood of selecting the lure quote in Experiment 1. If prior expectations exert a strong influence on memory, it is possible that even after viewing the original source material participants will still recall the misinformation that is pervasive in popular culture.

Experiment 1

Method

Participants Sixty-three Rutgers University undergraduate students participated in this study in exchange for course credit.

Materials The stimuli consisted of a brief demographics questionnaire (i.e. age, primary language, major, and media usage), and 27 3-alternative forced choice (AFCs) questions: three movie quotes, three famous quotes, four logos (note: the Google logo had six individual test questions, one for each letter[1], so the total number of logo questions was nine), and 12 distractor questions. See Figure 1 for the set of target stimuli. The 3-AFCs for each question included the correct response, a critical lure (i.e., the quote that has become common usage), and a non-critical lure. We selected the critical lures based on what has circulated on the Internet (e.g. In 2012's "Snow White and the Huntsman," Charlize Theron's character can be heard saying, "Mirror, Mirror, on the wall…"). For the graphics questions, the lures were selected based on one that closely resembled the target and one that did not. Both the demographics questionnaire and the

Movie Quotes:

Star Wars: *"No. I am your father."*
Snow White and The Seven Dwarves: *"Magic, mirror on the wall, who is the fairest of them all?"*
Forrest Gump*: "Life was like a box of chocolates."*

Graphics:

Figure 1. Stimuli (movie quotes and graphics) used in Experiments 1 and 2.

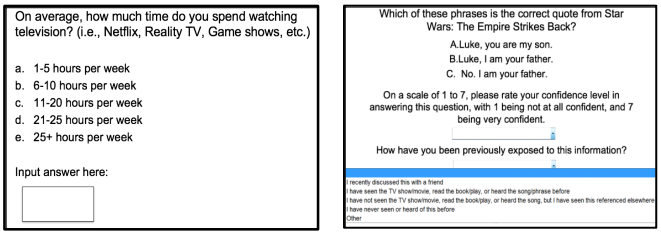

Figure 2. First panel: demographic questionnaire; Second panel: sample stimuli.

[1] Due to the difference, the Google graphic was not included in the analysis since it was designed differently compared to the other questions.

3-AFC questions were written in Matlab and presented on 23-inch Dell monitors

Design Given the types of questions that were asked (e.g. recognition of the Apple logo), participants were instructed to put away all cellphones and other electronic devices before the experiment began. First, participants completed the demographic questionnaire (Figure 2, first panel). Next, participants answered 27 questions, one at a time, which consisted of three parts: 1) participants responded to each question by selecting one of the 3-AFCs from a drop-down menu 2) participants rated their level of confidence in their answer on a seven point Likert scale, with one being not confident at all and seven being very confident 3) participants indicated from a drop-down menu if and how they had previously been exposed to the information presented in the question. The options included: "I recently discussed this with a friend", "I have seen the TV show/movie, read the book/play, or heard the song/phrase before", "I have not seen the TV show/movie, read the book/play, or heard the song, but I have seen this referenced elsewhere", "I have never seen or heard of this before", or "Other", which then allowed participants to elaborate on their source of knowledge using the keyboard (Figure 2, second panel). The presentation order of the 27 questions was randomized across participants. On average, it took participants 20 minutes to complete the experiment.

Results

Because the goal was to compare performance on the ubiquitous movie quotes and graphics between Experiments 1 and 2, only these target questions were used in the analysis. To evaluate whether participants could correctly identify the true quotes/graphics, we computed the response probability for the target, the critical lure, and the non-critical lure for each question (see Figure 3). We found that the preferred response for the movie questions was the critical lure (Star Wars: 95%; Snow White: 95%; Forrest Gump: 92%). The preferred response for most of the graphic questions was the target (Apple logo: 82%; American flag: 79%). However, for the Microsoft logo question, participants were split, with 48% of participants choosing the target, and 48% choosing the more closely matching lure.

A series of binomial tests were conducted to assess whether the proportion of correct responses for each question was different from chance. The tests revealed that performance was significantly worse than chance for the movie quote questions and significantly better than chance for the graphics questions (see Table 1).

Table 1*: Proportion Correct Compared to Chance*

Question	Exp1	Exp2	Chi Square Exp1 & Exp2
Star Wars	$p<.001^{**}$	$p=.08$	$\chi^2=25.04$, $p<.001^{**}$
Snow White	$p<.001^{**}$	$p=.01^{*}$	$\chi^2=2.39$, $p=0.12$
Forrest Gump	$p<.001^{**}$	$p=.004^{*}$	$\chi^2=4.54$, $p=0.03^{*}$
Apple Logo	$p<.001^{**}$	$p=.08$	$\chi^2=11.22$, $p<.001^{**}$
Flag	$p<.001^{**}$	$p<.001^{**}$	$\chi^2=0.09$, $p=0.77$
Microsoft Logo	$p<.001^{**}$	$p=.007^{*}$	$\chi^2=1.34$, $p=0.25$

$^{*}p<.05$; $^{**}p<.001$

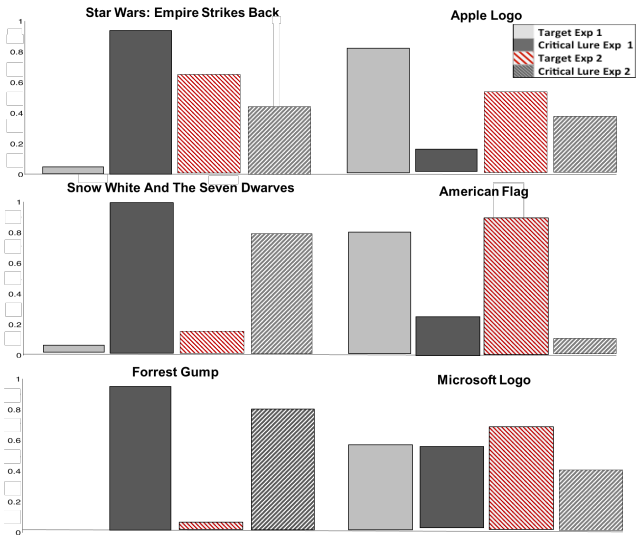

Figure 3: Response probabilities for the target and critical lure for each question in Experiments 1 and 2.

We then assessed confidence for the preferred response for each question. For the movie related questions, a majority of those who chose the critical lure also responded with high confidence, defined as five or higher (Star Wars: 86%; Snow White: 92%; Forrest Gump: 77%). For the graphics questions, a majority of those who chose the target responded with high confidence (Apple logo: 78%, American flag: 94%; Microsoft logo, target: 55%, most closely matching lure: 45%), see Figure 4. When comparing confidence ratings for targets to critical lures, we found that for most of the movie-related questions, confidence was greater for the critical lure than the target. We report the mean and standard deviation because there were not enough participants who chose the target to conduct a statistical test comparing confidence between target and critical lure (Star Wars: critical lure M=6.14, SD=1.63, target M=3.50, SD= 3.54; Snow White, critical lure M=6.55, SD=0.82, target M=3.50, SD=2.12; Forrest Gump, critical lure M=5.6, SD=1.6, no participants chose the target for this question). There was no significant difference in confidence ratings between targets and more closely matching lures for the Apple logo, American flag, and Microsoft logo questions.

For source attribution, we computed the response probability for each possible source conditioned on target and critical lure responses. Here we report the most frequently selected source for the preferred response for each question. Given that a majority of participants responded with the critical lure for the movie related questions, we analyzed which source they attributed their response to and found that they responded "watched the movie" as their direct source of knowledge (Star Wars: 71%; Snow White: 83%; Forrest Gump: 84%), see Figure 5.

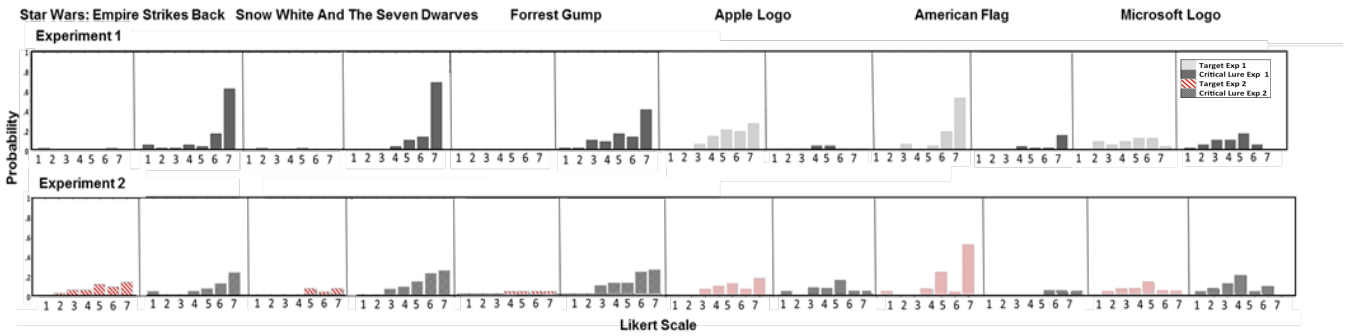

Figure 4: Confidence ratings for target and critical lures for movie related and graphic questions in Experiments 1 (top row) and 2 (bottom row).

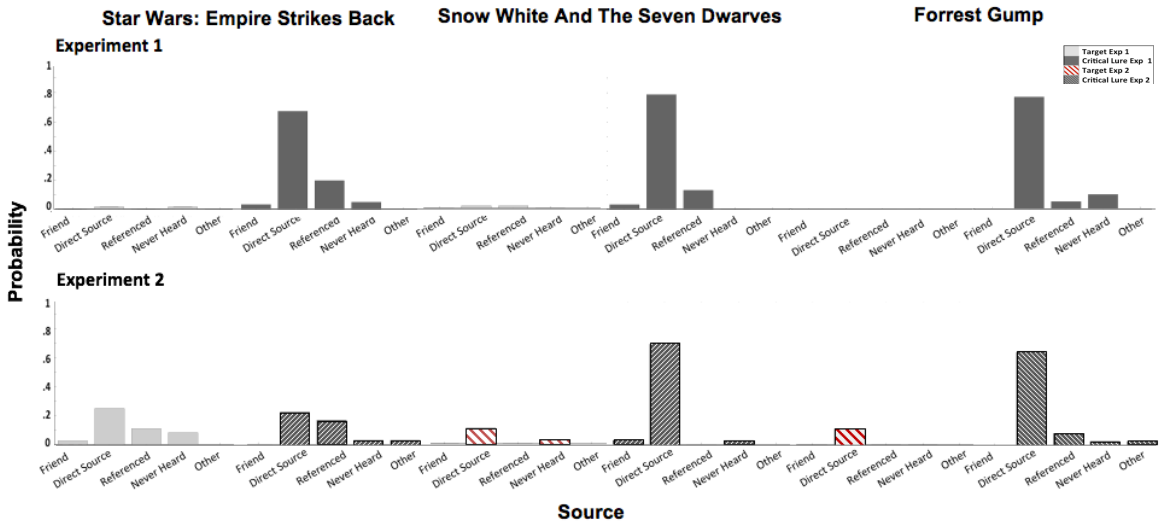

Figure 5: Source attribution for the movie related questions in Experiment 1 (left column) and Experiment 2 (right column).

Experiment 2

Method

Participants Thirty-six Rutgers University undergraduates participated in exchange for course credit.

Materials The demographic questionnaire was identical to Experiment 1. The study stimuli consisted of eight videos corresponding to the movie quotes and graphics, as well as one distractor clip. The video clips were scenes from movies that contained the quotes and commercials that contained the logos that were the basis of the questions in Experiment 1. The clips varied in length from 30 seconds to one minute. The test stimuli consisted of 12 3-AFC questions identical to those in Experiment 1, and related to the video clip content (three movie quotes, three logos, and three Google logo related questions[2]). The demographics questionnaire and 3-AFC questions were administered through Qualtrics Survey System on Dell computers in the lab.

Design After completing the demographic questionnaire, participants viewed seven of the eight video clips, one at a time, wearing a pair of provided headphones. Participants were instructed that they would receive a memory test on the content of the video clips. After viewing all seven target video clips, participants then watched an eighth clip which was unrelated to the memory test. This clip served as a distractor between study and test and lasted for roughly five minutes. After the distractor, participants answered 12 recognition memory questions related to the seven clips they had just viewed. Importantly, these questions were identical to those in Experiment 1 including the 3-AFC (target response, critical lure, and non-critical lure), confidence ratings, and source attribution questions. The recognition

[2] The 6 Google logo related questions tested participants on correctly recalling the colors of each of the letters in 'google.'

questions were self-paced and took participants 15 minutes, on average, to complete.

Results

To evaluate whether participants could correctly recognize the target quote and graphic after having viewed the original source, we computed the response probability for the target, critical lure, and non-critical lure for each question (see Figure 3). We found that participants were split for the Star Wars question with 44% choosing the lure response and 47% choosing the target response, indicating that performance was substantially better for participants after watching the original source (with 95% choosing the critical lure in Experiment 1). Interestingly, however, for the other movie related questions the preferred response was still the critical lure (Snow White: 75%; Forrest Gump: 78%). Participants were split for the Apple logo question, with 47% of participants choosing the target**,** and 33% choosing the more closely matching lure. It is important to note that more participants responded correctly with the target in Experiment 1 than in Experiment 2. For the other graphic questions, the preferred response remained the target (American flag: 84%; Microsoft logo: 56%).

A series of binomial tests were conducted to assess whether the proportion of correct responses for each question was different from chance (see Table 1). The tests revealed no significant difference for the Star Wars question and the Apple logo question. There was a significant difference in performance for the remaining questions, with participants doing significantly worse than chance for the Snow White and Forrest Gump questions, and significantly better than chance for the American flag and Microsoft Logo questions.

In order to further examine whether the introduction of the video clips improved performance, a chi-square test was conducted to compare the proportion of correct responses in Experiment 1 to the proportion of correct responses in Experiment 2 (see Table 1). The test revealed that performance on the Star Wars and Forrest Gump questions were slightly better for those participants who watched the video clips in Experiment 2. For the Star Wars question, there were significantly more people who answered correctly in Experiment 2 (47.22%) compared to Experiment 1 (3.28%). For the Forrest Gump question, there were significantly more people who answered correctly in Experiment 2 (11.11%) compared to Experiment 1 (0%), indicating that recognition accuracy was higher for those participants who had studied the direct source. However, there was no significant difference in performance between experiments for the Snow White, American flag, or Microsoft logo questions, indicating that for some questions, even for participants who had seen the video clips, recognition performance was no better than for participants in Experiment 1 who had not viewed the direct source. For the Apple Logo question, there were significantly more people who answered correctly in Experiment 1 (81.97%) compared to Experiment 2 (47.22%).

We then assessed confidence for the preferred response for each question in Experiment 2. For the movie related questions, a majority of those choosing the critical lure also responded with high confidence, defined as five or higher (Star Wars: 88%; Snow White: 81%; Forrest Gump: 75%, Apple logo, critical lure: 71%, more closely matching lure: 58%). It is important to note that for the Apple Logo question, more people answered with the critical lure in Experiment 2 than in Experiment 1. However, for the remaining graphic questions, a majority of those choosing the target responded with high confidence (American flag: 90%; Microsoft logo: 55%), see Figure 4. When comparing confidence ratings for targets to critical lures, we found that there was no significant difference in confidence ratings between target and critical lures for any of the questions, indicating that participants who chose the critical lure were just as confident as those who chose the target.

For source attribution, in Experiment 2 we computed the response probability for each possible source conditioned on target and critical lure responses. Here we report the most frequently selected source for the preferred response for each question. We found that a majority of those who chose the critical lure also responded that they had "watched the movie" as their source of knowledge (Star Wars, critical lure: 50%, target: 53%; Snow White, critical lure: 93%; Forrest Gump, critical lure: 82%), see Figure 5.

Discussion

The current study investigated people's semantic memory (i.e., prior expectations) and recognition memory for pop culture content, as a function of their confidence and perceived information source. We found that people chose the ubiquitous incorrect (critical) lure for the movie related questions. These results are consistent with the finding that people remember the gist of sources and not most of the details (Sachs, 1967). These responses were given with high confidence, with participants indicating that they had learned this information from the direct source, i.e., the movie. This suggests that people have strong prior expectations for pop culture content frequently circulated through the media – even though these expectations are not correct.

We found that in Experiment 2, exposure to original source material did not overwhelm pop-cultural distortions or lead to higher recognition accuracy for all of the movie quotes. Participants were still prone to select the critical lure, and did so with high confidence. This suggests that when prior expectations are strong, even if they are misaligned to the truth, viewing the original source cannot always overcome this inaccuracy.

Although there has been some success in correcting false memories (Brewer, 1977; Fazio & Marsh, 2010), we did not observe this in our study. Providing the original source material may have been ineffective in our task because we did not explicitly inform our participants to attend to the original source material (movie quotes or graphics). This was purposely done to simulate real world settings where people may passively encode information.

These two findings together present a somewhat dangerous picture of what misinformation can do to episodic memory.

For example, for the Apple logo where semantic memory (Experiment 1) was highly accurate, recognition memory (Experiment 2) faltered. This might be because the somewhat abstract noisy semantic representation is integrated with a noisy episodic representation in the reconstruction process. In contrast, for the pop culture movie quotes, recognition memory was only slightly better than semantic memory. This might be a result of semantic representations exerting a strong influence on the noisy episodic traces in the reconstruction process–consistent with a Bayesian interpretation of memory (e.g., Hemmer & Steyvers, 2009). In other words, the false semantic representation provides a high baseline contribution to episodic memory that is too strong to overcome even with exposure to the true source.

The implications of these findings as they relate to real world events are far reaching. Much of the "fake news" that was circulated the Internet throughout the 2016 presidential election consisted of fabricated stories posing as professional journalism. These stories were spreading misinformation, and ultimately became a means to influence public opinion. The importance of this issue has grown over time, as more people have reported that they get their news from the Internet (Lee, 2016). If we examine contemporary popular culture and the focus on social network distribution, it is easy to see how information spreads very rapidly through re-posts, re-tweets, or sharing via word of mouth throughout the Internet population, often in ways that the original producers cannot determine or control (Burgess, 2008). So, the next time you share a post on Facebook, or quote a movie, make sure you check your sources.

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