Examining Misinformation and Disinformation Games Through Inoculation Theory and Transportation Theory

Lindsay D. Grace
University of Miami
L.Grace@Miami.edu

Songyi Liang
University of Miami
sxl1399@miami.edu

Abstract

Media misinformation and disinformation continue to threaten the foundation on which scientific, political, and other socially relevant decisions are made. This paper examines games designed to serve as interventions for changing player's behaviors in misinformation and disinformation media. It analyzes the games formally through two common communication intervention theories for behavior modification and education: inoculation theory and transportation theory. The media theories are first framed in the context of games generally, then they are applied across six research focused games ; Harmony Square, Bad News, Fake It To Make It, Factitious and FakeYou!. The work offers theory-informed observations and recommendations to support improved efficacy for existing and future playable media.

Keywords: communication theory, disinformation games, misinformation games, game design, fake news

1. Introduction

At the end of the 20th century, the optimism of pervasive access to knowledge supported by the Internet abounded (Ernest III, 2004). In the 21st century it has become apparent that pervasiveness has also supported a plague of misinformation and an ability to easily amplify disinformation (Forbes, 2002). The result is mass confusion about even the most basic of facts (Kata, 2010). As has been the case with complex problems of the past (Anderson, Gentile, & Dill, 2012), a variety of game designers have aimed to help address the problem through play. The result is a myriad of theories and playful interventions that aim to improve media literacy (Literat, Chang, Eisman, & Gardner, 2021). and even inoculate players from misinformation and disinformation (Roozenbeek & Van Der Linden, 2019).

Investigations and investments in combatting disinformation and misinformation have increased (Biloš, 2019). The fundamental dilemma is that while access to information is at an unprecedented level, the ability to discern good information from bad has not kept pace. Evidently, the information superhighway as the Internet was once known, conveys a lot of bad information (Floridi, 1996). The result is a variety of literacy interventions, curricula, and social impact campaigns aimed at increasing people's ability to tell good information from bad. These include media-specific initiatives such as the News Literacy Project (https://newslit.org/), the Media Literacy Project (https://medialiteracynow.org/) and efforts by specific nations (Nemr & Gangware, 2019) and international non-governmental organizations to help combat this problem.

The societal risks of confusing good information from bad abound. They range from large-scale political radicalization (Bennett & Livingston, 2020; Piazza, 2022, Johnson, 2018) to poor decision-making for personal health (Swire-Thompson & Lazer, 2019). Recognizing that these risks are unlikely to decline, researchers have attempted to embrace a more widespread address. A myriad of prior interventions were created to address specific types of misinformation in health (Walter, Brooks, Saucier, & Suresh, 2021) environment literacy (Fjællingsda, 2021) and mass communication (Shekter-Porat, 2019). Current approaches aim more widely at addressing general information competencies that can be applied to a variety of domains. Essentially, these efforts focus on helping their users develop persistent skills in distinguishing useful information from the myriad of poor information sources.

Fundamentally, these harmful information sources can be described as misinformation or disinformation. Disinformation is typically used to describe sources that aim to provide inaccurate or misleading information by design. As Nemr and Gangware demonstration, disinformation and its research trajectory are often linked to political propaganda and military strategies aimed at disrupting societies, communities, and morale (2019). Disinformation is typically focused on misleading information broadcast intentionally to mislead.

URI: https://hdl.handle.net/10125/103204
978-0-9981331-6-4

Misinformation, alternatively, is focused on the misinterpretation of accurate information or the unintentional spread of unreliable sources or data. Where disinformation is focused on intent, misinformation is typically focused on interpretation. Disinformation is designed to mislead, and misinformation can be a product of design, misunderstanding, or incorrect interpretation of reliable information.

These failures in understanding can result from a variety of issues of interpretation caused by insufficiently understanding of numeracy, logical fallacy, and other common challenges. This worry over interpretation forms the core foundation for literacy-focused interventions to combat both disinformation and misinformation. From a misinformation perspective, improving abilities in numeracy, reasoning, logic, and others are expected to help avoid misinterpretation of fact.

From a disinformation perspective, understanding the strategies commonly used to spread disinformation is expected to prevent the efficacy of detecting fake news. Simply, identifying the characteristics of either is expected to decrease their impact on society (Verstraete, Bambauer, & Bambauer, 2021). Hence, literacy-focused solutions aim not to identify sources for disinformation and misinformation but instead to provide people the ability to adapt to a changing media environment to understand their characteristics. Literacy strategies aim to improve identification to lessen the impact of both misinformation and disinformation on society.

These identification strategies are often based on some guiding principle or core concept. The acronym, V.I.A., for example, is used in new literacy contexts. It describes verifiability, independence, and accountability as crucial news elements that are unlikely to misinform or disinform. It is frequently used to describe the democratic leaning characteristics that differentiate journalism from misleading or propagandist information sources. Other efforts focus on similar core concepts, such as source tests and logical fallacy, visual rhetoric examinations, clear language identification, etc. These core concepts often serve as the foundation for misinformation and disinformation interventions.

Much like interventions in other media, game-based interventions for mis and disinformation are often based on these guiding concepts used to specific communication strategies. These strategies are not always formally employed but often offer common intervention strategies applied to new playable media forms.

Communication theories abound on the pragmatic approaches to solicit healthy behavior change. These theories serve as a critical lens to examine the theoretical aims of persuasive media content. The examination, or in some cases the application, of these theories, demonstrates an opportunity to apply the lessons learned from previous work into the distinct practices of game design. While many of these theories were not developers specifically for games, they offer perspectives on behavior change efficacy for media consumers. Hence the researchers chose two communication theories commonly applied to behavior change interventions, these are transportation theory and inoculation theory.

These theories were selected for their pervasiveness across a variety of behavior change objectives and the age. These are widely published and applied theories in behavior change through communication, neither distinct to games and interactive media, nor contrary to them. They are theories that can be both applied to games that have been produced and to the future of games as a medium.

This research aims to analyze six games from the lens of these theories to understand how these designs may or may not be working. In short, instead of treating each game as a discrete design uniquely tailored to the goal of eliciting change, this paper aims to examine how these games intersect with previous research in applying communication-driven change. It is hoped that by identifying the ways in which these games adopt elements of common communication theory, a collection of generalizable observations may result in further effective development.

This effort is particularly instrumental in helping to unify somewhat disparate efforts in addressing a large-scale systemic problem. Given that disinformation and misinformation pervade the worlds' most significant problems, from climate change to health, seeking generalizable patterns from the effective design and development of such games seems valuable. In short, this is an effort to take two common theories in behavior change through communications and create a kind of Venn diagram of successful overlap. It is a way of interpreting a variety of individualized efforts toward the singular goal of identifying patterns for continued, generalizable success for future developers. It does so by applying theoretical frames to existing, popular game designs offering patterns from the lens of each of the popular theories.

In the least, a foundational examination of the overlap of theoretical frames and game design intention should prove useful for future development in this domain. Instead of starting from no frame, the

hope is that this literature will provide a formal frame from which to start.

1.1 Transportation Theory Overview

Transportation theory is a common strategy. The core tenets of transportation theory emphasize how an engrossing narrative situation can shape the attitudes and interests of the person consuming the media (Green, Brock & Kaufman, 2004). It is typically framed as providing a conforming set of values. From the theory, a foundation of empathetic storytelling can result in persuasive sentiments toward the relatable subject of that media. Simply, the viewer, player, or other witness to the media can be transported to the values, likes and dislikes of the story's portrayals. These are largely understood as either empathetic or mental imagery. Compelling examples of transportation theory in media research range from the specifics of sun safety (Andersen et al. 2017) to the general efficacy of using emoji in text messages (Willoughby & Liu, 2018).

Transportation theory provides a theoretical framework to understand the persuasive effects of entertainment media (Green et al, 2004). Transportation refers to allowing people to be fully immersed in one narrative world or story by experiencing high cognitive and affective engagement levels. This transportation can then change individuals' values, beliefs, attitudes, and behaviors in the real world by aligning with those implied by media products (Green et al, 2004). In theory, people are more likely to change their opinions when transported into a compelling story because of the narratives' power to persuade implicitly or explicitly. The effect of transportation has been determined in both health communication, social issues, and consumer contexts (Van Laer et al., 2014) contexts. For instance, narrative videos have been identified as playing a significant role in encouraging viewers to take breast cancer screening and smoking cessation (Williams et al, 2011). Given some video games' narrative emphasis and high visual appeal, transportation effects are worthy of further examination.

Compelling characters also serve as an important part of narrative quality, facilitating transportation. Furthering this foundation, Van Ler et al. (2021) adds that an individual must empathize with the characters and that the story must be imaginative to engage its audiences. While little has been discussed about this theory formally applied to game design in academic literature, the core concepts are evident in designer intentions. For many games, including the ones examined here, the player is provided with either an empathetic role to play or provided with a narrative context that helps situate the in-game challenges within a narrative construct. Common narrative situations in this context might include being a fake news detective (Junior, 2020), working as a reporter balancing sensualism with an appeal (Trial Day, 2020) or even creating a fictitious town with characters who are subject to the player's fake news (Roozenbeek & van der Linden, 2020).

It is also worth noting that while not all games offer a narrative frame, it has been argued that narratives are innately constructed as part of play (Grace, 2019). From such a perspective, players might construct a narrative about the value of their work in games and its effects. The more traditional narrative as an explicit element of the player's experience is emphasized for this analysis.

It is reasonable to scale an understanding of narrative elements toward this broader definition but ignore the value of characters in storytelling and engaging media, which such perspectives tend to underemphasize.

1.2 Inoculation Theory Overview:

The second communication theory to consider is Inoculation Theory. While transportation theory aims to change perspectives, inoculation theory aims to protect people from persuasive content. The analogy is like the medical use of inoculations. Inoculation theory is a resistance model, offering a strategy that employs repeated exposure to a weakened version of counterarguments, which can motivate the individual to develop counterarguments consistent with his or her pre-established attitude (McGuire & Papageorgis, 1961). Thus, in theory, strengthening an attitude against future attacks. In the context of mis and disinformation, it employs repeated exposure to either as a means of inoculating users from the threat.

Core to appropriate implementation is three components: threat, refutation, and counterargument. The threat is simply the acknowledgment that existing attitudes or beliefs are vulnerable to change. Refutation requires exposure to or reasonably facile construction of counterarguments to the threat. The trio of threat, refutation, and counterargument are structured in the media inoculation in a dose that is both refutable and arguable.

In the most uncomplicated games, the threat of mis or disinformation offers the first of these three elements. Offering players, the ability to identify and eliminate these threats repeatedly moves such work toward the refutation and counterargument components. In more complex implementations, such as the work of Roozenbeek and Sander van der Linden

(Roozenbeek & Van Der Linden, 2020) threat, refutation and counterargument are woven into the narrative. Inherent to an inoculation approach is a reliance on the time-dependent development of counterarguments. It's important to note that much like medical inoculation, it takes people time to process inoculation messages and generate the inoculation effect.

2 Game Selection:

The researchers identified 17 playful experiences, produced between 2017 and 2022, specifically focused on misinformation or disinformation. 13 of the games were produced with affiliation of a college or university researcher. The remainder were produced primarily by a governmental organization (e.g., the US Department of State's Harmony Square), media organizations (e.g., the British Broadcasting Corporation's iReporter) and even an individual (e.g., Amanda Warner's Fake It To Make It). A subset of these had at least one peer-reviewed publication outlining design decisions and media intervention strategies by the producing team.

The list was further narrowed for games, lacking a wide release, publicly playable versions, or produced as a student thesis. The six remaining games were chosen as a representative remaining balance of gameplay experiences(e.g., short to long, producing organizations, geographic origin, digital and non-digital, single, or multiplayer). The complete list of games reviewed, links to the play and their instructions are available at a website maintained by the researchers, https://journalismgames.org/.

3 Game Analysis by Theory: Transportation Theory

3.1 Transportation Theory: Harmony Square

Harmony Square is explicitly designed around the narrative fiction of the player as Chief Disinformation Officer. The player's goal, to create chaos in the fictitious town of Harmony, is the central player objective. It is witnessed through the responses of a variety of non-player characters who both provide game feedback and progress the narrative.

As such, this design meets the fundamental characteristics of a transportation theory-informed design. There is a straightforward narrative, characters with which to experience the narrative, and an effort toward the engaging story. It also relies on imagination and offers an empathetic inroad by providing the player a responsibility bestowed through the title and some non-player characterizations.

Harmony Square also relies on contextual familiarity by assuming that players are familiar with seeking , crafting, and spreading information via social media. This, in theory, should increase transportation through accessibility and involvement. Players are not only given a role, but they are also given a scenario that contains narrative elements familiar to them. A Harmony Square player should have experience spreading information via social media.

For these reasons, Harmony Square shares attributes with other communications media that is likely to employ transportation theory effectively. It is reasonable to interpret, and as evidenced in their own research (Roozenbeek & Van Der Linden, 2020), recognizes that players are engaged emotionally and cognitively in the game's fiction. It is an appropriate setup for transportation facilitated attitudinal shifts.

However, there is one complication. The player's empathies are set opposite the researcher's goals. Instead of aligning the protagonist of Harmony Square to thwarting the spread of disinformation, the player practices the behavior of disrupting democracy through disinformation. This runs contrary to the empathetic elements of transportation theory. In practice, the game is better structured to train future disinformation spreaders through the narrative, its characters, and the player's role.

This is further emphasized by the feedback loop of successful play. The humor of the game's experience, including the reactions of non-player characters and scoring as positive feedback, increases through the discord sown. The better the player spreads disinformation, the more they are rewarded and the more narrative they receive. The most pronounced moment begins the game, where the player must accept the role as Chief Disinformation Officer to continue. The game's dialogue (as shown in figure 1) does not allow the player to continue without accepting this role.

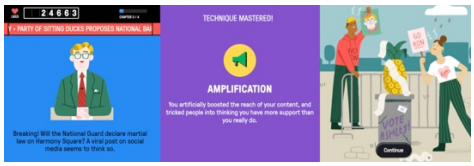

Figure 1: Harmony Square game screens.

Further, the empathetic attachment necessary for transportation theory is toward those who share disinformation, not those who are adversely affected by it. The player's role is not one of burden but instead one of honor and a source of joy. No negative

repercussions are associated with assuming the roles and responsibilities of spreading disinformation.

This is particularly important when considered in the context of transportation theory's reliance for counter arguing. At the start of the game, had players been offered roles on either side of the disinformation dichotomy, the game may have supported counter-arguing more completely. A negative relationship to the player's goals could also be followed by employing other narrative techniques like negative consequence or backstory. Lucas Pope's Republia Times (2011), for example, tasks the player with a somewhat similar responsibility, but indicates that the player is doing this work because their family will suffer otherwise. The entertainment of spreading false information is thus backgrounded with negative associations and dissociated from innocent fun.

Figure 2: Republia Times narrative frame for starting the game

To apply transportation theory more comfortably, this game might benefit from a design in which the player is protecting its fiction from the threat of disinformation instead of creating it. It might also become more effective through additional opportunities to discuss the game experience among players. Whether facilitated or encouraged through reflecting community conversation, such discussions may assist its counter-argument deficiencies. In the least, it should help increase the player's time spent in the game world. This should allow players to engage more consistently in the narrative, allowing more overlap between the game's fiction and the real world. Multiple episodes of the experience encouraging more profound character development and further investment in the game's narrative may assist transportation.

3.2 Transportation Theory: Bad News

Bad News follows a similar structure as Harmony Square. Designed via collaborations with several of the same researchers, it tasks players with producing and disseminating disinformation while gaining an online following and maintaining credibility. These tasks are wrapped in light fiction, which provides the status of the player's credibility and total number of followers in a simulated environment. Each player's selection affects one of two foci, followers and credibility.

The fiction of Bad News is not nearly as developed as its subsequent project, Harmony Square. From this perspective, it offers less opportunity for effective transportation. There is little characterization, save for the language's tone provided through in game prompts. Although it intends to create a social media platform allowing players to imagine generating influence on their followers, participants are not assigned with a particular character or role to play during the game. Therefore, the narrative is only embellished by informing players that game actions have consequences. Players can of course imagine the effect to their followers, but generally this narrative only hints that the game actions have consequences.

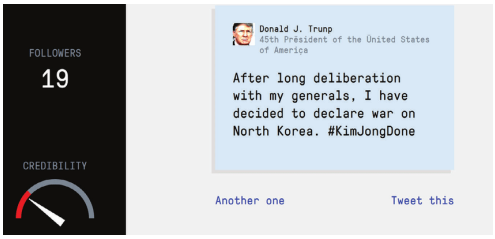

Figure 3. Bad News game single screen

While the narrative elements of Bad News fail to apply well to transportation theory, it does do well to offer a perspective useful in transportation theory's notion of counterarguing. The game's structure often creates dichotomies from which the player chooses. They may choose to play to an audience's fear or anger, to launch attack ads or fact-focused critique. This range is useful in helping players frame counterarguing elements. The game provides a frame from which counterarguing is highlighted.

Bad News also suffers from a similar tension to Harmony Square. The player's empathies are framed toward the producers of disinformation rather than those who are negatively affected by it. Therefore, it is subject to the same opportunities for improvement present in Harmony Square. For better application of transportation theory, it's obvious that a richer narrative could bolster the efficacy of this game. While the narrative world of Bad News is relatively simple, it does not require additional graphics to improve the narrative experience.

3.3 Transportation Theory: Fake It to Make It

Fake It To Make It begins with character selection and matching those characters to a goal. It attempts to visualize progress and personify the creation of misinformation source. Like other games, the player's empathies and goals are aligned with the producers of misinformation and other fakes sources. In the game success and failure are tied to financial success and little of the discord produced through the player's actions are shown. Hence one side of the fiction is perpetually apparent to the player – the side of the producer. What's missing is the narrative of the effect on the world consuming the media produced. For these reasons the game does well to affirm transportation theory through empathies for misinformation content producers. The player's role play is both an emotional and logical journey toward acquiring money. However, this simulation develops an understanding entirely focused on the production and leaves little space for understanding the effect of content consumers. It helps players understand the elements of fake news production but requires them to invert this understand to convert the knowledge into consumption habits. As is common with some games, the experience is like sharing a recipe for poison and then asking those who learned the recipe to detect it in the non-game world.

Figure 4. Fake It To Make It game

3.4 Transportation Theory: Lamboozled

As an analog card game, the game's core narrative is an imaged construct. With little character development, the primary narrative element is the fictional backstory of the world affected by the game. This reads primarily as a lure to situation the game experience. The designers write in the ruleset that it is a "deck-building card game set in the fictional sheep town of Green Meadows -- where, as the game's tagline reads, 'some news stories just want to pull the wool over your eyes!" (Literat, 2021). Players aim to "help the sheep citizens of Green Meadows figure out what's true and what's not, by using their best evidence to win them over" (Literat, 2021).

The fiction is somewhat maintained by mental images conjured by players who work through the evidence-building experience and observe the illustrations on the front of the card deck. When the personifications and light fictions are removed, the core scenario remains a simulation designed to impart the various layers of journalism and news literacy strategies.

Figure 5. LAMBOOZLED! card game photographs

3.5 Transportation Theory: Factitious

Unlike the aforementioned games, Factitious is an outlier from this lens. The goal of digital games is simply for players to immediately discard news they consider fake or keep news they really believe. They complete these actions with a left (discard) or right (keep) swipe for each article presented. The game offers no narrative or characterizations, and instead simple tasks the player with this challenge. The game is relatively bereft of elements for transportation theory. The game offers neither narrative nor character. This obvious lack of narrative precludes the games from inclusion.

Just as Lamboozled is the only analog game in this analysis, Factitious is the only game that evades narrative entirely. Players are only given feedback on their progress and the ratio of correct and incorrect decisions. Unlike the other games, players are not given any backstory to the task. Experientially, this is also the shortest gameplay experience of the set. Games of Factitious last 2-3 minutes, where the other games are often 20 or more minutes.

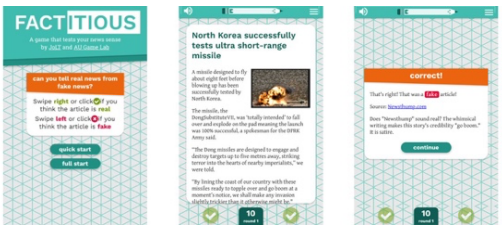

Figure 6. Factitious Game

3.6 Transportation Theory: FakeYou!

FakeYou!, like Harmony Square, is available in a multilanguage format, but offers pacing and narrative simplicity similar to Factitious. Game players are expected to create a credible headline for a certain newspaper article image, which distinguishes FakeYou! from other games. In addition, participants should figure out the correct headline of an image by choosing one of three options, where one headline is the original headline of the newspaper article, and the others are given by two opponents (Clever et al, 2020). The research authors describe this as a learning by doing or learning by playing strategy.

Like Factitious, the narrative case is not obvious with FakeYou! However, unlike Factitious, the opportunity for narrative exists as a product of the three-player structure of the game. The transportation theory may be applied to the narratives constructed by players among themselves or in the narrative implied by successive fake headlines produced by a player. In short, a player can construct a themed set of headlines that in sequence tell a story and perhaps even follow a narrative arc. A clever player may employ this strategy to mix truth with lie, propelling the potential for transportation theory. Ultimately however, without rules guiding such behavior, such a trajectory does not obviously align the game with the benefits of transportation theory.

Figure 7. FakeYou! Game

4. Game Analysis by Theory: Inoculation Theory

4.1 Inoculation Theory: Harmony Square

This game intends to present the tactics and manipulation strategies that fake news producers commonly use to realize their political goals. In the context of the application of the inoculation theory, the game did a great job in creating the weekend dose of the informational "virus" by exposing individuals to those tactics and strategies. Moreover, the humor appeal has been used wisely, offering a greater opportunity for the sufficient delivery of inoculation (Roozenbeek & Van Der Linden, 2010), and increasing intervention effects by decreasing people's reactance when they encounter a persuasive attempt (Compton & Pfau, 2009). Research suggests that players are allowed to expose themselves to the weakened versions of manipulation techniques from a fake news producers' perspective, which can motivate them to reflect and generate psychological antibodies against misinformation (Roozenbeek & Van Der Linden, 2020). Given the active engagement game playing requires, the inoculation process may enhance memory retention and increase the longevity of the inoculation effect.

Previous inoculation research indicates two primary limitations, including scholarship mainly focused on conferring attitudinal resistance against specific issues (Compton & Pfau, 2009), and the refutation was traditionally presented in a passive manner (Roozenbeek & Van Der Linden, 2020). Harmony square addresses these two issues particularly. Harmony Square aims to achieve a border cognitive resistance against the manipulation tactics rather than adopt an issue-based inoculation, which also aligns with the concept of the blanket of protection effect in the inoculation interventions, which deserves further examination. Under the framework of inoculation theory, instead of presenting the perceived threat component in a clear and straightforward way, individual players are granted plenty of freedom to interpret and understand the dangerousness of fake news and misinformation by breaking the Harmony Square on their own. Such design is wise enough to balance the gameplay and educational effects.

4.2 Inoculation Theory: Bad News

The Bad News game is a free social impact game, allowing players to learn about six common techniques for creating misinformation. This game intends to encourage individuals to create and maintain their own fake news empire by producing and disseminating disinformation while obtaining an online following and credibility at the same time (Bad News, 2018). Being an early project that tackles the two limitations of a traditional inoculation treatment, Bad News incorporates an active and experiential component to motivate a player to build cognitive resistance against misinformation on social media. It also sheds light on later interventions, taking Harmony Square as an example.

4.3 Inoculation Theory: Fake It to Make It

Fake It To Make It is also a social impact game about fake news, allowing participants to disseminate misinformation on social media and obtain social

impact through techniques such as purchasing bots and manipulating the audience's emotions. The game developer intended to design a game with persuasive power to change players' behavioral, attitudinal, and belief changes regarding fake news after playing the game. Although the game does not adopt the inoculation theory as its theoretical framework, it shares very similar structure with Harmony Square and Bad News. All of these provide a space for people to identify and gain an understanding of common themes and techniques utilized in the spread of false or misleading news stories (Urban, Hewitt & Moore, 2018).

This work analyzes the game guided by inoculation theory. By exposing people to those commonly used strategies of creating and disseminating misinformation, players are enabled to get the weakened versions of fake news "virus," which can motivate them to reflect and generate psychological antibodies against misinformation. The game excels in more complete narrative elements and higher playability, which has been proven to attract players to come reengage with the game. The repeated exposure will enhance the inoculation effects.

Unlike Harmony Square and Bad News, Fake It To Make It does not highlight the negative consequences of producing and disseminating misinformation. This includes causing political chaos (which Harmony Square demonstrates). Obscuring this effect likely decreases its persuasive and inoculation effects. In this context, participants only enjoy the pleasure of completing missions but do not understand the severe consequence of exposure to massive amounts of false information. This likely hampers further reflection and persuasive efficacy. For example, a prior study indicated that participants felt satisfied to see that their manipulation techniques realized the desired goals and knew that they could play people successfully (Urban et al, 2018).

Fake It To Make It aims to allow the player to be more aware of how and why fake news is written and disseminated. It also aims to help the player be more critical about the information they encounter in the future. Given these aims, it is evident that more thorough application of inoculation theory may serve as an excellent fit to guide future improvement.

4.4 Inoculation theory: Lamboozled

Lamboozled is distinct in that much of the inoculation benefit is a product of both the randomness of a card-draw and in the variability of interaction with other players. This means that unlike games that have a more structured experience, the inoculation effect may vary greatly play session to play session. To use the analogy of the theory, the potency of the inoculation varies widely depending on both the player and their card deck experience.

However, one strength with such design is that players, as teachers or as peer learners, can potentially adjust inoculation for each player (e.g., the right potency for the right person). This dynamic adjustment, which may occur naturally through non-digital play, is worth noting as an inoculation theory opportunity for digital designers.

4.5 Inoculation Theory: Factitious

Factitious aims to train players toward the skills needed to identity unreliable news sources. It is built upon fundamental habits of good news literacy (Grace & Hone, 2017). In terms of inoculation theory, it aims to repeatedly expose players to both real and fake news sources to help inoculate them. It does so by aiming for the middle of the spectrum, providing articles that are hard to discern real from fake, without practicing basic skills like identifying typos, checking website domains, and evaluating article sources. It exposes the player to misinformation sources in small doses and provides immediate feedback about the player's success and failures. From this perspective, it applies inoculation theory relatively bluntly. Unlike other games, there is no narrative or characterizations to complicate the players' relationship with the media. Instead, the player is given a very simple exposure to what can roughly be estimated as a dose of about 50% misinformation or disinformation articles and another 50% legitimate news. This small dose exposure is compliant with inoculation theory, seemingly built with the theory in mind. However, the research literature (Grace & Hone, 2019) never references inoculation theory.

4.6 Inoculation theory: FakeYou!

FakeYou adopts the theoretical framework of inoculation theory to build cognitive resistance against misinformation. Since players are both author and validator, identifying the concept aims to advance the inoculation effect by shifting player roles within a short time. Players are both creator and consumer in this multiplayer game. Guided by inoculation theory, the threat component is exposing players to fake headlines created by other players. The threat is clear because players have been asked to generate their own misinformation a few minutes prior. This ideally means players will be exposed to the negative consequence of spreading misinformation. With shifting goals between deceiving and recognizing it is

conceivable the game goals could reward players for tricking other players.

This game requires at least three players to start a new game, serving as one unique feature differentiating it from the inoculation games previously described. Each player is asked to compete with the other two since players will get a higher score if they fool other players. Fooling other players is capable of increasing players' engagement and further motivating them to process the inoculation treatment actively. It is also potentially problematic in that players are practicing the skill of spreading mis and disinformation. The goal is a push-pull between exposing others to being fooled and protecting oneself from such tricks. In theory, getting involved in this interdependent process of creating and discerning fake news headlines, players spontaneously generate counterarguments and build up cognitive resistance against disinformation.

5. Conclusion

The core goal of this work was to understand how examining games through a theoretical lens might shape an understanding of design efficacy, focus design decisions, and improve impact. While no existing game thoroughly applies each of these theories a few basic suggestions become apparent.

For all designers balancing efficacy often relies on a combination of narrative fiction and repeated engagement. This is where length of play complicates narrative aims. If a narrative takes too long to develop, it may be hard to get players to reengage with the media or complicated to design long-term engaging narratives. In short, if it takes 5 minutes to inoculate, uptake of that inoculation is likely to be more common than something that takes 60 minutes or more each engagement. An obvious means to addressing this would be episodic narrative elements that call the player back to the experience daily or weekly, in the tradition of popular experiences like the Wordle (2022) word game or crossword puzzles in print newspapers.

Beyond episodic experiences that reengage players and shorter play experiences, a comparative analysis also suggests these games could benefit from emotional engagement. Many of the games analyzed aimed at a basic logical structure over strong emotional appeal. The obvious nature of educational goal setting and research focused games may steer this type of work away from emotion, but these theories often rely on emotional response. None of the games were designed to make the player angry or uncomfortable, yet sometimes such emotional responses are essential to adjusting counterarguments. Just as a popular game may inspire a fondness for its characters, it may also inspire disdain for them. Given the importance of emotion in shaping counter arguments it's important to recognize this potential in games as well. Personification of other characters affected by the player may help with this.

It is also clear that while multiplayer experiences offer opportunities to replay, they also make the design vulnerable to unexpected consequences. Without careful mitigation through rulesets or software algorithms, different experiences may have counter-productive outcomes. Likewise playing toward the media intervention's aim or against it may shape efficacy. While it may seem more engaging to be the spreader of misinformation, there may be better efficacy via inoculation and transport theories in preventing spread.

The researchers did not aim to be exhaustive, but instead to offer foundational intervention communication theory and game design. This intersection, between the thirty or more years of communication theory in intervention with the more than 30 years of impact-driven game design, is perhaps overdue. It is hoped that such analysis is useful to future researchers aiming to understand how communication theory applies to interventions in media consumption. There are clearly benefits and drawback from such perspective. It is hoped that this work offers designers and other researchers a jumpstart or even templated framework from which to start new work. Future work will apply excitation-theory (Zillmann, 2008), to the theories referenced and expand the analysis across the growing number of misinformation and disinformation games. It may also apply these theories to a new game design.

References

Andersen, P. A., Buller, D. B., Walkosz, B. J., Scott, M. D., Beck, L., Liu, X., ... & Cutter, G. (2017). A randomized trial of an advanced sun safety intervention for Vacationers at 41 North American Resorts. *Journal of health communication*, *22*(12), 951-963.

Anderson, C. A., Gentile, D. A., & Dill, K. E. (2012). Prosocial, antisocial, and other effects of recreational video games. In D. G. Singer & J. L. Singer.

Bad News [Computer Software]. (2018), Cambridge University. https://www.getbadnews.com/#intro

Bennett, W. L., & Livingston, S. (Eds.). (2020). *The disinformation age: Politics, technology, and disruptive communication in the United States*. Cambridge University Press.

Biloš, A. (2019). Emerging focus on fake news issues in scientific research: a preliminary meta-analysis approach. *Interdisciplinary Management Research*, *15*, 1139-1150.

Breaking Harmony Square [Computer Software]. (2019). https://harmonysquare.game/en

Clever, L., Assenmacher, D., Müller, K., Seiler, M. V., Riehle, D. M., Preuss, M., & Grimme, C. (2020, October). FakeYou!-a gamified approach for building and evaluating resilience against fake news. In *Multidisciplinary International Symposium on Disinformation in Open Online Media* (pp. 218-232). Springer, Cham.

Clever, L., Assenmacher, D., Müller, K., Seiler, M. V., Riehle, D. M., Preuss, M., & Grimme, C. (2020, October). FakeYou!-a gamified approach for building and evaluating resilience against fake news. In *Multidisciplinary International Symposium on Disinformation in Open Online Media* (pp. 218-232). Springer, Cham.

Compton, J., & Pfau, M. (2009). Spreading inoculation: Inoculation, resistance to influence, and word-of-mouth communication. *Communication Theory*, *19*(1), 9-28.

Ernest III, J. (2004). *The information revolution and developing countries*. MIT press.

Factitious [Computer Software]. (2020). http://factitious-pandemic.augamestudio.com/#/

Fjællingsdal, K. S. (2021). The Green Gaming Project: The Role of Games in Promoting Environmental Literacy.

Floridi, L. (1996). Brave. Net. World: the Internet as a disinformation superhighway?. *The Electronic Library*.

Forbes, S. (2002). *Web of deception: Misinformation on the Internet*. Information Today, Inc..

Grace, L. (2019, July). Hauntalogy, the Penumbra, and the Narratives of Play Experience. In *25th International Symposium of Electronic Art (ISEA), Gwangju, South Korea*.

Grace, L., & Hone, B. (2019, May). Factitious: Large scale computer game to fight fake news and improve news literacy. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1-8).

Green, M. C., Brock, T. C., & Kaufman, G. F. (2004). Understanding media enjoyment: The role of transportation into narrative worlds. *Communication theory*, *14*(4), 311-327.

Johnson, J. (2018). The self-radicalization of white men:"Fake news" and the affective networking of paranoia. *Communication Culture & Critique*, *11*(1), 100-115.

Junior, R. B. (2020). The Fake News Detective: A Game to Learn Busting Fake News as Fact Checkers using Pedagogy for Critical Thinking.

Kata, A. (2010). A postmodern Pandora's box: anti-vaccination misinformation on the Internet. *Vaccine*, *28*(7), 1709-1716.

Literat, I., Chang, Y. K., Eisman, J., & Gardner, J. (2021). LAMBOOZLED!: The design and development of a game-based approach to news literacy education. *Journal of Media Literacy Education*, *13*(1), 56-66.

McGuire, W. J., & Papageorgis, D. (1961). The relative efficacy of various types of prior belief-defense in producing immunity against persuasion. *The Journal of Abnormal and Social Psychology*, *62*(2), 327.

Nemr, C., & Gangware, W. (2019). *Weapons of mass distraction: Foreign state-sponsored disinformation in the digital age*. Park Advisors. https://www.state.gov/wp-content/uploads/2019/05/Weapons-of-Mass-Distraction-Foreign-State-Sponsored-Disinformation-in-the-Digital-Age.pdf

Piazza, J. A. (2022). Fake news: the effects of social media disinformation on domestic terrorism. *Dynamics of Asymmetric Conflict*, *15*(1), 55-77.

Pope, Lucas. Republia Times [Computer Software]. (2012). https://dukope.com/trt/play.html

Roozenbeek, J., & Van Der Linden, S. (2019). The fake news game: actively inoculating against the risk of misinformation. *Journal of risk research*, *22*(5), 570-580.

Roozenbeek, J., & van der Linden, S. (2020). Breaking Harmony Square: A game that "inoculates" against political misinformation. *The Harvard Kennedy School Misinformation Review*.

Shekter-Porat, N. (2019). Southwell, BG, Thorson, EA, & Sheble, L.(eds.)(2018). Misinformation and mass audiences. Austin, TX: University of Texas Press. 307 pp. *Communications*, *44*(4), 469-470.

Swire-Thompson, B., & Lazer, D. (2019). Public health and online misinformation: challenges and recommendations. *Annual review of public health*, *41*, 433-451.

Trial Day [Computer Software]. (2020). https://erencaylak.itch.io/trial-day

Urban, A., Hewitt, C., & Moore, J. (2018). Fake it to make it, media literacy, and persuasive design: Using the functional triad as a tool for investigating persuasive elements in a fake news simulator. *Proceedings of the Association for Information Science and Technology*, *55*(1), 915-916.

Van Laer, T., De Ruyter, K., Visconti, L. M., & Wetzels, M. (2014). The extended transportation-imagery model: A meta-analysis of the antecedents and consequences of consumers' narrative transportation. *Journal of Consumer research*, *40*(5), 797-817.

Verstraete, M., Bambauer, D. E., & Bambauer, J. R. (2021). Identifying and countering fake news. *Hastings Law Journal*, *73*.

Walter, N., Brooks, J. J., Saucier, C. J., & Suresh, S. (2021). Evaluating the impact of attempts to correct health misinformation on social media: A meta-analysis. *Health Communication*, *36*(13), 1776-1784.

Williams, J. H., Green, M. C., Kohler, C., Allison, J. J., & Houston, T. K. (2011). Stories to communicate risks about tobacco: Development of a brief scale to measure transportation into a video story–The ACCE Project. *Health Education Journal*, *70*(2), 184-191.

Willoughby, J. F., & Liu, S. (2018). Do pictures help tell the story? An experimental test of narrative and emojis in a health text message intervention. *Computers in Human Behavior*, *79*, 75-82.

Wordle [Computer Software]. (2022). New York Times. https://www.nytimes.com/games/wordle/index.html

Zillmann, D. (2008). Excitation transfer theory. *The international encyclopedia of communication*.