

MUSEUM OF MISINFORMATION

***AN INTERACTIVE EXHIBIT ILLUMINATING THE EFFECTS OF SOCIAL MEDIA
ALGORITHMS ON COGNITIVE BIAS AND THE SPREAD OF MISINFORMATION***

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MUSEUM OF MISINFORMATION

*THE EFFECTS OF SOCIAL MEDIA ALGORITHMS ON
CONFIRMATION BIAS AND THE SPREAD OF MISINFORMATION*

Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Studio and Digital Arts
with a Concentration in Graphic Design of Liberty University

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ABSTRACT

Misinformation is so easily believed and spread due to social media and its algorithms that amplify bias. This severely effects the millennial population and their ability to assess information, as many of them have begun to forego traditional news outlets and rely on social media for their news. The aim of this research was to investigate the phenomenon of confirmation bias and its connection to millennials' belief in misinformation along with how social media uses confirmation bias to aid in the spread of misinformation. Specifically, it investigates methods that would aid millennials in combatting spreading misinformation. The following research questions were asked:

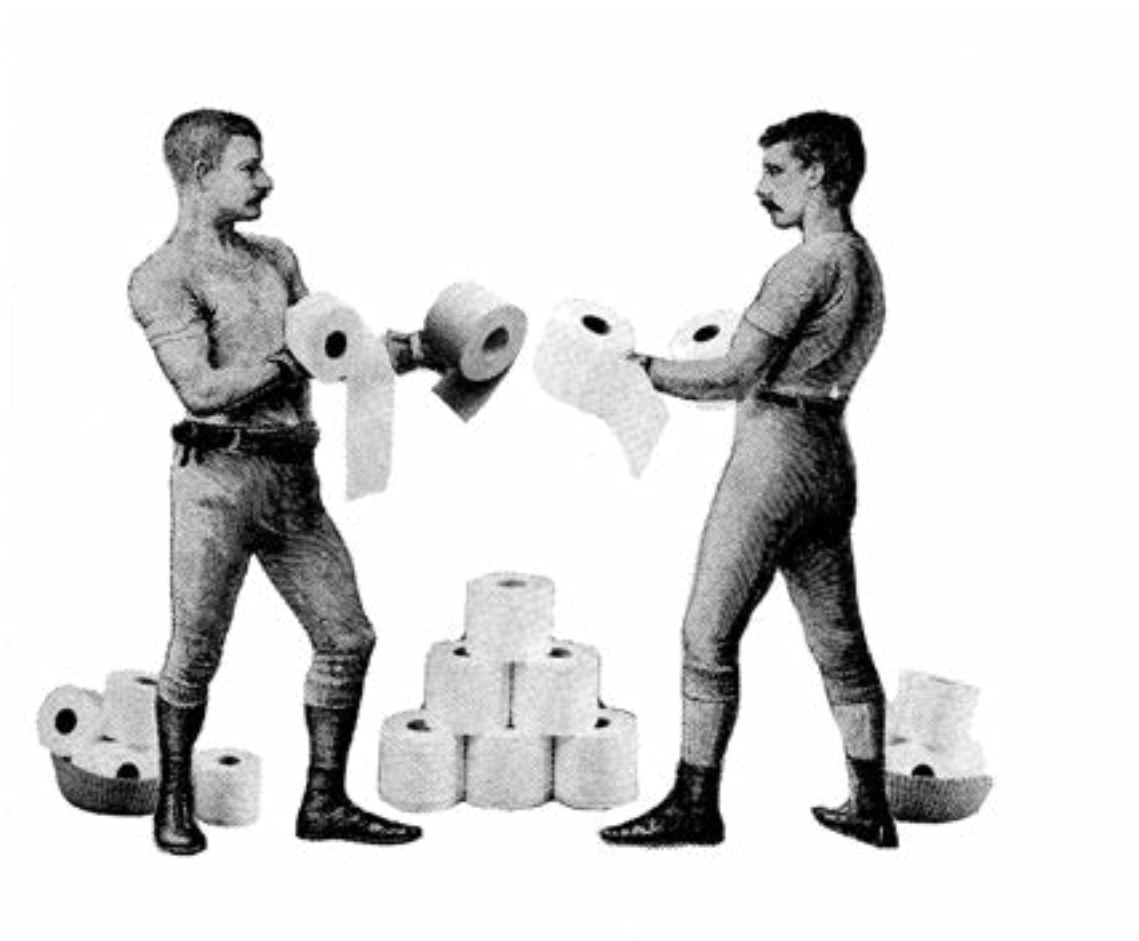
- 1. What is Information Disorder?*
- 2. What is the psychology of misinformation?*
- 3. What role does social media play in spreading misinformation?*
- 4. Why does the perpetuation of misinformation propose a threat?*
- 5. Why is misinformation difficult to stop?*

After researching these questions through a literature review, visual analyses, and content analyses, a solution was created to raise awareness of social media algorithms and how they aid in the spread of misinformation by amplifying biases. An experiential pop-up exhibit was created that helps educate millennials on the spread of misinformation through interactive artwork. Research revealed that millennials, the target audience, learn and have better retention when exposed to a tactile environment. Therefore, the solution to combat the spread of misinformation due to confirmation bias was an interactive pop-up exhibit.



CHAPTER 1

Introduction



INTRODUCTION

The year 2016 was a turning point for America. It was a turning point not because of the election that took place but because an “infodemic” was starting. So much misinformation began to spread that the word “post-truth” was declared the international word of the year by the Oxford Dictionary. “Post-truth” is defined as, “relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief” (“Post-truth”). The concept of “post-truth” has been around for centuries, but in just 2016 alone, the word saw an increase of usage by 2,000% (Oxford Word of the Year). The increase in usage of the word came from a year that was charged with political and social discourse, all thanks to the rise of social media as a news source. Social media not only enabled the spread of misinformation, it encouraged it.

Flash forward to the year 2021, and the “infodemic” has only gotten worse. Social media, which is now considered one of the most popular sources for news, has aided immensely to this. Because social media was never intended to be a platform to serve as a news source, it is no surprise that it has done more harm than good when it comes to spreading misinformation. The algorithms that are put in place by social media allow misinformation to be posted and shared freely, without repercussions and without much warning.

When it came time to pick a topic for this thesis, I found myself scrolling through social media to distract myself from having to picking a topic. As I scrolled, I began to notice a large amount of those that I followed were posting and sharing outrageous, false news articles. I chuckled to myself wondering how they could believe something so obviously fake. Not soon after I was quickly humbled. A news article that supported a particular belief I had come across my news feed. I quickly shared it with a couple of friends. It was not until I thought to Google what I had just read that I found out I had not only fallen for, but shared misinformation. Almost as quickly as I was humbled, I got an idea for my thesis. Research shows that over 88% of millennials are getting their news from social media; this puts them at a great

risk not only to believe but also spread misinformation (“How Millennials Use and Control Social Media”).

The goal of this thesis is to educate millennials on how social media algorithms are encouraging a spread of misinformation by amplifying their biases. To fully understand the complexity of this topic, a set of research questions were addressed:

- 1. What is Information Disorder?***
- 2. What is the psychology of misinformation?***
- 3. What role does social media play in spreading misinformation?***
- 4. Why does the perpetuation of misinformation propose a threat?***
- 5. Why is misinformation difficult to stop?***

In the following chapters, this research is discussed and explained in further detail. The research includes a literature review, content and visual analyses, and design process. Additionally, a defense of the thesis and the final deliverable will be included in the last chapter.

OBSERVED PROBLEM

Millennials’ ability to analytically assess information has been skewed by confirmation bias due to the algorithms set up by social media platforms, thus resulting in the perpetuation of misinformation through these digital platforms.

RESEARCH PROBLEM

The spread of fabricated and purposefully misleading information is hardly a new phenomenon. Rumors, conspiracy theories, and fabricated information have been used for centuries to push personal agendas and to sway individual’s beliefs on anything ranging from lifestyle to health choices. However, due to the recent rise of social media being positioned as a news source, these forms of misinformation have been disseminated at an alarming rate. Because social media allows fact and fiction to live side by side, while implementing an

algorithm that builds off of and amplifies confirmation biases, millennials' ability to analytically assess information has been impaired. This results in the direct perpetuation of misinformation which serves as a threat not only to the individual but the democracies in which they live. In order to slow the spread of misinformation, individuals must become aware of how social media algorithms amplify their own biases.

KNOWLEDGE GAP

The use of social media platforms has changed. These platforms have begun to find themselves as a news source rather than an entertainment-based platform, especially amongst their millennial users. However, while the platforms' usage has been evolving and changing, the algorithm, the program that curates content for the platforms users, has failed to do so. These algorithms are being used to show users the content that they prefer and interact with the most. Many users do not even realize what the algorithm within these platforms do, even more don't realize that they are there in the first place. This has become increasingly dangerous, as this aids in the spread of misinformation. As the user searches for news information on their feed, they fail to realize that the algorithm is constantly curating the information they see to match their views. This leads to users being fed false information, believing it to be true.



CHAPTER 2

Research Questions
Literature Review
Research Methods
Summary of Findings

SUMMARY OF LITERATURE REVIEW

INTRODUCTION

The night of December 4th, 2016, a man carrying an assault rifle walked into the pizza restaurant Comet Ping Pong in Washington DC. The man had intentions of doing some firsthand “investigating” on whether the restaurant was the headquarters of an underground child sex ring run allegedly by presidential candidate Hillary Clinton and her campaign team. While inside of the restaurant the man fired several shots into the ceiling threatening the workers to confess to their alleged crimes. It was later discovered that his motivation to investigate was developed through stories and posts he had read on blogs as well as social media sites such as Facebook. This was not the only threat that Comet Ping Pong encountered. After a series of “news reports” spread throughout social media, the pizza place began to receive a large amount of threats. However, these “news reports” that were circulating social media turned out to be a hoax, with the District of Columbia’s Metropolitan Police Department officially declaring it a “conspiracy theory” (Pizzagate: From Rumor).

This incident became later known as Pizzagate and was just one of the many fake news stories that flood social media. Other instances of these fake news stories include posts that claim Pope Francis endorsed Donald Trump (Edson et al) and that Beyonce joined the Illuminati. With the rise of threatening actions taking place from these fake news stories, world leaders such as Barack Obama have expressed concern over its spread. Even the World Economic Forum has listed the spread of misinformation as one of the main threats in society (Burkhart). In a survey conducted by BuzzFeed in 2016, it was found that fake news headlines fooled its millennial users at least “75% of the time.” Millennials’ ability to analytically assess information has been distorted by confirmation bias due to the algorithms set up by social media platforms. Algorithms are the technical means of curating timelines and feeds based on the relevancy of a post rather than the post time. The posts that are more relevant to the user are shown over those that aren’t (Algorithms in Social Media Platforms). Because the algo-

rithms are prioritizing posts that are more interesting to specific users, they fail to filter out misinformation, thus resulting in the perpetuation of misinformation through these digital platforms. While some readers may ignore the fake stories they come across, the consumption of these stories can lead to scary actions, as seen in the Pizzagate instance. Now more than ever there is a call to understand the implications the world can have if the spread of this misinformation is not slowed or stopped (Edson et al.)

The term “fake news” is not new, rather it has just been reinvented (Edson Et al). Earlier definitions coined the term to relate to distinct types of content such as new parodies or political satires. But in a recent study performed by behavioral microeconomist and Microsoft principal researcher Hunt Allcott and Stanford University Professor of Technology Matthew Gentzkow, they have defined fake news to “be news articles that are intentionally and verifiably false but could mislead readers” (213). There are two main motivations that underlie the production of fake news: financial and ideological (Edson et al). Some fake stories go viral because they are extremely exaggerated; however, it provides content producers with clicks that are converted to advertising revenue. Other fake stories are produced to promote specific ideas or people they favor. These stories often discredit other parties involved. In order to understand the situation, one must understand the Information Disorder the world is experiencing to its full extent. Understanding the psychology of misinformation, the ways in which it is disseminated, and how social media encourages the spread is vital to slowing down the fake news phenomenon.

FAKE NEWS DEFINITION

In 2016, following the previous year’s Presidential Election, Oxford Dictionary coined the term “post-truth” as its word of the year. The Oxford Dictionary defined this word as, “relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal

belief” (Oxford Dictionary). Just a year later, the Collins Dictionary followed in the Oxford Dictionary’s footsteps coining “fake news” as the 2017 word of the year. This came as a response for the word “fake news” usage being up 365% since 2016 (Oxford Word of the Year). The term “fake news” has had many different definitions, changing periodically throughout time. Before 2016, fake news often was used to describe satirical news such as what was read in the magazine *The Onion* or watched on the TV show *The Daily Show*. During the 2016 election, the word began to be appropriated by political candidates to discredit news sources with whom they did not agree. Today, the term has become a “catch-all” phrase, being used to describe disinformation, misinformation, and malinformation (Tandoc). Because of this, The Council of Europe has warned individuals to be wary of using the term “fake news.” Clair Wardle, a co-founder and executive director of First Draft, a coalition researching online misinformation, states that the term fails to capture the gravity of the information disorder (Information Disorder).

“Most of this content isn’t even fake; it’s often genuine, used out of context and weaponized by people who know that falsehoods based on a kernel of truth are more likely to be believed and shared. And most of this can’t be described as ‘news’. It’s good old-fashioned rumors, it’s memes, it’s manipulated videos and hyper-targeted ‘dark ads’ and old photos re-shared as new.”

Therefore, in actuality, fake news is “fabricated information that mimics news media content in form but not in organizational process or intent” as the director of the Psychology of Misinformation at Northeastern University Briony Swire-Thompson et al. defines it (Swire-Thompson). This makes “fake news” a type of misinformation as investigator of the Australian Research Council Robert Ackland states. The malintent is based on the creator of the fake news, not the individual spreading it.

DISINFORMATION, MISINFORMATION & MALINFORMATION:

Disinformation

The term disinformation refers to false information that is purposefully created with the intention to harm a person, social group, organization, or country. An example of this was the creation of a sophisticated duplicate version of the Belgian newspaper *Le Soir*, with a false article claiming that presidential candidate Emmanuel Macron was being funded by Saudi Arabia along with false claims on Twitter that he was in a relationship with his step-daughter.

Malinformation

Malinformation is information that is true but shared with the intention to cause extreme harm and damage reputations. An example of malinformation occurred when presidential candidate Hillary Clinton’s emails were leaked before her presidential run. The content that was leaked was factual; however, it was done in such a way that was intended for to ruin her public appearance. This was considered to greatly affect her presidential run.

Misinformation

Misinformation, on the other hand, is the innocent sharing of false information with no intention to cause harm. This means that the user sharing the information does not realize that the information is untrue or misleading. They share it with the intention of helping or informing their fellow peers. The sharing of misinformation is driven by socio-psychological factors, says Wardle. On social media platforms, users are “performing” their identities. An example of misinformation were the events that followed the attack on Champs Elysees on April 20th, 2017. Individuals began sharing a source that stated a policeman had been killed. The individuals were attempting to be helpful by sharing this information, but they failed to adequately inspect the source,

resulting in the spread of false information (Medium.com). With the intention of harm being difficult to determine, misinformation is often used for false information in general. This thesis will also address information that is not factual that is being spread as misinformation. It is important to note that misinformation is not confined to political information. False information is disseminated in all areas including consumer products, health information, finances, and even scientific journals (Greifeneder et al).

Claire Wardle has defined seven different types of misinformation that are within the overarching types of information disorder. By breaking down the seven categories, individuals can understand the complexity of the information disorder. This also helps individuals move away from their reliance on the “catch all” term “fake news.”

Satire or Parody

News satire and parody are the most common type of misinformation that is spread throughout social media (Edton). Satire and parody news are certainly an art form on their own and provide entertainment for individuals. However, it has become a popular way to bypass fact-checkers and disseminate rumors and conspiracies. This is because creators can push back stating that it was never meant to be taken seriously. A popular example of news satire is The Daily Show (Baym). The show is produced and ran as an actual news broadcast, including a set, a news anchor behind a desk, and graphics that correlate to the story being reported. However, the difference is that the show promotes itself as entertainment, ran by a group of comedians and entertainers. The show overcompensates with humor to capture and keep the attention of its younger audience. Even with their use of humor, the show can be seen as equal parts entertainment and equal parts informing because the events within discussion are actual live events. While yes, the audience that first sees the satire and shares it may understand it as such, the more the clips of the show are shared, the more people begin to lose the understanding that it is satire. This can be

seen most commonly in parody sites such as The Onion or The Babylon Bee (Wardle). These websites play on the vague plausibility of news sites. They do a great job of creating attention grabbing headlines that make readers want to believe them. As Associate Professor at Nanyang Technological University EC Tandoc says: “in the case of successful news parody, the authors, with a “wink” to the audience, carry off sophisticated balance between that which may be possible and that which is absurd” (137). These sites can be so well disguised that there have been instances where legitimate websites have used their articles as sources and fact checking.

False Connection

Another term for this type of misinformation is “click-bait.” This is when news sites use dramatized language in order to generate traffic to their articles or website. When the user then arrives to the said article or website, the story does not always add up to what the headline made it out to be. While this may not cause direct harm with the information being distributed, the true harm comes from the decline of trust between users and news sources. This begins to chip away at an already declining relationship with the public and news.

Misleading Content

Misleading content is difficult to describe because it relies on context. This type of misinformation can be seen in a variety of different ways. “Reframing stories in headlines, using fragments of quotes to support a wider point, citing statistics in a way that aligns with a position or deciding not to cover something because it undermines an argument” are all techniques that Wardle states misleading content can be used as (Information Disorder). This type of misinformation is hard to correct through fact-checking. Computers and algorithms only know right and wrong, misleading sites somewhere in the middle; therefore, they can not accurately pick out misleading content. (possibly insert image of new York times article here)

False Context

False context is content that is true but has been framed in a polarizing way. A popular example of this is the image of a child in a cage that caused outrage at the time it was circulating. The image appeared during the summer of 2018, a time in which there were many immigration protests happening. The picture was quoted on twitter with the caption, “this is what happens when the government believes that people are ‘illegal.’” The post received over 20,000 retweets on Twitter and 10,000 more shares on Facebook. It was not until the image was later revealed to be a cropped image of a protest against immigration policies in Dallas that the post was revealed to be false. However, the damage had already been done, and thousands of individuals began to believe that children were being held in cages. Another popular example of false context was the circulating tweet containing a video that showed a voting machine malfunctioning. The machine was selecting the wrong name when the user pressed the screen. The machine was quickly taken out of operation, and the user was able to correctly vote; however, the circulating tweet pushed the agenda that the election was rigged.

Imposter Content

Imposter Content is content that relies on the heuristics that the human brain uses to understand information and decide on credibility. This type of content uses logos of credible sources and attaches them to a made up, false source. A popular example of this involved the Miami Herald news reporter Alex Harris (Wardle). A fake tweet generated was used to doctor up offensive tweets, making it look like Alex Harris had tweeted them. The tweets circulated as screenshots, meaning that anyone who went to Alex Harris’s profile would have known they were fake. However, tweets can be deleted giving no immediate way Alex Harris could prove she did not write them.

Manipulated/Photoshopped Content

The manipulation of images has become a very common

occurrence given the rise of digital photos and the rise of powerful image manipulation software (Tandoc). While there are simple adjustments that can be made to photos such as color saturation or lens correction, the dangerous adjustments come in the form of adding or removing prominent elements of the photo. In an example from the lead up to the 2016 presidential election, two photos were photoshopped together. The first photo features a line of voters in Arizona, and the second image depicts an ICE officer making an arrest. When photoshopped together, the image was used to portray the false idea that the officer was arresting the man in line voting.

Fabricated Content

Fabricated content is 100% false (Wardle). This is content that plays off of emotions and is usually novel. Perhaps one of the most famous instances of this was during the 2016 presidential election. A false claim that stated Pope Francis had endorsed Donald Trump began to circulate. Another example emerged in 2014. A video depicting a boy saving a girl from the middle of gun fire in Syria went viral. Stills from the video were even mentioned on the front of The New York Times. However, it was later revealed that the video was actually created by professional film makers in hopes to raise awareness about the dangers taking place in Syria. Fabricated content knows no bounds and continues to evolve. Most recently the invention of “deep fakes” has gone viral. This is the ability to fabricate content with the power of artificial intelligence. Jordan Peele was able to create a fake version of President Obama that looked and sounded real.

As noted above, the information disorder the world is experiencing is quite complex. While most of the misinformation stems from clickbait, headlines, or satire that fools, there are still a large majority that are extremely deceptive and dangerous. In order to better understand these types of misinformation, individuals must understand what makes them so believable and “sticky.”

PSYCHOLOGY OF MISINFORMATION

Misinformation rarely comes with a warning label. Individuals usually do not and cannot tell a piece of information is false until a correction or retraction is made. Stephan Lewdansky, a cognitive and misinformation scientist at the University of Bristol, states, “For better or worse, the acceptance of information as true is favored by tacit norms of everyday conversational conduct: Information relayed in conversation comes with a “guarantee of relevance” and listeners proceed on the assumption that speakers try to be truthful, relevant, and clear, unless evidence to the contrary calls this default into question” (106). Tommy Shane, a misinformation specialist for First Draft, blames this on the psychology of misinformation, stating that there are everyday heuristics that cause belief in misinformation. Heuristics are “the tendencies of individuals to rely on simplistic patterns to reduce the expenditure of critical thought,” as cognitive scientist Stephan Lewandowsky defines. Because heuristics are the indicators used to make quick judgements, an example of this would be automatically believing a post someone you trust has endorsed without much pushback. Studies have proven individuals have become cognitive misers, using as little effort as possible to arrive at a conclusion; therefore, reliance on these heuristics have increased (Shane). This becomes dangerous because in order to comprehend information, it must temporarily be accepted as true. To go beyond the heuristics requires energy, energy that many users are not willing to expend. Therefore, “...the deck is stacked in favor of accepting information rather than rejecting it, provided there are no salient markers that call the speaker’s intention of cooperative conversation into question” (Lewandowsky, 131). Lewandowsky, Ecker, Seifert, Schwarz, and Cook identified four different factors that can influence belief and the decision if a source is true or not. These four factors are often used by misinformation to create confusion as well. These factors include coherence, community, credibility, and compatibility. These categories go through an analytical evaluation as well as an intuitive evaluation

within an individual to decide if a source is true.

Coherence

Coherent stories are much easier to understand and believe than incoherent stories. A coherent story is usually very compelling and does not contradict itself within human motivation and behavior. Individuals fill in the gaps of stories with information they already know, thus creating consistency with what they already know. This makes the story more memorable, something that misinformation is good at. The design of information can also effect the coherence by addressing the fluency of the message. When addressing the information in question, the user subliminally asks themselves, “does this make me stumble or does it flow smoothly?” (Lewandowsky, 106). When the material is easier to process, individuals are more likely to believe it (Reber, 563). Design of the message also matters when it comes to coherency. Rolf Reber, an expert in processing fluency and psychology professor at Michigan University, suggests that “a statement is more likely to be judged as true when it is printed in high- rather than low-color contrast ... presented in a rhyming rather than non-rhyming form ... or delivered in a familiar rather than unfamiliar accent ... Moreover, misleading questions are less likely to be recognized as such when printed in an easy-to-read font” (Shwarz). Misinformation is often designed to be simple and easy to understand, thus making humans more susceptible to believing it.

Credible Source

Information is more likely to be accepted as true and shared as such when it comes from a credible or reliable source. When a source seems more credible, the source’s message becomes increasingly more persuasive (Lewdansky, 131). However, more often than not, sources that are not credible and untrustworthy are believed and influential. This is because individuals begin to focus on the characteristics of a source rather than the context. For example, expert testimony has been found to be similarly persuasive whether it is provided under oath or in another context. Feelings of familiarity

also can lead to a false sense of credibility. Lewdansky states, “the mere repetition of a name can make something unknown seem familiar, making its bearer ‘famous overnight’” (Lewdansky, 113). Misinformation and those who create it are bound by no journalistic laws, which allows them to lie and give themselves false credible associations

Community

Individuals often rely on their communities to decide if something is true or not. If many people agree and believe something, more than likely, it is true. This is also known as the social consensus (Lewdansky, 113) or Pluralistic Ignorance. Often times this is also referred to as “social proof.” These theories state that individuals are often more confident in their beliefs if it is shared by a seemingly large group of others and are more likely to endorse or share that belief. In the lead-up to the invasion of Iraq in 2003, voices that advocated unilateral military action were given prominence in the American media, which caused the large majority of citizens who actually wanted the U.S. to engage multilaterally, in concert with other nations, to feel that they were in the minority (Leviston & Walker). Conversely, the minority of citizens who advocated unilateral action incorrectly felt that they were in the majority. When presented with information that is questionable in reliability and trustworthiness, individuals will often ask themselves, “What do my friends say, what do the opinion polls say?” Misinformation is able to use this against the individual. Often times misinformation is presented in such a way that it seems like many people believe and share that view. This can be seen most popularly in conspiracy theories (Shane).

Compatibility

Claims are more likely to be counted as true when they are compatible with the information already known. When individuals encounter a new belief or a new set of information, it is checked against prior knowledge to see if it is compatible. If the new information is compatible with prior information, the new

information is believed. This is known as a cognitive bias called confirmation bias. Disinformation actors can exploit this tendency to amplify existing beliefs (Shane). Disinformation actors are those that are paid to spread false information. R.S. Nickerson a Psychology Research Professor at Tufts University who specializes in confirmation bias states, “It remains an enormous challenge in combating fake news that humans are most gullible when it comes to things they wish to be true or believe to be true for the power of confirmation biases” (Nickerson).

CONFIRMATION BIAS

So what is the phenomenon of confirmation bias? Why is it detrimental to an individual's ability to process and analyze information, and how does it relate to the spread of misinformation? A common misconception about opinions are that individuals form them from years of rational and objective analyses. However, the truth is, opinions form as a result from years of paying attention to information which only confirmed what individuals wanted to believe, while ignoring information that challenged those preconceived notions (McRaney). This cognitive phenomenon is called confirmation bias. Raymond S. Nickerson defines the phenomenon of confirmation bias as, “the seeking or interpreting of evidence in ways that are partial to existing beliefs, expectations, or a hypothesis in hand” (Nickerson). In more laymen's terms, confirmation bias is the unconscious tendency to favor and interpret information in such a way that it reinforces a pre-existing belief. It is the tendency for the human brain to seek evidence to support its hunches instead of seeking disconfirmation of those hunches. Confirmation bias is a crucial ingredient in delusional thinking, irrational behavior, and motivated reasoning. It is crucial to fooling the brain into thinking things that are not true and maintaining outdated belief even though there is easily attainable evidence to contrary (McRaney).

“If one were to attempt to identify a single problematic aspect of human reasoning that deserves attention above all others, the confirmation bias would have to be among the candidates for consideration. Many have written about this bias, and it appears to be sufficiently strong and pervasive that one is led to wonder whether the bias, by itself, might account for a significant fraction of the disputes, altercations, and misunderstandings that occur among individuals, groups, and nations.”

Confirmation Bias has been around since the beginning of time and is believed by many philosophers to be a determining factor of thought and behavior. Tommy Shane believes that confirmation bias is one of the largest reasons in which misinformation is believed and then disseminated throughout social media. This is because confirmation bias prevents individuals from experiencing cognitive dissonance. Cognitive dissonance is the negative experience that stems from receiving information that does not support one's beliefs. Because there is a constant desire for cognitive balance, this has led researchers to believe that individuals will only expose themselves to certain types of media post in order to maintain confirmation bias. However, when an individual does enter a state of dissonance, they often have two initial reactions: they either engage in a counter-argument or search for ways to discount or ignore the counter information (Toddicken & Wolfe, 2006). If the individual is successful in these efforts, they will experience a rush of dopamine, leading to them feeling rewarded and relieved as the part of the brain associated with pleasure will be reacted (Greifeneder). So, what causes this bias to kick in? Philosophers believe that when people have an emotional investment in an issue, they are more prone to viewing and interpreting information in a biased way. Interestingly enough, the opposite is true when there is no emotional investment in an issue.

“If we have nothing personally at stake in a dispute between people who are strangers to us, we are remarkably intelligent about weighing the evidence and in reaching a rational conclusion. We can be convinced in favor of either of the fighting parties on the basis of good evidence. But let the fight be our own, or let our own friends, relatives, fraternity brothers, be parties to the fight, and we lose our ability to see any other side of the issue than our own. . . . The more urgent the impulse, or the closer it comes to the maintenance of our own selves, the more difficult it becomes to be rational and intelligent”

In an experiment conducted by PhD psychologist Sarah Lichtenstein and past President of Society of Judgment and Decision Making Baruch Fischhoff evidence was found that confirmation bias does not just encourage individuals to seek out information that favors their belief, it also encourages them to avoid information that would be considered counter indicative. During the experiment, Lichtenstein and Fischhoff found that confirmation bias can come in the form of “restriction of attention to a favored hypothesis.” This means that individuals can recognize the possibility of other beliefs outside of theirs, but will strongly remain committed to their belief, even going as far to apply the new information gained favorably towards their own belief. Another way Nickerson says confirmation bias can show up is through “preferential treatment of evidence supporting existing beliefs.” This is the tendency for an individual to give far more attention to the information that affirms a certain belief than information that discredits this belief. It is important to note here that the individual does not completely ignore the counter indicative information but will quickly discredit it. This is seen when individuals only recall information that supports their beliefs on a controversial issue and do not recall reasons to support the opposing side. D. Khun found that when young adults and children were presented with evidence that was inconsistent with a prior belief they “either

failed to acknowledge discrepant evidence or attended to it in a selective, distorting manner” (Nickerson, 178). This reinforces the fact that there are other motivational factors that could cause confirmation bias to appear such as self-esteem, control, and the desire for consistency. Confirmation bias can also effect memory. In a study done in 1979 by McKnight Presidential Chair of Psychology Mark Snyder and social psychologist Nancy Cantor, individuals read about the week in the life of an imaginary woman named Jane. In the story, Jane exhibited behaviors that could be interpreted as introverted as well as extroverted. A few days later, the individuals were called back and sorted into two different groups. In one group, the individuals were told that Jane was considering a job as a Real Estate agent and were asked if they thought she would be good at the job. Most of the group stated she would be great at it, only recalling the instances in which Jane showed extroverted behaviors as their evidence. The other group was presented with the idea of Jane taking a job as a librarian. The members of that group stated they thought she would make a great librarian, using only instances of her introverted behavior as evidence.

Dangers of Confirmation Bias

Confirmation bias contributes to the perseverance of untrue and false beliefs. The belief is able to persevere because the individual is able to selectively find information that supports it. As a result of confirmation bias, a false sense of confidence is then felt within the individual. Thus, the individual then wants to spread their knowledge to others in order to feel a sense of community. This is how misinformation can be spread. When a belief in something is wrong, yet an individual is only seeking out information that validates their false belief, it can become a danger to society. The Witch Hunting Trials of the 16th and 17th century in New England show this. During that time period, the belief in witchcraft and sorcery were very normal and widely viewed for much of the problems that could not be explained. Execution type punishments were dealt out regularly. Within the first 80 years of this frenzy, 40,000 innocent people had been killed. People believed so

strongly in witchcraft that special rules were introduced into the courts just prove evidence. Bodinus, a 17th century French authority figure is quoted saying: “The trial of this offense must not be conducted like other crimes. Whoever adheres to the ordinary course of justice perverts the spirit of the law, both divine and human. He who is accused of sorcery should never be acquitted, unless the malice of the prosecutor be clearer than the sun; for it is so difficult to bring full proof of this secret crime, that out of a million witches not one would be convicted if the usual course were followed” (Nickerson, 191). In order for the courts to get evidence that the individual in question was practicing witchcraft, the individual would be tortured until a confession was given. Although it may seem like a situation like the witchcraft hysteria is not possible today because of how outlandish it may seem that an incorrect belief could spread to such massive heights, a quick reflection reveals many situations similar. Most recently due to misinformation spread by confirmation bias, there was an attack on the capital of the United States. This resulted in heightened tensions within the United States. The phenomenon of confirmation bias may seem small but its presence makes it extremely easy for individuals to be manipulated and taken advantage of. No matter how strange or untrue a belief is, confirmation for that belief is now just a Google search away (McRaney).

THE RISE OF SOCIAL MEDIA

At the beginning of 2018, over half of the world had internet access. While the growth rate of the internet may seem insane, the growth of Facebook blows these numbers away. Just twelve years after it opened in 2006, Facebook declared that 2.8 billion users are active on their site monthly. This correlates to about 185 million daily users, which equates to roughly 85% of the US and Canadian population. With this new information ecosystem comes a place for misinformation to thrive. Social media, given its growing role as a new source, is well suited for the dissemination of misinformation for several reasons. Gaining an understanding of how and why this is dangerous is of great importance to combat the continued spread of misinformation.

Progression of Misinformation

Like stated previously, the phenomenon of “fake news” and misinformation is not new. Information fabrication has been a core feature of human communication since the beginning of time (Posetti). The only thing that has changed is the way and speed in which it disseminates. Back in Ancient Roman times, Octavian, also known as Caesar Augustus, began a propaganda war against Marc Anthony in order to ruin his reputation. Both were in the running to be the new ruler of Rome. Octavian began to paint Anthony as a womanizer and a drunk who had become Cleopatra’s puppet after being corrupted by their affair. This slanderous propaganda was spread using short slogans written on coins, almost in a Tweet like fashion. Octavian eventually won and became Rome’s first emperor, largely thanks to his spread of misinformation about Anthony, thus setting the standard for any democratic system. With the invention of the Gutenberg Printing Press in 1493, misinformation began to take on a new form as the press enabled it to be disseminated at a larger and broader scale. This led to the “Great Moon Hoax” in 1834 when The New York Sun wrote and published 6 articles about the discovery of life on the Moon. The articles were complete, including illustration of “alien-like” creatures and blue unicorns. The introduction of the radio was also a large step for the “one-to-many” form of communication, thus satirical news and entertainment began to evolve as well, making it even harder for individuals to tell fact from fiction. Perhaps one of the most famous instances of this occurred in 1938 with the broadcast of a radio adapted version of H.G Wells’s drama: The War of the Worlds. By adopting a radio news format via the relatively new technology of the radio, complete with actors playing the roles of reporters, residents, experts, and government officials, radio drama director Orson Welles found a clever way of bringing the story of the Martian invasion to life. While his intentions were pure, and he only wanted to entertain listeners, the radio adaptation assumed the form of a live news report. This was dangerous as the main source of information during that time in the United States was the radio. Thus millions

of listeners began to interpret the radio drama as actual news and became extremely frightened.

Millennials and Social Media

According to the American Press Institution, adults ages 25-35 are spending an increased amount of time on their mobile devices as they scroll through social media. These adults fall into the “millennial” age range. Social media has become an extraordinarily important part of millennials’ digital lives because of their increased reliance on social media as a news source ((“How Millennials Get News”). Millennials are skipping out on reading through long articles on websites, watching televised news, and subscribing to print news. Instead, they are using social media sites to find quick synopses of major stories, accessible within just a few taps. In a follow up study conducted by American Press Institute, it was discovered that 88% of millennials use social media platforms as their primary news source ((“How Millennials Get News”). Even with the multiple other paths to news, social media is the predominant source cited by many millennials. Facebook ranks as the current number one popular news source, with nine out of ten millennials using it, Twitter as the second, and Instagram and YouTube tying for third. Data suggests that these social media sites may be increasing news consumptions in ways that the millennial users do not anticipate or intend. With social media sites also being used for entertainment purposes, much of the news consumption become unexpected and serendipitous, only looking at articles that are interesting to them. In fact 60% of millennial users state that they will accidentally bump into news information when using these social media sites. Facebook and other platforms are becoming more prone to negativity, being filled with useless, inaccurate, and untrustworthy information. This has begun to put millennials at risk of believing and spreading misinformation.

Gatekeepers

Information in the past was only limited to a select number of privileged individuals. These individuals

usually held some position of importance ranging from military leaders to emperors. Controlling information gives individuals power and perhaps has contributed to the hierarchal cultures known today.

“Knowledge is power. Those controlling knowledge, information, and the means to disseminate information became group leaders, with privileges that others in the group did not have.”

With the use of print and broadcast media as news sources, there were certain “gatekeepers” that information had to pass through to be vetted to make sure it was correct and professional. In the late 1900s, a journalistic code of ethics was introduced to reinforce this. These “gatekeepers” of information filtered out information that was outdated, incorrect, or incomplete (Metgzer). Essentially, these gatekeepers controlled the flow of information. The gatekeepers were granted the credibility to do this due to the credentials they had. These credentials came from expertise, the government, etc. Only those with something of merit were allowed to be published, put on the air, or allowed to teach or practice (Metgzer). There was usually a high cost that was involved in producing and disseminating information. However, with the rise of the internet, the price of these actions decreased heavily. The traditional gatekeepers that were held of high esteem essentially became useless. The internet has given every user a platform and a chance to be a journalist (Shelbe). These individuals are not bound however to the integrity that traditional journalist are. With the sheer amount of information being produced and sent out onto these platforms, the gatekeepers cannot keep up with what is true and false; therefore, the gatekeepers have been replaced by algorithms (Pariser). These algorithms do not have the capability to vet and capture the information like humans would. This makes the internet the perfect breeding ground for misinformation to be created and spread. Websites that are fake, blogs that feature false information, and posts that are biased opinions are now being spread to mass audiences without little pushback. The average Twitter account has 707 followers (Brand-

watch). Therefore large amounts of information could be going out to large amounts of people at low cost, with nothing to stop it. This is exemplified by rumors surrounding the Boston Marathon. A well intentioned Reddit thread was created to help catch the perpetrator, yet instead, the accusation of an already deceased Brown University student went viral, creating confusion. This Reddit spread was allowed to stay up due to the lack of gatekeepers and social media’s reliance on emotional responses (Swire-Thompson).

Social Media and Emotions

Misinformation that is spread online has an advantage compared to its correct information counterpart. Misinformation is not constrained by reality; it has the ability to be shaped into a more appealing, attention grabbing and memorable version of real information. Creators of false information can deliberately tailor their content to be buzzworthy (Acerbi). These creators also purposefully use emotion as a way to spread their content. Unfortunately, due to social media’s use of “emotional-impulsive functions,” this has become increasingly problematic (Taddicken). Social media puts more emphasis on emotionally driven posts, thus they are seen more by users. Emotions are an important factor to consider when understanding the spread of misinformation, as they influence belief. A study conducted by Festinger in 1957, examined further by Monika Taddicken, the head of the Department Communication and Media Sciences at Technische University and Laura Wolff, director of the Behavioral Design Center, showed that anger can encourage belief in an untrue piece of information. Taddicken and Wolff state, “Emotional states, and anger in particular, are assumed to interact with individual ideologies and the information environment— such as the presence or absence of correctives—to influence how people encounter (mis/dis)information. Thus, potentially exacerbating their beliefs in falsehoods and shaping how (mis/dis)information is assimilated into their own worldviews” (Scheufele & Krause, 2019).

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Negative events have been proven to be recalled more clearly than positive ones. Information that is framed negatively is often times considered more truthful than information when framed positively. Social media has been known to be a place where the algorithms favor the spread of polarizing and pointed rhetoric making this dangerous (Acerbi).

MEET THE MILLENNIALS

In 2020, roughly 72 million, people worldwide, nearly a quarter of the entire global population, were considered to belong to the generational group called millennials. This millennial cohort is defined by their birth year, which ranges from 1981 to 1996, making millennials in 2021 anywhere from 26 to 40 years old. This generation is considered the largest adult cohort overtaking the previous generation, those born from 1960 to 1980, known as Baby Boomers. Millennials are more racially diverse than any previous generation as well with 47% of millennials being a minority. In 2010, a study conducted by Pew Research predicted that millennials will be the most educated generation as well, with millennials associating higher education with success both in job and marriage markets.

Millennial Strengths

While the size of the millennial generation is quite impressive, that it not what makes the Millennial generation stand out. Often referred to as “digital natives,”

millennials were the first generation to grow up with technology such as personal computers and cellphones. David Burstein, author of the book “Fast Future: How the Millennial Generation is Shaping Our World,” stated, “Through our formative years, however, digital technology began to make quantum leaps almost daily in the variety and extent of applications and functions, as well as user access and mobility...” (NEED CITATION). This has allowed millennials the power to influence and create new technology. Burstein reinforces this idea noting that the founders of companies such as YouTube, Facebook, Instagram, and Twitter were all millennials.

According to Pew Research, millennials will be the largest generation in the workforce in America by 2025 and will also hold the most leadership positions. Instead of following in the previous generations footsteps of “waiting their turn,” millennials are challenging the leadership status quo. Millennials thrive and take risks, seeking out new information instead of using what is tried and true.

The Millennial Mindset

While traits for past generations include negative connotations such as “self-reliant” and “workaholics,” traits attributed to the millennial generation include “optimistic” and “multitasking.” These traits can be seen both in millennial’s work and family life. When it comes to jobs, millennials want to be valued and told that their work matters. They believe they are very capable and are constantly searching for the next opportunity. In a study conducted by Indeed.com, it was discovered that millennials value meaningful motivation and experiences above monetary gain.

According to research conducted by the company Deloitte, while millennials have many great strengths, they have one large kryptonite: ambiguity . Millennials, more than any other generation, hate “not knowing.” Researchers believe that this comes from growing up with the internet and having the ability to search for whatever answer they desire. Millennials would rather find an answer that makes no sense, then find no answer at all.

Millennial Learning

While millennials may be the most educated generation, they still are a key group in believing and spreading misinformation. Because millennials think and act drastically different than previous generations, it is no surprise that there have been many failed attempts at correcting the spread of misinformation amongst the millennial generation. Millennials have grown up with technology. This has allowed them a unique perspective on how information is delivered which has resulted in a shift in learning styles from theoretical to experiential (Decoding the New Generation: How Millennials Learn). Due to this information, millennials are drawn towards interactive and tactile experiences to learn. They are attempting to find the balance between feeling educated and entertained.

Growing up with the internet has allowed millennials to constantly be connected. Millennials' attention spans have become short, making it difficult for them to process large chunks of information at a time. They often prefer precise learning, small bite sized chunks of information that have relatable content, instead of long draw out lectures. Relatable content allows millennials to stay engaged longer and retain information more successfully.

Millennial's Aesthetics

Because information is so readily available, millennials often are bored by traditional text-dominant designs. Over 41% of millennials struggle with information overload; therefore, they are drawn to clear visuals that help stimulate their creative minds. In a study conducted by Statia Elliot and J.E. Barth, millennials were found to be drawn to packaging that had personality as well as non-traditional imagery along with a minimalistic design style. Referred to as "millennial minimalism," designs that effectively use white space and have clear, bold focal points are preferred by millennials. Bright contrasting colors are also preferred by millennial audiences (Tjarks, 2019).

The millennial generation is seen as the most nostalgic generation group. This has resulted in a growing admiration for design that imitates these nostalgic feelings. Retro style textures, print styles, and hand drawn images have become increasingly popular in design choices for millennials (Martz). Companies such as Coca-Cola and Nintendo have effectively used nostalgia to increase their success amongst their millennial audience (Friedman).

Millennial's Humor

Incorporating humor into a learning experience has also been shown to improve retention on a subject amongst millennials. According to Edutopia.org, humor activates the brain's dopamine reward system, which stimulates goal-oriented motivation and long-term memory. In a poll conducted by Pew Research, it was discovered that its participants retained information much more accurately when information was presented with a humorous twist. Humor also builds a sense of community, lowering the defenses of individuals, making them more open to learning. Judith Y Lee, the editor of *Studies in American Humor*, states that "humor serves as a significant tool to navigate the complexities, trends, and anxieties of American society" (Koltun, 99).

Millennials have a very specific style of humor, often leaving other generations confused. These styles of humor have been influenced from the generation growing up with social media. While conventional humor may include puns, wit, and irony, millennials' style of humor relies on absurdity, universality, and self-depreciation. Famous French philosopher Albert Camus defines the word absurd as "the divorce between the mind that desires and the world that disappoints" (Camus, 17). Millennials are drawn to this type of humor because they grew up in a world that over promised and under delivered (Koltun, 102). They use this style of humor to trivialize the stressful factors that are a part of their lives. *Rick and Morty*, the number one television show for millennials, bases their show off of this style of humor. The use of bizarre and unusual scenarios and imagery keeps their millennial audience engaged.

DANGERS IN ALGORITHMS

In a study conducted by Indiana University Department of Operation and Decision Technologies to conduct the efficiency in which 83 millennial social media users could identify misinformation, results showed that only 17% could detect misinformation consistently. This study also discovered that 73% of users would make better judgement call by flipping a coin (Moravec, et al). This is extremely concerning considering social media's new found role as a news source for millennials, with over 88% of millennials getting their news online. This concern stems from the polarizing algorithms social media uses along with its promotion in an already untrustworthy confirmation bias. Social media sites such as Facebook differ from other media outlets (TV, news, news sites, and mobile phone news apps) because users are not choosing the source of articles they seen on social media. Instead purposefully targeted and curated information is displayed and decided upon by algorithms, the technology used to curate news feeds for individual users. (Moravec et al). When asked about those algorithms Mark Zuckerberg responded saying, "A squirrel dying in your front yard may be more relevant to your interests right now than people dying in Africa" (Poche). Often users of the platform are not even aware that algorithms are being used to curate their feed.

"as people seek out the social settings they prefer...the nation grows more politically segregated, clustering into communities of like-mindedness. This results in a growing intolerance for political differences that has made national consensus impossible...so polarized that election are no longer just contest over politics but bitter choices between ways of life" – Bill Bishop.

When an individual logs on to social media, he or she enters a specific mindset called a hedonistic mindset. Hedonistic mindset is used when individuals are

engaged in the pursuit of pleasure and self-indulgence. This is opposite of the mindset of an individual when reading or watching the news from a traditional news source. This mindset is called a utilitarian mindset, wanting to find information in order to make a decision. When news and social media are mixed, and individuals begin to read and find news information on social media platforms, they stay in a hedonistic mindset. Individuals begin to search and process information that gives them that sense of pleasure and self-indulgence (Moravec et al). Social media knows that its users are on its platform in a hedonistic mindset; therefore, they fine tune their algorithms to fit this "desire." Facebook has given a disproportionate weight to clicks, likes, and shares. The more likes, shares, and engagement a post has, the more likely it will begin to appear at the top of a feed. Facebook begins to pay attention to its users' preferences of information, taking into account the type of information they interact with the most. The "like" buttons that are incorporated into social media sites are one of the top ways algorithms can begin to filter content. These like buttons are enticing for the users to click. As mentioned above, when a user finds information that reaffirms a belief or matches ideals that they align with, their brains get a rush of dopamine. The same is true when they click the "like" button. As they click the button a rush of dopamine is released in their brain, triggering the reward system. This encourages them to continue to click those buttons whenever they come across a post that aligns with their beliefs. In return, algorithms begin to curate the users news feed to maximize engagement, so it begins to show more and more of that type of information. Eventually, people are then able to unintentionally "filter out" information that they do not want to see nor agree with almost subconsciously. This is dangerous as this type of behavior, encouraged by the algorithm, begins to reinforce confirmation bias when processing information. Individuals then begin to become very polarized in their views.

Facebook Whistleblower

On October 5, 2021 a former employee of the social

media site Facebook took to the US Senate to testify against the company, claiming that the platform is misleading the public on its efforts against misinformation. Frances Haugen, more famously known as the Facebook Whistleblower, claimed that Facebook's own research showed that the site not only amplified hate speech and aided in the spread of misinformation, but chose to purposefully hide it. What set her claims apart from being just another "angry ex-employee" were the thousands of documents and research she took from Facebook's headquarters when she left in May of 2021 (Whistleblower: Facebook is Misleading the Public).

Haugen, a graduate from Harvard's computer engineering school, worked at tech companies for 15 years including those such as Google and Pinterest. However, Haugen claims what she saw inside the Facebook headquarters was unlike anything she had seen before. "The thing I saw at Facebook over and over again was there were conflicts of interest between what was good for the public and what was good for Facebook. And Facebook, over and over again, chose to optimize for its own interests, like making more money" (Whistleblower: Facebook is Misleading the Public).

Haugen, who was recruited to work for Facebook in 2019, was a part of the Civil Integrity team. This team was designated to work against the spread of misinformation, a topic close to Haugen's heart due to the death of a close friend over the belief in a conspiracy theory. What she believed would be a long career within this team was cut short soon after the 2020 presidential election. Haugen believed that Facebook only pretended to care about the spread of misinformation and hate speech in order to prevent riots during the election, then once it was over, decided to go back to the old algorithm. "And as soon as the election was over, they turned them back off or they changed the settings back to what they were before, to prioritize growth over safety," Haugen stated. The root of Facebook's problem, Haugen believed, was the algorithm – the program that was deciding what posts to show its users.

"And one of the consequences of how Facebook is

picking out that content today is it is – optimizing for content that gets engagement, or reaction. But its own research is showing that content that is hateful, that is divisive, that is polarizing, [that it is full of misinformation] it's easier to inspire people to anger than it is to other emotions" (Whistleblower: Facebook is Misleading the Public).

The documents that Haugen copied and took also claim that Facebook knows if it changes its algorithm to eliminate misinformation, people will spend less time on the platform, which would then result in less clicks on ad and cause Facebook to make less money. Because misinformation and emotionally sparked content are highly prioritized within the algorithm, Haugen knows that this could begin to influence social and political climates across the globe. In a 2019 internal report Haugen obtained, it shows that lawmakers in European countries are having to take more extreme policy positions because of how the algorithms portray communication. While Haugen understands that no one working at Facebook is evil, she believes incentives have caused their views to be misaligned. Given the new position Facebook has as a news source, Haugen plans to continue the fight against Facebook's algorithms to make it a safer place for all users.

Filter Bubbles

Filter bubbles are a result of social media's algorithms. The algorithms that social media sites such as Facebook use are intended to help customize and personalize an individual's feed. The algorithm is constantly considering what content the user interacts with and feeds the user similar content. However, this results in a place where the user is only presented with information that matches his or her previous consumption behavior. This begins to put users in a "bubble" where they are only seeing like-minded information. Most users of social media are not even aware of the algorithms that have been put into place. With the lack of awareness of these algorithms and filter bubbles they have been placed in, individuals have unknowingly given social media the full ability to control the news they consume. This has be-

gun to create polarization between individuals, not only with politics but lifestyle choices. Media psychologist Dominic Spohr states that “numerous studies have indicated that in a polarized setting the benefit that ought to come with having a variety of opinions is lost to the entitlement of the homogenous groups” (Spohr, 150). This leads to a self-reinforcing social division where individual opinion gives way to group thinking. Individuals have thus lost the ability to proactively discuss information and ideas with a group that has differing opinions. Misinformation that is posted within these filter bubbles will then go unchecked. This is due to the confirmation bias that social media algorithms reinforce. There are numerous different reasons that these filter bubbles reinforce confirmation bias that results in the belief and spread of misinformation.

Claire Wardle explains when individuals use social media, they are performing parts of their identities in order to feel connected: “...to feel connected to others, whether the “others” are a political party, parents who do not vaccinate their children, activists who are concerned about climate change, or those who belong to a certain religion, race or ethnic group” (“Fake News, It’s Complicated”). When individuals begin to become more invested and connected to these “groups” or communities they begin to follow, like, share, and believe the information that is being presented to them from those groups. Because algorithms begin to pick up on the engagement of certain types of information, they begin to show more and more of this type of information until eventually the only “news” and posts an individual see is that which only confirms their beliefs. This then results in a repetition of information. This repetition not only continues to reinforce confirmation bias but the belief and spread of misinformation. By seeing or hearing something more than once, this causes belief in something. Tommy Shane also states that repetition can also make a belief seem more widespread than it actually is, especially in filter bubbles.

DANGERS OF MISINFORMATION

Misinformation has become a part of everyday life for the average American (Greifender et al.). When individuals believe and spread that misinformation, it proposes a direct threat to democracies. In order for democracies to succeed, their population must be educated and well-informed. Therefore, opinions that are formed are made from public interests. “If a majority believes something that is factually incorrect, the misinformation may form the basis for political and societal decisions that run counter to a society’s best interest; if individuals are misinformed, they may likewise make decisions for themselves and their families that are not in their best interest and can have serious consequences” (Lewandowsky, 107). In the United Kingdom in 1988, a study suggested there was a link between the Measles Mumps and Rubella (MMR) vaccine and autism. This generated large amounts of fear in the general public regarding the safety of the vaccine. Many individuals began to opt out of the vaccine completely. It was later discovered that the scientist who “discovered” the “link” failed to disclose a significant conflict of interest, therefore negating his findings. Once further inspected, the scientist was found guilty of misconduct and lying, and he lost his license completely. However, the damage from the spread of false information had already taken its toll. There has been a marked increase in the vaccine-preventable diseases along with an increase in preventable hospitalizations and deaths. The US has seen at least 16 cases of a measles outbreak causing an economic burden of 5.3 million dollars (Ortega-Sanchez, Ismael R., et al).

Along with public safety, misinformation can also affect elections. Both the 2016 US presidential election and UK Brexit referendum were influenced by the spread of misinformation. Leading up to the US presidential election about one in four Americans had come in contact with or visited a website that was claiming misinformation. There was misinformation about the election being shared constantly. On Facebook alone, 115 articles containing false information supporting Trump was shared a total of 30 million times, and 41 pro-Clinton articles containing false information were shared a total of 7.6 million times (Allcot). Some of the most popular false

articles claimed that Pope Francis had endorsed Donald Trump for president, that an FBI agent involved in the release of the Clinton emails was involved in a murder-suicide, and the outcome of the election was being paid off by George Soros (Lyons). All of these articles were proven to be false and misleading yet still became very hot topics, with thousands of people believing them. With all of the popular articles favoring Donald Trump for president, it has been widely believed that they were vital to his victory, whether Trump himself supported the claims or not.

Misinformation and its wide belief and spread propose a threat to society due to its ability to decrease the public trust within each other. Peaceful human interaction and societal prosperity strongly depend on interpersonal trust (Greifeneder)With the division of labor, trade between individuals and countries all rely on the shared beliefs that certain things are true and certain individuals can be relied upon. If someone is found to be lying or a company or country has violated trust, they face serious consequences and backlash. Misinformation has the ability to manipulate the truth and erode society's trust within one another.

ATTEMPTED SOLUTIONS

The belief and spread of misinformation is difficult to correct and stop, hence the reason it is still around today. Once an individual has decided to believe and trust information, it is very difficult to get them to change their minds; therefore, misinformation is very resistant to change (Lewandowsky). President Barak Obama's birth certificate has often been called into question. During his run for president, many sources began to speculate that he was not a legal citizen. This claim was so heavily supported and believed that even when proof was presented that it was false, a majority of the public still held true to their original belief. For decades, Listerine ran a very deceptive advertising campaign for their mouthwash. They claimed, for more than 50 years, that their mouthwash helped prevent and reduce the severity of colds and sore throats. The US Federal Trade Commission then sued Listerine for their deceptive

ad after it was discovered that their claims were false. For 16 months between 1978 and 1980 Listerine began to run 30 second ads retracting their deceptive claims. Even with their 10 million dollar budget, Listerine was only moderately successful in reducing their consumers' belief that Listerine could help with colds and sore throats, as a staggering 42% still believed these claims. Both instances attempted to rely on a retraction of the misinformation that was spread; however, they ultimately failed to completely eradicate the false beliefs.

With the unsuccessfulness of using retraction as a form of stopping misinformation, scientist have attempted to stop the spread of misinformation before an individual consumes it with fact checking. Fact checking is done by using external sources to check claims made in news items. Fact checking can also be done by comparing sources in which the information is located. There are three different variants of this: fact checking by domain experts, crowdsourcing, and knowledge graphs.

Fact checking by domain experts is a method of determining the reliability of a statement when there is perceived risk of misinformation. This style of fact checking was first implemented during the 1988 presidential election, used to monitor the behavior of each candidate. This was called "ad watch" as the fact checking was done real time by professionals. Social media platforms have begun to implement this style of fact checking to discourage users to spread misinformation. Now every article that is considered to be at risk of containing information has a small notification along with it that allows users to know if it has been fact checked or not. Algorithms have also been created in order to go through and cross check sources to determine if the information is false or not. However, both human fact checking and algorithmic fact checking propose their own issues. Algorithms lack human heuristics. Therefore, they can only search for so much. Information that is easily disguised as a "joke" or "meme" will slip past these algorithms, making them less effective (Wardle). Human fact checking most recently has been called into question regarding freedom of speech. Scientists ful or false, deciding the fate of the source completely.

Another reason fact checking has been claimed to be unsuccessful is because of the “worldview backfire effect.” Tommy Shane explains that this is the phenomenon of an individual rejecting a correction because it is incompatible with their worldview. This is often driven by the confirmation biases that individuals have. While flagging news articles as fake may trigger more brain activity, findings from Moravec, Minas, and Dennis find that confirmation bias prevents the correction of misinformation. Many scientists believe that in order to stop the spread of misinformation, the key is simple. They believe that awareness of the cognitive heuristic that causes misbelief could be more effective than any other solution.

RESEARCH METHODS

Research methods are specific ways of collecting and analyzing data. Using these methods serves as a very important part in developing a successful design. There are two different types of ways that data can be collected: qualitative and quantitative. Qualitative research is used to study things that cannot be describe numerically. Quantitative research often involves hypothesis testing. For this thesis, the following qualitative research methods were used to ensure that the proposed visual solution is successful.

MOOD BOARDS

An image board is a collection of pictures, illustrations or brand imagery that is used to visually communicate a description of a target aesthetic, style, audience or context. Essentially this is a broader term for a mood board. This type of additional research is commonly used in the design process that is completed by graphic designers. Image boards allow the designer to stay within the brand or aesthetic, therefore making their visual solution more successful.

This method of research will be helpful in making sure a successful visual solution is created. Because my visual solution is experiential, it will be very important to stay within the brand and design I have created. This will allow for users to fully experience the visual solution. Image boards will allow me to gather visual research that gives me a set base of aesthetics that not only go well with my research, but my target audience as well. The image board will be used constantly throughout the design process to ensure that everything is staying within brand.

VISUAL RESEARCH

Visual research can be composed in a variety of different ways. However for this thesis, the use of visual research pertains to the study of images, forms, and objects in both visual and material culture. When doing this type of research the following questions will be used to guide the research:

- 1. What does the selection depict?*
- 2. Who is the audience?*
- 3. How do people consume the visual solution?*
- 4. How is this project embedded in a wider cultural context?*

5. What is the interrelation between the image, the form, or object, and the accompanying text?

6. Compositional Interpretation

7. Content Analysis

8. Semiotics

9. Iconography

10. What aesthetic choices led to the success or failure of the visual solution.

11. How do the aesthetic choices relate/connect back to your identified problem?

CASE STUDIES

Case studies are very useful in Exploratory Research for understanding existing visual solutions for comparison, information and inspiration. This method of research focuses on gaining details and extensive knowledge about a specific instances or a set of related instances, in this case, advertising campaigns. The details and understanding of the case studies come from analyzing the campaign and understanding the following prompts:

- 1. Define who initiated and is responsible for the project.*
- 2. Identify the motivation of the project.*
- 3. Summarize the project.*
- 4. Identify challenges they faced.*
- 5. Project outcome.*
- 6. Identify and connect relevant elements back to your identified problem.*

SUMMARY OF FINDINGS

To better understand attempted solutions at correcting the spread of misinformation for a millennial audience, case studies on the topic were conducted. Because a experiential exhibit does not exist for this topic, these case studies cover campaigns created to encourage a millennial audience to switch news sources along with encouraging fact checking their sources.

CASE STUDY 1

Read Yourself Better - Wall Street Journal

In November 2019, the Wall Street Journal launched a brand campaign that encouraged viewers to go beyond the misinformation and distraction that social media offers and find quality news sources like the Journal. The title of the campaign was “Read Yourself Better,” which hoped to be a wake up call to their millennial audience. The central theme and message of the campaign was media literacy, hoping to encourage the viewer to sort through the noise and know for themselves what’s good quality information and what’s a distraction. It is here that the Journal makes it clear that it is not a platform issue, but an individual issue, therefore it is up to them to find the truth.

Conclusion:

The most successful piece of this campaign was the commercial. It’s satirical and colorful take on dilemma at hand allowed it to break through the noise and perfectly land the Wall Street Journal’s message. The commercial throws the viewer into an overwhelming, overdramatized world run by social media. It mimics the clutter, misinformation, and other distracting content that the viewer consumes all day. The commercial also pokes fun at Snapchat filters, Emojis, and hashtags, all visuals the target audience is familiar with and have used at some point. This allows the commercial to be relatable to its viewers. While the visuals flash across the screen, an echoing “read yourself better” is said by the narrator as he guides the viewer through the commercial. His tone is whimsical, which keeps the message from coming across as talking down or scolding. This allows the viewer to fully engage with the commercial as if listening to a friend. Even the background music was specifically chosen for the message. The track that plays comes from a 1976 album titled Plantasia that enhances focus. As the commercial comes to an end, the Wall Street Journal places itself as the solution to the

clutter and misinformation. It encourages viewers to come back to traditional print new sources such as themselves to find the most reliable information.

CASE STUDY 2

Read More. Listen More. - New York Times

For World Press Freedom Day, the New York Times did the unthinkable. They asked the most prominent news organizations in the world to come together, putting aside their competitive and ideological differences, to join in a new initiative. The initiative was simple: to support and create a better-informed society. News organizations came together and advertised against themselves, encouraging their own viewers and listeners to read and listen to other news sources. With politicians, organizations, and governments working to manipulate and skew the news to fit their own agenda, the New York Times understood that the news media was being threatened. That, along with people falling into “echo chambers” that confirm their bias, The New York Times knew they had to encourage people to step out of their bubbles and engage with differing points of view. Thus the campaign “Read More. Listen More.” was created.

Conclusion:

Overall the campaign was extremely successful. The campaign drove over 724 million impressions from around the world. Conversations were generated across 87 countries with 81% positive discussions on social media, including support from some of the world’s top journalist. There was also a 361 percent increase in conversation around World Press Freedom Day. The visuals and the message were able to cut across the distractions and inform its viewers about the dangers of echo chambers.

CASE STUDY 3

Factitious - American University

Factitious is an online news game created by the American University Game Lab. The game tests the users ability to discern between real and fake news articles that one would come across on a social media platform. To play, users must swipe left or right after reading specific news articles that flash up on the screen. Swiping right means the user thinks the article is true, while swiping left means the user thinks the article is fake. If the user is unsure, the game provides “hints” at the bottom of the screen that gives the source of the article, to make the decision easier. After each swipe the game gives the user feedback on if their decision was correct or not. It also provides tips on what features of the article could have tipped the user off on if it was fake or not.

Conclusion:

The game falls flat in a few areas. The game cycles through the same articles, giving it limited teaching capability until the creators update the articles. The game also doesn't present the information in a way that the user would come across it on a social media platform, thus the user does not need to fully think as hard. Also, not all stories are true or fake. Some stories and articles have a little bit of truth and fake information mixed in, this includes memes and satire posts. Visually the game is a bit lackluster. The interface runs smoothly, but design wise the website is very simple. The color scheme isn't too overwhelming, not to take away from the information that is being taught. The type is small and a bit difficult to read, making it a tedious task to discern if the article is true or not.



CHAPTER 3

Design Process

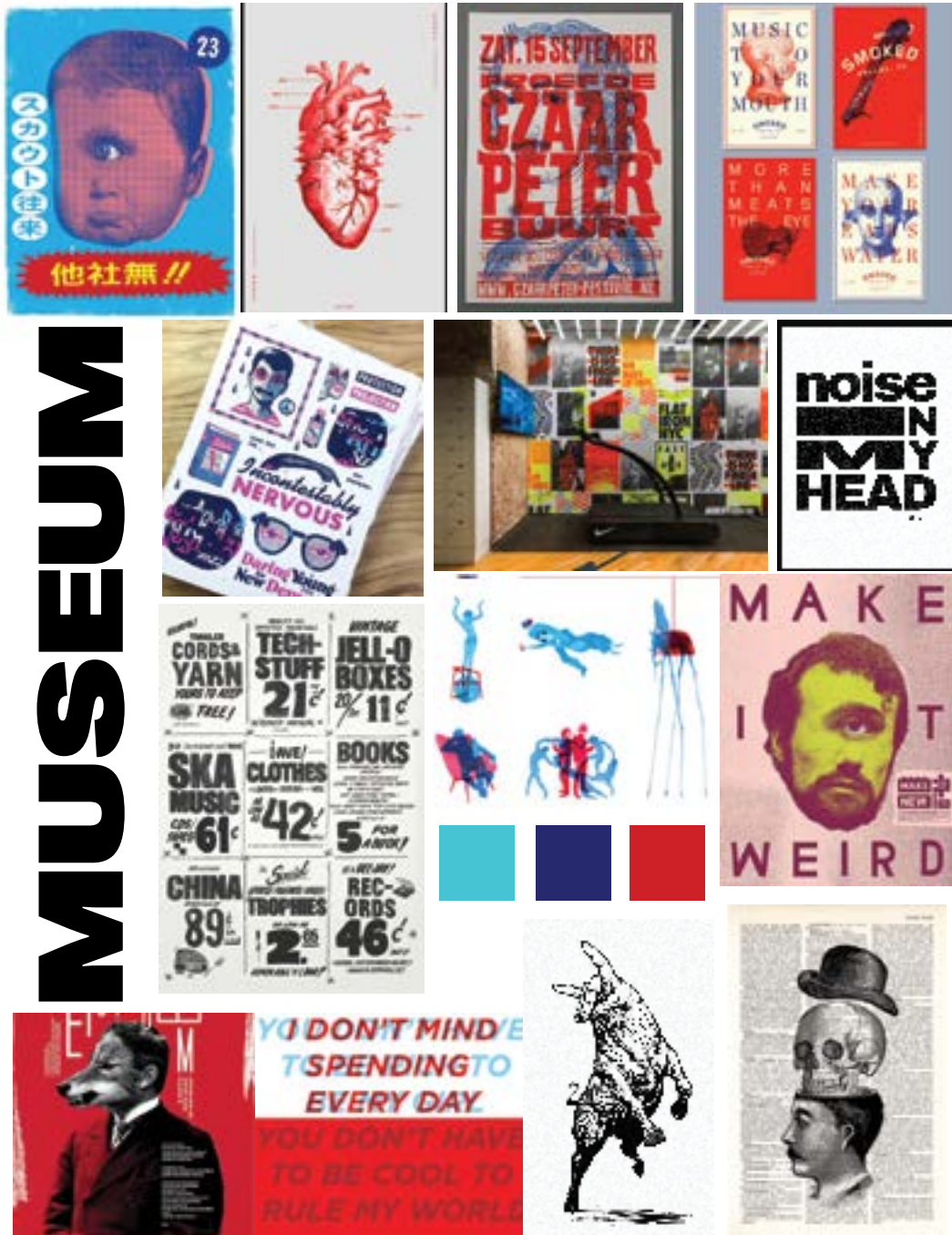
VISUAL SOLUTION

The visual solution of this graduate thesis needed focuses on educating and raising awareness to millennials on how social media's algorithms reinforce confirmation bias which results in a belief and spread of misinformation. To fulfill this need, an interactive exhibit was created. This exhibit was created to include the core information within the topic, while also including plenty of visuals to assist in cognition, understanding, and retention. The use of tactile elements were also included to add an interactive element within the exhibit. This further reinforces understanding and retention, while adding a novel entertainment element.

The interactive exhibit progresses thematically through six sections, each one focusing on a specific subtopic to educate the audience about. Each section provides its own novel element to interact with, keeping the audience engaged, while educating them. Through the use of a consistent high contrast color pallet, vintage textures and type, multiple tactile elements, and humor, the interactive exhibit caters to the educational and entertainment needs of the target millennial audience.

MOOD BOARD

The purpose of a mood board is to help guide the visual direction of a new project. The mood board allows a singular place where all visual research can be collected. This visual research includes typography, textures, color pallets, and photography styles. Every design decision made is checked against the mood board to make sure the project is staying within the consistent style. The mood board for the suggested visual solution of this thesis was made to reflect the design styles that closely reflect the popular styles of the millennial audience. This heavily influenced the composition and imagery styles used in the final solution.



SKETCHES

Sketching is an important part of the design process. Sketching allows quick exploration of various concepts, along with ensuring a successful layout and composition. Each poster created for the exhibit was created through sketching. This allowed a consistent layout and theme to be created for each poster, while giving each one a unique point of interest. Because of the interactive component to each poster, notes were made next to each poster giving further detail into how they would be created. In addition to each poster having an interactive component, certain posters were screen printed by hand. Sketching was used to ensure the success of each layout.

NEVER
BE
WRONG
AGAIN

NEVER
BE
WRONG
AGAIN

TO A WORD
OPEN YOUR EYES
OF ONE SIDE
POSSIBILITIES



WHAT/BE
SEE/NEVER
WANT/AGAIN

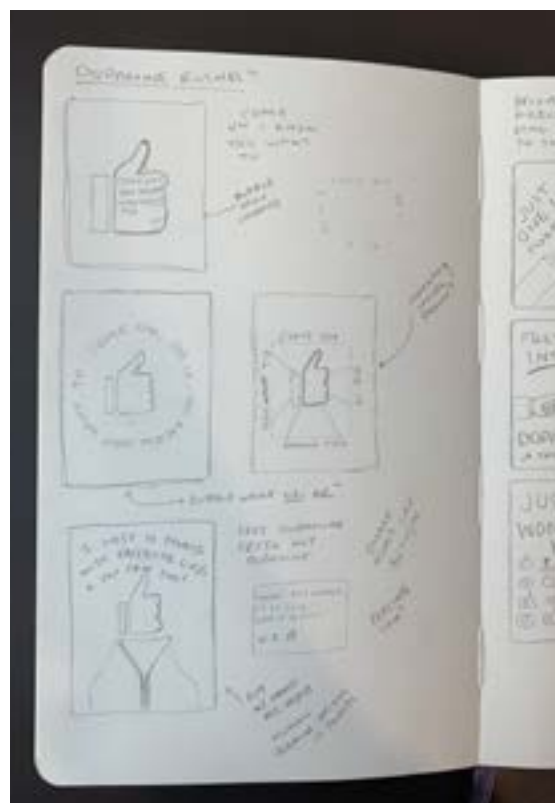
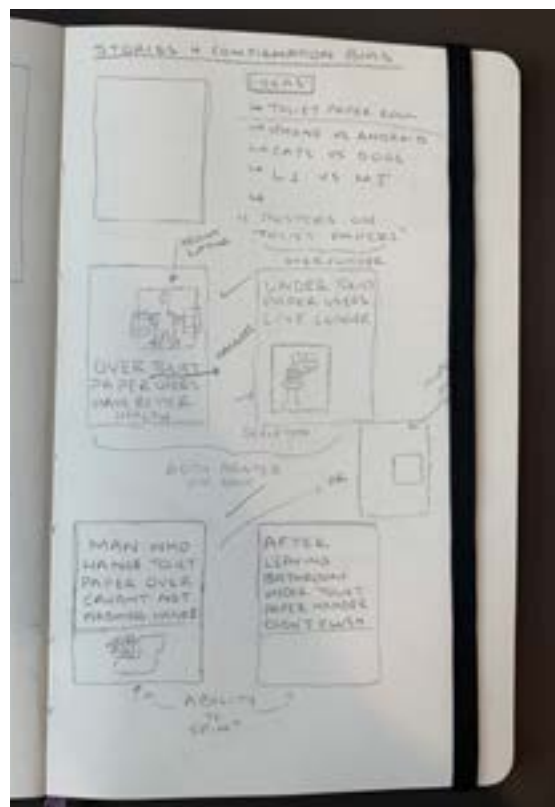
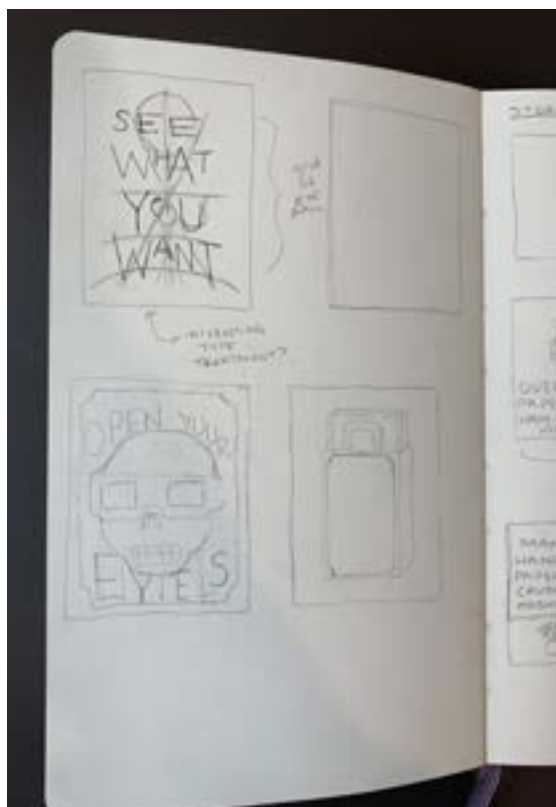


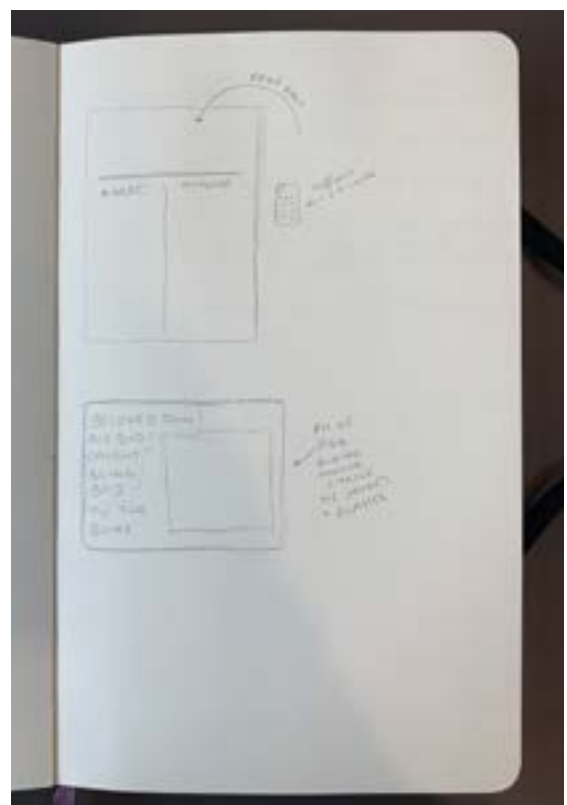
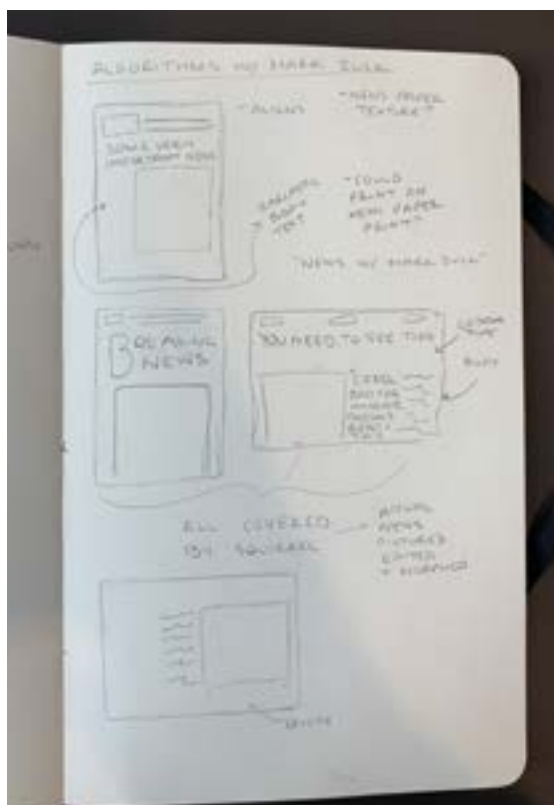
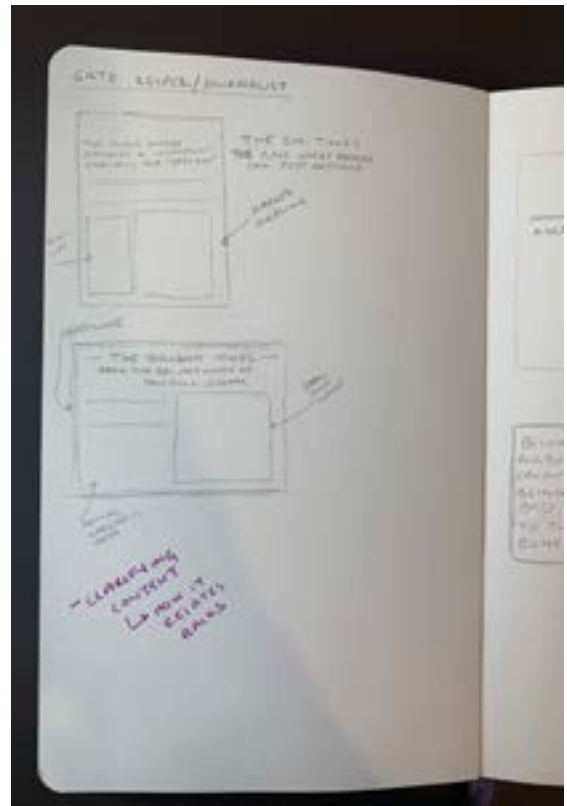
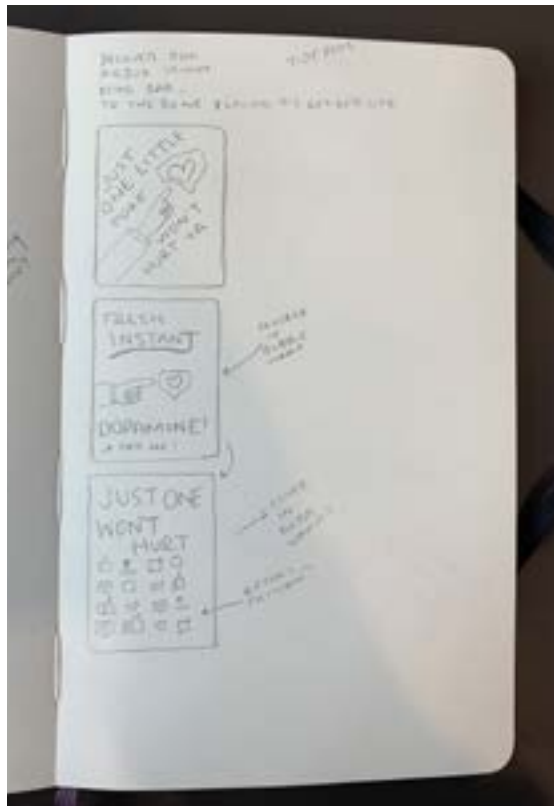
SMALLER
EXAMPLES?
SMALLER TYPE?

SEE
HAT
YOU WANT



NEVER
BE
WRONG
AGAIN





COLOR PALETTE & TEXTURES

The color palette was based on inspiration from the red and cyan colors used in the anaglyph glasses. Research revealed that millennial audiences are drawn to colors with high contrast; therefore, the red and cyan were developed a bit further to increase contrast between them. Because the digital printer was unable to replicate the cyan used within the anaglyph glasses, it was adjusted for digital printing. The cyan was developed further, making it lighter and more saturated giving it a cool tone. This allowed for better contrast against the red when considering visibility and legibility. The goal of the color pallet was also to mimic the feeling between two drastically differing sides of an opinion.

Halftone patterns were applied to the imagery as a texture. A halftone pattern is the effect caused when a dot pattern is overlaid onto an image. This type of effect was very popular in retro printing techniques due to the limited abilities of older printers. Now when used, a halftone pattern creates a retro-looking design. Millennial's attraction and interest in vintage and retro aesthetics influenced the decision for this pattern to be used. Along with a halftone pattern being used, a paper texture was also used to create the illusion of an older, retro design. The paper texture was also used to create the look of an old newspaper style.

COLOR PALLET



CMYK: 15, 100, 100, 6

RGB: 198, 18, 18

HEX: C61212

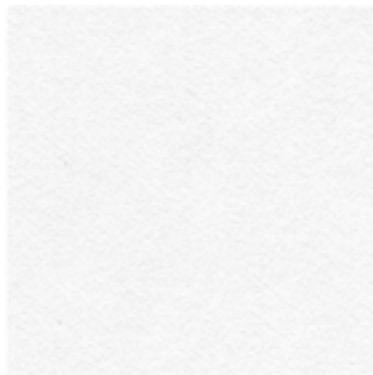


CMYK: 15, 100, 100, 6

RGB: 198, 18, 18

HEX: C61212

TEXTURES



PAPER TEXTURE



HALFTONE

TYPOGRAPHY

The typography for the final deliverables was chosen after extensive research was completed both on the targeted audience and topic being discussed. Typography choices were important due to the posters being used as an educational tool. Legibility and readability were two important factors considered when choosing the final typography used.

The typeface family of Right Grotesk was the primary choice used for the posters. Right Grotesk is a sans serif styled typeface. Within its family it provides a variety of weights, allowing for easy legibility across a variety of sizes. Previous research shows that when a typeface is easier to read information is more likely to be judged as

true. Misinformation is often designed in sans serif styled typefaces; therefore this style was chosen to mimic that deceiving design. Sans serif style typefaces can adapt and take on the style of its surrounding imagery. This was considered when deciding to use Right Grotesk as the primary type choice for the final deliverable. Tuna Heavy was used sparingly. This typeface acted more as a decorative element, adding nice contrast between it and Right Grotesk. Tuna Heavy is a serif style typeface. Because of its old-style design it was used to further drive home the retro feel of the poster designs. Tuna Heavy was also used to create realistic looking headers for newspaper designs.

**RIGHT GROTESK
SPATIAL BLACK**

**RIGHT GROTESK
COMPACT BLACK**

**TUNA
BOLD**

PHOTOGRAPHY & ILLUSTRATION

Research shows that millennials prefer learning when there is less text and more visual elements. Research also shows that millennials retain information when there is a source of visual interest involving photography or illustration. The photography that was chosen for the final deliverables includes old black and white photographs. This, along with the old book illustrations that were used, further duplicates the retro feel that millennials enjoy. To appeal to the millennial's sense of absurdity humor, photo compositions were created using the photography. This included taking obscure pieces from different illustrations and photographs and combining them into a new image. The creation of the new image had ties to the text and topic being

discussed. It also made a more memorable image. The images that were used to create the final photo compositions were public domain from Flickr Commons. To add a sense of consistency, a halftone treatment was applied to each image as well as a color overlay in the specific color palette used for this thesis.



INK MIXING

Like previously stated, in order for the anaglyph poster to work properly, the cyan and red ink used during the printing process, must match the cyan and red lens of the glasses. The color matching process proved to be difficult. Screen printing requires a specific type of ink. The two most common types of ink used in screen printing are plastisol ink and acrylic ink. Plastisol ink offers more vibrant CMYK colors but need a temperature of 320 degrees Fahrenheit to dry. When exposed to the extreme heat temperature, the paper the posters were printed on began to burn and turn a brown color. Therefore, the decision to use acrylic ink was made. Acrylic ink is a water-based ink that air dries. This allowed for a faster turnaround time when printing and did not discolor the paper.

In addition to research what type of ink would work best for the suggested posters, research to find the correct colors was completed. Screen printing artist Emma Zimmerman, who has done a series of anaglyph prints

on fabric, recommended mixing inks to get the correct cyan color. Eight different shades of cyan along with green and yellow ink were purchased to find the correct cyan. The process of mixing ink to achieve the correct shade of cyan proved to be very difficult. After a long trial and error period, no ink mixture correctly worked with the anaglyph glasses. Further research into screen printing ink was done. It was found that water-based paint, when mixed with a special paste, could be substituted for ink. Twelve bottles of water-based paint were purchased and tested with the anaglyph glasses. Out of the twelve bottles of paint, one was found to work successfully. Even though the paint color successfully worked, it came with a cost. Paint, compared to ink, dries much faster on the screen being used to print. This causes the mesh to become clogged and effects the accuracy of the print. The print process was sped up in order to accommodate for this reason, thus resulting in a handful misprints that could not be used.







SCREEN PRINTING PREPARATION

As explained in previous research, millennials have a growing admiration and interest into retro style designs (Martz). They enjoy the nostalgic feel and look of prints that have been designed and printed by hand. Many of the textures they are drawn to are produced through screen printing. Screen printing is a traditional method of printing that involves pressing ink through a stenciled mesh screen to create a printed design (needs citation). This method can be used to print on a variety of surfaces ranging from t-shirts to paper. For this thesis, screen printing was used to print a series of anaglyph posters.

The screen-printing process happens over a set of specific steps that if not carefully followed could result in an unsuccessful print. Cotton Connection, a Lynchburg screen printing shop, was consulted to learn the steps of this process. The owner, HB Atkinson, was extremely helpful in teaching and explaining each step of the screen printing process. He was also very gracious in allowing his dark room to be used for burning the screen as well as cleaning the screen.

To begin the screen printing process, the screen mesh size was chosen. Mesh size effects how detailed the prints will be. The higher the mesh count, the more de-

tailed the image within the print can be. For this set of particular prints, because a halftone pattern was being used, a 330-mesh count was used. A total of 3 screens were used per poster, as each color used within the poster needed its own screen. Each screen was coated with a light sensitive emulsion. Once the emulsion was applied to the screens, they were left in a dark room where it took them 1-2 hours to dry. While the emulsion dried, the artwork that went on each poster was separated into layers based on the color they were to be printed. These separation of layers are called “separations,” or “seps” for short. The seps were then printed on inkjet transparency film in all black ink.

Once the emulsion is dried, the “sep” is then carefully placed on the back of the screen. Each “sep” is measured and placed in the same spot across each screen. The screen was then carefully placed inside an UV exposure unit. After the screen was taken out of the exposure unit, it was rinsed with warm water. The image that was to be printed was then revealed. This process was called “burning.” The screen was then ready to print the image.





SCREEN PRINTING

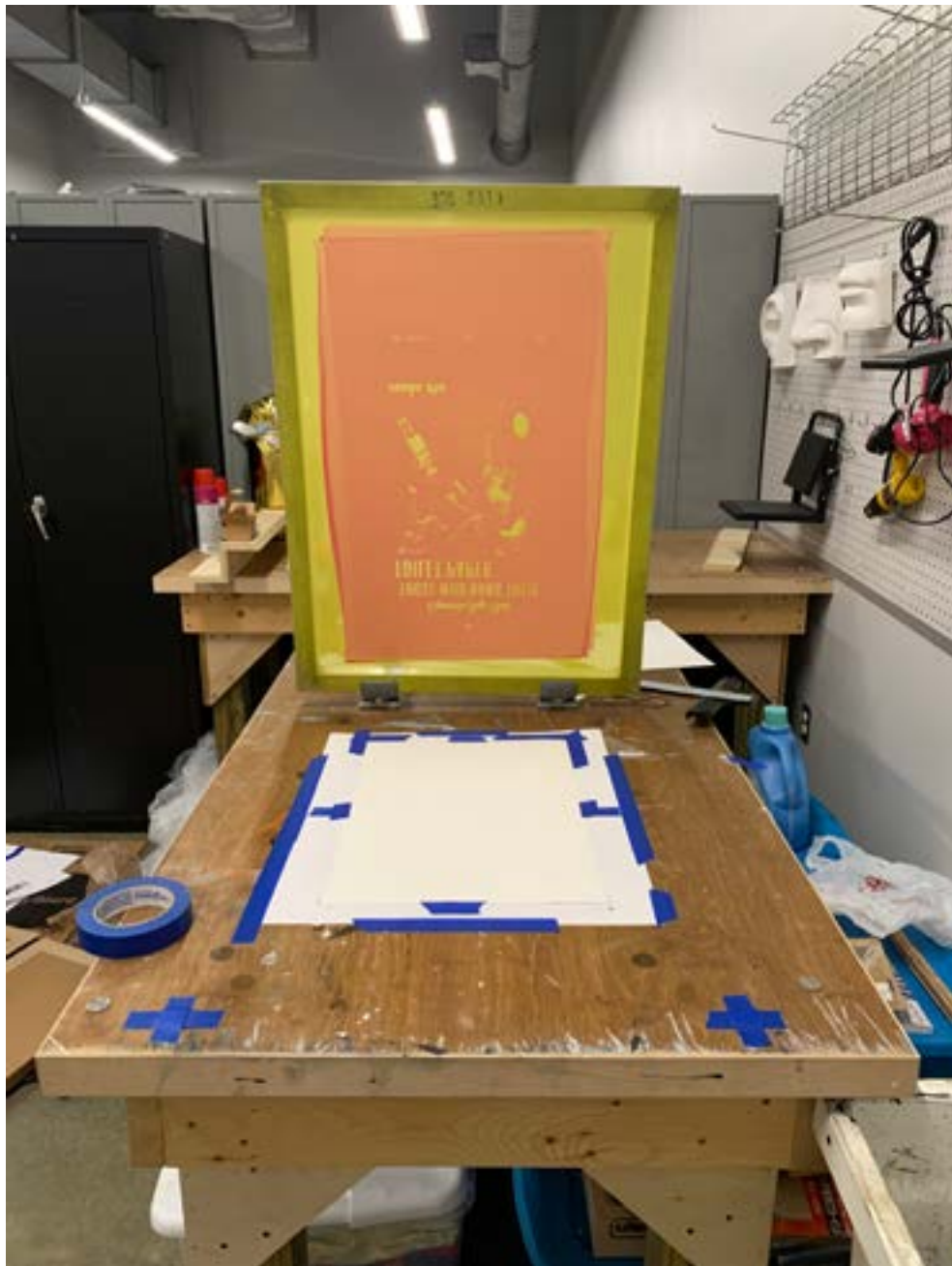
A press for the screens to sit in was constructed using metal clamps and a wooden table. The metal clamps were aligned to fit the screen, allowing for proper space to print. By drilling holes into the wooden table, the clamps were secured in place. Painters tape was used to outline the space where the paper would be secured beneath the screen. Paper tabs were used to secure the paper in place, assuring that the paper would not move causing a double print. Before the ink was poured onto the screen, papers tape was used to tape the exposed edges of the screen. This process was completed for each screen used. Once the screen was in place, a test print was completed to correctly align the image in the center of the paper.

For the prints to successfully function as an anaglyph, the colors needed to be printed in a specific order. Black was the easiest and largest layer to print; therefore, it was printed first. The cyan layer was printed second due to transparency issues. Paint is less transparent than

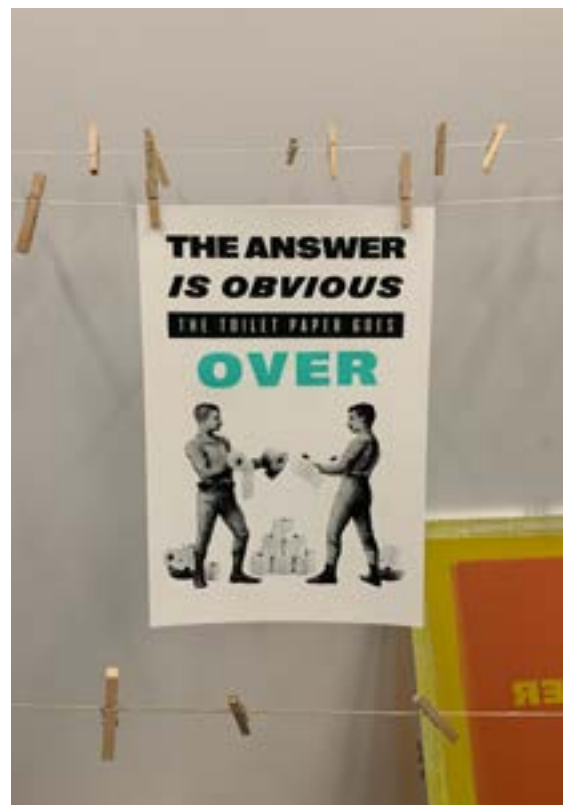
screen printing ink, so it needed to be on the bottom layer. The red ink was the last layer to be printed. A mixture was created between the red ink and a transparent base mixture to aid in increasing its opacity. Because of the high amounts of this mixture being used, it began to alter the consistency of the ink, making it difficult to pull successful prints.

A total of ten prints each were pulled for each poster design. This allowed room for error when printing. In between printing layers, the prints were laid out to dry, while the screen was cleaned. The screens needed to be pre-cleaned quickly after each layer was finished. If left too long with the ink on the screen, the screens would become useless, as ink would dry within the mesh. The pre-cleaning proved to be difficult given the small sink that was used along with the lack of water pressure.

After each print was officially finished, the screens were then taken back to Cotton Connection to be reclaimed.







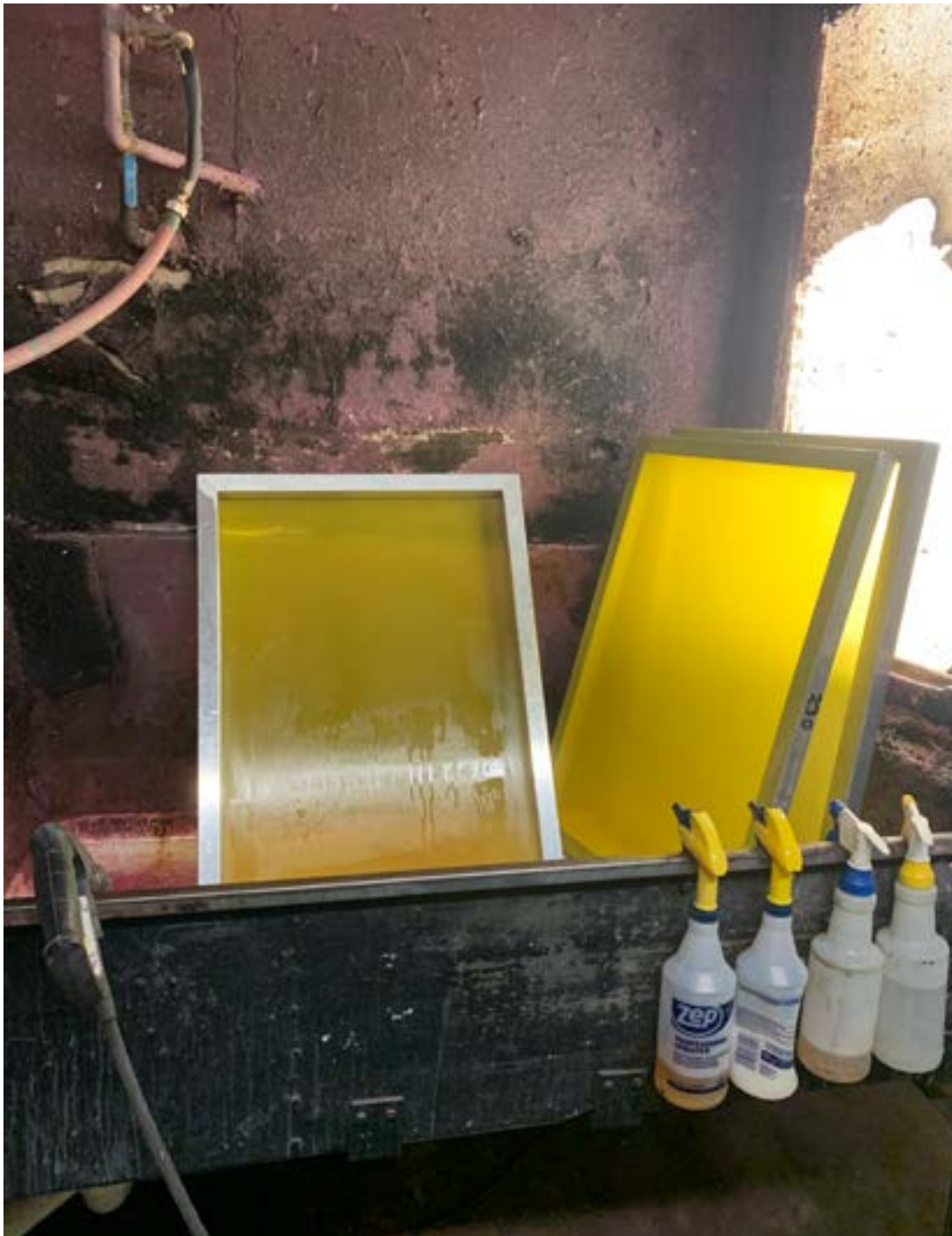
RECLAIMING PROCESS

When a screen has been used to print, but is no longer needed, it goes through a reclaiming process that allows it to be used for future prints. The reclaiming process is a four-step process that if not done correctly could ruin a screen and render it useless. To begin, the excess ink that may have been left on the screen is removed using a small amount of high concentrated soap. Once the soap has been rinsed, and the screen is clean of any left-over ink, the second step can begin. The second step involves removing the emulsion on the screen. The remover is called “strip-e-doo” by Franmar. This chemical breaks down the emulsion, allowing it to be rinsed off using a pressure washer. After the emulsion has been cleaned off the sink, a dehazer is applied to the screen. The dehazing process is used to remove any “ghosting,” a leftover outline of the design that was printed. The product used in the dehazing process is called “D-Haze” by Franmar. This chemical is extremely dangerous when exposed to skin and inhaled; therefore, protective gear such as gloves and a mask were used

when completing this step. The final step completed in the reclaiming process was the degreasing of the screen. The degreasing stage rids the screen of any left-over debris and allows the screen to properly dry. Once the four step process was complete, the screens were placed in front of a fan to dry. The screens were then used again to complete other posters.



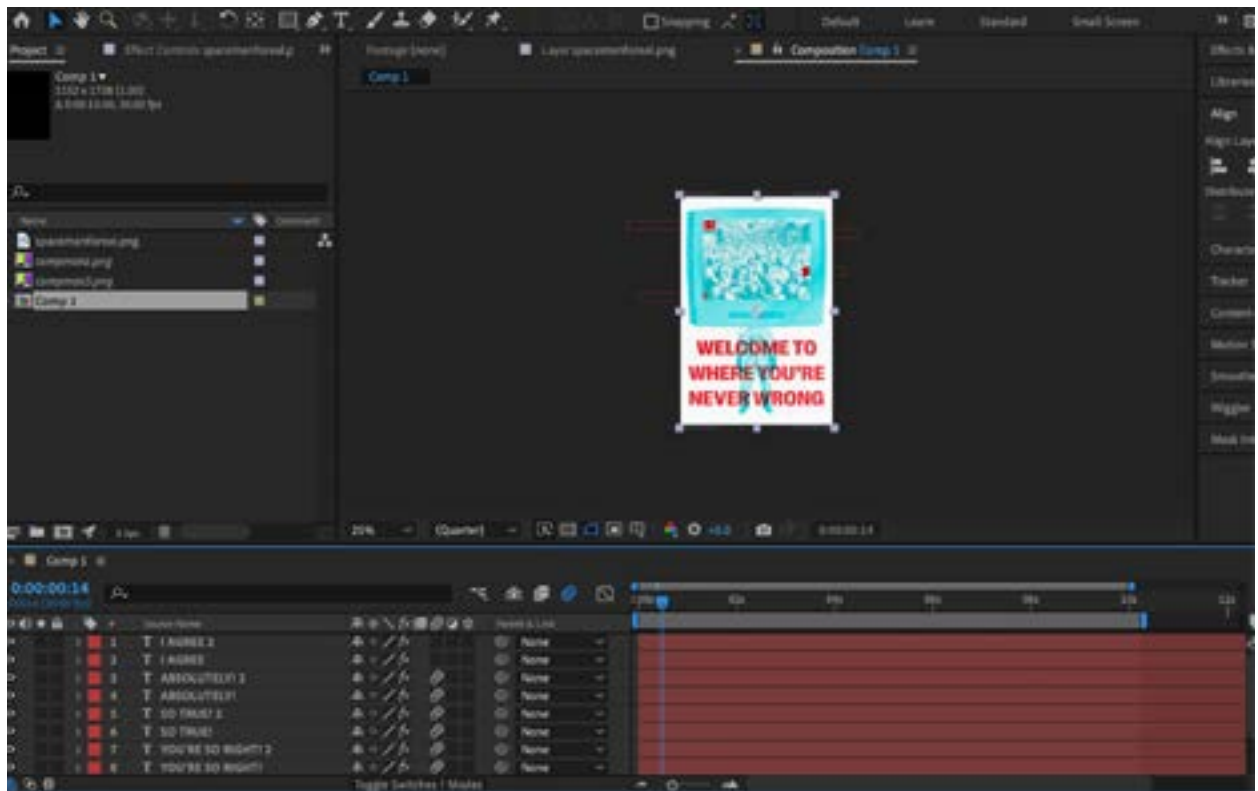




AUGMENTED REALITY

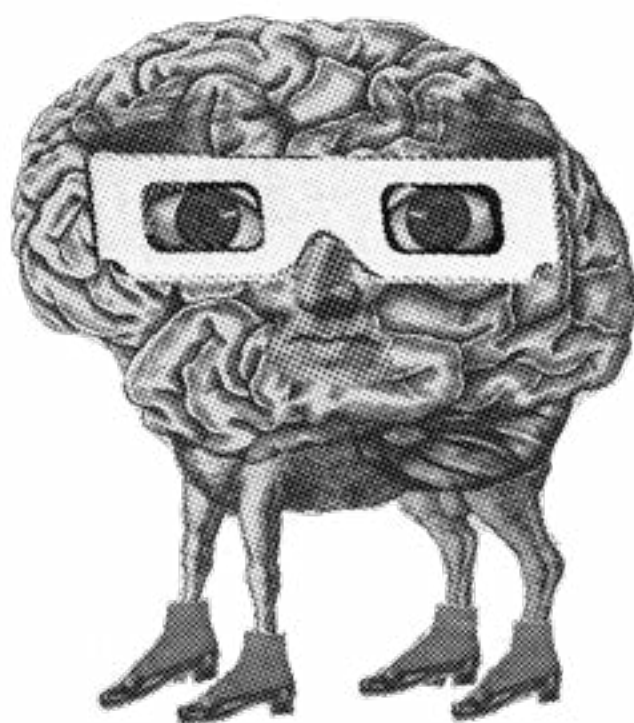
Millennials have grown up using technology in both their social and educational lives. Millennials are constantly looking for new ways technology can function and create experiences. In previous research completed on millennials' retention abilities, it was found that when incorporating new, exciting technology, they are much more likely to be engaged and open to learning. A series of posters were created through this research using AR, augmented reality. Augmented reality has become one of the biggest technology advances in the last several years thanks to the accessibility that smart phones have caused (Franklin Institute). Augmented reality, "AR" for short, allows the user to see a real-life environment in front of them, with a digital augmentation layer on top of it. This is achieved through the use of a smartphone camera and special apps. Augmented reality provides an interactive component, allowing

millennials to interact with artwork, thus improving retention. The augmented reality used helps incorporate a visual to the topic being explained. The app that was used to create the augmented reality posters is called Artivive. The base design of the poster was created using Photoshop, while the motion was created in After Effects.



TACTILE ELEMENTS

Millennials are drawn to experiences that involve tactile elements. Tactile elements are those that are designed to be perceived by touch. Because these elements also increase understanding and retention within a subject, they were incorporated into the visual solution. The tactile elements were combined with the designed posters to make an interactive poster. The different tactile elements that were used include bubble wrap, plexiglass, anaglyph glasses, and posters that are moved to reveal their purpose. Along with increasing understanding about the topic being discussed, the tactile elements were used to add an entertainment element.



CHAPTER 4

Defense of Work

FINAL DELIVERABLES

MUSEUM OF MISINFORMATION

The name of the interactive exhibit was important to set the stage for the information that was to be portrayed within it. Too uninteresting of a name could cause the target audience to lose interest in the exhibit and too conceptual of a name could cause the target audience to be confused about the exhibit.

The name “Museum of Misinformation” was chosen because of the novelty and humor it possessed. Millennials, the target audience, are drawn to experiences that use both of those tactics. The name also plays from the common knowledge of what museums are and what they hold in them. Museums are places where objects of historical, scientific, and artistic importance are stored. “Museum of Misinformation” is a contradiction of this, housing objects that are full of misinformation. The alliteration of the name also makes it catchy, making it easy to remember.



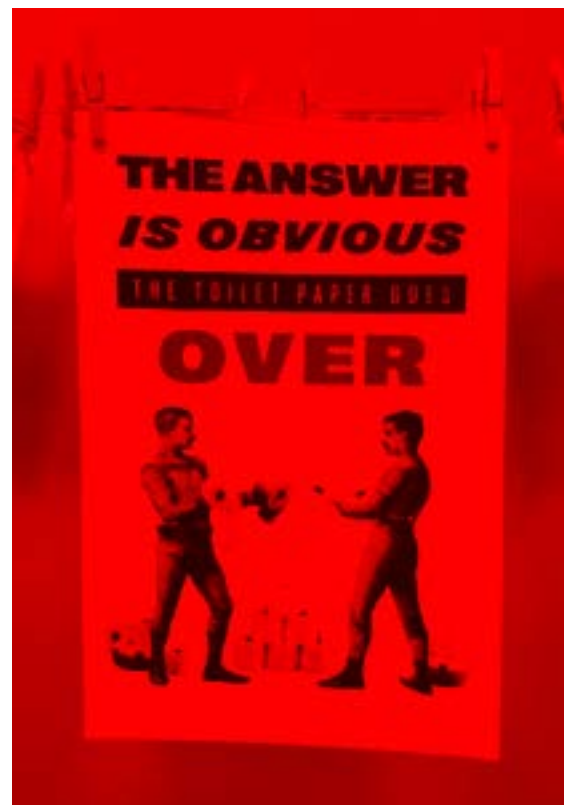
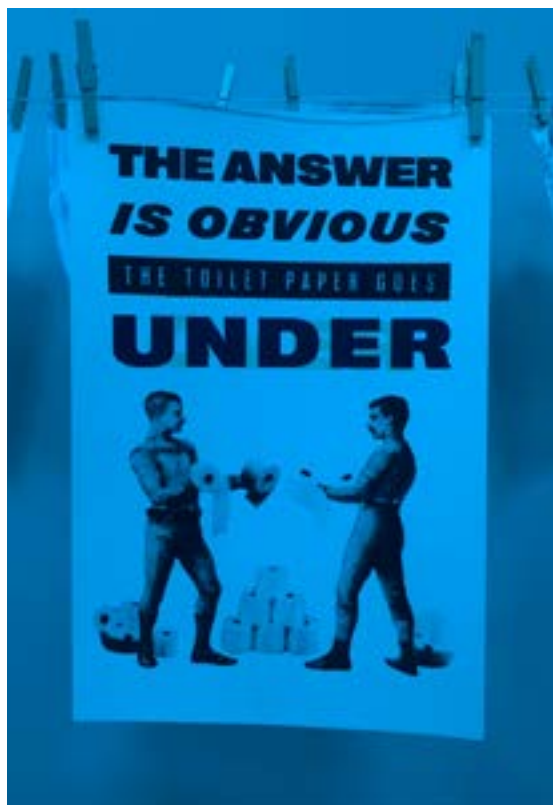
CONFIRMATION BIAS

Confirmation bias is one of the core reasons that misinformation is spread so effectively on social media platforms by the millennial target audience. Because this topic can be hard to understand, a series of posters were created to visually explain this phenomenon. Millennials are visual and interactive learners, therefore the poster was designed using an anaglyph technique. This technique allows the viewer to interact with the artwork, increasing understanding and retention of the subject. The anaglyph technique also visually demonstrates how confirmation bias works. As explained in earlier research, an anaglyph is when two specific layers, designed in two separate colors are placed on top of each other. Depending on which lens of a special set of glasses is chosen to look through, a layer will reveal itself becoming prominent, while the other disappears. That is very similar to how confirmation bias works, as it is the act picking out and believing information that only affirms a specific belief set, while the opposing information “disappears” or gets ignored. Before the viewer looks at the posters, they are encouraged to pick a side, either cyan or red. Depending upon the choice they have made, they will only be able to see the information that affirms that side, just like the phenomenon of confirmation bias.

The visuals used on each poster revolve around the decision of which way toilet paper should be hung on a roll, either over or under. This is a very popular humorous debate. This visual and topic were chosen because of the benefits that humor has on learning and retention within the millennial audience. Because the topic is light-hearted and humorous it allows for the viewer to put their guard down, allowing them to be more open to learning and understanding the topic. While they are still encouraged to pick a side, the audience does not feel attacked for their specific viewpoints. Because millennials have an attraction to retro and vintage aesthetics, a halftone pattern was applied to the imagery for these posters.







ALGORITHMS

To introduce the concept of algorithms and how they aid in encouraging confirmation bias along with the spread of misinformation, a poster series was designed based on a famous quote from Facebook CEO Mark Zuckerberg. When asked about his use of algorithms to curate his user's news feeds Zuckerberg famously said, "A squirrel dying in your front yard may be more relevant to you than someone dying in Africa." To set the stage for the poster series within this section, a poster was designed with the previously mentioned quote on it. This specific poster was positioned in front of the rest, ensuring that viewers were given context and a connection as to what the poster series was displaying and educating them on. The typography choices for the poster featured 3 different typefaces, giving it visual emphasis and interest. The contrast between the typefaces was used to break up the quote, making it easier to read and comprehend for the millennial audience. Imagery of a laptop and squirrels with their heads replaced with Mark Zuckerberg's head on the laptop screen were chosen to be used on this poster. The imagery helped connect the quote with who said it along with creating a visual to help the viewer visualize the absurdity of the quote. It also connected millennial's use of their laptops and social media as their news source. The imagery was given a color treatment from the color palette, giving it a consistent look as the rest of the visuals within the experience. A halftone pattern was applied to the visuals to recreate the vintage feel that attracts the millennial audience.

The posters that followed the Mark Zuckerberg quote poster were designed as if they were breaking news stories on the front page of a newspaper. Squirrels were purposefully printed overtop of the breaking news type and design. This prevented the viewers from being able to read and see what the news story was saying. This was done to provide context and give a visual example Mark Zuckerberg's quote. The viewer is attempting to read the news but are unable to because the squirrel is blocking their view, this correlates to how the target audience is using the platform for news, but the algorithm instead feeds them what it decides is important to them, news related or not.

Because millennials find visual interest in vintage objects, the decision to make the poster series in the format of an old newspaper was made. Because newspapers are a well-known source to find news articles, the connection behind the message of the posters and the visuals were easier to make for viewers. The news stories that are written on each poster involve a humorous approach on popular conspiracy theories, this allowed for maximum millennial interest and engagement within each poster.

A SQUIRREL DYING IN YOUR
**FRONT
YARD** *may
be*



MORE RELEVANT TO YOUR INTERESTS

than people dying in Africa

EXTRA

THE ZUCK TIMES

EXTRA

VERY IMPORTANT NEWS YOU NEED TO KNOW

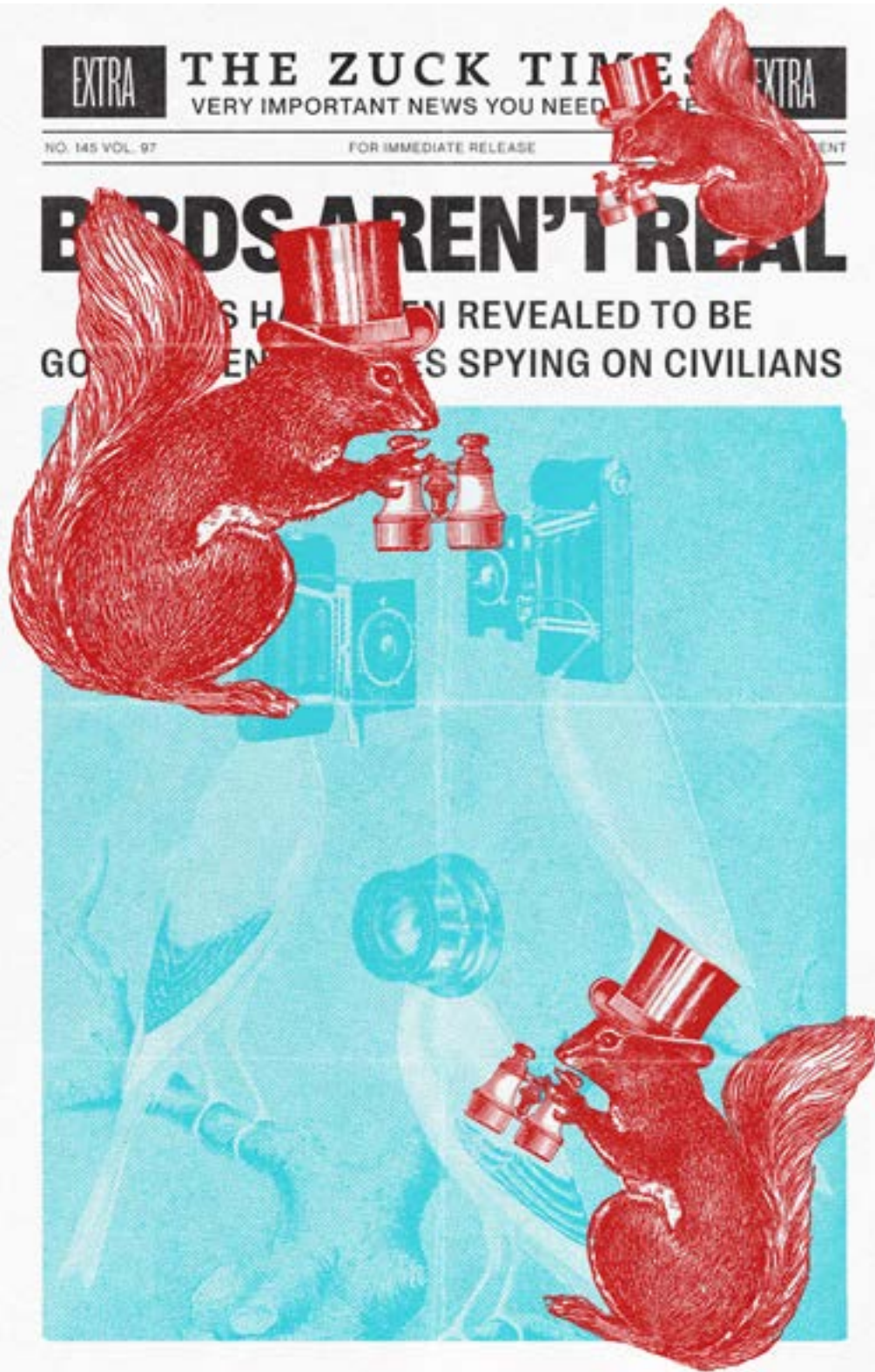
NO. 145 VOL. 97

FOR IMMEDIATE RELEASE

ENT

BIRDS AREN'T REAL

GOVERNMENT HAS BEEN REVEALED TO BE
GOVERNMENT IS SPYING ON CIVILIANS





JOURNALIST

Social Media has allowed every user to become a self-proclaimed journalist. The platform is designed to let anyone post anything, regardless if it is backed by fact or not. When posting on social media, the need for proper credentials when claiming to have knowledge on a subject or creating a news story is no longer essential. Because social media has become a prominent news source for the targeted millennial audience, as previous research shows, they begin to read these unverified posts and claims as actual news. To help educate the millennial audience on how social media allows everyone to be a journalist, regardless of if their posts are based on fact, an interactive series of three posters were created. Using a newspaper style template, plexiglass, and dry erase markers a space was created that gave the audience the power and ability to create their own front page news story, placing them in the position of a journalist who has no proper credentials. Whatever story the viewer decided to create and draw on the plexiglass poster, was then left for other viewers to see or until another viewer came along and created their own story. This created the connection that anyone could come and create any news story they wanted, just like on social media.

To further draw the connection that social media allows anyone to be a journalist, additional permanent articles were created and designed on the poster template as well. The additional news articles that were designed followed the same format that a post on social media would, bringing in the social media connection. The information that was used to create these stories were taken from popular conspiracy theories that people have spread on social media. A humorous approach was used to create the so-called author of the stories, incorporating common cliches of who is often associated

with making such outlandish claims. Other humorous approaches that also aided in making the connection back to social media encouraging this behavior include the verbiage used when creating the newspaper style template. The name given to the made-up newspaper is “The Museum of Misinformation Post,” this gives connection not only to the exhibit, but that the stories written and created for this newspaper are purposefully filled with misinformation. The tagline for the newspaper is “the place where everyone is a journalist” connecting back to the fact that social media allows everyone to also be a self-proclaimed journalist.

The newspaper style template was designed to incorporate a vintage feel, attracting the target millennial audience. A paper texture, along with a distressed texture was also used to further enhance the vintage feel. The use of plexiglass gave the poster an interactive element. Plexiglass has the capability to be used as a dry erase board, it can be drawn on with special markers and erased multiple times while maintaining its transparency. This allowed the plexiglass to be placed over top of the posters, giving the posters the ability to be drawn on multiple times. The use of an interactive element was used to create an environment that both entertained and educated. As previous research shows, millennials thrive in these types of environments.

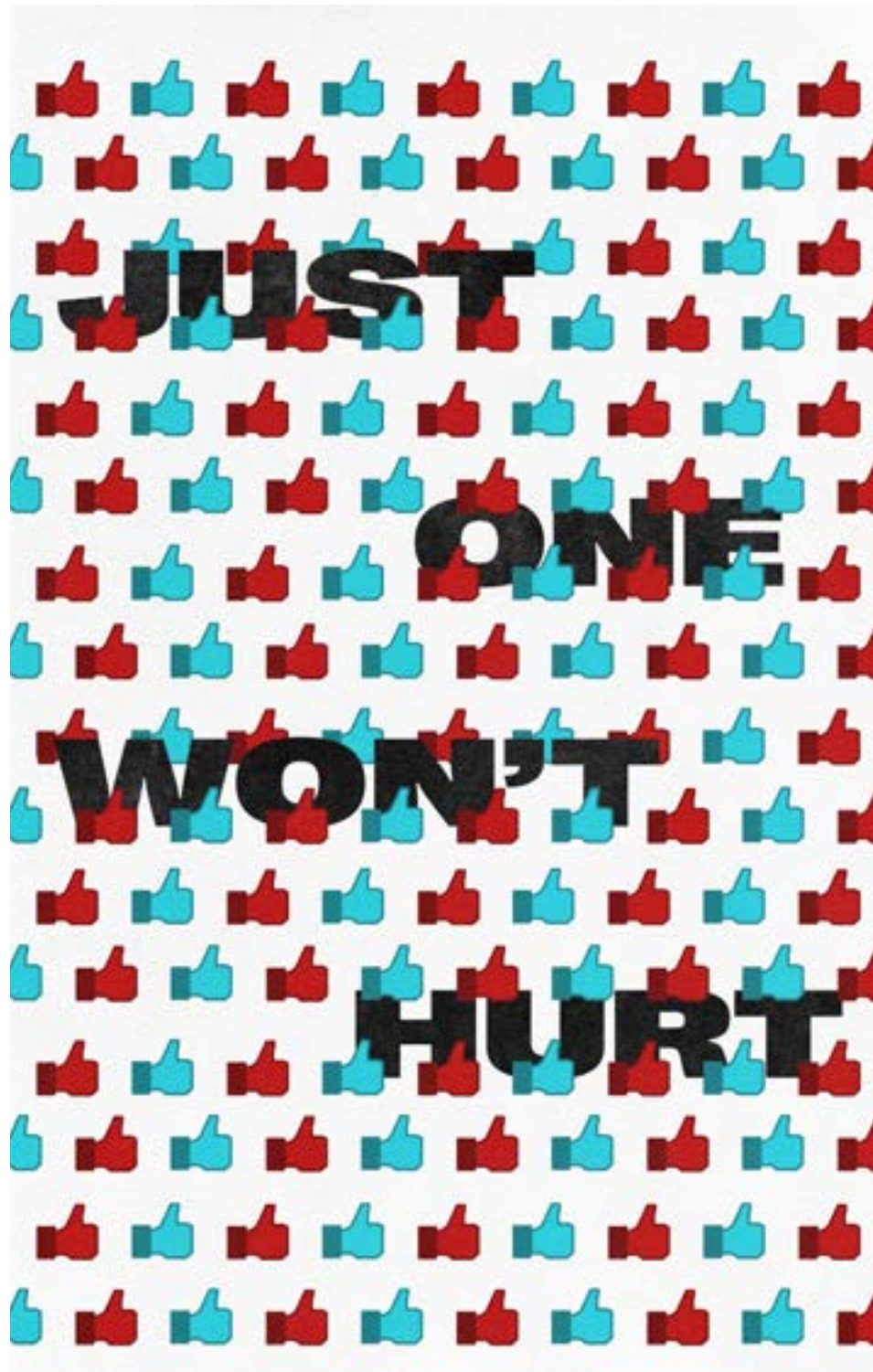






LIKE BUTTONS AND ECHO CHAMBERS

Many social media sites have incorporated a “like button” into their interface. The “like button” is a button that a user can click or push when they agree with, or like something another user has posted. As previous research mentions, when users are clicking those buttons, their brain is getting a rush of dopamine, making them feel pleasure and satisfaction, which encourage them to continue that behavior. While this behavior seems innocent, the previously mentioned algorithm begins curating their news feed to only show content that will warrant the user to click more “like” buttons. This begins to result in a user’s news feeds becoming echo chambers/filter bubbles. These echo chambers and filter bubbles are places where users only encounter posts and information that conform and reaffirm their own beliefs. This begins to reinforce the user’s confirmation bias, resulting in a spread of misinformation. A series of four interactive posters were created to illustrate and educate this complex topic to the target audience. The four posters were placed in a thematic order creating the connection that using the “like” button results in begin unintentionally placed in a filter bubble or echo chamber.

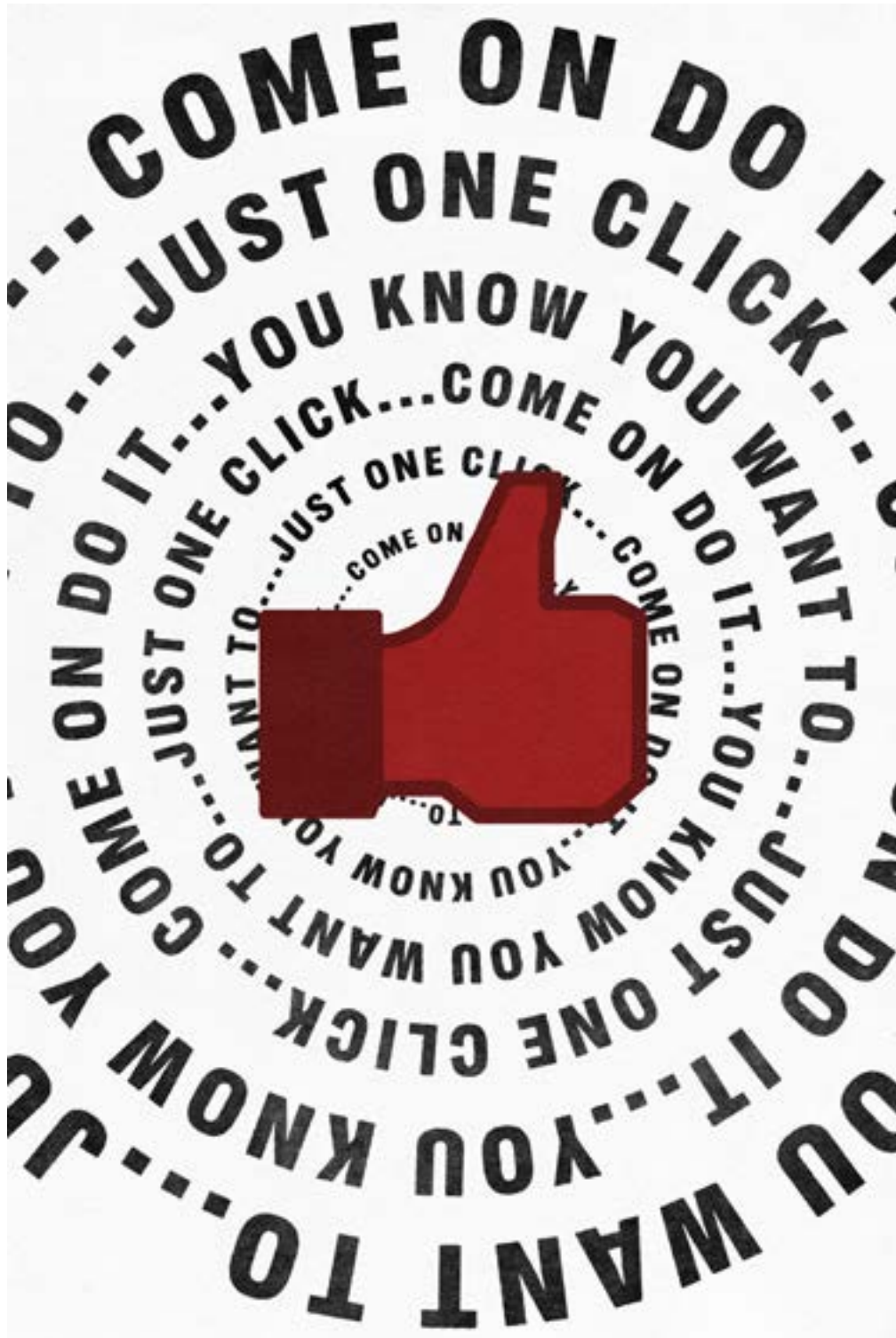


Bubble wrap was used to create a poster that illustrates the small dopamine rush that occurs when the user clicks a “like” button. Bubble wrap was specifically chosen to help illustrate this topic because research shows that popping bubble wrap also releases small amounts of dopamine to the brain, resulting in an increased desire to continue the behavior (Why Do People Like Bubble Wrap So Much?). The bubble wrap, because of its transparent properties, allowed it to be placed over top of a designed poster. To connect the viewer to the topic of social media “likes”, the poster used small icons that resembled the “like” buttons found on social media platforms. The icons were given a color treatment that matched the chosen color pallet, this allowed for a cohesive look throughout the entire exhibit. Each icon was placed on a 12 x 18 sheet of paper so that when the bubble wrap was placed over top of it, it would look as if a “like” button was sitting within each bubble. Therefore, when the viewer pops one of the bubbles, it also acts as if they were clicking the “like” button, making the connection between the “like” buttons and the small

rushes of dopamine they get when they click them. The message “just one won’t hurt” were designed and placed throughout the icon pattern. A distressed texture was applied, giving it a cohesive look with the rest of the exhibit along with matching the aesthetic preference of the targeted audience. The phrase “just one won’t hurt” creates an eerie, mysterious feeling inviting the viewer to interact with the poster. An interactive element was used to capture the targeted audiences’ attention and provide them with an experience that increases their learning and retention rates.



The second poster in the series was created using Augmented Reality technology, AR for short. The same “like” icon that was used in the previous was also used in this poster, maintaining the connection to social media “likes”. The icon was placed in the center of the poster surrounded by text. The text, designed in the shape of spiral, says “come on do it, just one click won’t hurt you, just one click”. This was used to create the feeling of temptation, relating to how the brain is constantly tempted to click like buttons to achieve those small rushes of dopamine. An AR effect was used to give the poster motion when viewed through a cell-phone camera. The motion that was applied to the poster, gives the poster a hypnotic effect. The words move in a spiral motion while the icon gently gets bigger and smaller. The hypnotic effect creates a feeling of temptation that connects to the same feeling when making the decision to click the “like” button. The decision to use AR technology was made because previous research shows that millennials become more engaged in a topic when technology is used in interesting ways.



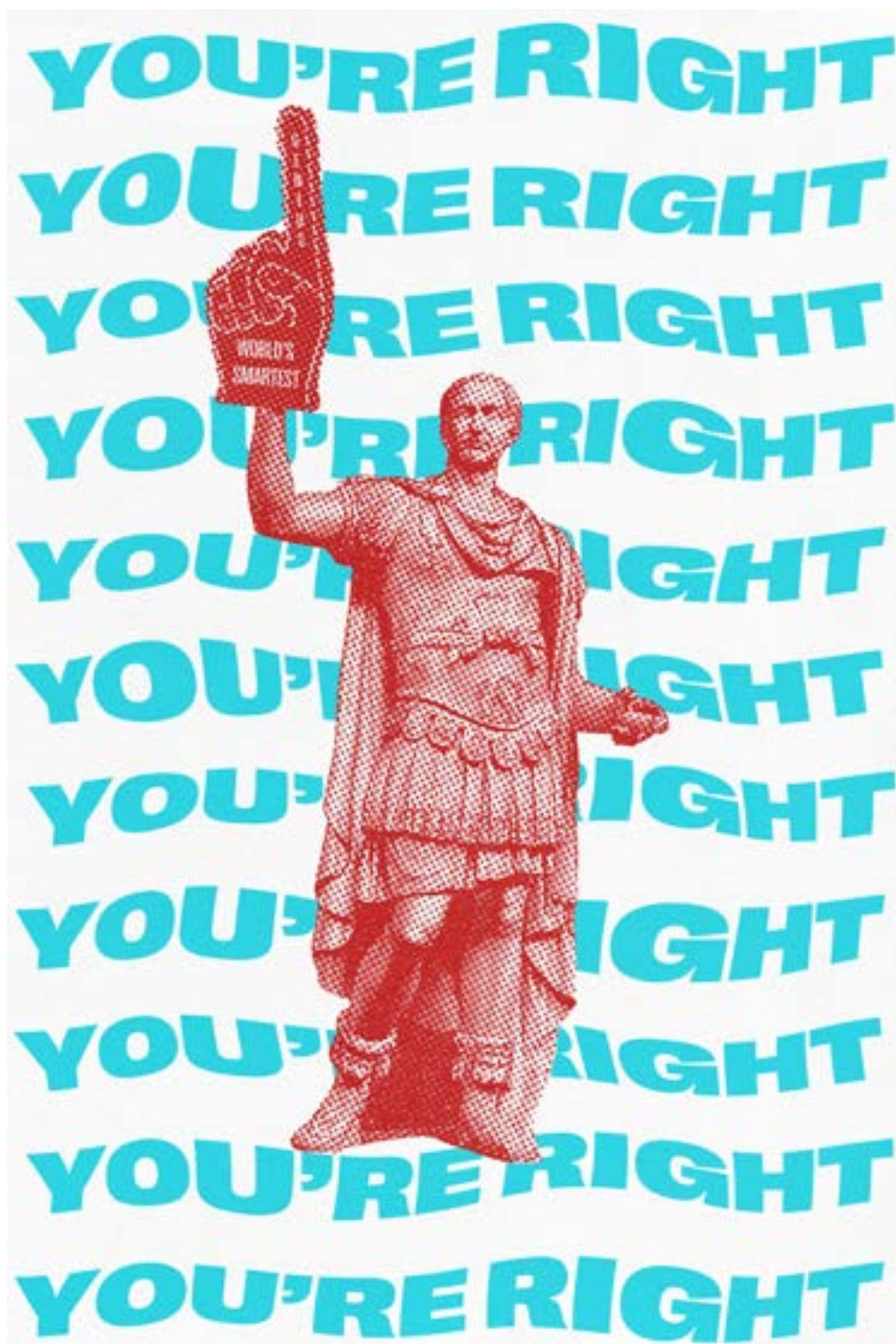
The third and fourth poster in this series relate to the echo chambers and filter bubbles that form as a result of clicking the “like” button. Both posters were designed using AR technology as well. As previously mentioned, this technique was used to keep the millennial audience engaged with the topic that was being illustrated. The AR technology also allowed movement that reflected what being in an echo chamber and filter bubble looks like. The third poster was designed to introduce what an echo chamber and filter bubble are. A futuristic dressed man with his head replaced by an enlarged computer monitor was used as the predominant imagery. Within the computer monitor was imagery of a large group of people cheering. A halftone texture was used on the imagery. This reinforced consistency throughout the design as well as giving the poster a vintage feel. Accompanying the halftone imagery is the phrase “welcome to where you’re never wrong.” This phrase connects the

viewer to how in an echo chamber and filter bubble, they are constantly reaffirming each other’s view. To further solidify this connection, when the audience views the poster through a cellphone camera, small affirming phrases begin to bounce around inside the computer overtop of the cheering audience. This was done to create a visual for what an echo chamber and filter bubble look like.



**WELCOME TO
WHERE YOU'RE
NEVER WRONG**

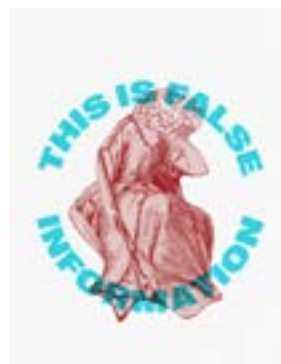
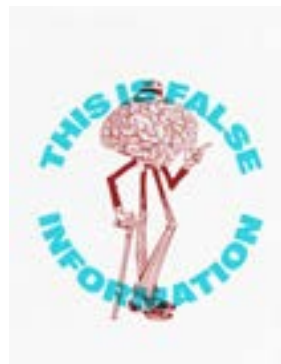
The fourth poster in the series features a statue of a roman general, on the general's hand is a foam finger that says "worlds smartest". Behind him features the phrase "you're right" repeatedly. These visuals are used to illustrate how being stuck in an echo chamber or filter bubble enhances their confirmation biases. When viewed through a cellphone camera, the imagery begins to move back and forth, waving his hand as if he were gloating. The typography in the background repeats in a downward motion while small bubbles are made. This is a payoff of the term "filter bubbles."



MISINFORMATION

In prior research, it was discovered that 73% of millennials would be better at telling if something was misinformation if they flipped a coin, rather than guess themselves. To educate the millennial audience on this startling statistic and allow them to see how they stacked up against it, a small interactive game was created. Six 8.5 x 11 interactive posters were made with commonly heard “facts” on them. Beneath each poster was a second poster, revealing whether the fact was true. The audience was encouraged to guess if the fact was true or not and flip the poster upwards to reveal if they guessed correctly. If the user felt stumped, they had the option to flip a provided coin to determine if the fact was true or false. Unbeknownst to the audience, every “fact” used was a common fact that included misinformation, making them all false. This was done to stump the audience, opening their eyes to just how difficult spotting misinformation can be.

All the imagery used for visual emphasis used the halftone pattern, creating a vintage feel that attracts the target audience. The imagery that accompanies each “fact” was also created using the absurd humor that millennials enjoy. The type treatment used in the previous posters was also the same type treatment used for each “fact”. A distressed texture was applied to the type to further reinforce the vintage feel.







QUOTE WALL

Misinformation is spread in many different forms, one of the most common types of misinformation is fabricated content. This is content that is 100% false and has novel. A common way this appears is through quotes with the incorrect person attributed to saying them. To bring an awareness and educate viewers to how misinformation is often spread, a quote wall was created using famous quotes with the incorrect person attributed to saying them. Even though this portion of the exhibit is not interactive, it uses humor and novelty as an education tool. The space provides the audience an opportunity to reflect on how outrageous the claimed quote and attribution to who said the quote is. It encourages the audience to consider believing or spreading information that also evokes the same response. The quotes were taken from popular culture that millennials find interesting. Those that are attributed to saying those quotes were also taken from popular celebrities or historical figures that millennials find interesting. This allowed there to be a connection to the audience, which aids with engagement and retention. To keep a consistent aesthetic, the typography used within the quotes was the same used throughout the previously mentioned poster series.

**CAN WE PRETEND
THAT AIRPLANES
IN THE NIGHT
SKY ARE LIKE
SHOOTING STARS**

- WOLFGANG AMADEUS MOZART

**THAT'S ONE
SMALL STEP
FOR MAN ONE
GIANT LEAP
FOR MANKIND**

- DOLLY PARTON

**IT'S A
PARTY IN
THE USA**

- GEORGE WASHINGTON

**I DON'T THINK
MY FATHER THE
INVENTOR OF
TOASTER STRUDEL
WOULD BE TOO
PLEASED TO
HEAR ABOUT THIS**

- JULIUS CAESAR

**HE WAS A BOY
SHE WAS A GIRL
CAN I MAKE
IT ANYMORE
OBVIOUS**

- ARISTOTLE

**SPEAK
SOFTLY &
CARRY A
BIG STICK**

- CARDI B

**THE WORST
THING ABOUT
PRISON WAS
THE DEMENTORS**

- CHANDLER BING

**THAT
IS SO
RAVEN**

- EDGAR ALLEN POE

**WE HOLD THESE
TRUTHS TO BE
SELF-EVIDENT
THAT ALL MEN ARE
CREATED EQUAL**

- KIM KARDASHIAN

**HIT ME
BABY ONE
MORE TIME**

- MUHAMMAD ALI

**ALL THOSE
WHO WANDER
ARE NOT LOST**

- ABRAHAM LINCOLN

**LIVE
LAUGH
LOVE**

- SOCRATES

**WE BUILT
THIS CITY
ON ROCK
AND ROLL**

- THOMAS JEFFERSON

**ILL
BE
BACK**

- JESUS

**DID YOU
TOUCH MY
DRUMSET**

- LUDWIG VAN BEETHOVEN



CHAPTER 5

Conclusion

CONCLUSION

In conclusion The Museum of Misinformation offers a new, successful approach to helping solve the issue of the perpetuation of misinformation within the millennial generation. The Museum of Misinformation solves this issue by focusing on educating millennials about misinformation and the ways that social media encourages its spread. Rather than taking a traditional educational approach, The Museum of Misinformation focuses on interactive and experiential learning spaces, methods that were found within the Literature Review to be the most successful when educating a millennial audience. Humor and nostalgia were used to further target the millennial audience as research showed they allow for a higher retention rate within that audience. Humor was also important in providing a space that was not polarizing, allowing for the user to become more comfortable with the topic.

While The Museum of Misinformation provides a successful experience now, as time goes on there are many ways the exhibit could continue to grow. Because technology is rapidly changing, interactive components that involve new technologies could be used. This would allow the exhibit to stay up to date and relevant to the target audience. As social media platforms grow and evolve, so will the ways misinformation spreads. Just as both of those expand, The Museum of Misinformation could also expand, continuing to educate on the evolved topics.

Expanding the way the target audience interacts with the information being taught to them would be key to helping further the success of the exhibit. Having large wall graphics that explain a topic that lead into the interact components could allow a visually interesting

space for the viewer to stop and read. Not only would this help create a focal point for the educational component of the exhibit, it would help create a cohesive feel to the environment. An additional poster that provides a reminder of the information in the exhibit could be produced for each visitor to take home and hang up.

Overall, the goal of educating the millennial audience on the dangers of the algorithms used by social media that encourage the spread of misinformation through the Museum of Misinformation was successful.

Personal Growth

Throughout the process of completing this thesis I experienced an immense amount of growth. This thesis allowed me to push past creative block and taught me tenacity on how to overcome tough challenges. I felt myself grow in the way that I approach visual problem solving and have a renewed interest in learning new topics and design techniques. This thesis also pushed me to design for an audience other than myself. The skills and knowledge I learned from this thesis will benefit me for the rest of my design career.



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