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Facts from Fiction: Packaging Misinformation

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Facts from Fiction: Packaging Misinformation

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Abstract

Previous research established that readers learn both accurate and inaccurate information from fictional stories. The current study explored factors that might moderate the impact of misinformation. Participants read fictional stories that contain three assertions; the first two were labeled as set-up assertions, and the last were labeled as the critical assertion. First, there was a manipulation of plausibility of information within the stories by presenting either assertions with truthful information, assertions with small lies (plausible misinformation), or assertions with big lies (implausible misinformation). Second, there was manipulation of reliability of the fictional stories by presenting big lies or truthful information in the set-up assertions before the critical assertion. Each story had two set-up assertions (either both are big lies, or both are truthful) that were presented prior to the critical assertion. We expected to replicate many existing findings found within the misinformation literature. Of most interest in this study, we observed being presented with misinformation led to lower accuracy and being presented with subtle misinformation led to higher production of that misinformation on the general-knowledge test. The setup assertion manipulation interacted with the type of critical assertion in one way: When the critical assertion was presented accurately in a story, the setup assertions mattered a lot in that reliable narrators presenting true critical assertions and led to greater accuracy on the general knowledge test than when unreliable narrators presented this information.

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Introduction

Acquiring information from reading

People gather general knowledge from various sources. One source for the acquisition of general knowledge is through fictional stories. There is a scientific interest in how misinformation is acquired through the same process. Empirically, obtaining misinformation from fictional narratives has been established (e.g., Marsh, Meade, & Roediger, 2003; Rapp, Hinze, Slaten, & Horton, 2014). Many researchers have observed what is called the *misinformation effect* (e.g., Marsh et al., 2003; Rapp et al., 2014; Jacovina, Hinze, & Rapp, 2014). The misinformation effect is when an individual is exposed to information that is not true (e.g., *Saturn is the biggest planet in the solar system)* and is subsequently negatively impacted in their ability to correctly answer an associated general-knowledge question (e.g., *What is the biggest planet in the solar system?).* This means that participants have a harder time answering general-knowledge questions when they are exposed to information that is inaccurate. Researchers usually measure the extent of the misinformation effect through an open-ended general knowledge test (e.g., Marsh et al., 2003; Rapp et al., 2014; Jacovina et al., 2014). The open-ended general knowledge test shows how much misinformation is produced, as well as how much misinformation exposure reduces the ability to get a question correct. The general-knowledge test is important because it is the main measurement of the misinformation effect in the research reported in this thesis.

Arguably the results reported by Marsh et al. (2003) launched this line of research. Furthermore, much of the current study is a modification of their study. Marsh et al. had participants read several fictional stories. In each of the original stories., there were six assertions with three levels of accuracy that were either misleading, neutral framing, or truthful. “I sailed

across the Atlantic Ocean, the largest ocean in the world" is an example of what a misleading frame looked like. "I sailed across the largest ocean in the world" is an example of a neutral frame. "I sailed across the Pacific Ocean, the largest ocean in the world" is an example of truthful framing. In the original study, participants read the stories, completed a visual-spatial distractor task, and then answered general knowledge questions. Marsh at el. found that misleading frames increased the chances of producing misinformation and reduced the probability of correctly answering the questions.

Source Reliability

Although researchers understand that misinformation can be acquired through fictional stories, they do not fully understand the role of source reliability and its influence on the misinformation effect. A real-life example that illustrates the importance of examining the impact of source reliability on misinformation would be the genre of historical fiction. Researchers have argued that historical fiction sometimes gets confused as a trustworthy narrative and can be a source that spreads misinformation (e.g., Fazio, Barber, Rajaram, Ornstein, & Marsh, 2013). For example, *The Pillars of the Earth*, written by Ken Follett (1989), romanticizes the living conditions of Medieval Europe. Sometimes historical fiction like *The Pillars of the Earth* purposely manipulates the truthfulness of a historical event to fit the narrative. The current study is designed to examine the role of narrative reliability on the misinformation effect by manipulating the trustworthiness of the narrator in a fictional story. Either the narrator will give extreme falsehoods – later labeled as *big lies*, which should indicate an untrustworthy source, or the narrator will give truthful statements – later labeled as *truths*, which would imply a trustworthy source.

In research conducted by Sparks and Rapp (2011), participants were shown to be attentive to the reliability of the narrator while reading. In this study, the researchers manipulated source reliable into two conditions: a reliable source and an unreliable source. To establish reliability, participants read short summaries establishing a character's trustworthiness. Reading statements like the one below would establish a reliable source.

> *Whenever someone's home has been damaged by a severe storm, Quentin helps clean up the debris and pays for a portion of the repairs. Quentin is hard working and willing to help those in need. Residents know that Quentin is honest and trustworthy.*

Or participants would read statements like the one below, which would establish an unreliable source.

> *Zane convinced some of his campaign workers to solicit elderly voters for large donations. Zane then used the donations to buy himself a new sports car. Residents know that Zane is dishonest and untrustworthy.*

Participants were less likely to believe the unreliable source. The unreliable source was measured to be less trustworthy. Furthermore, participants in the study read unreliable sources slower than reliable sources. The reading times indicated that the participants were focused on the level of reliability. In addition to Spark and Rapp's research on narrator reliability, a study conducted by Henkel and Mattson (2011) showed the power of reliability in regard to how much a participant is willing to believe information or misinformation. Participants in this study read less-known facts from a book or website that was either labeled as a known reliable source or as a known unreliable source. Participants were more likely to believe the less-known facts (e.g. *Nairobi is the capital of Congo* – really the answer is Kenya) when provided by the known reliable source when compared to the known unreliable source. Henkel and Mattson (2011) had the conclusion that participants made a judgement of reliability based on the available information that had been presented to them (e.g., if the source is known to be reliable or not). This is important because it

shows that participants are more susceptible to misinformation if the source is established as reliable.

Plausibility of information

In addition to the reliability of the source, the plausibility of an assertion is important because it impacts the likelihood that the misinformation effect will occur (e.g. Jacovina et al., 2014; Marsh et al., 2003; Rapp et al., 2014). Realism of a narrative increases the plausibility; in turn, the level of realism plays a role in the extent to which misinformation is acquired. Rapp et al. (2014) showed that the misinformation effect is strengthened if the stories are placed in a plausible context, such as stories that are not too fantastic (e.g., dragons, witches, unicorn, etc.), but could be possible in current reality.

With the assumption that the stories are realistic, the plausibility of a fact is important. In the Hinze et al. (2014) study, when a fact was classified as easy or hard, the level of plausibility was shown having an impact on the misinformation effect. Hinze et al. (2014) classified general-knowledge statements as easy (e.g., Venice is the Italian city known for its canals) or hard (e.g., General Meade was the leading Union general that defeated the Confederate Army at the Battle of Gettysburg), based on general-information norms from Nelson and Narens (1980). When participants were exposed to plausible lures, or small lies (e.g., *Lee Oswald assassinated President Abraham Lincoln*), embedded in fictional stories, they were less able to correctly answer the corresponding general knowledge question (*Who assassinated President Abraham Lincoln?*). Furthermore, when participants were exposed to implausible lures, or big lies (e.g., *Andrew Johnson assassinated President Lincoln*), they were less likely to produce misinformation effect. This means big lies (implausible lures) are not luring enough to allow misinformation to negatively impact general knowledge, whereas small lies (plausible lures) are

luring enough to allow misinformation to negatively impact general knowledge. Furthermore, Hinze et al. found that small lies are accepted almost as well as the truth; participants were as likely to believe that, for example, *Lee Oswald assassinated President Lincoln* when compared to the truth that *John Wilks Booth assassinated President Lincoln.* Through that observation it can be concluded that when people read inaccuracies in fictional stories, they encode those inaccuracies into memory; therefore, those inaccuracies will compete with prior knowledge during recall (Hinze et al., 2014). The plausibility of the inaccuracies can make recalling the correct information harder for participants, thus producing a robust misinformation effect.

The RI-Val model

The RI-Val model of language comprehension may be a way to explain how misinformation encountered during reading can challenge the recall of general knowledge. According to the RI-Val model, there are three phases of the comprehension process: resonance (R), integration (I), and validation (Val). When reading new information, a reader will encode that information into working memory. While this encoding process is happening, any information in long-term memory that is related to the new information will be reactivated, or resonate. Imagine a participant is reading the word *ark.* Related information is reactivated (e.g. *flood*, *Moses*, *Noah*, *character*, etc.) because they read the word *ark*. The integration phase is when the mind links the new information to the information active in working memory. When a person is reading a paper about theology and they see the word *ark*, they might integrate *ark* and *Noah* together. Validation is the process by which a reader confirms that *Noah* was the correct link to word *ark*. It is assumed that activation, integration, and validation are all passive processes. Reactivation, integration, and validation are also assumed to be parallel asynchronous processes, which are processes that are working alongside each other but that start at different

times (O'Brien, Albrecht, Rizzella & Halleran, 1998; O'Brien & Cook, 2004; Williams, O'Brien & Cook, 2018).

With this foundation of the RI-Val, it is possible to explain the reason why plausibility can impact the production or recall of correct general knowledge or misinformation when it is presented in a fictional context. The Moses Illusion (Hinze et al., 2014; Singer, Solar, & Spear, 2017) is a demonstration of corrupted integration and failed validation. When participants were asked, *how many of each animal did Moses bring on the Ark?* some participants answered *two* (Erickson & Mattson, 1981). This is wrong because Noah was the biblical character who brought pairs of animals on the ark. Park and Reder (2004) have argued that the reason participants fall for the Moses Illusion is because they fail to notice the difference because of a powerful semantic overlap. When they read *Moses*, many biblical characters should resonate; when they go on to read *ark*, many more biblical concepts resonate. When the participant reads *Moses* and the *Ark* together, the misinformation can corrupt the integration process and now have two pieces of information that will compete. This means that the new information, *Moses*, and the prior knowledge, *Noah* are now both in competition. The validation processes then can fail because of the semantic similarity between Moses and Noah, allowing the participants to accept *Moses* created the *Ark* and then they produce the wrong answer *two*. So, the Moses Illusion is a possible demonstration in why presenting small lies (plausible lures) in a fictional context induces participants to produce misinformation. With the Moses Illusion, validation fails because the new knowledge has a strong enough semantic overlap (a small lie) that it can sometimes be encoded as correct; in this case it would be competing with the prior knowledge that Noah built the Ark. The RI-Val model can explain how plausibility has an impact on resonance and integration.

The RI-Val model posits that the validation threshold can be changed to be more or less strict. The reliability of a narrator might lead to a relaxing of validation. If a person read that the Atlantic Ocean was the largest ocean from a reliable source, it might lead a reader to make the validation threshold less strict. In such a circumstance, a small lie that has a strong semantic overlap with the truth, or at least is not on its face implausible, will be more likely to escape scrutiny and be encoded into memory. This process will make the new encoded memory available later on when a question is asked about that memory. In the end, the participant may validate the fact that the Atlantic Ocean is the largest ocean. Whereas an unreliable narrative might lead to more focus on validation. Meaning if a person read that the Atlantic Ocean was the largest ocean from an unreliable source, that person would have a heighten validation threshold. In the end, the participant may not encode the information into memory and validation decides not to accept that fact that the *Atlantic Ocean* is the largest ocean.

The Current Study

In the current study participants read stories, originally from Marsh et al. (2003), but modified to fit the current experiment's goals. The original stories were split into two separate stories and condensed, creating more stories and thereby allowing more observations per condition. Within each of the stories we used, there were three assertions with various levels of accuracy of information throughout the story (i.e., truthful information, small lies, and big lies). An example of a truthful assertion is *Jupiter is the biggest planet in the Solar System*. A small lie would be that *Saturn is the biggest planet in the Solar System*. A big lie would be that *Pluto is the biggest planet in the Solar System*. Within these stories, the first two assertions are the *set-up assertions*, and they were responsible for establishing narrator reliability; both set-up assertions were two big lies or two truths. The two big lie set-up assertions should establish an unreliable

source, and the two truths should establish a reliable source. The last assertion is the critical assertion; this is the assertion that I am most interested in. I wanted to see if the set-up assertions would impact how much a participant will accept or disregard the critical assertion. This was 2 (Set-up Assertions: truthful, big lies) × 3 (Critical Assertions: truthful, small lies, big lies) within-subjects design, there is an example story provided in Appendix A. Participants reading times were recorded in three sections in the stories. It was usually in the last section that the critical assertion was embedded. After reading, and after a delay filled with a distractor task, participants completed an open-ended general knowledge test. During that test, participants rated confidence in the answers they gave. After the general knowledge test, participants provided a source judgement for all the questions they answered, asking if they knew the answer before reading the story or if they learned it while reading the story; the source judgements were collected for comparison with previous literature but are not reported in this thesis because there were not theoretical expectations about them. **Table 1** provides examples of the conditions.

Table 1: Illustrations of the conditions with example assertions

TTT	**Truthful set-up**: Atlantis is the mythical island that sunk into the sea. **Truthful set-up**: The Mayflower was the Pilgrim's first boat. **Truthful critical**: The Pacific Ocean is the world's largest ocean.
TTS	**Truthful set-up**: Atlantis is the mythical island that sunk into the sea. **Truthful set-up**: The Mayflower was the Pilgrim's first boat. **Small lie critical**: The Atlantic Ocean is the world's largest ocean.
TTB	**Truthful set-up**: Atlantis is the mythical island that sunk into the sea. **Truthful set-up**: The Mayflower was the Pilgrim's first boat. **Big lie critical**: The Red Sea is the world's largest ocean.
BBT	**Big lie set-up**: Avalon is the mythical island that sunk into the sea. **Big lie set-up**: The Titanic was the Pilgrim's first boat. **Truthful critical**: The Pacific Ocean is the world's largest ocean.
BBS	**Big lie set-up**: Avalon is the mythical island that sunk into the sea. **Big lie set-up**: The Titanic was the Pilgrim's first boat. **Small lie critical**: The Atlantic Ocean is the world's largest ocean.
BBB	**Big lie set-up**: Avalon is the mythical island that sunk into the sea. **Big lie set-up**: The Titanic was the Pilgrim's first boat. **Big lie critical**: The Red Sea is the world's largest ocean.

Hypotheses

The primary prediction that was tested in this experiment is that participants should be more likely to encode during reading and later produce misinformation on a general-knowledge test when the misinformation assertion is preceded by two true assertions than when misinformation is preceded by two big lies. According to the RI-Val model (O'Brien & Cook, 2016), readers can be more or less strict with validation during reading; when participants encounter a plausible source (e.g., a reliable narrator), they are more likely to let a small lie pass through the validation process; and when they encounter an implausible source (e.g., an unreliable narrator), they are more likely to catch the lie and not allow the lie to pass through the validation process. For instance, if a participant were to read one of the two-set up assertions that included big lies such as "the Titanic was the name of the pilgrim's ship that landed in America", the participant would have a hard time believing a subsequent critical assertion. Because of the big lies, the participants will then question the reliability of the source (i.e., the narrator) they are reading from. The assumption is that the participant will have a lower probability to validate anything that comes afterwards because the two assertions with the big lies established a nonreliable source. Reliable sources (trustworthy source) increase the misinformation effect, whereas nonreliable sources (untrustworthy source) does not increase the misinformation effect (e.g., Jacovina et al., 2014: Marsh et al., 2003; Rapp et al., 2014).

For our main dependent measure, which is accuracy on general-knowledge questions associated with the third, critical assertion in each story, we expected the TTT condition would result in higher accuracy on the general knowledge test when compared to BBT condition because the truthful set-up lowers the validation threshold. Furthermore, truthful assertions have been observed to produce more accurate answers on the general knowledge test when compared

to small lies. We expected that BBS condition would result in more accuracy on the general knowledge test when compared to TTS condition because the small lie may sneak by the lowered validation threshold in the validation process of the truthful set-up. In addition, the heightened validation threshold should scrutinize the small lie in the big lie set-up. Lastly, we expected the difference of correctness between BBS and TTS will be greater than the difference between BBB and TTB because the small lie critical assertions should be impacted by the set-up assertions. Moreover, the big lies in the critical assertion should be rejected more often. In addition to accuracy on the general knowledge test we had some hypothesis about misinformation as well. We predected that TTS would produce more misinformation than the BBS because the validation threshold of the truthful set-up should be lowered, and the validation threshold of the BBS conditioned should be heightened. Furthermore, we predicted that participants would be most confident in any of the TT set-up conditions when compared to the BB set-up conditions because the participant would accept that truthful set-up as more reliable-thus have more confidence. Lastly, since we were no longer able to get line by line readings via technical issues, we decided to measure reading times on 3 sections of all the stories. We expected reading times to be longer on sections or conditions that had the big lies set-up when compared to the lowered validation of the truthful set-up. This stricter validation threshold from the big lies set-up would lead to people noticing lies and slowing down.

Method

Participants

The participants were 141 University of Arkansas general psychology students who received partial course credit in exchange for participation.[1] No further demographics were recorded. It is also important to state our rationale for the sample size were based off previous literature and simulations of linear-mixed models using the R package simr (Green & MacLeod, 2016), which revealed that a sample size of 180 gives estimated power of approximately .8 to find an interaction of this size that is statistically significant at the conventional .05 level. Recruitment was conducted using Sona Systems (an online recruiting tool). All participants gave informed consent, and the participants were informed that the study was IRB approved.

Materials

Materials include the experimental stories, comprehension questions, spot the difference picture task, and the general knowledge test, all presented using Qualtrics. Qualtrics recorded responses, including time viewing each page.

The experimental stories, originally from Marsh et al. (2003), were modified to fit the current experiment. Each of the nine original stories was split into two similar stories, although with different characters, resulting in 18 total stories. The stories used in the current research are fictional stories that each have three different easy assertions embedded in them. The operational definition of an easy assertion is a general knowledge fact that on average is answered correctly at least 41.7% of the time according to Tauber et al.'s (2013) norms. The other 235 facts from these norms were fell under the 41.7% accuracy rate and were classified as hard facts, thus not

[1] This is the subset used for analysis, there is still about 40 participants in which we have not added to the analysis.

being used in the assertions within the stories; some were used on the general-knowledge test described below.

Within each story there were two set-up assertions that preceded one critical assertion. The set-up assertions were either two truthful assertions or two big lies. The critical assertion is found in the story at some point after the two set-up assertions were either truthful, a small lie, or a big lie. A truthful assertion is a factually accurate statement (e.g., “The Pacific is the largest ocean in the world.”). A small lie is a false statement that seems like it may be fact but is not (e.g., “The Atlantic is the largest ocean in the world.”). A big lie is a false statement that is not likely to be mistaken as fact (e.g., “The Red Sea is the largest ocean in the world.”) The two set-up assertion conditions were crossed with the three critical assertion conditions to create the six versions of each story. Participants were randomly assigned to one of six lists of stories. Each list had $1/6^{th}$ of its stories in each of the conditions. Across lists, each story appeared in each of the condition $1/6^{th}$ of the time.

Two comprehension questions were generated for each of the 18 stories to test the participant’s attention, and all answers were yes or no responses. The spot the difference picture task is a visual awareness puzzle that asked the participants to spot the difference between two nearly-identical pictures.

The general knowledge test was based on Nelson and Narens' (1980) general knowledge norms, updated by Tauber et al. (2013); we used 108 questions from those norms. In the general knowledge test, of the 108 questions, 18 of them were associated with the critical assertion in each story; responses to these are the primary outcome in the study. Another 36 items of the 108 items were associated with the set-up assertions. The other 54 items of the total 108 items are filler general knowledge questions. The general knowledge test can be found in the Appendix.

Design

The study was a 2 (set-up assertions: truthful, big lies) × 3 (critical assertion: truthful, small lies, big lies) repeated-measures design. The dependent measures were the proportion correct on the general knowledge test, the proportion of misinformation produced, reading times for the section of the story that contained the critical assertion, and confidence in answers. Each participant was exposed to all six conditions. Serial positions of stories were randomized anew for each participant. Each participant was exposed to one stimulus list. Within each list, one-sixth of all stories appeared in each condition; across lists, each story was seen by one-sixth of the participants in each of its conditions.

Measured variables

The main measured variable was dichotomous. Participants answered the questions on the general knowledge test correctly or not. However, we were focused on the "critical" general knowledge questions. The critical general knowledge questions (e.g., "What is the largest ocean on planet earth?") were associated with the critical assertions ("The Red Sea/The Atlantic/The Pacific Ocean is the largest ocean on planet earth") in the stories read by the participants. Although reading times were not measured per line read, reading times were measured by sections read. There were three sections per story and reading times allow a gross measure of the pace of the reader.

Procedure

The participants went through four phases in the experiment. In phase one, the participants were given a consent form to sign electronically. In the online instructions, they were told that they will be participating in a four-phase study. They were also informed that they will first read a series of unrelated short stories on their computer monitor. They were instructed

to use the keyboard to interact with the computer. To begin the task and to advance through the task, they were told to click on the arrow button on the Qualtrics survey. The instructions made it clear that the participants could not go back to re-read anything, so they were instructed not to click the arrow until they were ready to continue. The participants were also informed that after each passage there were two yes-no comprehension question. They were instructed to answer these questions carefully before starting the next passage. During this series of instructions, participant were instructed to read the stories at a normal pace. Participants were presented with phase-specific instructions before each phase.

In the first phase, the participants read the various stories in their randomly-assigned list. Each story was split into three sections, each one appearing on a separate webpage. After each story was completed, participants were asked to answer two yes-no comprehension questions.

In phase two, participants completed the distractor task, a visual puzzle utilizing a spot the difference set of pictures. They were instructed to find and count the difference between both pictures presented. In the instructions, they were also made aware that that had 2 minutes and 10 seconds to complete the puzzle. After they read the instructions, the distractor task began. After the 2 minutes and 10 seconds where up, they were shown the answers to the puzzle.

In the third phase, participants were instructed to answer the general knowledge questions. They were instructed not to guess, and that if they did not know the answer to a particular question, then they should leave the space blank. During this phase, participants were also asked to rate their confidence in their answers using a self-reported four-item Likert-scale labeled “no confidence”, “slight confidence”, “moderate confidence”, or “high confidence”.

In the fourth and final phase, participants were asked to review the answers they provided to the general-knowledge test, following the procedure used by Marsh et al. (2003). Participants

were asked to make a source-judgment in which they indicated about the answer they have provided either “I knew it before the experiment” or “I learned it during the experiment”. After the participants finished making source judgements, they were given an electronic debriefing form. The debriefing form explained the true nature of the experiment. In the debriefing form, they were informed that they were exposed to misinformation, so we provided the option to email the researcher for a list of all the correct answers to the general knowledge question.

Results

Data Collected

In total, 141 University of Arkansas students who were enrolled in General Psychology took part of the study. From the 141 students, data from 128 students were used for data analysis, ending with a total of 2304 observations. These observations were used to analyze reading times, and answers to the general knowledge test. Exclusion criteria are described below.

Exclusion Criteria

If participants read too fast (faster than 10 words per second), all of their data were excluded from the analysis. If participants did not at least score 70% correct on the comprehension questions, all of their data were excluded from the analysis. After the exclusion criteria were implemented, data from 13 participants were excluded from further analysis.

Data Wrangling

After the study was conducted, we needed to correct misspelled answers to properly analyze the data. During this process, we identified misspelled words and then corrected them. For example, misspellings such as “ostrch”, “ostriche”, or “ostridge” were counted as the correct answer “ostrich”.[2]

[2] A list of corrections made will be made publicly available.

Analysis

A conventional alpha level of .05 was used as the criterion for deciding whether a hypothesis test result was statistically significant for the main models. All follow-up tests used the Bonferroni correction to control the probability of a Type I error.

Modeling

For the accuracy and misinformation data, logistic mixed-effects models with two fixed-effect predictors (setup and critical assertions) were used. For the reading-time and confidence data, a linear mixed-effects model with two fixed-effect predictors (setup and critical assertions) were used. In addition, the interaction of the two independent variables, along with random slopes for stories were also included for all models.[3]

Overview

Overall, the subjects had a mean score of 60.1% correct (*SD* = 20.0) on the general knowledge test. From the 2 (set-up assertions: truthful [TT] or big lies [BB]) x 3 (critical assertion: truthful [T], small lie [S], or big lie [B]) repeated-measures design there are six conditions: BBB, BBS, BBT, TTT, TTS, and TTB. These six conditions will be described using their respective labels (see **Table 1**).

Accuracy

Figure 1 summarizes the estimated mean percentage accuracy on the critical questions by condition. There was not a significant difference between the BBB conditions and truthful TTB condition ($z = -0.156$; $p > .05$). This demonstrated that accuracy of the critical assertion when it was a big lie (B) was not significantly impacted based on the set-up conditions in the study. The

[3] Originally, we were using the random effects of the participants in the models; however, for the misinformation model, the estimated variance between participant was 0, so the misinformation model was a conventional logistic model rather than a logistic mixed model.

condition which had the small lie (S) and big lie (B) in the critical assertions did not differ significantly from one another in impacting the production of accurate information on the general knowledge test (z = -0.881; $p > 0.05$). If the critical assertion was truthful (T), the critical assertion increased the probability that the participant would answer correctly on the general knowledge test (z = 3.977; $p < .001$) compared to if the critical assertion was a big lie . This effect was observed both in the BBT and TTT conditions when compared to the BBB and TTB conditions. The effect of the set-up assertions did not differ significantly between big and small lies (z =-0.218; $p > 0.05$). This is to say that the difference between BBB and BBS was not significant, and that the difference between TTB and TTS was not significant. The effect of the setup assertions was large when the critical assertions was a truth. There is a significant difference of accuracy between the BBT condition and the TTT condition (z = 2.119; $p < 0.05$).

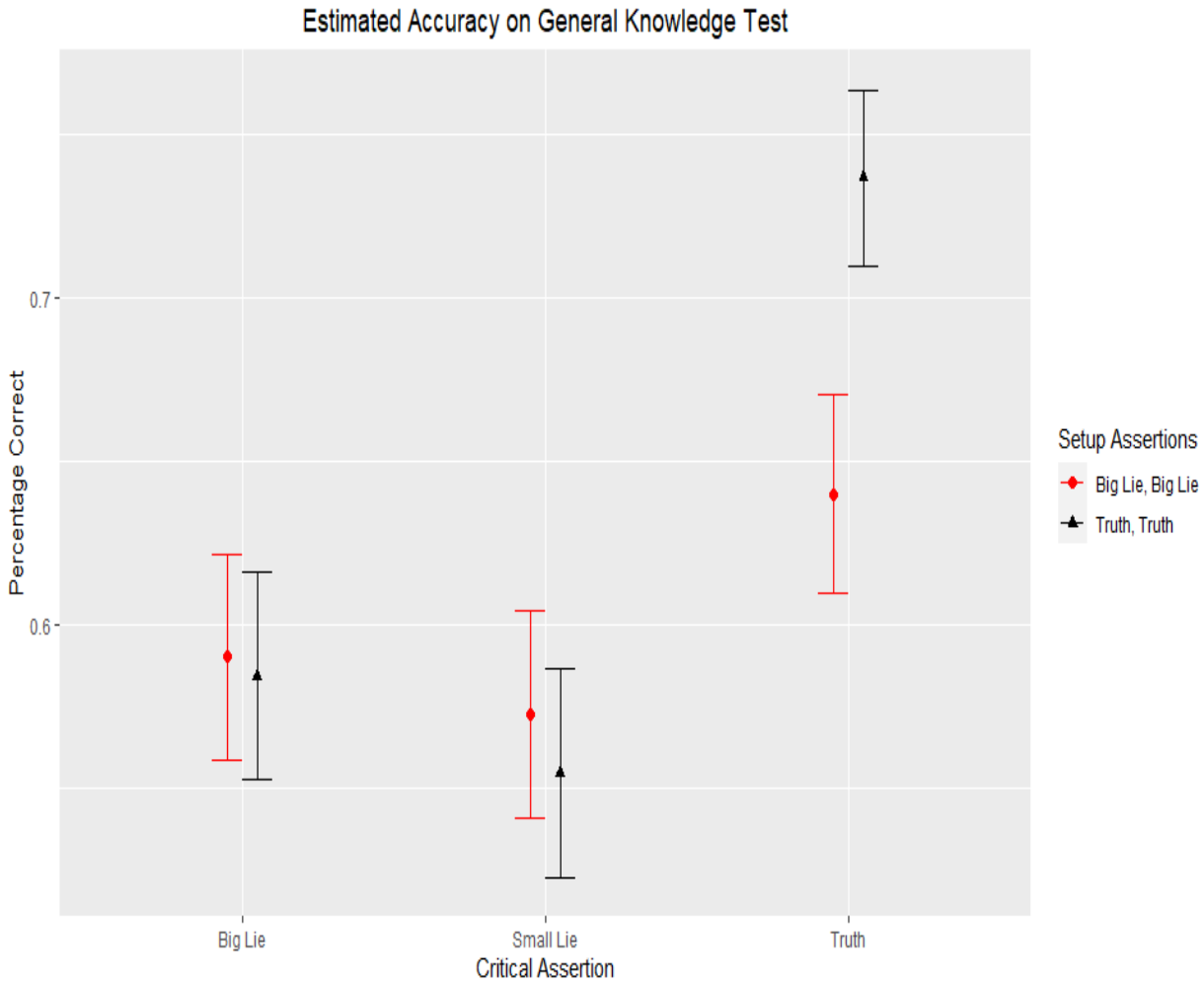

Figure 1: Accuracy Graph

Misinformation

Figure 2 below displays the overall summary of misinformation produced. Set-up assertions had no significant impact on the production of misinformation ($z = 0.372$; $p > 0.05$). This demonstrated that there was not a significant difference between the BB and TT set-up conditions. However, if the critical assertion was a small lie (S), it was shown to have a significant impact on producing misinformation ($z = 2.779$; $p < 0.01$) compared to when the critical assertion was a big lie (B) . This is true for both set-up conditions. Both BBS and TTS significantly produced more misinformation than both BBB and TTB conditions. When the critical assertion was truthful (T) compared to a big lie (B) participants produced significantly

less misinformation (z = -2.003; $p < 0.05$). This was true for both the comparison between the BBB and BBT conditions and between the TTB and TTT conditions.

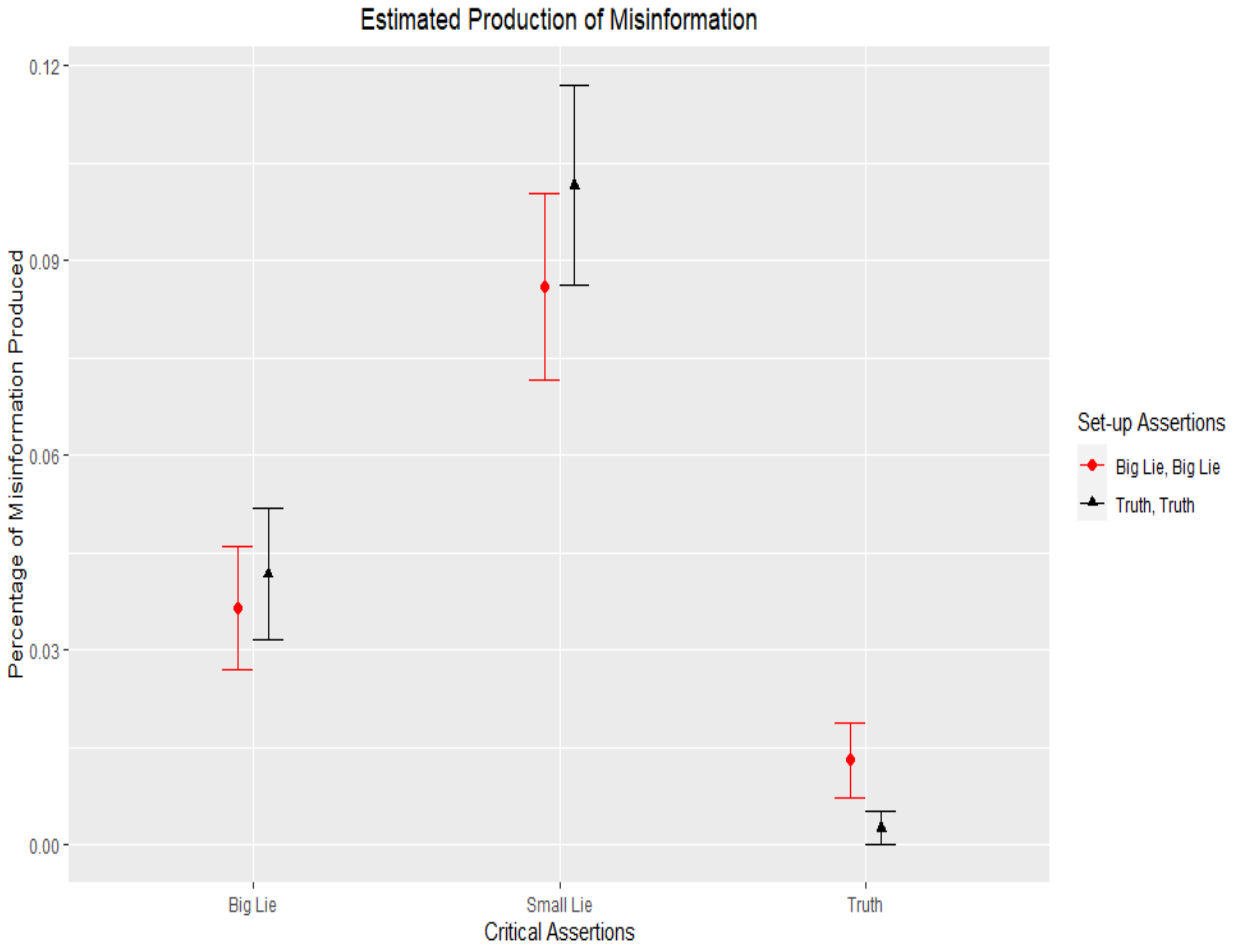

Figure 2: Misinformation Graph

Confidence

When observing confidence, set-up assertions had no significant impact ($t(1666) = 0.150$; $p > 0.05$). In addition, the small lie (S) critical assertion has no impact on confidence ($t(1664) = 1.472$; $p > 0.05$). However, confidence was found to have a significant difference when the critical assertion was a big lie (B) or truthful (T). When the critical assertion was truthful (T), participants were most confident ($t(1662) = 3.201$; $p < 0.001$). There were not significant effects found with the set-up assertions and small lie critical (S) assertion ($t(1667) = 0.867$; $p > 0.05$) or

the set-up assertions and truthful (T) critical assertion ($t(1665) = 0.354$; $p > 0.05$). **Table 2** provides a summary of the confidence results. The confidence ratings are generally high because participants did not have to answer questions they did not think they knew the answer for.

Table 2: Confidence Cell Means

	T Critical	S Critical	B Critical	Total
TT Set-up	2.45 (.057)	2.40 (.059)	2.29 (.059)	2.38
BB Set-up	2.41 (.059)	2.31 (.059)	2.28 (.059)	2.34
Total	2.43	2.36	2.29	

Note: Participants answered on a 0-3 scale; 0 being no confidence, and 3 being high confidence.

Reading-time

After completing the analysis for the reading times, the independent variables had no significant effect on reading-times, although the setup effect is nearly significant (F (1, 2154.0) = 3.64, p = .057). **Table 3** is a summary of the reading-time results.

Table 3: Reading-Time Cell Means

	T Critical	S Critical	B Critical	Total
TT Set-up	193.2 (19.5)	232.3 (19.5)	208.6 (19.5)	211.4
BB Set-up	242.9 (19.5)	217.6 (19.5)	239.9 (19.5)	233.4
Total	218.02	224.95	224.24	

Note: Reading times in milliseconds per word for the sections containing the critical assertion.

Discussion

In this research participants read fictional stories with assertions related to real-world facts embedded in them. There were three assertions in each story. The first two setup assertions were manipulated such that they were presented accurately or as likely-obvious misinformation; this was intended to make the narrator of the story seem reliable or unreliable. The last, critical assertion was presented as either accurate (truthful), likely-obvious misinformation (big lie), or as subtle misinformation (small lie). After reading the stories, participants answered general-knowledge questions related to the critical assertions, rated their confidence in their answers, and made source attributions for their knowledge, although these are not reported in this thesis.

In general, being presented with misinformation led to lower accuracy, and being presented with subtle misinformation led to higher production of that misinformation on the general-knowledge test. The setup assertion manipulation interacted with the type of critical assertion in one way: When the critical assertion was presented accurately in a story, the setup assertions mattered a lot in that reliable narrators presenting true critical assertions and led to greater accuracy on the general knowledge test than when unreliable narrators presented this information.

Comparing results to the field

These results conform to some of the predictions laid out in the introduction but not others. The set-up assertions had an impact on the critical assertion, but only when they preceded a true assertion (i.e., in the BBT and TTT conditions). The unreliable setup in the BBT condition had the participants showing the misinformation effect significantly more than the reliable TTT condition. Like previous research (Sparks & Rapp, 2010), participants in this study seemed to have distrust in the unreliable narrator presented in the BBT condition. Thus, the participants

correctly answered the associated truthful assertion almost 10 percentage points less on average compared to the TTT condition (**Figure 1).** As predicted, participants seemed to trust the reliable narrator in the TTT condition and produced the correct answer significantly more often in that condition.

In regard to the critical assertions, the production of misinformation based on plausibility is in line with previous research (e.g. Jacovina et al., 2014; Marsh et al., 2003; Rapp et al., 2014). As predicted, if the critical assertion was a small lie (S), the participants was more likely to produce the provided misinformation. Previous research explains this observation in various ways. The basic premise is that a small lie can be mistaken as a truthful assertion because it has plausibility. When the participants were exposed to the big lie (B) critical assertion, participants produced misinformation at a low rate. When participants were exposed to a big lie, the implausibility is not likely to compete with a previously known truthful knowledge. In addition, if the participants did not know the general knowledge previously, research has shown that implausible assertions are too far-fetched to be considered as truth (e.g. Jacovina et al., 2014; Marsh et al., 2003; Rapp et al., 2014). When the participants were exposed to a truthful (T) critical assertion, they produced misinformation less than 1% of the time. Again, this effect has been observed throughout previous research (e.g., Hinze et al., 2014). If given the truth, you will reinforce your previous knowledge and not likely to produce random misinformation.

If the participants were exposed to a truthful associated assertion, they were confident in their answers on the general knowledge test. If participants knew the truthful assertion was correct, it is understandable if the confidence can be tied to the RI-Val model. When participants read a fact that they know is true, their validation is reinforced when answering the associated general knowledge test. For instance, if participants read the *Pacific Ocean is the largest ocean*

in the world, participants will resonate all the other facts they know about the world, the Pacific Ocean, and so on. After this resonance, integration happens, leading the reader to understand that yes, the story tells me that the Pacific Ocean is the largest ocean. But, simultaneously during validation, the participant already checked their previous memory and validated the incoming "new" information as correct. So, since their validation was already correct, validation gets that reinforcement. From that reinforcement, the participant feels more confident in their answer. Something interesting was shown in these results regarding big lie critical assertions and their impact on confidence. According to the results, when exposed to big lie critical assertions, participants had lower confidence when compared to when exposed to truthful assertions. The big lie can be a challenge to validation, and since there is an internal competition, the participants may have reported lower confidence. For instance, when participants read the *Red Sea is the largest ocean in the world* they still integrate and encode the big lie into the working memory. Later, when participants came across the associated general-knowledge question, *What is the largest ocean in the world?*, the participant might recall the associated assertion, the big lie that the Red Sea is largest ocean, which competes with their prior, correct knowledge that the Pacific Ocean is the largest ocean in the world. Because there is competition between the big lie and the previous known truth, the participants are no longer reinforced like the situation above, but instead the participants have a seed of doubt that lowers confidence.

One other interesting result showed up with the study's establish source reliability; source reliability (the set-up conditions) only mattered when the critical assertion was a truthful assertion. According to previous research, a small lie is supposed to be accepted almost as much as the truth. The difference between the BBT and TTT conditions was not observed between the BBS and TTS conditions. That is, narrator plausibility did not seem to have an effect on the

impact of being given subtle misinformation the same way it had an impact of being given a correct assertion. A possible reason the current study did not produce this effect is because previous studies used both hard facts and easy facts. In previous studies (e.g. Jacovina et al., 2014; Marsh et al., 2003; Rapp et al., 2014), participants were shown to have a higher chance in accepting the small lies with hard facts compared to accepting small lies with easy facts. While in the current study, we only used easy facts, so naturally they are easier to get right on a general knowledge test. Another reason that the current study did not produce this effect may be because the set-up conditions may not had been powerful enough to have an impact on the small lie assertions or big lie assertions. There is a possibility that the set-up assertions did not establish enough narrator reliability or lack thereof because information about reliability was embedded implicitly in stories, while Sparks and Rapp (2013) had a stronger manipulation of source reliability and made source reliability explicit in their study. An alternate illustration of Sparks and Rapp's method would be a researcher providing information to the participants that a news story is from a reliable source or an uncredible source; whereas the current method would be a researcher not providing any information on reliability to the participants and made them read the news story.

There are two possible ways to explain the observed difference between the BBT and TTT conditions in the production of correct answers. First, the BBT condition may have established a clearly unreliable source such that it negatively impacted accuracy on the general knowledge. That is, the validation process was challenged from the implicit established unreliable source by the two big lies condition. The validation process was challenged because the participants had been reading implausible facts from the whole story until the point in which the participants were exposed to the critical assertion. And because they have been reading from

an unreliable source, they lose their trust in that reliable source even if they add a truthful assertion in the end of the story. And that distrust might give the participant the seed of doubt not to believe the truthful assertion towards the end of the story. Or, the TTT condition established enough reliability that it increased the accuracy on the general knowledge test. That is, the validation process had produced a less strict threshold and participants were inclined to accept the truth more often. Since the truthful set-up assertions established a reliable source, participants gained trust with the narrator. And when they gained that trust, their validation threshold was lowered. And since the validation threshold was lowered, participants open the path to accept knowledge less strictly; and in this case it was accepting the truth more often.

Furthermore, there were no significant effects of the manipulations on reading time. The reading times provide some information but because of the online nature of the study we were not able to capture reading times line by line as originally planned. However, the set-up effect is nearly significant when capturing reading times. This optimistic point of view may suggest that participants were paying attention to source reliability. It was shown that participants were reading slower when reading the unreliable narrator, though not quite significantly because we were measuring gross reading times and not measuring the assertions themselves. This is optimistic because in the future when we measure reading times better it would present evidence of the RI-Val model.

Strengths and improvements

The strengths of the study included the use of the implicit manipulation of reliability. This is a strength because it has real-world parallels. When gaining information that may be truthful or misinformation, there are many instances in which people are not aware if a source is reliable or not. In addition to the implicit manipulation of reliability, another strength would be

the novel and systematic combination of set-up and critical assertions. This is a strength because to our knowledge no one has tried to see if there is a story-by-story switching from reliable to unreliable narrators that participants keep track of.

With strengths, there come areas of improvement. The current study lacked a control condition, and this was a weakness because without a control condition we lose the ability to make confident inferences. The ideas to improve the control condition can be found in the future directions subsection. Another weakness of the study included the lack of experimental control due to the online nature of the study. Another weakness was the gross measurements of reading times, and this gross measurement prevented a cleanly-measured test of the RI-Val model's prediction about reading times.

Future directions

If possible, the study can be revised and conducted in a lab setting, and this would address the experimental control issue. Some other ways to improve the study would include making the manipulation of reliability stronger. There are three possible ways to make the source reliability stronger. One way to improve the manipulation of source reliability is to make the source reliability manipulation explicit by giving reliability information to the partcipants; or secondly, to add an extra assertion to set-up that will help establish a better implicit level of reliability. In addition to the first two suggestions, a norming study can be added to the process to test the participants' perception of narrator reliability. Regarding the improvement of control, it is suggested to add a control condition with neutral framing much like the previous study conducted by Marsh et al. (2013). Lastly, the stimuli of the study can be simplified to see if there is similar or different effect. For example, the study can be adapted with a modern approach with a twitter-like presentation of assertions. Instead of stories with set-up assertions to establish

reliability, there would be short assertions presented in a sentence. In this future study, participants are explicitly told the reliability of source, or the participants will have a simpler set up like the current study and have an implicit reliability.

Conclusions

This study has shown that participants are not only able to learn from fictional stories, but some participants even produce both correct information and misinformation. It is important to understand how source reliability can influence ability to take in information, but the understanding of source reliability is also important to help avoid misinformation. If fictional stories have the power of a misinformation effect, this means that many different forms of media have the potential power to create the misinformation effect as well. So if studies show that reliability matters, then the research matters. It is important to continue this line of research because it can be applied to everyday life. The more psychologists learn about the different aspects of the misinformation effect, the more chance we can produce a way to protect ourselves from misinformation. Misinformation has had throughout history created division among people. Information is power, and in the end everyone should have the ability to protect themselves from misinformation.

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Appendix

Appendix A

Full Example Story

When Frank suggested I join him on a cruise, I was picturing a big ship, lots of polite waiters in white uniforms, and dinners that require semi-formal spangled gowns. Then he told me that it would be a private cruise, on his own personal boat. Even better, I thought, a man with his own yacht! So, I agreed to go.

When the big day arrived, I met up with Frank and we headed straight to the docks. I scanned the boats, trying to figure out which one was his. Just when I decided this great big white and shiny one must be his boat, he stopped at the dinkiest, dirtiest, little tub of a boat.

"Here she is! I wanted to name her the **Atlantis (T) / Avalon (B)** after the mythical island that sunk into the sea, but instead she's the **Mayflower (T) / Titanic (B)**, named after the pilgrim's boat -- my grandmother chose the name because she's a direct descendant!" Chuckling, Frank jumped onto the rat-trap and started whistling away as he hoisted the sails.

I was just standing on the dock, staring blankly. I couldn't believe Frank expected me to climb onto that dirty vessel. Part of me wanted to march right back to the airport and fly back to Boston, but I kept thinking about how I told everyone at work what a fabulous private cruise I was going to have with a special, wealthy, eligible bachelor.

I got on the boat and ended up sitting in the cabin for hours while Frank prepared the boat. The cabin was tiny, with 2 berths, and it looked like it hadn't been cleaned in months, maybe even years. Finally, I laid on a bunk and drifted off to sleep.

When I awoke, it was late. The boat was rocking gently. I was about to let it rock me back to sleep when the door opened and Frank came in. He looked completely pleased with himself and he started rambling about the sea, but I was just too sleepy to follow his conversation. He kept talking, and I was so sleepy that I was sure I must have misheard him -- "Frank -- wait, slow down, I'm half-asleep. What did you say? What was that reference to Greenland?" "I'm describing the course to you. Pay attention, we will go up to Greenland, then head to Iceland."

"WHAT? What happened to Miami Beach?" I shrieked.

"Miami Beach?" Frank genuinely sounded puzzled. "I never said we were going to Miami Beach… One day I want to cross **Pacific (T) / Atlantic (S) /Red Sea (B)**, the world's largest ocean, and this trip to Iceland seems like a good warm-up to that goal. I want to see how my skills are and how the boat holds up. It'll be the perfect training."

I let Frank know I was tired, so he went to sleep. It took me a long time to fall asleep that night, I was so upset and because the motions of the boat kept waking me up. Obviously, I don't need to explain the rest of the trip. It was horrible, and I never saw Frank again after the "cruise". Maybe next time I should get to know a guy better before agreeing to travel the seas with him.

Appendix B

General Knowledge Test

WHAT IS THE NAME OF THE NORTH STAR? _____

WHAT IS THE NAME OF AN INABILITY TO SLEEP? _____

WHAT IS THE TERM IN GOLF REFERRING TO A SCORE OF ONE UNDER PAR ON A PARTICULAR HOLE? _____

WHO WAS THE EGYPTIAN QUEEN WHO JOINED FORCES WITH MARK ANTONY OF ROME? _____

WHAT IS THE NAME OF THE LIQUID PORTION OF WHOLE BLOOD? _____

WHAT IS THE ONLY WORD THAT THE RAVEN SAYS IN EDGAR ALLEN POE'S POEM "THE RAVEN"? _____

WHAT IS THE LAST NAME OF THE AUTHOR OF THE BOOK "1984"? _____

WHAT IS THE NAME OF THE LARGE HAIRY SPIDER THAT LIVES NEAR BANANAS? _____

WHAT IS THE NAME OF THE CHAPEL WHOSE CEILING WAS PAINTED BY MICHELANGELO? _____

WHAT IS THE LAST NAME OF THE MAN WHO PROPOSED THE THEORY OF RELATIVITY? _____

WHAT IS THE LAST NAME OF THE ACTRESS WHO RECEIVED THE BEST ACTRESS AWARD FOR THE MOVIE "MARY POPPINS"? _____

IN WHICH SPORT DOES A RIDER ON HORSEBACK HIT A BALL WITH HIS MALLET? _____

WHAT IS THE UNIT OF ELECTRICAL POWER THAT REFERS TO A CURRENT OF ONE AMPERE AT ONE VOLT? _____

WHAT IS THE NAME OF THE COMIC STRIP CHARACTER WHO EATS SPINACH TO INCREASE HIS STRENGTH? _____

WHAT IS THE LAST NAME OF THE MYTHICAL GIANT LUMBERJACK? _____

WHAT IS THE NAME OF THE CRIME IN WHICH A BUILDING OR PROPERTY IS PURPOSELY SET ON FIRE? _____

WHICH SPORT IS ASSOCIATED WITH WIMBLEDON? _____

WHAT IS THE NAME OF THE PROCESS BY WHICH PLANTS MAKE THEIR FOOD? _____

WHAT IS THE LAST NAME OF THE SINGER WHO RECORDED "HEARTBREAK HOTEL" AND "ALL SHOOK UP"? _____

WHAT IS THE LAST NAME OF THE FIRST PERSON TO SET FOOT ON THE MOON? _____

WHAT IS THE NAME OF THE MOLTEN ROCK THAT RUNS DOWN THE SIDE OF A VOLCANO DURING AN ERUPTION? _____

OF WHICH COUNTRY IS BAGHDAD THE CAPITAL? _____

WHAT IS THE NAME OF A GIANT OCEAN WAVE CAUSED BY AN EARTHQUAKE? _____

WHAT IS THE NAME OF THE CITY IN ITALY THAT IS KNOWN FOR ITS CANALS? _____

WHAT IS THE NAME OF THE BIRD THAT CANNOT FLY AND IS THE LARGEST BIRD ON EARTH? _____

WHAT IS THE NAME OF DOROTHY'S DOG IN "THE WIZARD OF OZ"? _____

WHAT IS THE LAST NAME OF THE BROTHERS WHO FLEW THE FIRST AIRPLANE AT KITTY HAWK? _____

WHAT IS THE NAME OF THE NAVIGATION INSTRUMENT USED AT SEA TO PLOT POSITION RELATIVE TO THE MAGNETIC NORTH POLE? _____

WHAT IS THE LAST NAME OF THE SECOND U.S. PRESIDENT? _____

WHAT ANIMAL RUNS THE FASTEST? _____

WHAT IS THE NAME OF A DRIED GRAPE? _____

WHAT IS THE LAST NAME OF THE AUTHOR WHO WROTE "ROMEO AND JULIET"? _____

WHAT IS THE LAST NAME OF THE VILLAINOUS CAPTAIN IN THE STORY "PETER PAN"? _____

WHAT IS THE NAME OF DEER MEAT? _____

WHAT IS THE NAME OF THE FIRST ARTIFICIAL SATELLITE PUT IN ORBIT BY RUSSIA IN 1957? _____

WHAT IS THE LAST NAME OF THE FIRST SIGNER OF THE "DECLARATION OF INDEPENDENCE"? _____

WHAT IS THE LAST NAME OF THE MAN WHO SHOWED THAT LIGHTNING IS ELECTRIC? _____

WHICH BREED OF CAT HAS BLUE EYES? _____

WHAT IS THE NAME OF THE LEGENDARY ONE-EYED GIANT IN GREEK MYTHOLOGY? _____

WHAT IS THE NAME FOR A MEDICAL DOCTOR WHO SPECIALIZES IN DISEASES OF THE SKIN? _____

WHAT IS THE NAME FOR A MEDICAL DOCTOR WHO SPECIALIZES IN CUTTING THE BODY? _____

OF WHICH COUNTRY IS BUENOS AIRES THE CAPITAL? _____

WHAT IS THE LAST NAME OF THE MAN WHO ASSASSINATED PRESIDENT JOHN F. KENNEDY? _____

WHAT IS THE NAME OF THE OCEAN THAT IS LOCATED BETWEEN AFRICA AND AUSTRALIA? _____

WHAT IS THE LAST NAME OF THE BASEBALL PLAYER WHO HAD THE MOST HOME RUNS IN A SINGLE SEASON PRIOR TO 1961? _____

WHAT IS THE TERM FOR HITTING A VOLLEYBALL DOWN HARD INTO THE OPPONENT'S COURT? _____

WHAT IS THE NAME OF THE REMAINS OF PLANTS AND ANIMALS THAT ARE FOUND IN STONE? _____

WHAT IS THE NAME OF THE LONG SLEEP SOME ANIMALS GO THROUGH DURING THE ENTIRE WINTER? _____

WHAT IS THE LONGEST RIVER IN SOUTH AMERICA? _____

WHAT IS THE LARGEST PLANET IN THE SOLAR SYSTEM? _____

WHAT IS THE LAST NAME OF BATMAN'S SECRET IDENTITY IN THE BATMAN COMICS? _____

WHICH SPORT USES THE TERMS "GUTTER" AND "ALLEY"? _____

WHAT IS THE NAME OF THE CRIME IN WHICH A PERSON PURPOSELY BETRAYS HIS COUNTRY? _____

WHAT IS THE NAME OF THE THREE-LEAF CLOVER THAT IS THE EMBLEM OF IRELAND? _____

WHAT IS THE NAME OF AN AIRPLANE WITHOUT AN ENGINE? _____

WHAT IS THE UNIT OF SOUND INTENSITY? _____

WHAT WAS THE NAME OF TARZAN'S GIRLFRIEND? _____

WHAT IS THE NAME OF THE KIND OF CAT THAT SPOKE TO ALICE IN THE STORY "ALICE'S ADVENTURES IN WONDERLAND"? _____

WHAT IS THE CAPITAL OF RUSSIA? _____

IN WHICH SPORT IS THE STANLEY CUP AWARDED? _____

WHAT IS THE CAPITAL OF NEW YORK? _____

WHAT WAS THE LAST NAME OF THE WOMAN WHO SUPPOSEDLY DESIGNED AND SEWED THE FIRST AMERICAN FLAG? _____

WHAT IS THE NAME OF THE ORGAN THAT PRODUCES INSULIN? _____

WHAT IS THE NAME OF THE POKER HAND IN WHICH ALL OF THE CARDS ARE OF THE SAME SUIT? _____

WHAT IS THE NAME FOR A CYCLONE THAT OCCURS OVER LAND? _____

WHICH TYPE OF SNAKE DO ASIAN SNAKE-CHARMERS USE? _____

WHAT IS THE NAME OF THE AUTOMOBILE INSTRUMENT THAT MEASURES MILEAGE? _____

WHAT IS THE NAME OF THE CONSTELLATION THAT LOOKS LIKE A FLYING HORSE? _____

WHAT IS THE NAME OF THE ISLAND-CITY BELIEVED SINCE ANTIQUITY TO HAVE SUNK INTO THE OCEAN? _____

WHAT IS THE NAME OF A YOUNG SHEEP? _____

WHAT IS THE ONLY LIQUID METAL AT ROOM TEMPERATURE? _____

WHAT IS THE NAME OF THE COMPANY THAT PRODUCES "BABY RUTH" CANDY BARS? _____

FOR WHICH COUNTRY IS THE YEN THE MONETARY UNIT? _____

WHAT KIND OF METAL IS ASSOCIATED WITH A 50TH WEDDING ANNIVERSARY? _____

WHAT IS THE LAST NAME OF THE FAMOUS MAGICIAN AND ESCAPE ARTIST WHO DIED OF APPENDICITIS? _____

WHAT IS THE NAME OF THE THICK LAYER OF FAT ON A WHALE? _____

WHAT IS THE NAME OF A DRIED PLUM? _____

WHAT IS THE NAME OF THE SHORT PLEATED SKIRT WORN BY MEN IN SCOTLAND? _____

WHAT IS THE NAME OF THE EXTINCT REPTILES KNOWN AS "TERRIBLE LIZARDS"? _____

WHAT WAS THE NAME OF KING ARTHUR'S SWORD? _____

WHAT IS THE NAME OF THE SHIP THAT CARRIED THE PILGRIMS TO AMERICA IN 1620? _____

WHAT IS THE NAME OF THE DESERT PEOPLE WHO WANDER INSTEAD OF LIVING IN ONE PLACE? _____

WHAT IS THE NAME OF THE LIZARD THAT CHANGES ITS COLOR TO MATCH THE SURROUNDINGS? _____

WHICH COUNTRY WAS THE FIRST TO USE GUNPOWDER? _____

WHAT ITALIAN CITY WAS DESTROYED WHEN MOUNT VESUVIUS ERUPTED IN 79 A.D.? _____

WHAT WAS THE NAME OF THE SUPPOSEDLY UNSINKABLE SHIP THAT SUNK ON ITS MAIDEN VOYAGE IN 1912? _____

WHAT BRAND OF CIGARETTE WAS FIRST TO HAVE THE FLIP-TOP BOX? _____

IN WHAT PARK IS "OLD FAITHFUL" LOCATED? _____

WHAT IS THE NAME OF THE RUBBER OBJECT THAT IS HIT BACK AND FORTH BY HOCKEY PLAYERS? _____

WHAT IS THE NAME OF THE SPEAR LIKE OBJECT THAT IS THROWN DURING A TRACK MEET? _____

WHAT IS THE CAPITAL OF FRANCE? _____

IN WHAT EUROPEAN CITY IS THE PARTHENON LOCATED? _____

WHAT IS THE NAME OF THE MOUNTAIN RANGE IN WHICH MOUNT EVEREST IS LOCATED? _____

WHAT IS THE NAME OF SOCRATES' MOST FAMOUS STUDENT? _____

WHICH PRECIOUS GEM IS RED? _____

WHAT IS THE NAME OF THE SEVERE HEADACHE THAT RETURNS

PERIODICALLY AND OFTEN IS ACCOMPANIED BY NAUSEA? _____

WHAT IS THE NAME OF THE COLLAR BONE? _____

WHAT IS THE NAME OF THE LARGEST OCEAN ON EARTH? _____

WHAT IS THE NAME OF THE PROJECT WHICH DEVELOPED THE ATOMIC BOMB DURING WORLD WAR II? _____

WHAT IS THE LAST NAME OF THE MAN WHO RODE HORSEBACK IN 1775 TO WARN THAT THE BRITISH WERE COMING? _____

WHAT IS THE NAME OF BATMAN'S BUTLER? _____

WHAT IS THE NAME OF THE HORSE-LIKE ANIMAL WITH BLACK AND WHITE STRIPES? _____

WHICH GAME USES A RUBBER BALL AND LITTLE METAL PIECES? _____

WHAT IS THE WORD THAT MEANS A NAUTICAL MILE PER HOUR? _____

WHAT IS THE LAST NAME OF THE MAN WHO ASSASSINATED ABRAHAM LINCOLN? _____

IN WHICH GAME ARE MEN CROWNED? _____

WHAT IS THE NAME FOR THE ASTRONOMICAL BODIES THAT ENTER THE EARTH'S ATMOSPHERE? _____

Appendix C

To:	Angel Ray Houts
From:	Douglas James Adams, Chair IRB Committee
Date:	03/20/2019
Action:	**Exemption Granted**
Action Date:	03/20/2019
Protocol #:	1903179608
Study Title:	Facts from fiction main experiment

The above-referenced protocol has been determined to be exempt.

If you wish to make any modifications in the approved protocol that may affect the level of risk to your participants, you must seek approval prior to implementing those changes. All modifications must provide sufficient detail to assess the impact of the change.

If you have any questions or need any assistance from the IRB, please contact the IRB Coordinator at 109 MLKG Building, 5-2208, or irb@uark.edu.

cc: Bill Levine, Investigator