The Effects of Confirmation Bias and Susceptibility to Deception on an Individual's Choice to Share Information

by

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ABSTRACT

As deception in cyberspace becomes more dynamic, research in this area should also take a dynamic approach to battling deception and false information. Research has previously shown that people are no better than chance at detecting deception. Deceptive information in cyberspace, specifically on social media, is not exempt from this pitfall. Current practices in social media rely on the users to detect false information and use appropriate discretion when deciding to share information online. This is ineffective and will predicatively end with users being unable to discern true from false information at all, as deceptive information becomes more difficult to distinguish from true information. To proactively combat inaccurate and deceptive information on social media, research must be conducted to understand not only the interaction effects of false content and user characteristics, but user behavior that stems from this interaction as well. This study investigated the effects of confirmation bias and susceptibility to deception on an individual's choice to share information, specifically to understand how these factors relate to the sharing of false controversial information.

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CHAPTER 1

INTRODUCTION

Photos of sharks swimming in the streets of New York and a hurricane majestically floating over the statue of liberty went viral on Twitter when hurricane Sandy raged through New York and New Jersey in October of 2012. These ridiculous stories and photos opened the door for more realistic yet still entirely false information, like the flooding of the New York Stock Exchange, to proliferate across even more social media platforms. Forbes online magazine writer, Kashmir Hill, notes that one particular Twitter account produced a slew of both true and false information regarding the hurricane's effects, and subsequently has been identified and socially punished for propagating false information (Hill, 2012). The spread of false information on social media has become a large issue affecting research, economics, politics, and numerous other platforms. Deceptive information, like that stemming from the events of hurricane Sandy, multiplies at a furious rate on social media; and deception grows even more strategic as technology changes and social media becomes a main source of news for many of its users (Shearer & Gottfried, 2017).

Social media presents an excellent opportunity for deception in cyber space, as it sees the most web traffic and has low social costs associated with sharing and posting information, compared to direct news sites and other validated, reputable sources (Allcott & Gentzkow, 2017). Cyber criminals can reach thousands of potential victims through social media. For example, a common scam, named "like-farming," uses a fake social media profile to share a post offering a free prize if individuals like and share the post. This ensures that the page receives thousands of likes and therefore increases the page's

market value and potential to endorse other false campaigns and information (Abel, 2017). In the context of a bogus product, this deception seems ludicrous at best. However, put into the context of important information, like the Presidential Election or gun control policy, deception in this form takes on a whole new, dangerous precedent.

Although the source of deceptive content online introduces the deception, that source is not necessarily responsible for the dissemination of deceptive information. The source relies on the online sharing behavior of their victims; much like in the previous "like-farming" example, those who produce the content rely on the sharing, commenting, and liking behavior of users who see the information. Even if those users do not intend to spread false information, those individuals perpetuate the issue to an even higher level. Therefore, the behavior of those who share deceptive information should be evaluated alongside the behavior of those who produce deceptive information. Current research assumes that users can and will (in theory) effectively question the credibility of information on social media, and that this has the potential to decrease the spread of false information (Metzger, Flanagin, & Medders, 2010). However, humans are subject to biases and heuristics that govern and ease the otherwise complex process of digesting information. Part of the process of digesting information includes the ability to discern false information from truthful information, which is also affected by these biases and heuristics (Metzger, & Flanagin, 2013). Therefore, it is important that research aimed at remedying this issue considers the biases of users in terms of deception detection, as well as social media users' susceptibility to deception, and the roles they play in the user's actions following the consumption of false information. This study aims to uncover the

roles confirmation bias and susceptibility to deception play in a user's choice to share information on social media.

Research in this area has yet to focus on how confirmation bias affects a user's choice to share false information, instead focusing on the effects that exist if users simply believe the information they consume (like a polarized public opinion in politics resulting from belief in false information consumed and believed about one political party). Believing the information and choosing to disseminate the information are two separate issues, each with their own consequences. However, the two are not mutually exclusive. People may be more likely to share information that they believe and deem credible. The existing research has observed this issue from two perspectives. The first aims to aid users in discerning, detecting and preventing deceptive information that has already gone viral in cyberspace (Driskell, 2012). The second, which reflects more recent research, has focused on what factors make users more susceptible to false information online (Williams et al. 2017). Both approaches to preventing deception on social media have a few issues. First, there is no evidence that social media users regularly use the tools currently available to them (e.g., Politifact.com, Snopes.com) for fact-checking or detecting deception, so introducing new ways to aid this effort may be misguided. Secondly, little research has evaluated the behavior of users who are considered victims of online deception and how their characteristics and beliefs may affect that behavior. Specifically, the sharing behavior of those online users has yet to be thoroughly evaluated as it relates to their susceptibility to deception and confirmation bias. Research in this area has instead focused on what personal characteristics, sources, and type of information make people more susceptible, but not necessarily how that susceptibility

affects an individual's decision to share information they see online (Clayton, Davis, Hinckley, & Horiuchi, 2017).

Confirmation bias is known to contribute to an individual's susceptibility to false information (Williams et. al, 2017); but research has not explicitly looked at the effects of that susceptibility on the users' choice to share deceptive information on social media. The current study aims to answer the question: How does confirmation bias and susceptibility to deception affect a user's choice to share false information on social media? The findings from this study will contribute to measures taken to mitigate false information online and prevent the spread of false information on social media.

Susceptibility to Deception

Questions about how to directly and effectively mitigate the spread of false information on social media remains to be answered. A multitude of research has studied different algorithms and theories applied to cues and motivations associated with both the false information online and the sources that share the information. On its own, deception has been studied in a plethora of domains targeting both the behavior of deceivers as well as the behavior of the deceived. Rarely does research put the deceived in the role of the deceiver (albeit, an unintentional deceiver); that is, the deceived as the direct perpetuator of the deception, even though deception is characterized by the conscious, premeditated manipulation of another's behavior (Bodmer, 2012). Understanding how users' susceptibility to deception affects their sharing behavior and considering susceptible users as active deceivers in the context of sharing false information, may answer questions about how to prevent users from disseminating false information online.

Behavior of the deceiver. Much of research surrounding deceiver behavior is focused on identifying motives and characteristics of deceivers and their deception, assuming that these are consciously decided, and that the deceiver's behavior is fully intentional. Caspi and Gorsky (2006) aimed to discover motivations of those who indicate having engaged in online deception, and to investigate emotions associated with online deception. Using a web-based questionnaire, the study uncovered that 29% of respondents had deceived online. They also uncovered that more than 20% of respondents lied about personal characteristics like sex, age, residence, marital status, or occupation. Respondents who reported engaging in deception online indicated privacy concerns and identity play as common motivations for deception. A study by Abbasi and Liu (2013) considered the source of the information and aimed to identify the credibility of the source of information. They considered the coordination of users (those in a clique or highly connected) to hold less credibility, as these users have a high level of support and can share each other's content, deter sharing from other less coordinated users, and therefore spread information widely and efficiently (i.e., imagine a band of Twitter accounts aimed at spreading a false narrative about the President's golf game). The authors presented the *CredRank* algorithm, which can monitor and analyze the behavior of social media users, and identify collective, coordinated behavior from similarities in behavior between the users. The algorithm clusters coordinated users together and then assigns a credibility weight to each cluster, with lower credibility weights assigned to highly coordinated users.

Allcott and Gentzkow (2017) explored the economic effects of fake news in social media in the context of the 2016 United States Presidential election. The study measured

the number of fake news stories each participant read and remembered of 15 news stories (randomly selected from 30 fake news stories) that circulated during the 2016 election to gauge the level of exposure to fake news. They found that the US adult on average read and remembered at least one fake news story. The study also looked at the social costs associated with using social media and found that consumers who believe the content of a fake news outlet may hold inaccurate beliefs and become more doubtful of information on real news outlets. They also found a potential reduction in incentive for news outlets to invest in accurate reporting. Fake news may reinforce confirmation bias, as people become more skeptical of the real news reported by credible sources and instead turn to less reputable sources like social media to find information that may confirm their preconceived beliefs.

Reinforcement of confirmation bias could possibly be a factor that encourages those individuals who believe the false information to then share the false information. The idea that consumers who believe fake news might disregard the truthful information put out by credible news sources may facilitate the role confirmation bias plays in the information consumed and disseminated by users on social media platforms. Therefore, further investigation of the effects of confirmation bias on a user's choice to share false information may inform research about ways to counter confirmation bias and prevent users from spreading deceptive information.

Behavior and beliefs of the deceived. Taber and Lodge (2006) investigated people's inability to fairly criticize arguments due to prior beliefs, and confirmation and disconfirmation bias. They evaluated how participants rated strength of political arguments that either aligned with their beliefs or did not, in the context of affirmative

action and gun control policy. They evaluated these ratings while also considering strength of political affiliation (strength of attitude), political competency (sophistication), and congruence of arguments to participant's political beliefs. Using two experiments, the study evaluated a prior attitude effect, disconfirmation bias, confirmation bias, attitude polarization, an attitude strength affect, and a sophistication effect. The first experiment required participants to evaluate political issues, some of which were used to measure strength of attitude and attitude position on either affirmative action or gun control. Participants were then asked to view information from 8 policy arguments provided from a matrix of 16 policy arguments with a labeled source (Republican party, NRA, Democratic Party, Citizens Against Handguns), followed by demographic questions. This task tested for confirmation bias by allowing participants to view 8 policy arguments of their own choosing. The participants were then asked to evaluate the political issues again to measure any change in attitude. The second experiment mimicked the first, except participants were also asked to give their thoughts on two pro and two con policy arguments for either issue (affirmative action or gun control policy). They found that those who advocated for the issue chose to view information from the source that primarily aligned with their beliefs. This study demonstrates how confirmation bias affects the information people choose to view and provides a strong argument for the notion that confirmation bias affects a person's perception of deceptive information; what this effect does to the person's decision to disseminate the information remains unanswered.

Clayton, Davis, Hinckley, and Horiuchi (2017) evaluated if people would rate a vague, false statement from an article as accurate and if they would want to read more of

the article if that article were from a source that aligned with the person's ideologies. They found that participants exposed to a false statement often judged them as accurate, and that exposure to the false statement increased the participants' interest in reading more of the article regardless of political beliefs or source of news. This led to the conclusion that content does play a larger role than source cues in predicting if participants will believe the false statement. Similarly, Pennycook, Cannon, and Rand (2017) found that knowledge of the source of news did not affect how people perceive truth of the false information.

Williams, Beardmore, and Joinson (2017) presented a theoretical review of factors identified in the literature that influence susceptibility in relation to responding to online scams, and presented a holistic model for assessing individuals' susceptibility to online scamming and influence. They discuss self-awareness, self-control, trust, self-deception, motivation, expertise, and other types of individual characteristics that previous research has studied regarding susceptibility. They also highlight four levels that are likely to affect individual susceptibility for their model: individual traits of the recipient of the scam, the current state of the recipient (current mood, fatigue, etc.), the context which the individual is in currently (work, home, etc.), and the type of online influence used (time pressure, appealing to emotion, etc.). This review sheds light on individual characteristics that have been shown to increase a person's susceptibility of engaging with online scams and can be extended to those who consume and disseminate information on social media.

Dissonance theory. Deception relies on the concrete, consistent, and unyielding beliefs and behaviors of target individuals, and those with the most unyielding beliefs and

behaviors tend to be the most susceptible to deception, as these are the individuals that deceivers tend to manipulate for gain (Bodmer, 2012). Therefore, understanding the strength of individuals' beliefs and their sharing behavior in terms of information online will allow research to investigate more direct associations between the strength of beliefs and sharing behavior.

Similar to the concept that there is consistency between a person's attitudes and their beliefs, there generally is also consistency between a person's beliefs and their behavior (Festinger, 1962). Cognitive dissonance theory in relation to behavior stems from this basic principle: people act in accordance with what they believe. Festinger (1957) observed the behavior of individuals involved in a cult, which believed that a great flood would destroy the earth and only the most faithful cult members would survive. When no flood came, the most devoted cult members maintained a stronghold on their beliefs in the face of clear, contradictory evidence, as they tried to justify their behavior and rationalize their beliefs rather than accept that their beliefs were misguided and change them. Instead, they looked for information that aligned with their beliefs and that would also explain why the flood did not occur, even if that evidence did not possess the same credibility as the contradictory evidence. They rationalized in order to lessen the cognitive dissonance between their beliefs, actions, and the existing evidence, and ended up spreading information about how their devotion had saved the world (Festinger, Riecken, Schachter, 1956).

Like many people, social media users also hold beliefs and opinions that may be strongly contradicted by existing evidence. When exposed to information on social media that contradicts those beliefs, people will either choose not to believe the information,

rationalize an explanation in favor of their existing beliefs, or search for confirmatory evidence of their beliefs. Although people may not necessarily shy away from the possibility of contacting conflicting points of view, their beliefs and the presence of contradictory information may still influence what they choose to believe; and consequently, what they share on social media (Garrett, 2009; Knobloch-Westerwick, Meng, 2009). What people believe and what they are presented may cause cognitive dissonance and have bearing on their behavior; the effects of which may be the sharing of false information. The proposed study aims to uncover the behavior that follows the consumption of information in the presence of deceptive information and confirmation bias tendencies.

Confirmation Bias

Peter Wason (1960) coined the term confirmation bias when he discovered that most people solely seek confirmatory evidence, instead of both confirmatory and disconfirming evidence, to make inferences about an abstract conceptual task. In Wason's original study, participants were presented with a set of three numbers (2, 4, 6) and asked to discover the rule associated with this sequence of numbers by creating other sets of 3 numbers that conform to the same rule. Participants were told when their numbers conformed to the rule. When participants thought they knew the rule, they would write it down and were told whether or not the rule was correct. If the rule was incorrect, the participants would continue creating number sequences and announcing rules until they announced the correct rule, or until the session ended. Only 6 out of 29 participants announced the correct rule the first time after initially eliminating a significant amount more of possibilities than those who did not give the correct rule the

first time. In Wason's famous selection task (1968), participants were asked to make inferences about an "if P, then Q" statement from a set of four cards. Provided with the conditional statement "If there is a vowel on one side of the card, then there is an even number on the other side", and four cards which showed a vowel or consonant and two which showed an even or odd number, participants were asked to choose which cards they would need to turn over in order to prove the statement true or false. Most participants selected the card with a vowel, between 60 and 75 percent of participants selected the card with an even number, a small number of participants selected the card with an odd number, and barely any participants selected the card with a consonant letter (Wason, 1968).

The correct answer is to turn over the vowel card and the odd number card. If one turns over the vowel and there is not an even number on the other side, then this disproves the statement. If the number is even, then this proves the statement. If one turns over the odd numbered card and there is a consonant on the other side, then this also proves the statement. If the other side of the odd number card reveals a vowel, then this disproves the statement. If a vowel and an odd number occur on the same card, then the conditional statement is false (Wason & Shapiro, 1972). The most common option chosen, the vowel card and the even number card, do not satisfy the conditions of the statement; for example, the statement never specifies that an even card would always have a vowel on the other side. Therefore, turning over this card would neither prove nor disprove the statement. Less than 10% of people chose the correct cards, indicating that when individuals engage in reasoning tasks they rely on confirmatory biases (Wason, 1968; Evans, 1982).

Other studies have also experimented with the selection task, varying it in content with thematic material like drinking ages and transportation. Studies like Griggs (1989) addressed the low success rate in the original experiment by introducing the idea that the original task was too abstract in content. For example, changing the task to include social constructs, instead of arbitrary numbers and colors, increases the percentage of people who are successful in the task (Johnson-Laird, Legrenzi, & Legrenzi, 1972). Results from these studies challenge the results from Wason's original study, as they show higher task success rates (Griggs, 1989; Nickerson, Butler, & Barch, 2017). Speculation has also surrounded the notion that the vowel and the even number cards in the original experiment may be the most selected options because they are a part of the rule stated, or because they are the most relevant options for the task (Margolis, 1987; Evans, 1984). Wason and Shapiro (1971) presented the task in both an abstract and thematic form and found that success increased on the thematic representation of the task. They outline three theories to explain this jump in task success rates, citing the concrete nature of the thematic content. This study will implement a selection task modeled from Wason and Shapiro (1971).

Confirmation bias is commonly known as a reasoning or inferential error that biases an individual's search and acceptance of information related to a preconceived belief (Evans, 1989). The concept has been studied as it applies to decision making in multiple areas including medical, group, and financial decision-making among other domains. Confirmation bias has also been referred to as selective exposure and congenial bias, among other terms, in previous studies (Hart, Albarracín, Eagly, Brechan, Lindberg, & Merrill, 2009). Selective exposure, congenial bias, and confirmation bias all involve

the tendency to consume more information that aligns with pre-existing views while avoiding information that contradicts those pre-existing views (Dylko, Dolgov, Hoffman, Eckhart, Molina, & Aaziz, 2017). Studies like Taber and Lodge (2006) and Stroud (2008) demonstrate selective exposure through their evaluation of attitude polarization within a political context, and media types more likely to inspire selective exposure. Research in this area focuses on the consumption of information; namely the amount of biased information and the context of the information that people seek. Little research concerns how this consumption affects the sharing of information. As stated previously, believing and consuming information are separate but related actions to sharing information.

The concept has not been explicitly studied as it applies to the decision-making that goes into sharing information on social media. This has become a hot issue, affecting political decision-making, perception of news outlets and other sources found online, the public image of reputable political figures, celebrities, local law enforcements, and even personal relationships among users. This issue continues to grow as social media has become a major part of information consumption and dissemination; therefore, promoting research on confirmation bias as it applies to this area will prove beneficial for efforts aimed at improving information sharing on social media.

Sharing Behavior

Little research has focused on what facilitates information sharing on social media. Stieglitz and Dang-Xuan (2014) examined the relationship between sentimental social media content and information sharing behavior. Comparing neutral and emotionally charged Twitter posts, they found that emotionally charged posts were shared much more often than those containing neutral content. Yu, Lu, and Liu (2010)

explored information sharing, and the factors that promote and encourage individuals to share knowledge. They found that perceived openness and fairness within online communities encouraged people to share knowledge within that online community. Acquisti and Gross (2006) evaluated factors that motivate Facebook users to share personal information, even when those users express general concerns about privacy. They found that users were more concerned with access to the information vs. the information itself, and that "having fun" and providing relevant and necessary information for themselves and others on Facebook were highly motivating factors to share information on Facebook. Stemming from Stieglitz and Dang-Xuan (2014), the current study aimed to evaluate sharing behavior, in the presence of controversial content that may elicit confirmation bias tendencies, to evaluate whether confirmation bias affects the choice to share information. The current study also sought to evaluate users' susceptibility to deception, and the role it plays in this decision as well.

Confirmation bias has been studied in a plethora of contexts and situations. However, it has not been directly applied to a user's choice to share false information on social media platforms. The literature on this subject is rich with cues that indicate deception (Zhou, Burgoon, & Twitchell, 2003; Briscoe, Appling, & Hayes, 2014), people's natural and trained ability to detect deception **(**Anderson, DePaulo, Ansfield, Tickle, & Green, 1999; Driskell, 2012**)**, deceiver profile types (Seebruck, 2015), and the subsequent effects of deception on social media (Allcott & Gentzkow, 2017). Previous research that focused on increasing the accuracy of detecting lies and deception, both in face-to-face and online platforms, guided research toward developing ways to enhance people's ability to detect deception in cyberspace; but much of research has not studied

the effects of confirmation bias and susceptibility to deception on that ability and the actions that follow.

Social Media

Social media has allowed small pieces of information to flourish beyond fully-fledged articles and other lengthy pieces of information that generally give more context and information on a subject. These small pieces of information hold almost the same value as a full article in the sense that people are willing to believe and digest the information as if it came from a traditional and reputable news source. Therefore, this study aimed to capture the effects of confirmation bias and susceptibility to deception on sharing behavior using small pieces of information, rather than full articles and news posts, to better mimic the social media environment. Users may be more likely to encounter false information from an easily consumed, short piece of information rather than a long article. Pempek, Yermolayeva, & Calvert (2009) found that users of social media spend more time consuming information than sharing information. Because shorter pieces of textual information generally require less time to attend to than traditionally long pieces of information, social media users may be more likely to attend to shorter pieces and fully digest the information presented. These conjectures, as well as the current state of common social media platforms, contributed to the context and formation of content used in this study.

Without understanding the effects of confirmation bias and susceptibility to deception on a user's choice to share information, one cannot efficiently equip users to accurately detect deception on social media. As previous research has demonstrated that individuals' political views influence their attention to information (Garrett, 2009) — and

that people typically choose to read more and spend more time on attitude-consistent content (Knobloch-Westerwick & Meng, 2009) — this study hypothesized that those considered highly susceptible to deception, and prone to confirmation bias, would have a higher rate of false confirmatory posts shared than those with a low level of susceptibility to deception. This hypothesis is based on the idea that those who are prone to confirmation bias may typically choose to view information related to their views on controversial topics; and that those considered highly susceptible to deception may be more likely to believe false information; both which in turn may influence sharing behavior.

CHAPTER 2

METHODS

Design

This study utilized a within-subjects experimental design with content (true vs. false) posts shared (controversial vs. neutral) as factors, and susceptibility to deception and confirmation bias as covariates. All participants partook in a Wason Selection Task to determine the inclination to succumb to confirmation bias. Participants then played a modified version of Battleship, a game developed for ARO MURI Cyber Inception project, which emphasizes the use of deception to win. Measures taken from the modified version of Battleship were used to assess a rate of susceptibility to deception. All participants were then asked to read through 20 small pieces of information, of both neutral and controversial content that mimic social media posts, and indicate which posts they would share. A post-test questionnaire was used to gather information concerning participants' agreement (agree vs. degree) on 10 pre-selected controversial topics present on social media in the last 6 months. The controversial content among the 20 posts was based on 5 of these 10 pre-selected topics.

Participants

Thirty participants were recruited for this study. Participants were consenting adults between the ages of 18 and 55, were fluent in the English language, had at least average or average to corrected vision, and were familiar with social media platforms. Participants were from all types of backgrounds including differences in industry, education, income level, and technological aptitude. Participants were recruited via the

ASU SONA System, fliers put up around ASU Polytechnic and Tempe campuses, and through word of mouth.

Procedure

Verbal consent was obtained from each participant. Each participant was assigned an arbitrary number (ex: participant 1, participant 2, etc.) to ensure that personal information, stances on controversial issues, and characteristics cannot be traced back to specific participants. After having obtained participant consent, each participant partook in the Wason Selection task. Participants then played the modified version of Battleship, from which measures were taken to determine their level of susceptibility to deception. Participants were then presented with 20 different posts. Participants viewed each of the 20 posts and indicated if they would share the information by clicking the available share button, or by clicking "next" if they did not wish to share the post. Participants were able to click "previous" to go back and view any of the posts. Ten of the posts contained considerably neutral information (non-controversial information), while the remaining ten contained information related to 5 controversial topics that have been consistently present on social media for at least the last 6 months. The information in each post was made up of either completely false or completely true information. There were no posts with a mixture of false and true information. After indicating which posts they would share, participants were given a questionnaire which asked about their views on 10 controversial topics, 5 of which were used for topics in the controversial posts. Controversial topics include gun control policy, the millennial generation, healthcare, immigration policies, technology, minimum wage, abortion, sexual assault investigations, U.S. intervention into world politics, and nuclear power. After completing all phases of

the experiment (Selection task, Battleship, post sharing, questionnaire) participants were debriefed to establish that not all of the posts they viewed were real, and that they should not believe any of the information they were presented without looking into the information on their own.

Materials

Wason Selection Task. All participants participated in a context-based, Wason selection task to determine confirmation bias. The current study utilized a selection task comprised of "thematic" content. Participants were presented with 4 cards on a touchscreen tablet, 2 labeled with a city name (Chicago and New Orleans) and the other two labeled with a transportation type (taxi and bus), as shown in Figure 1. They were instructed to select cards that they think would need to be turned over to falsify the statement: "If I am traveling to New Orleans, I am traveling by bus." Participants who turned over the "New Orleans" and "taxi" cards successfully tested the conditional rule. Those who turn over New Orleans and taxi, or just New Orleans, will be considered less prone to confirmation bias (0), and those who turn over the bus will be considered the most prone to confirmation bias (1) as the New Orleans and bus cards indicate a person's propensity to search for confirmatory evidence only; and choosing "bus" is committing a logical error.

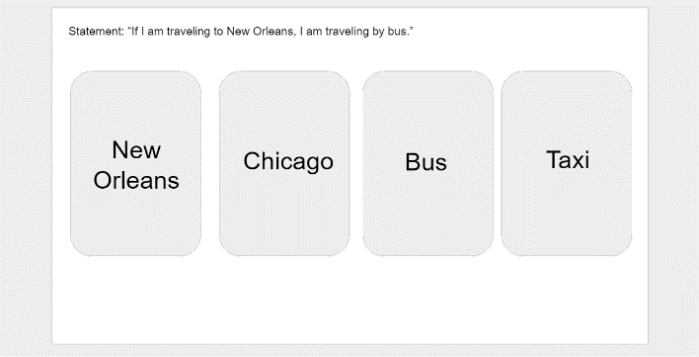

Fig 1. Wason Selection task interface

Modified Battleship board game. A modified version of the traditional Battleship has been created as a part of the ARO MURI Cyber Inception project to understand deceptive cues and behaviors. This game was used in this study to measure susceptibility to deception. This version of Battleship allows players to deceive their opponents by lying about "hits" and "misses." For example, if one player calls out the position A4 and it is a "hit", their opponent may lie and say that it was a "miss." Players may call out their opponent's bluff and will earn an extra shot for themselves and lose a shot for their opponent on the next turn if the bluff is correctly uncovered. If the player calls out a shot as a bluff that is actually truthful, then they lose a shot for themselves and gain a shot for their opponent on the next turn. Each player keeps track of "hits" and "misses" just like in the original Battleship. This is demonstrated in Figure 2. By the end of the game, bluffs left uncovered will be considered bluffs believed. The susceptibility of a player will be based on how many bluffs he believes compared to the total number of bluffs by the end of the game. For example, if there are 5 uncovered bluffs out of 15 bluffs total throughout the game, then the player's susceptibility to deception will be 5/15. For simplicity this also means, for example, that those who believe 1 of 2 bluffs will be considered as susceptible as someone who believes 10 of 20 bluffs. This may present a limitation to the measure. Both players' game boards were photographed and documented to identify bluffs believed and bluffs questioned, as shown in Figure 2. For example, if a player has put a white peg (indicating a "miss") where on his opponent's board is actually a hit, that will be considered a believed bluff. This ratio will be used as a

measure of susceptibility. The less bluffs a player believes compared to the total amount bluffs, the less they are considered susceptible to deception.

Fig 2. Battleship Game playing boards

In the real world, the more lies believed means a lower rate of detected deception, and this may indicate higher susceptibility to deception. Within the context of this game, the more lies believed means less consistency between players' boards, which indicates the more likely players are to believe lies. The full rules and guidelines for this modified version of the Battleship game are available in Appendix A. Although these measures gauge susceptibility to deception within a direct interactive context, they may still inform susceptibility to deception in an indirect interaction (communicating through sharing information online). Battleship does not require social interaction beyond verbally calling out shots; it instead requires players to carefully observe their opponent's actions. This mimics a social media environment where one can observe the actions of others but not observe nonverbal cues associated with those actions.

Post content. Participants were presented with a Google Slides presentation of 20 mock social media posts of either false or true information on a touch screen tablet, as depicted in Figure 3 below.

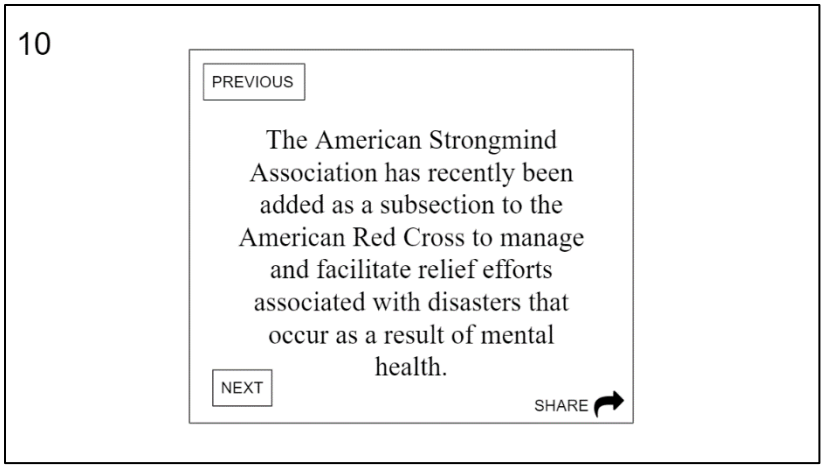

Fig 3. Social Media posts presentation interface

Each participant was exposed to an equal combination of these true and false posts; that is, 10 posts were true and 10 were false. The content of these posts is modeled from similar information currently found online, but does not adopt a similarity that threatens a history effect. The content was created using common topics highlighted on social media to prevent participants from choosing to share information based on previous knowledge of posts likely seen on social media. Ten posts contained controversial topic information found on social media in the last six months; these topics include advances in technology, immigration policy, gun control policy, healthcare, and characteristics of the millennial generation. These topics were selected based on the selection of topics in previous research (Taber & Lodge, 2006). Topics were also selected from a variety of areas to avoid agreement or disagreement with all topics presented (ex: someone who may agree with gun control policy may disagree on advances in technology). These topics were chosen from a variety of controversial issues specifically, which are topics known to likely elicit public disagreement. The other ten posts contained information on more neutral topics such as health suggestions, fitness information, online

products and businesses, charities, and pets/animals, topics that do not elicit the same public disagreement as the controversial topics. The presentation order of posts for each participant was random to control for order effects, and each of the ten topics (5 neutral, 5 controversial) was equally represented. Content for both topics is available in Appendix B.

Post-test questionnaire. The post-test questionnaire was used to determine the participants' stance on 10 controversial topics to measure for congruence of beliefs to content shared. All participants were asked to complete this questionnaire. Cross-referencing these measures with the amount of false information posts and truthful information posts shared by the participants, and their level of susceptibility to deception, was intended to reveal the role of both on sharing behavior. Post-test questions are available in Appendix C.

Pilot Data. The social media posts and Wason Selection task were piloted to evaluate differences in sharing behavior and confirmation bias susceptibility. Five individuals voluntarily participated in the pilot. All participants indicated a proneness for confirmation bias, as no participants selected the "New Orleans" and "taxi" card combination. An array of sharing behavior was observed, as 1 participant shared a false confirmatory post, 4 participants shared one or more true confirmatory posts, 4 participants shared one or more false neutral posts, and 3 participants shared two or more true neutral posts, as shown in Table 1 below. The pilot data demonstrated a variety of sharing behavior, and consistency of susceptibility to confirmation bias.

Table 1.

Pilot Data for Sharing Behavior of True (T) and False (F) Content

Participant	Wason Selections	Controversial (F)	Controversial (T)	Neutral (F)	Neutral (T)
1	Chicago; taxi	0	2	0	2
2	Chicago; bus	1	1	1	3
3	New Orleans; Chicago; bus	0	1	2	3
4	New Orleans; bus	0	0	1	0
5	bus	0	2	1	0

CHAPTER 3

RESULTS

Twenty-two of the 30 participants selected the “bus” card in the thematic Wason Selection Task, indicating their proneness to confirmation bias (M = 0.76, SD = 0.45). Participants also demonstrated a variety of rates of susceptibility to deception (M = 0.51, SD = 0.29), with exactly half (N =15) demonstrating a rate below 50% and the other half (N = 15) demonstrating a rate above 50%. Means of both measures are represented in Figure 4 below. Sharing behavior also varied, as seen in the pilot study, with participants sharing a variety of controversial, neutral, true, and false posts. Further analysis is discussed below.

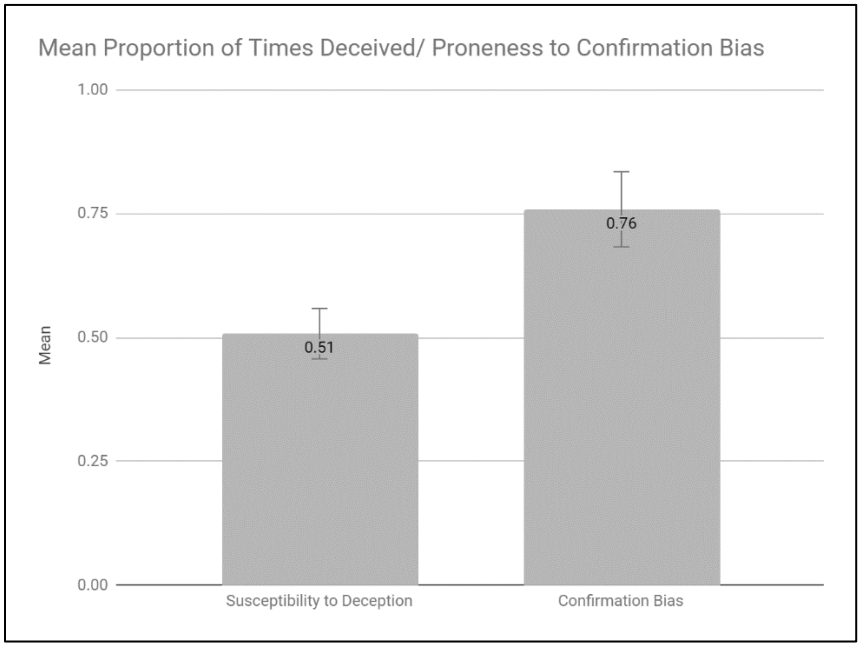

Fig. 4 The mean proportion of times participants were deceived (susceptibility to deception) and the mean of participants’ proneness to confirmation bias (coded as either 1 or 0 for each participant).

This study hypothesized that those considered highly susceptible to deception, and those prone to confirmation bias, would be more likely to share posts with false

information about controversial topics. A Pearson correlation was conducted to evaluate the relationship between rate of susceptibility to deception and total number of false controversial posts shared. There was no correlation between rate of susceptibility to deception and total number of false controversial posts shared (r = -.073, n = 30, p = .703. Figures 5 summarizes these results.

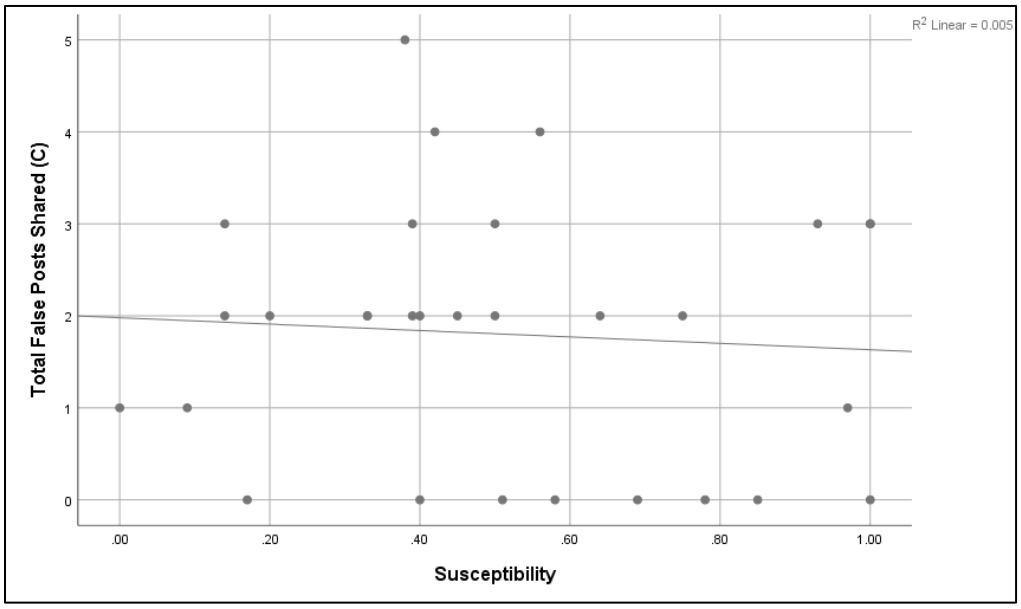

Fig. 5 Relationship between rate of susceptibility to deception and total number of false controversial posts shared

A chi-square analysis was used to determine if there was a relationship between proneness to confirmation bias and total number of false controversial posts shared. For this analysis, participants were either less (0) or more (1) prone to confirmation bias, and sharing was categorized based on the number of posts shared. Those who shared 2 or less false controversial posts were considered “low sharers” while those who shared 3 or more posts were considered “high sharers”. The maximum number of false controversial posts that each participant could share was 5. The chi-square analysis revealed no significant

relationship between confirmation bias and the number (low vs. high) of posts shared (1, N = 30) = 1.591, p = .207.

As past studies have evaluated the information people choose to view while considering the strength of their agreement on a controversial topic, or the congruence of the content to their beliefs, this study also evaluated the relationship between the strength of agreement on the 5 controversial issues and the sharing of false controversial posts. A Pearson correlation demonstrated no statistically significant relationship between total false controversial posts shared and strength of agreement on gun control (r = -.288, p = .122), the millennial generation (r = .051, n = 30, p = .791), healthcare (r = -.042, n = 30, p = .827), immigration (r = .054, n = 30, p = .776), or advances in technology (r = -.090, n = 30, p = .634).

Figures 6 and 7 below show how many times each post associated with each of the controversial issues was shared compared to agreement and disagreement on the controversial issue. Important to note is that the posts were written in a way that they might appeal to either those who agree or disagree with the controversial topic. For example, the conceal carry post read as: “Conceal carry permit owners may choose in which states to carry their weapon.” This may appeal to those who agree with gun control, as the post is something they would want to share as a means for promoting gun control policy for increased safety. It may also appeal to those who are against gun control, as the post is something they would want to share as a means of highlighting the value of less gun control policy.

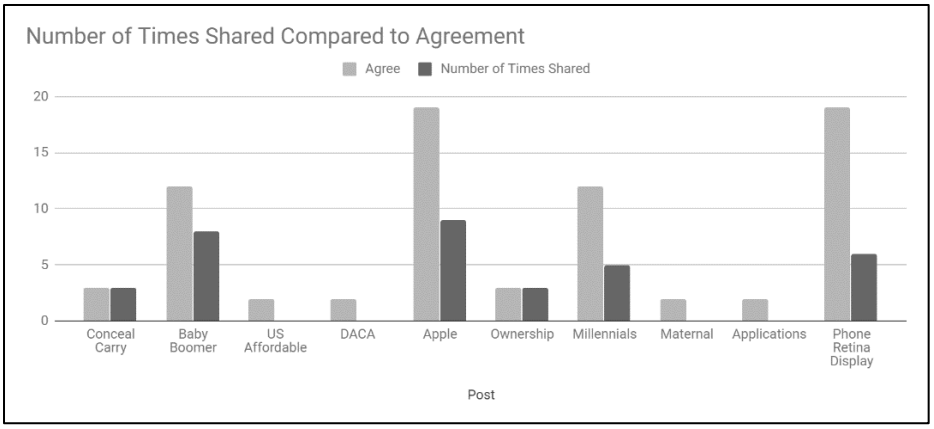

Fig. 6 Posts related to controversial issues shared compared to agreement on related issue

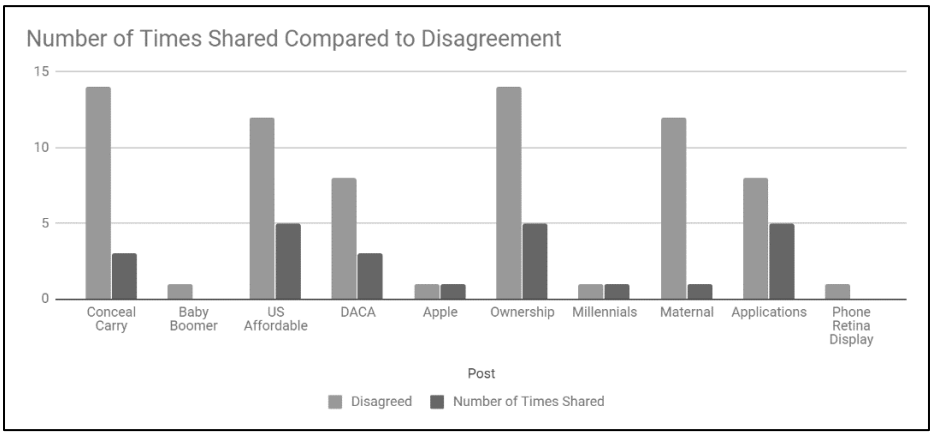

Fig. 7 Posts related to controversial issues shared compared to disagreement on related issue

Although the current study was most interested in false controversial posts shared, the sharing of other posts was also considered in reference to past research. Figure 8 shows, overall, how many false controversial posts, true controversial posts, false neutral posts, and true neutral posts were shared across all participants, along with the total number of posts shared overall. This shows that more true neutral posts were shared overall, and that more false controversial than false neutral posts were shared, and that more true neutral posts than true controversial posts were shared. A one-way ANOVA was conducted to understand if there was a significant difference between types of posts (false controversial, true controversial, false neutral, true neutral) on the number of posts

shared. The ANOVA revealed no significant effect of the type of post on the number of posts shared, $F(3, 116) = 1.613$, $p = .19$. Figure 9 depicts the mean number of times each type of post was shared.

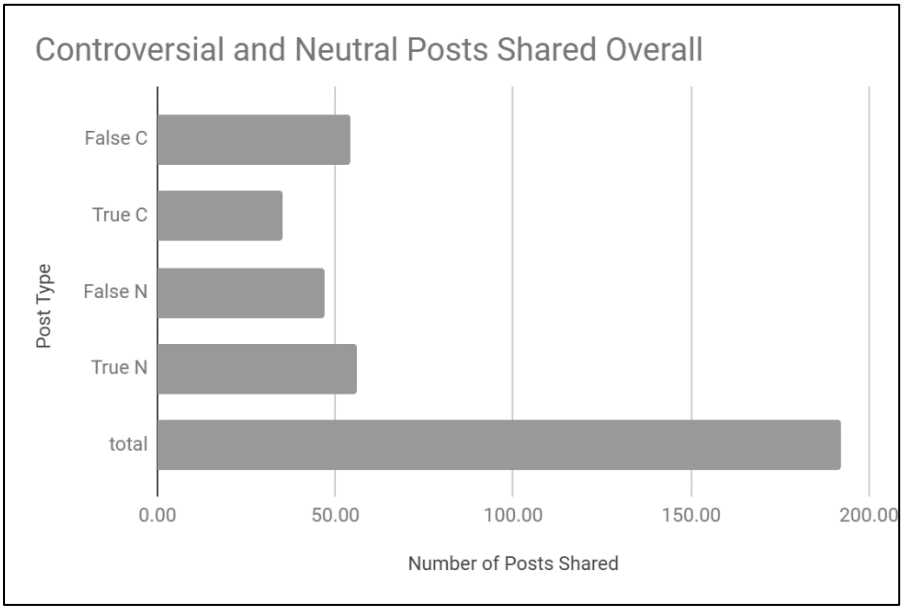

Fig. 8 Number of true and false, controversial (C) and neutral (N), posts shared overall

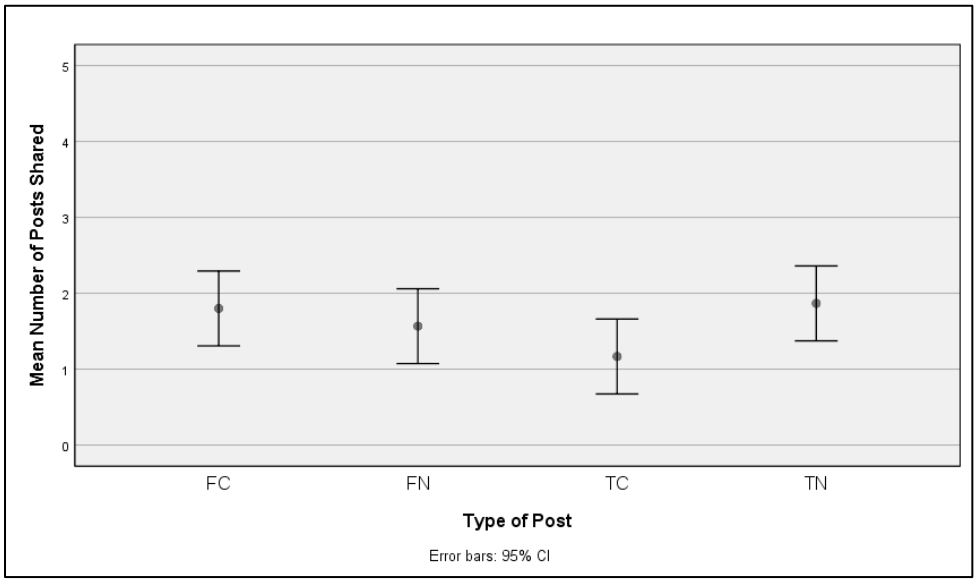

Fig. 9 There were 5 of each type of post: false controversial (FC), true controversial (TC), false neutral (FN), and true neutral (TN). The figure shows the mean number of times each type of post was shared.

Reasons for Sharing

Participants were asked why they shared the information that they did in this study. Reasons have been coded from open-ended responses, shown in Figure 10 below. Most participants shared information in this study because it was interesting, or they agreed with the information. This suggests that confirmation bias may play a role, although not a largely significant one, in the type of information participants shared.

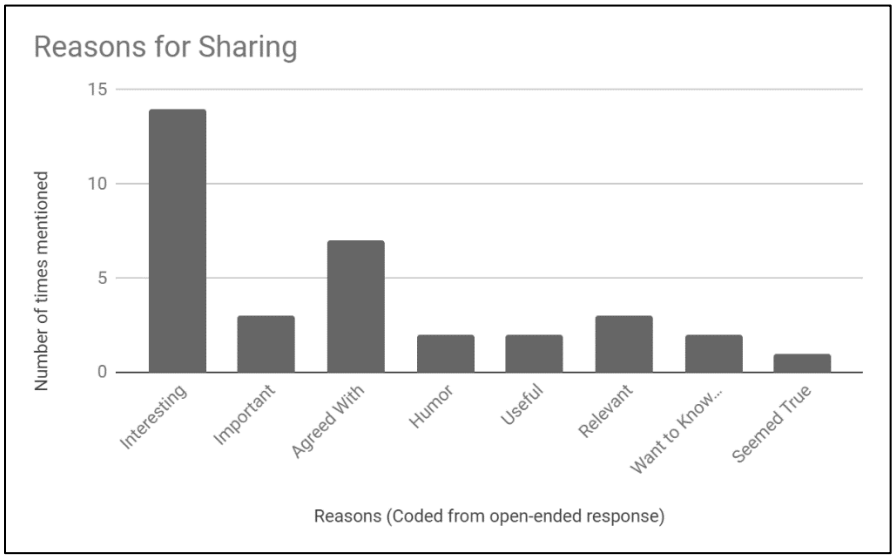

Fig. 10 Coded reasons for sharing

Frequency and content shared. Participants were asked to indicate how often they share information on social media, as well as what type of information they share. Figure 11 shows participants' self-report measure of how often they share on social media, and Figure 12 shows the types of posts participants indicate they typically share on social media. A majority of participants indicate that they share on social media daily, and they typically share posts from friends, personal photos, and posts from family.

Considering the reasons people shared information in this study, how often they typically share information on social media, and what information they typically share

suggests that 1) people share information that is interesting to them or aligns with their beliefs and 2) that they share information from someone they trust, like a family member or friend. Therefore, they may be likely to share information that aligns with their beliefs or is interesting if it comes from a friend or family member, regardless of whether the content may be true or false.

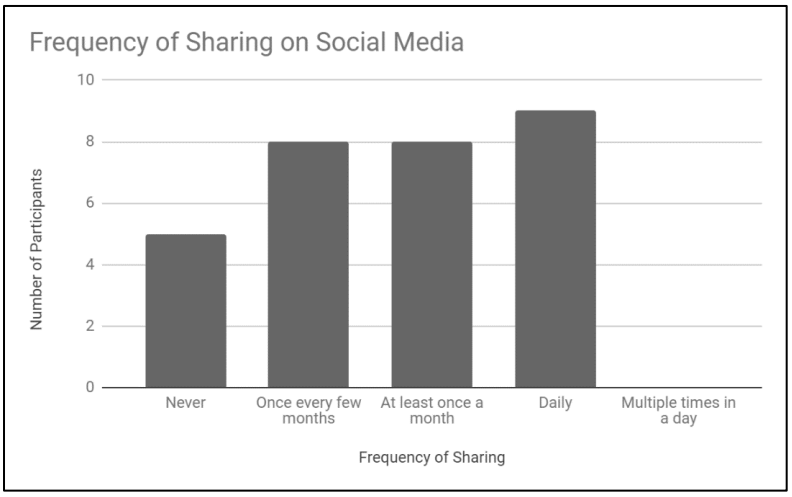

Fig. 11 Frequency of sharing

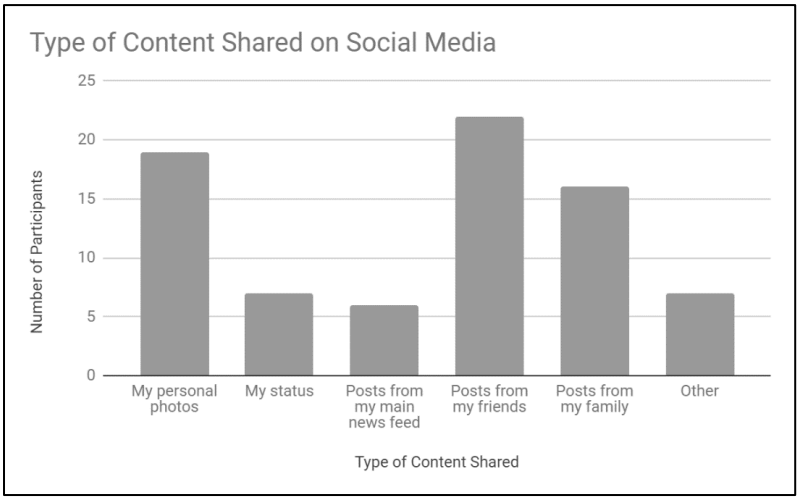

Fig 12 Types of content shared

CHAPTER 4

DISCUSSION

The current study sought to understand the effects of susceptibility to deception and confirmation bias on the information that people choose to share within a social media platform. Specifically, the study examined how these factors relate to the amount of false controversial posts participants shared. There was no statistically significant relationship found between the total number of false controversial posts shared and susceptibility to deception or confirmation bias, which may suggest that if these factors do play a role in the choice to share information on social media, it may be a small role.

Overall, participants shared more false controversial posts than false neutral posts, and more true neutral posts than true controversial posts. This may have something to do with participants' comfort and perceived level of knowledge with the topics. For example, a participant may be more comfortable and consider themselves more knowledgeable about health and fitness rather than healthcare, which may lead them to share more true information about health and fitness and less true information about healthcare. This could be investigated in the future by asking about their perceived level of knowledge and comfort in the topics presented and comparing it to the information they choose to share.

Limitations

As this study aimed to understand the sharing behavior that follows exposure to deceptive information, limitations are acknowledged. These include the assumption of confirmation bias and susceptibility to deception as large factors, the susceptibility to deception measure taken within the context of a larger project, and the differences that

exist between social media users. First, this study assumes that confirmation bias and susceptibility play a larger role when other larger factors, such as accountability or trust, may be at play as well. However, this study does contribute to understanding the role of these factors in the face of entirely deceptive information and with the opportunity to share that information.

The measure for susceptibility to deception was taken in the context of a larger project; the ARO MURI Cyber Inception grant project, specifically. The context of the Cyber Inception project aims to investigate a deceiver's behavior and strategies, and an individual's tendency to believe the deceiver's lies in a game environment. Taking this measure from this context may not have accurately represented a person's true susceptibility. There may be other factors involved including attributes like propensity for risk, self-awareness, and perception of online credibility among other factors. Participants were also exposed to different amounts of deception in this study. Although this may be more realistically representative of real-world exposure, it may have affected the results of this study. In future work, this could be controlled by limiting the number of times a person deceives or requiring them to deceive a specific number of times in order to keep exposure to deception equal across all participants. This may also allow levels of susceptibility to be categorized as numerically high or low. This, of course, comes with its own limitations as people are not generally restricted in the amount of lies they can tell.

Although not investigated here, the difference between different types of social media users (ex: those who consistently share, and those who simply consume information) in regard to sharing deceptive information may be worth exploring in future

research. As mentioned before, the level of knowledge and comfort in a topic presented may have affected whether or not people chose to share information as well.

The study also did not consider the time spent understanding information, deceptive or truthful, that each individual would potentially devote either within or outside of this study. After all, the time people choose to spend understanding the information they consume, as well as their overall willingness to dig deeper, may also play a large role in whether they choose to share the information.

Future Direction

For future research, the relationship between susceptibility to deception, confirmation bias, and information shared should be further evaluated to understand the level at which these cognitive mechanisms truly affect how people behave. For improvements to this study, it is suggested that a more direct measure of susceptibility to deception be taken and other factors in conjunction with confirmation bias and susceptibility to deception be considered, among other changes discussed previously.

Research has shown that people will share within an environment that they perceive to be open and fair. Comparing these findings to the reasons people shared in this study loosely suggests that people may typically share information from their family or friends because they perceive them as open, fair, and potentially trustworthy. The relationship between the information presented and the source of that information should be explored to further understand the role trust and credibility of source play when people choose to share information on social media.

This study represents a step forward in research toward understanding sharing behavior in online environments. As past research has provided knowledge about

persistent cognitive models, behavior, and biases, these things should be studied within the changing environments of communication and interaction. As social media and other online interaction becomes an increasingly common medium for communication, it remains even more important that research keeps up with these changes to understand how the interactions are affected, and what opportunities they create for both good and malicious communication.

REFERENCES

Abbasi, M. A., & Liu, H. (2013, April). Measuring user credibility in social media. In *International Conference on social Computing, Behavioral-Cultural Modeling, and Prediction* (pp. 441-448). Springer, Berlin, Heidelberg.

Acquisti, A., & Gross, R. (2006, June). Imagined communities: Awareness, information sharing, and privacy on the Facebook. In *International workshop on privacy enhancing technologies* (pp. 36-58). Springer, Berlin, Heidelberg.

Allcott, H., & Gentzkow, M. (2017). Social media and fake news in the 2016 election. *Journal of Economic Perspectives*, *31*(2), 211-36.

Anderson, D. E., DePaulo, B. M., Ansfield, M. E., Tickle, J. J., & Green, E. (1999). Beliefs about cues to deception: Mindless Stereotypes or Untapped Wisdom?. *Journal of Nonverbal Behavior*, *23*(1), 67-89.

Android phones with wireless charging | life at 100% (2018, June 20). Retrieved from https://www.powermat.com/blog/android-wireless-charging/

Bodmer, S. M. (2012). *Reverse deception: Organized cyber threat counter-exploitation*. New York ...: McGraw Hill.

Briscoe, E. J., Appling, D. S., & Hayes, H. (2014, January). Cues to deception in social media communications. In *System Sciences (HICSS), 2014 47th Hawaii International Conference on* (pp. 1435-1443). IEEE.

Caspi, A., & Gorsky, P. (2006). Online deception: Prevalence, motivation, and emotion. *CyberPsychology & Behavior*, *9*(1), 54-59.

Chan, A. L. (2014, October 13). What You Need To Know Before You Reuse That Plastic Water Bottle. Retrieved from https://www.huffingtonpost.com/2014/08/14/reuse-plastic-water-bottle_n_5671681.html

Clayton, K., Davis, J., Hinckley, K., & Horiuchi, Y. (2017). Media Source, Selective Exposure, and Susceptibility to False Information.

Cohen, P. (2015, March 18). Apple's new MacBook: How does its Retina display compare to other Macs? Retrieved from https://www.imore.com/apples-new-macbook-how-does-its-retina-display-compare-other-macs

Community Partners. (n.d.). Retrieved from http://www.redcross.org/donations/companies-and-foundations/community-partners#NAACP

Donnelly, G. (2017, November 1). Everything You Need to Know About the $1 Billion LuLaRoe Lawsuit. Retrieved from http://fortune.com/2017/11/01/lularoe-lawsuit/

Downs, J. S., Holbrook, M., & Cranor, L. F. (2007, October). Behavioral response to phishing risk. In *Proceedings of the anti-phishing working groups 2nd annual eCrime researchers summit* (pp. 37-44). ACM.

Driskell, J. E. (2012). Effectiveness of deception detection training: A meta-analysis. *Psychology, Crime & Law*, *18*(8), 713-731.

Dylko, I., Dolgov, I., Hoffman, W., Eckhart, N., Molina, M., & Aaziz, O. (2017). The dark side of technology: An experimental investigation of the influence of customizability technology on online political selective exposure. *Computers in Human Behavior*, *73*, 181-190.

Evans, J. S. B. (1989). Bias in Human Reasoning Causes and Consequences.

Evans, J. S. B. (1984). Heuristic and analytic processes in reasoning. *British Journal of Psychology*, *75*(4), 451-468.

Evans, J. St.B. T. (1982). *The psychology of deductive reasoning*. London: Routledge & Kegan Paul.

Faggian, D. (2018, July 11). WWF. Retrieved from https://www.facebook.com/WWF/

Festinger, L. (1962). *A theory of cognitive dissonance* (Vol. 2). Stanford university press.

Festinger, L., Riecken, H. W., Schachter, S. (1956). *When Prophecy Fails: A Social and Psychological Study of a Modern Group that Predicted the Destruction of the World*. University of Minnesota Press.

Fogg, B. J., Soohoo, C., Danielson, D. R., Marable, L., Stanford, J., & Tauber, E. R. (2003, June). How do users evaluate the credibility of Web sites?: a study with over 2,500 participants. In *Proceedings of the 2003 conference on Designing for user experiences* (pp. 1-15). ACM.

Fry, R. (2017, September 06). 5 facts about Millennial households. Retrieved from http://www.pewresearch.org/fact-tank/2017/09/06/5-facts-about-millennial-households/

Garrett, R. K. (2009). Echo chambers online?: Politically motivated selective exposure among Internet news users. *Journal of Computer-Mediated Communication*, *14*(2), 265-285.

Gibson, M. L. (2015, November 07). How to hydrate your skin. Retrieved from https://www.mayoclinic.org/healthy-lifestyle/adult-health/expert-answers/hydrated-skin/faq-20058067

Griggs, R. A. (1989). To "see" or not to "see": That is the selection task. *The Quarterly Journal of Experimental Psychology*, *41*(3), 517-529.

Griggs, R. A., & Cox, J. R. (1982). The elusive thematic-materials effect in Wason's selection task. *British Journal of Psychology*, *73*(3), 407-420.

Hart, W., Albarracín, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: a meta-analysis of selective exposure to information. *Psychological bulletin*, *135*(4), 555.

Health care in Sweden. (2018, April 05). Retrieved from https://sweden.se/society/health-care-in-sweden/

HHS Office, & Public Affairs. (2017, January 31). Pre-Existing Conditions. Retrieved from https://www.hhs.gov/healthcare/about-the-aca/pre-existing-conditions/index.html

Hill, K. (2012, November 01). Hurricane Sandy, @ComfortablySmug, and The Flood of Social Media Misinformation. Retrieved February 27, 2018, from https://www.forbes.com/sites/kashmirhill/2012/10/30/hurricane-sandy-and-the-flood-of-social-media-misinformation/#258146c62560

Kertscher, T. (2016, June 10). It goes too far to say assault rifles are banned. Retrieved from http://www.politifact.com/wisconsin/statements/2016/jun/20/ron-johnson/aftermath-orlando-gop-sen-ron-johnson-says-assault/)

Kolowich, L. (2016, April 14). How the News Feed Algorithms Work on Facebook, Twitter & Instagram. Retrieved January 20, 2018, from https://blog.hubspot.com/marketing/how-algorithm-works-facebook-twitter-instagram

Knobloch-Westerwick, S., & Meng, J. (2009). Looking the other way: Selective exposure to attitude-consistent and counterattitudinal political information. *Communication Research*, *36*(3), 426-448.

Lawhorne, A. (2017, May 06). Why Only Female Mosquitoes Drink Blood • DC Mosquito Squad. Retrieved from http://dcmosquitosquad.com/why-only-female-mosquitoes-drink-blood/

Margolis, H. (1987). *Patterns, thinking, and cognition: A theory of judgment*. University of Chicago Press.

Metzger, M. J., & Flanagin, A. J. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. Journal of Pragmatics, 59, 210-220.

Metzger, M. J., Flanagin, A. J., & Medders, R. B. (2010). Social and heuristic approaches to credibility evaluation online. *Journal of communication*, *60*(3), 413-439.

Nickerson, R. S., Butler, S. F., & Barch, D. H. (2017). Set size, assertion form, thematic content and sampling in the selection task. *Thinking & Reasoning*, *23*(2), 134-157.

NRA-ILA. (n.d.). Gun Laws. Retrieved from https://www.nraila.org/gun-laws/
Origami Owl Custom Jewelry - Our Story. (n.d.). Retrieved from https://www.origamiowl.com/ourstory

Pempek, T. A., Yermolayeva, Y. A., & Calvert, S. L. (2009). College students' social networking experiences on Facebook. *Journal of applied developmental psychology*, *30*(3), 227-238.

Pennycook, G., Cannon, T. D., & Rand, D. G. (2017). Prior exposure increases perceived accuracy of fake news.

Position Statement on Pit Bulls. (n.d.). Retrieved from https://www.aspca.org/about-us/aspca-policy-and-position-statements/position-statement-pit-bulls

Rettner, R. (2010, September 08). Runners Who Stretch Don't Run as Far, Researchers Find. Retrieved from https://www.livescience.com/34913-stretching-running-endurance-100908.html

Robertson, L. (2018, January 22). The Facts on DACA. Retrieved from https://www.factcheck.org/2018/01/the-facts-on-daca/

Seebruck, R. (2015). A typology of hackers: Classifying cyber malfeasance using a weighted arc circumplex model. *Digital Investigation*, *14*, 36-45.

Shearer, E., & Gottfried, J. (2017, September 07). News Use Across Social Media Platforms 2017. Retrieved from http://www.journalism.org/2017/09/07/news-use-across-social-media-platforms-2017/

Snider, M. (2017, June 30). Facebook aims to filter more fake news from news feeds. Retrieved from https://www.usatoday.com/story/tech/news/2017/06/30/facebook-aims-filter-more-fake-news-news-feeds/440621001/

Stieglitz, S., & Dang-Xuan, L. (2013). Emotions and information diffusion in social media—sentiment of microblogs and sharing behavior. *Journal of management information systems*, *29*(4), 217-248.

Stroud, N. J. (2008). Media use and political predispositions: Revisiting the concept of selective exposure. *Political Behavior*, *30*(3), 341-366.

Tiku, N. (2018, March 13). Facebook's Latest Fix for Fake News: Ask Users What They Trust. Retrieved from https://www.wired.com/story/facebooks-latest-fix-for-fake-news-ask-users-what-they-trust/

US Census Bureau. (2015, June 25). Millennials Outnumber Baby Boomers and Are Far More Diverse. Retrieved from https://www.census.gov/newsroom/press-releases/2015/cb15-113.html

USCIS. *Number of Form N-400, Application for Naturalization, by Category of Naturalization, Case Status, and USCIS Field Office Location* [PDF File]. Retrieved from https://www.uscis.gov/sites/default/files/USCIS/Resources/Reports%20and%20Studies/Immigration%20Forms%20Data/Naturalization%20Data/N400_performancedata_fy2018_qtr1.pdf

Wallberg, J. (2016, May 17). Running on a Treadmill vs Outside -Which is Harder on the Knees and Achilles Tendons. Retrieved from http://orthopropt.com/running-on-a-treadmill-vs-outside-which-is-harder-on-the-knees-and-achilles-tendons/

Wason, P. C., & Shapiro, D. (1971). Natural and contrived experience in a reasoning problem. *The Quarterly Journal of Experimental Psychology*, *23*(1), 63-71.

Wason, P. C. (1968). Reasoning about a rule. *Quarterly journal of experimental psychology*, *20*(3), 273-281.

Wason, P. C. (1960). On the failure to eliminate hypotheses in a conceptual task. *Quarterly journal of experimental psychology*, *12*(3), 129-140.

Williams, E. J., Beardmore, A., & and Joinson, A. N. (2017). Individual differences in susceptibility to online influence: A theoretical review. *Computers in Human Behavior*, *72*, 412-421.

Yu, T. K., Lu, L. C., & Liu, T. F. (2010). Exploring factors that influence knowledge sharing behavior via weblogs. *Computers in human behavior*, *26*(1), 32-41.

Zhou, L., Burgoon, J. K., & Twitchell, D. P. (2003, June). A longitudinal analysis of language behavior of deception in e-mail. In *International Conference on Intelligence and Security Informatics* (pp. 102-110). Springer, Berlin, Heidelberg.

APPENDIX A

BATTLESHIP PLAYING RULES

At the beginning of each game, each player will set up his/her battleship board, placing ships where desired. The game is played in rounds, where each player is allowed 1 shot each round.

Objective: Sink all of opponent's ships.

Rounds: Each round consists of one player calling 1 shot and the opponent confirming or denying the shot as hit/miss. The player who calls the shot then has the opportunity to call the opponent's bluff. If the player correctly calls the opponent's bluff, they are awarded an extra shot (the opponent loses their next shot). If the player incorrectly calls a bluff, then that player loses a shot.

Caveats:

Bluffs can only be called once the shot has been fired.

Sunken ships must be truthfully acknowledged after final shot fired in the round, but before bluffs are called out. The end of the game (one player's ships are all sunk) must also be truthfully acknowledged.

Experimenter will call any ships that have been sunk at the end of each round, before any bluffs are called out.

Players can make eye contact with each other, but are not required to. Players cannot see each other's game board.

Players can only deceive about hits/misses.

Strategy: Players can keep track of misses and hits.

APPENDIX B

CONTENT FOR SOCIAL MEDIA POSTS

Neutral Post Content

True Content:

- Plastic water bottles should not be reused without thorough cleansing, as they may harbor bacteria from your mouth (Chan, 2014)
- Stretching before running may lower your endurance (Rettner, 2010)
- Only female mosquitoes bite (Lawhorne, 2017)
- Origami owl, a popular custom jewelry company, has been called a pyramid scheme, but is actually just a multi-level marketing company made up of independent designers that sell a legitimate product. (Origami Owl Custom Jewelry - Our Story, n.d.)
- The World Wildlife Fund is working with Tiger beer, a company that sells beer, to support tiger conservation efforts for the endangered species. (Faggian, 2018)

False Content:

- Drinking water keeps your skin from becoming dry. (Gibson, 2015)
- Running on a treadmill is better for your knees because it places less stress on your joints than running on pavement (Wallberg, 2016)
- Pitbulls and Rottweilers have the same bite strength. (Position Statement on Pit Bulls, n.d.)
- LuLaRoe is suffering a lawsuit of $1 billion for selling clothes with illegally used copyright patterns. (Donnelly, 2017)

- The American Strongmind Association has recently been added as a subsection to the American Red Cross to manage and facilitate relief efforts associated with disasters that occur as a result of mental health. (Community partners, n.d.)

Controversial Post Content

True Content:

- The ownership of machine guns was prohibited in the United States back in 1986. (Kertscher, 2016)
- More millennials households are in poverty than households headed by any other generation. (Fry, 2017)
- Maternal mortality in Sweden is among the lowest in the world. (Health Care in Sweden, 2018)
- Applications for citizenship experienced a 49% increase in approval from 2016, meaning more foreign immigrants were granted citizenship since 2016 (U.S. Citizenship and Immigration services. *Number of Form N-400, Application for Naturalization, by Category of Naturalization, Case Status, and USCIS Field Office Location* [PDF File])
- The iPhone 4s was the first iPhone to support retina display. (Cohen, 2015)

False Content:

- Conceal Carry permit owners can choose in which states to carry their weapon (NRA-ILA, n.d.)

- The Baby Boomer population size and diversity exceeds that of millennials. (US Census Bureau, 2015)
- The US Affordable Healthcare Act did not cover pre-existing conditions. (HHS Office, & Public Affairs, 2017)
- DACA recipients cannot gain citizenship by serving in the army. (Robertson, 2018)
- Apple was the first major company to introduce wireless charging for mobile phones. (Android phones with wireless charging, 2018)

APPENDIX C

POST-TEST QUESTIONNAIRE

Why did you decide to share the posts that you did?

_____

_____

_____

_____

_____

_____

How often do you share on social media?

1. Never
2. Once every few months
3. At least once a month
4. Daily
5. Multiple times in a day

Please select the option that best reflects your opinion.

1. Generally, do you agree or disagree with gun control policy as it stands today?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

2. Generally, do you agree or disagree that the millennial generation is generous, team-oriented, and collaborative?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

3. Generally, do you agree or disagree with healthcare as it stands in the US today?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

4. Generally, do you agree or disagree with the current immigration policies in US as they stand today?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

5. Generally, do you agree or disagree with the overall, current advances in technology?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

6. Generally, do you agree or disagree with the minimum wage laws in the U.S. as they stand today?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

7. Generally, do you agree or disagree with laws surrounding abortion as they stand today?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

8. Generally, do you agree or disagree with the idea of increasing the use of nuclear power?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

9. Generally, do you agree or disagree with the U.S. intervening in world politics?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree

10. Generally, do you agree or disagree with how cases of sexual assault are investigated in the U.S.?

Strongly Agree | Agree | Somewhat Agree | Neutral | Somewhat Disagree | Disagree | Strongly Disagree