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# Factitious: Large Scale Computer Game to Fight Fake News and Improve News Literacy

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## **ABSTRACT**

This case study describes a game designed to serve as new literacy education tool, playful polling system for research audience perceptions. The game underwent two primary designer iterations. As a result of design changes and renewed political chatter about fake news, the game's second iteration gathered more than 500,000 plays. The data collected reveals useful patterns in understanding news literacy and the perception of play experiences. This data of more than 45,000 players, indicates that the older the person the better they are at identifying fake news, until the approximate age of 70. It also indicates that higher education correlates to better performance at identifying real news from fake, although the time it takes to do so varies. This case study demonstrates the potential for such game designs to collect data useful to non-game contexts.

## CCS CONCEPTS

- Applied computing~Computer games
- Applied computing~Interactive learning environments

## KEYWORDS

Game Design; Fake News; Games with a Purpose; Polling Systems; Human Computation Games

### ACM Reference format:

Lindsay Grace and Bob Hone. 2019. **Factitious: Large Scale Computer Game to Fight Fake News and Improve News Literacy**. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI'19 Extended Abstracts)*, May 4–9, 2019, Glasgow, Scotland, UK. ACM, New York, NY, USA. 4 pages. <https://doi.org/10.1145/3290607.3299046>

## 1 INTRODUCTION

The challenges to effective journalism are increasingly complex. There are political critiques of news veracity [16] the production and efficacy of fake news [17], increased risk of violence for journalists [4] and a bevy of other negative effects to productive journalism [18]. The scale and scope of these challenges is enormous and likely beyond the address of a single initiative and research trajectory. In an effort to address one of the core challenges, researchers and educators have been working to develop news literacy among the general public. Specifically, helping consumers of news, whether readers, television viewers or participants in social media understand how to interpret news sources [10][13] [7].

One of the contemporary challenges to news literate audiences is the ambiguity of real and fake news. Fake news itself can be a rather ambiguous concept and a challenge to define. The difference between editorial and advertizing is not always clear, especially when an advertisement may be nestled among articles of a magazine or editorial produced by the benefactor of products from which they profit. Adding entertainment only deepens the ambiguity. There are, for example, fake news television shows that combine the reporting of real news and editorial with comedy. These entertainment venues were popularized, in part by US Television networks like Comedy Central through the Daily Show or HBO through it's John Oliver Show. While satirical content, lampooning politics and news is nothing new [1], the challenges it creates have been amplified as of late.

In part, these challenges arise from the ambiguity of communication and interface [2].

As more consumers of news use the Internet to get news the qualities of professional journalism muddle with amateur journalism, satirical websites and even online sources of misinformation and disinformation [5]. The signs and symbols of professional journalism have simply become too easy to fake. Amateurs in their homes can drop a green screen behind their webcam broadcast and mimic a professional newsroom for little cost. Websites can, and do, incorporate professional seeming logos, real-time data feeds and other elements for little or no investment. The result is an increasingly ambiguous environment where real and fake news are interchanged almost indistinguishably. In short, there is an ambiguity in the interface between real and fake news. Real and fake news are becoming harder to tell apart, as the visual and experiential cues that once distinguished them become more muddled. Some view this as a problem in human computer interaction [2] and one worthy of address by computer scientists [3].

For the purpose of this research, fake news is defined as content provided as news which aims to intentionally mislead or misinform its audience. According to a 2016 report, fake news can outperform real news in social media [19]. While there have been efforts to dissimulate real and fake news by labelling it as such and efforts within social media to label questionable news sources, the work is likely to produce limited results. In part, the challenge is that the producers of content adjust to such efforts. The other problem is that labelling such work does not help readers who are exposed to the content outside of traditionally controlled environments. Labelling a website as potentially fake news in Facebook does not prevent readers from discovering it in organic search or an email forward. Instead, it may be more effective to address the systemic issue via news literacy. Instead of designing software to identify questionable content, this research team believes it is more productive to train consumers of content to identify it on their own.

News literacy is an umbrella term for efforts to increase the ability of citizens to understand news. It is useful term to describe efforts to train people to be better news consumers, although there is much debate about the specific definition [11] News literacy efforts are most commonly focused on traditional education and have had limited effect in these traditional efforts [8]. News literacy is taught primarily through classroom education, training and to a limited degree through case study. It is supported by non-profit organization's like the News Literacy Project (<https://newslit.org/>) and academic centers like the Center for News Literacy at Stony Brook University. These efforts are primarily focused on curriculum in news literacy, particularly in journalism aligned educational contexts. Notably, there are claims that teaching news literacy through a journalistic lens is not effective [8]. Instead, researchers champion news literacy training is often more effective when it is offered via out-of-school activities and encourages a spirit of inquiry [8]. Improving news literacy is no small task, and it is compounded by a variety of demographic and technographic challenges [10]. It is also not an age specific challenge, as news literacy varies across all ages.

The goal of the Factitious game was to help aid these challenges to professional journalism in two primary ways. First it is designed as a game to help players think more critically about the signs and symbols, of fake news. It does so through both its design and its content. Instead of aiming to disambiguate articles that are clearly real or fake news, it provides content that makes players think critically about the content and the source.

The game, by design, aims at the grey area between fake and real news to encourage players to not only think critically, but practice the work of distinguishing between the two types of content. In so doing it encourages a spirit of inquiry that works in and out of classroom contexts.

The game's second goal was to address the challenge of fake news through data collection. The game is designed as a light version of a human computation game. While most human computation games have been designed to tag data [6], Factitious is designed to function like a playful polling system. It aims to poll a large population of Internet based readers to understand their perceptions of ambiguous news content. In so doing it can serve as a tool to news producers who want to disambiguate their content. The game can augment existing automated fake news detection systems by employing human heuristic analysis to the more difficult to detect fake news items, since most proposed systems have a margin of non-automated identification of at least 1% [20].

The game also serves as a research tool, providing an exceptionally large data set from which audience perceptions can be mapped. This data includes a subset of demographic data for analysing the tendencies of specific audiences. The focus of this case study is its research potential, by providing data about the performance of players within a non-controlled, real world environment.

These goals are further supported by the non-proprietary design of the game. The game is provided as an open source tool, via GitHub, that supports further polling and computation through play. Research teams aiming to create similar systems need only change the content of the open source tool to create their own A/B test version. As of the publication of the game, others have proposed designing polling and teaching systems focused on cancerous mole detection and memory assessment

## **2 DESIGN AND IMPLEMENTATION**

The game went through two major implementations. These are Factious 1.0 and Factitious 2.0. In each of the versions, the core player task was to review an article and make an informed decision about what type of article they believed they were viewing. For all iterations of the game, articles were selected by a single professional journalist who had more than 15 years experience as a journalist and correspondent in both the US and Asia. Those selections were reviewed by the research team, which included a chair of a college journalism program and a former television news professional. For all versions the article content was truncated, to respect intellectual property rights of the original authors. The selected content was subsequently reviewed to identify the veracity of the real or fake news labels attributed to the selected content and flagged any articles selections for which difference of opinion was the primary debate. In short, the fake and real news article selections were based on careful, substantial, objective review intended to avoid political bias or difference of opinion.

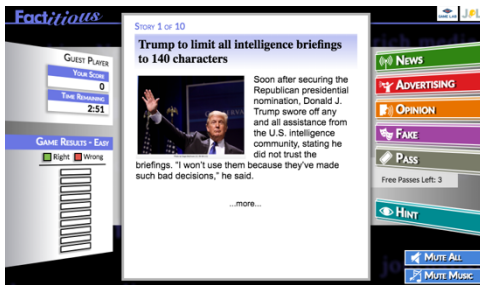


Figure 1. Factitious 1.0 with player performance indicated on the right hand side and player options (news, advertising, opinion, or fake) on the right.

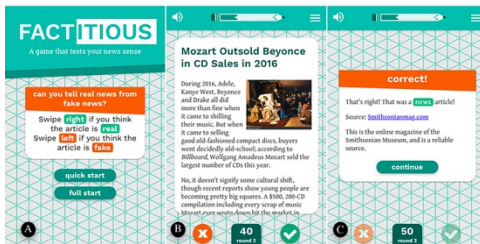


Figure 2. Factitious 2.0 final game design. A) depicts initiation instructions and start screen, B) shows game play mode and C) shows user feedback when correct

## 2.1 Design and Implementation of Factitious 1.

Factitious 1.0, shown in figure 1, was a game aimed at the educational market with a digital implementation based on the game show aesthetics of the popular video game title, You Don't Know Jack [9]. It was the product of a 9-month design and development cycle initiated by an interest in helping players understand 3 types of content commonly misunderstood; opinion, advertising, and entertainment (which included fake news and satire). This is 4-option approach was informed by the News Literacy Project's categorization system. Players were required to determine if each article they were shown was one of the aforementioned categories or an actual news article. The game relied on timers, and game show-styled audio feedback in keeping with the tradition of such gameshow experiences. This include a professional voice over which would give either snarky or encouraging feedback as a user setting. The game offered multiple challenge modes (e.g. hard and easy) and for particularly challenging articles players could use one of three passes, skipping an article with no consequence to their score. The complete game could generally be played in 15 minutes or less.

## 2.2 Design and Implementation of Factitious 2.0

Factitious 2.0 aimed to simplify the experience of the original while continuing the goal of improving news literacy. It also aimed to more directly meet the needs of a human computation game by improving data collection and reporting. Revisiting the project 6 months after the first release, a new team of diverse designers was added to the project. Their goals were to improve the game mechanics, graphics and refine the data reporting.

Factitious 2.0 was designed around a more contemporary play analogy. The team aimed at designing Tinder for news, referencing the then popular swipe mechanics of dating apps. Players would swipe right if they believed it was real news and fake if it were not real. The evident tradeoff is that players would not practice identifying the nuances of advertising, opinion, satire, and intentioned misinformation. However, the experience would be more playful and allow players to decide faster. The goal was to move the new experience toward the environment in which media consumers are sharing fake news. If media consumers are simply deciding to share or not to share in social media, then the design of Factitious 2.0 would be equally as dichotomous and fast-paced. The design moved toward play based on seconds, instead of the more moderate pace of a gameshow.

The second version of Factitious, as shown in figure 2, was also aimed at a different platform. It was implemented as an adaptable web-based app, playable on large screen for party audiences or small, personal mobile screens. It's primary game verb, swipe, is effective for mobile device screens or a computer mouse. The second version of the game can be played in less than 8 minutes, with an average play at about 5 minutes (or 300 seconds). It was organized around 5 article reviews per round, for 3 rounds. In a single full gameplay experience, players could review 15 articles before being given a final score.

Players are scored based on the correct identification of an article as either real or fake (right or left swipe respectively). Players are provided the opportunity to request a hint, which provides the

**TABLE 1. NUMBER OF PLAYERS PER AGE GROUP**

Player Reported Age	Number of Players in group
<b>0-9</b>	51
<b>10-19</b>	12301
<b>20-29</b>	7635
<b>30-39</b>	9112
<b>40-49</b>	6511
<b>50-59</b>	4812
<b>60-69</b>	3359
<b>70-79</b>	918
<b>Not Given or Over 80</b>	332

source of the article. Requesting a hint provides the source and diminishes the score by 5 points if correct (from 10 points for correct, to 5). It does nothing to the score if they are incorrect. Once a player swipes, they are told whether or not are correct and a one sentence rationale. For real articles, the game provides a link to the article; whereas with fake articles, there is a little to an archived version of the fake story to prevent driving traffic to those sites.

At the end of each round players are shown the ratio of correct to incorrect responses. Articles are somewhat randomly selected per each round. The content management tool also allowed the designer to specify which articles are available per round, but when more than 5 articles are available in a round any of the articles can be shown in any order (avoiding repeats in a round). Given the rigorous review of the articles, there were only 45 articles available for the 3 rounds of play. The result is a unique experience in the first full game play (15 of 45 articles), but likely repetition for subsequent full game plays.

As a result to design changes and renewed political chatter about fake news, the game’s second iteration gathered more than 500,000 plays. The data collected reveals useful patterns in understanding news literacy and the perception of play experiences.

### 3. Data Collected

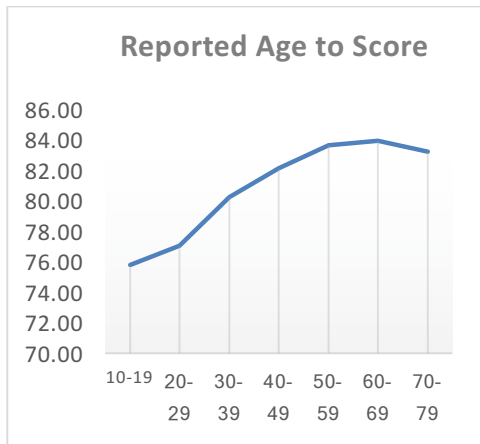
In the first 3 days of the game’s release, players reviewed more than 1.6 million articles. From 2017 to 2018 the game collected more than 450,469 unique players of at least one complete round (i.e. 5 articles in a row) . 285,640 of those players completed the game, by reviewing 15 or more articles. These players completed the game in an average of 345.52 seconds. 47,501 players completed more than 1 complete game (to as many as 20 or more repeated games). It took repeat game players 289.82 seconds on average to complete their second game. 32,534 players completed two games, 7,959 completed 3 games and 3,169 completed 4 games. Their average time playing the game were 289.82, 270.53, 263.37 second respectively.

Since players were not required to provide demographic data to play, only 45,031 players provided demographic data. Table 1 indicates the number of participants in each recorded age group. 22,490 players self-identified as males, 21,329 self-identified as female, and 1,212 self-identified as other or non-binary. 20,780 reported having achieved a bachelor’s degree, 11556 reported completed a master’s degree, and 4279 reported completing a PhD. 8,416 reported having an educational background of other, which include no post-secondary education or formal education.

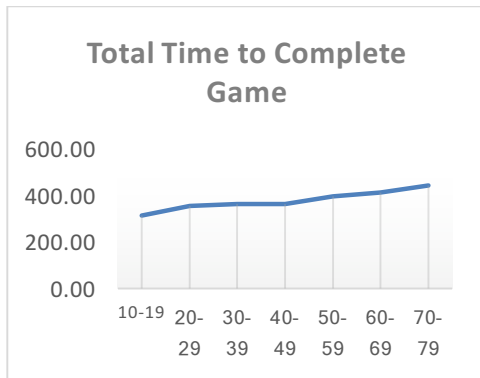
Of all players for which demographic data is available, players spent an average of 21.52 reading and deciding to swipe left or right (aka reviewing an article). They were correct 68% of the time, and relied on a hint 47% of the time. The general average time spent across all players

### 4. Analysis

The data indicates some trends that are useful to both media producers and analysts of media literacy. The largest group of players by age were 10-19 year olds. This is likely attributed to the appeal of the game in journalism classes for high school and college age students.



**Figure 3. The reported age of players on the X axis compared to their performance as final score on the Y axis.**



**Figure 4. The reported age group of players on the X axis compared to the number of seconds they spent playing the entire game.**

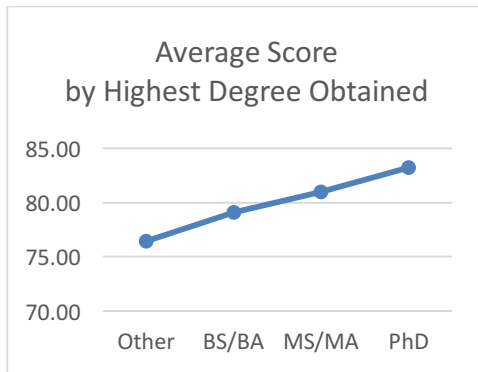
The research team has received emails from librarians, community college and university staff and faculty who use the game as an activity within their curriculum.

As indicated in figure 3, it is clear that older players generally outperformed younger players, until age 70 or higher. This is illustrated in the higher scores as player reported age increases. Likewise, younger players tended to make their decisions sooner. The spread between the fastest age group, 10-19 year olds, and the slowest age group, 70-79 was 128.73 seconds across average players. This is shown in figure 4. That reflects an average of a 8.6 seconds difference between the fastest age group to complete the game and the slowest.

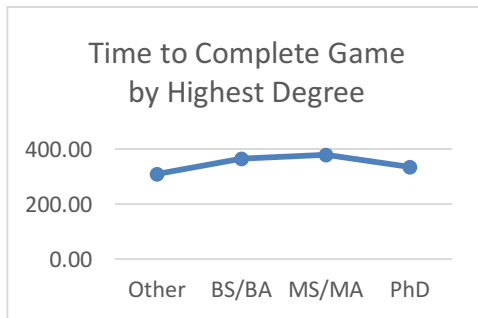
All players who provided demographic information average 345.52 seconds to complete the game. The average player typically spent 23 seconds making the decision. The 8.6 second decision time is a significant difference at this scale. It is beyond the scope of this case study to explain why the difference exists as it could be related to cognitive processing, habits or even the assumption or aversion to a playful or risk-taking behavior in evaluating each article. Simply, older people may be less prone to guessing, a relatively playful approach, than younger people. It's also important to note that there are analyses of teenage understanding of journalism which indicate specific bias for non-objective news [12]. Given the original games efforts to help players discern entertainment, opinion and advertising it is possible that those distinctions may be harder for teen players.

Education also illustrated a clear pattern. Average score by educational experience maps to a somewhat expected result. The more education a person indicated, the better their performance in the game. However, interestingly, the same linear relationship to time to complete the game did not exist. As shown in figure 6, time to complete the game plateaus in masters educated players, and declines among PhD players. Although not provable from the data collected, a reasonable hypothesis for this is PhD are perhaps the most practiced of the groups in ferreting out legitimate content, but also the least rushed. The practice of reviewing literature, noting sources and being critical is an integral part of the PhD process and may have primed this group for efficacy in the context of the game. It may be that the PhD granted individuals were more careful, slower at processing, older or a myriad of other compounding factors.

3,169 distinct players played the game 4 times, 1,523 played 5 times, and 845 played 6 times. Given the design of the game, and the limited number of articles, it is surprising that a player would elect to play for than 2-3 times. This is because with a data set of 45 articles, and 15 articles per round, players can get repeat in their second or third play. As such, it is likely that replay beyond a third game comes from instructors using the game content in classrooms, libraries and other learning environments. High repeat players are also technically hypothesized as players who share a device with other players, such as shared mobile devices amongst friends and institutions.



**Figure 5. Reported highest degree obtained on the X axis compared to average score on the Y axis (of 100 possible points).**



**Figure 3. Highest reported degree on the X axes compared to average time spent on a single game on the Y.**

## ACKNOWLEDGMENTS

The researchers acknowledge the work of Chas Brown, Joyce Rice, Cherisse Datu, Kelli Dunlap, Amy Eisman for their contribution to the redesign of the game. Special acknowledgement goes to Maggie Farley for her original concept and work in selecting and evaluating content for the game. This work was funded and supported by the Knight Foundation.

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