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Measuring Readers Flow State with a High Medium Interactivity Online News Story

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Abstract

The rapid maturation of the Internet has enabled journalists and news media companies to push the boundaries of traditional journalistic narrative by utilizing the techniques of literary journalism to integrate pictures, audio, video and other multimedia elements into interactive and immersive multimedia rich stories. These immersive stories, while aesthetically stunning, are neither easy nor cheap to create. This study uses *expectation confirmation theory* and the *theory of flow*, with uses and gratifications as an umbrella theory to examine whether individuals who read interactive stories experience higher levels of media disorientation than readers of stories presented in a traditional online story format. The study results demonstrated that medium interactivity of an online news story does not impact a participant's state of flow.

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Measuring Readers Flow State with a High Medium Interactivity Online News Story

Journalism's initial entrance into the online realm reflected a belief in the mantra, keep it short, break it up and don't forget to highlight. With improvements in new media technology, such as the advent of HTML 5 which allows for development of more interactive web pages and the ease of producing and integrating audio and video into an online story, news outlets have begun to utilize the techniques of literary journalism in developing interactive long form multimedia stories. In contrast to standard news stories, characterized by objectivity, direct language and the inverted pyramid form, literary journalism seeks to communicate facts through narrative storytelling and literary techniques (Royal & Tankard, 2004). In his book, aptly entitled *The New Journalism*, Wolfe (1973) defines four basic techniques of this new journalism, scene by scene construction, use of extended dialogue, third person point of view and the use of details symbolic of status. These types of interactive long form stories have become increasingly prevalent among online news sites, so much so that Medium co-founder Bobbie Johnson began [a Google Spreadsheet in 2013 to collect examples of these treatments](#) and as of August 2019, the spreadsheet includes close to 300 entries. Development of these stories is neither easy nor cheap. In April 2013, the *New York Times* received a Pulitzer for Snow Fall, an online interactive story about the Avalanche at Tunnel Creek. The story provided a multimedia digital experience for the reader as they moved further through the story, with images, video, maps, moving explainer graphics and image slideshows. Snow Fall took six months to report and the credits include a graphics and design team of 11, a photographer, three video people, and a physicist who was brought in to recreate the avalanche. Also, in 2013 a team at the *Tampa Bay Times* spent nine months producing The Last Voyage of the Bounty, a multimedia series about the Bounty sinking during Hurricane Sandy in 2012 (Betancourt, 2014). In addition to the time it took to develop the

online story, another major challenge was making sure it was usable for all browsers and platforms, which as one editor stated involved constant “rejigging.” For example using a static image for the mobile platform, instead of an interactive one. Despite the critical acclaim and accolades for stories like Snow Fall and The Last Voyage of the Bounty, little is known about why readers interact with these types of stories and if the increased interactivity impacts their ability to retain information about the story and their overall satisfaction of the experience. This study attempts to answer these questions through *expectation confirmation theory* and the *theory of flow*, with uses and gratifications as an umbrella theory.

Literature Review

A key component of new media literary journalism is the integration of interactivity into stories, which the Online News Association (2003) called the “hallmark of the digital medium”. Steur (1995) defined interactivity in relation to new media as, “the extent to which users can participate in modifying the form and content of a mediated environment in real time” (p. 46), however scholars have struggled to agree on a standard definition (Bordewijk & van Kamm, 1986; Rogers, 1986; Rafaeli, 1988, Rafaeli & Sudweeks, 1997; Heeter, 1989; Kiouisis, 2002).

Despite the lack of a standard definition, numerous scholars have made a distinction between types of interactivity; medium interactivity, also known as user-to-system/content activity, and human interactivity, also known as user-to-user activity (Bucy, 2004a; Lee, 2000; Outing, 1998; Stromer-Galley, 2000, 2004). Medium interactivity, which is what this study will focus on, relates to the interaction between users and technology based on the nature of the technology and what it allows users to do. Human interactivity relates to the communication between two or more users that takes place through a communication channel, for online news sites this can be commenting on a story, posting in a discussion forum or using a site’s chat

function. Deuze (2003) highlighted three types of interactivity for the design of news websites, navigational interactivity, adaptive interactivity and functional interactivity. Navigational interactivity, much like medium interactivity, allows users to navigate a site through hyperlinks and menu bars. Adaptive interactivity, a hybrid of medium and human interactivity, allows users' experiences to have consequences on site content. Functional interactivity, like human interactivity, allows users to communicate with each other. Research on news website interactivity has mostly focused on the extent to which news sites, rather than the individual news stories, offer opportunities for interactivity (Chung, 2007; Dimitrova et al., 2005; Domingo et al., 2008; Kenney et al., 2000; Massey and Luo, 2005; Oblak, 2005; Paulussen, 2004), or whether the level of interactivity has changed over time (Bucy, 2004b; Greer and Mensing, 2006; Tremayne, 2005, 2006). These studies have shown that interactivity levels have increased over time, but do not delve deeper into individual news stories and the impact the interactivity at this level has on users. The lack of data on how interactivity at the news story level impacts user retention and experience provides rationale for examining this topic further.

Another concept associated with interactivity is usability. Interactivity can impact the usability of the news stories and poor usability can discourage a reader from finishing the story or making the reader retain less information about it. Usability is defined by Nielsen (2012) as a measure of quality, essentially assessing how easy something is to use. For medium interactivity news stories, usability experts usually look at quality in terms of the interface. Nielsen (2012) also identifies usability as the part of the development process that focuses on making the interface easier to use. Usability, or how easy it is to use a site, is critical as it can influence the user's satisfaction level and belief about the credibility of the site. Zhang & von Dran (2000) found that user satisfaction of a site might lead to users spending more time on a site, revisiting

the site and even recommending it to other users. Zviran, Glezer, & Avni (2006) found that user satisfaction and loyalty to a website can create long-term relationships critical to the success of websites. Wang and Emurian (2005) also documented that poor usability undermines overall site credibility. The credibility of a news organization is one of its main selling points and poorly designed news stories which can lead to a loss of credibility, would be a cause for concern.

Unlike web design standards, such as the former standard of using a house icon to indicate the home link, which change with time and new technology, usability principles tend to remain stable. Nielsen (2012) breaks the components of usability quality into five areas:

1. Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?
2. Efficiency: Once users have learned the design; how quickly can they perform tasks?
3. Memorability: When users return to the design after a period away from it, how easily can they reestablish proficiency?
4. Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
5. Satisfaction: How pleasant is it to use the design?

The lack of research regarding the impact interactivity has had on readers at the news story level as opposed to the news site level along with the impact interactivity can have on the usability of an online site, provide an opportunity to examine these issues at more depth via this study.

Theoretical Overview

Uses and Gratifications (U&G)

Lazarsfeld and Stanton (1944) developed uses and gratifications in the 1940s as an attempt to explain the reasons people use mass media and the different types of gratification they receive from it. Gratifications, in their most basic forms, are rewards or satisfactions obtained by the individual when using a certain form of media. Researchers challenges to the behavioral beliefs that audiences consumed media without much information processing began during the late 1950s and early 1960s and uses and gratifications became a key theory in this work (Blumler, 1979; Swanson, 1979). Instead, this theory believes that the audience members take an active, not passive, role in selecting different media to meet their needs (Infante, Rancer & Womack, 1997; Lowery & De Fleur, 1983). This theory has a long history of researching the motives and selection patterns of individuals in the context of their use of new media. Early examples (Herzog 1940, 1944) focused on quiz programs and the gratifications sought from radio daytime serials, and Wolfe and Fiske (1949) looked at children's interest in comics. More recently, researchers have utilized the uses and gratifications to examine how individuals use the Internet (LaRose & Eastin, 2004; Yang, 2004).

Rubin (1986) stated two assumptions of the uses and gratifications model: (1) researchers need to understand an individuals' needs and motives for using mass media in order to comprehend the effects of the media and (2) understanding an individuals' consumption patterns will enhance understanding of media effects. An early example of applying the uses and gratifications model to type of media use was the Rubin (1983) study of television use by adults. Five reasons explaining the reason adults used television were posited by Rubin (1983): passing time, information, entertainment, companionship, and escape. Further study by Rubin (1984) identified instrumental and ritualized as two types of television viewers. Instrumental users often had a specific reason in mind when they watched TV, for instance watching the nightly news to

be informed about what was happening in the world. Ritualized users on the other hand often watched TV as a means of diversion.

Further refining the definition of an active audience, Levy and Windahl (1984) explained how the different members of an audience display different amounts of activity depending on the communication setting and the order in which it happens. Three types of audience activity when using mass media were identified: (1) pre-activity (behaviors taken in the selection of mass media content); (2) duractivity (psychological attentiveness and personal involvement in the experience); and (3) post-activity (such as discussion or reflection on the content engaged with). Further study by Levy and Windahl (1984) showed that the audience was active and self-aware about the media's ability to gratify certain psychological and social needs. Uses and gratifications has an impact on human information processing too as Garramone (1984) observed that the channel and content can impact the reasons an individual uses various media.

Additional research has demonstrated that individuals actively select news media based on a medium's ability to gratify particular motives. For example, print news media are closely associated with gratifications of information-seeking motives, while television news programs are often viewed by those with greater entertainment and escapism motives (Vincent & Basil, 1997). Research on motivations for using the Internet have developed four primary motives — information seeking, socialization, entertainment, and pastime. Yoo, (2011) observes that the four motives for Internet use do not align exactly to those of traditional news media, but they do provide a good starting point for the exploration of gratification-seeking motives in the context of these interactive long form stories, because of their broader range and owing to the commonalities with the motives identified in traditional news media studies.

Despite its long use in the research literature, the research community has a number of criticisms of uses and gratifications. Since uses and gratifications contains a number of different elements some have argued that is more of a framework than a stand alone theory. Blumler (1979) and Windahl (1981) suggest uses and gratifications is best approached as an umbrella concept encompassing several theories and Swanson (1979) added conceptual ambiguities and inconsistencies arise when viewing the model as a framework of theories. A reliance on self-reported data led Infante et al. (1997) to question the reliability and validity of the data collected. Becker (1979) states that it is difficult to define and measure gratification since it is so user centered. Becker (1979) does point that an individual who seeks a certain type of gratification from one medium will likely do the same for another medium, so gratifications do not appear to be tied to specific media. Rubin (1986) suggests an exploration into the specific links among attitudes, behavior, communication effects and motives should be the focus of uses and gratification research.

Uses and gratifications theory provides a useful umbrella from which to conduct this research. It provides a framework to understand the needs and motives an audience has for using certain types of media. Placing flow theory and expectation confirmation theory beneath the uses and gratifications umbrella has potentially significant benefits for producers of these high medium interactivity stories. These additional theories can identify the form and the content that satisfies the needs of their readers and discover whether these deeply immersive yet expensive to produce online story formats are necessary or are more of a niche offering.

Flow Theory

Originally proposed by Csikszentmihalyi (1975) after he analyzed artists and musicians at work, the concept of flow was defined as “the wholistic sensation that people feel when they

act with total involvement” (p. 43). Csikszentmihalyi’s analysis revealed that artists and musicians often became lost in their creative work, focused, yet oblivious to the world around them. Though there were no external rewards, artists expressed feelings of intense pleasure as they strove to complete their creations. Csikszentmihalyi (1975) originally argued that flow was experienced rarely in a person’s lifetime. However additional studies suggest it occurs in various daily activities, even mundane activities (Csikszentmihalyi & Csikszentmihalyi 1988; Hoffman & Novak 2009), with substantial differences in the frequency and intensity of flow experiences across individuals (Csikszentmihalyi & Csikszentmihalyi 1988; Csikszentmihalyi & Schneider 2000; Moneta 2004; Asakawa 2010).

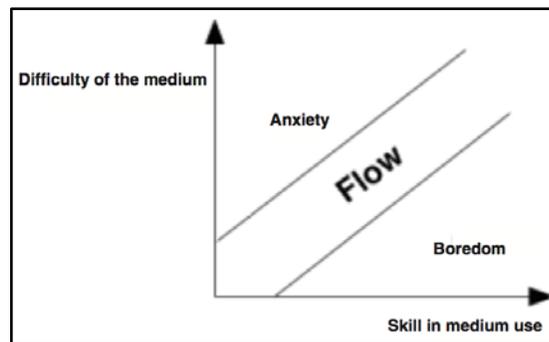


Figure 1. Flow, Anxiety, and Boredom as Function of Medium Difficulty and Skill

Source: Sherry (2004)

In order to achieve flow (or enjoyment), there must be a balance between the difficulty of the task and the skill of the participant (see Figure 1). Extremely easy tasks result in boredom, but tasks that are beyond the skill set of the participant can create anxiety and disorientation, preventing the participant from reaching the flow state. For instance, games like *Candy Crush* are easy to learn, yet they offer a number of increasing challenges as well as levels as one progresses through the game. In contrast, a board game like *The Cones of Dunshire* can be overly complicated and takes a long time to master. A simple game like *Cow Clicker* is easy to play, but offers few challenges preventing the participant from achieving a flow state. According to

Csikszentmihalyi (1993), there are four activities that are most likely to enable a flow state: (1) have concrete goals with manageable rules; (2) make it possible to adjust opportunities for action to the capabilities of the participant, (3) provide clear feedback on how the participant is doing, and (4) make concentration possible by screening out distraction.

The long history of uses and gratifications research provides a strong foundation for the argument that media use can result in a flow state. Past uses and gratifications research shows that interacting with media can provide an enjoyable experience and individuals often use media to escape and to forget, characteristics indicative of the intense focus and loss of self-consciousness required for a flow state. Individuals who use media have reported losing track of time while reading a novel, listening to music or staying up late at night to reach the next level in a video game. Finally, the entire uses and gratifications research tradition rests upon the premise that media use is, at least in part, intrinsically motivating. Individuals interact with media such as novels, movies, music, or games, which often provide opportunities to achieve flow. Message difficulty and individual usage skills are two factors that determine if the flow state is achieved and both can be applied to these non-traditionally presented and multimedia rich online stories.

One might not think that watching a television show or movie could be a difficult task. However scholars such as Bordwell & Thompson (1993) and Seiter (1987) argue that film and television have highly evolved and formal structures that most individuals easily recognize and take for granted: conventions of shot composition, editing, use of sound, and narrative structure are somewhat complex in nature. The traditional presentation format for online news stories has been rather uniform - story text in the middle, thumbnail images with captions sprinkled to the right or left of the content and recently the addition of small video snippets to the right or left of the text. Following the research of Bordwell & Thompson (1993) and Seiter (1987), online news

stories that depart from these conventions would be more difficult to read and could result in the participant not easily reaching a flow state. Based on the concepts of flow, media users find enjoyment in a balance between familiarity and freshness (but not too much freshness).

Sherry (2004) uses the example of books to prove her point that individuals can exercise different levels of usage skills within a given medium. Children progress from basic, rudimentary reading to competency to various levels of mastery. Beyond simple verbal comprehension, children learn to interpret and understand increasingly complex narratives. As they gain more experience, they develop additional mastery within a particular genre that possesses its own formal characteristics and jargon, such as science fiction, or in an area of advanced study, such as medical science. Just because an individual graduated college with a bachelor's degree does not mean they have the specialized knowledge and experience to navigate an academic journal article or the ability to understand and appreciate *Gray's Anatomy*.

The work of Bordwell & Thompson (1993), Seiter (1987) and Sherry (2004) demonstrate that users learn to expect a certain formal structure for film, television and books and if the expected structure is changed, it can impact an individual's ability to achieve a flow state. In the online medium, usability, or how easy it is to use a web site, is as critical as the formal structure for film, television and books and a site's usability can influence the individual's satisfaction level and belief about the credibility of the site. Zhang & von Dran (2000) found that user satisfaction of a site might lead to individuals spending more time on a site, revisiting the site and even recommending it to others. Zviran, Glezer, & Avni (2006) found that individual satisfaction and loyalty to a website can create long-term relationships critical to the success of websites. Wang and Emurian (2005) also documented that poor usability undermines overall site

credibility. Usability, or lack of usability can be a key factor in determining if an individual will achieve a flow state in the online environment.

Both flow and usability however are strongly connected to another concept referred to as *user expectation* which is a key concept embedded in expectation confirmation theory (ECT). “Before using an interactive product, people form expectations about what the experience of use will be like. These expectations may affect both the use of the product and users’ attitudes toward it” (Michalco, Simonsen, & Hornbæk, 2015). Expectation confirmation impacts perceived usefulness, which also influences satisfaction and the intention to continue with the experience. Also, perceived ease of use has an effect on flow, which further predicts the intention to continue with the experience (Zhou & Liu, 2014).

Expectation Confirmation Theory

Mondi et al. (2008) argue that the uses and gratifications approach is too simplistic to accurately account for the gratification sought or obtained by individuals from the media. In response to this criticism of the approach, ECT was included in this study to extend and add detail to the basic tenets of uses and gratifications. ECT is widely used in the consumer behavior literature to study consumer satisfaction and post-purchase behavior such as level of consumer complaints after an experience (Anderson and Sullivan, 1993; Dabholkar et al., 2000; Oliver, 1980; Patterson et al., 1997; Tse and Wilton, 1988). The predictive ability of this theory has been demonstrated in a variety of contexts, including automobile repurchase (Oliver, 1993), camcorder repurchase (Spreng et al., 1996), institutional repurchase of photographic products (Dabholkar et al., 2000) restaurant service (Swan and Trawick, 1981), and business professional services (Patterson et al., 1997). While focused on consumer satisfaction when engaging in the purchase of an item, the theory is still relevant in this context even though readers of the online

news story aren't "paying" for it. Just as consumers who have a poor purchase experience are less likely to repurchase an item, someone who has a poor experience with an online news story would be less likely to return to the news site and view additional stories.

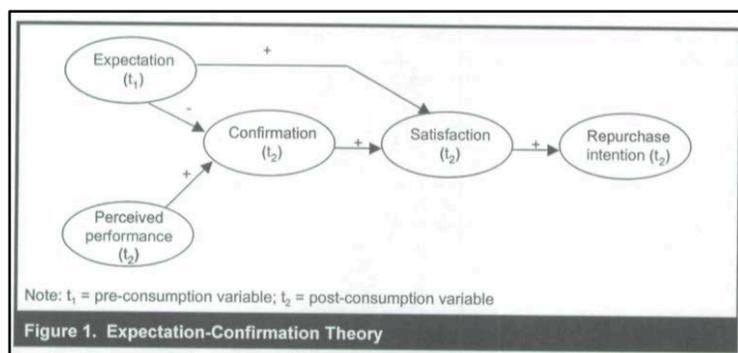


Figure 2. Expectation-Confirmation Theory

Source: Bhattacharjee (2001)

Oliver (1980) originally proposed the ECT framework, the key constructs and relationships of which are illustrated in Figure 2. First, consumers form an initial expectation of a specific product or service prior to purchase. Second, they accept and use that product or service. Following a period of initial consumption, they form perceptions about its performance. Third, they assess its perceived performance based on their original expectation and determine the extent to which their expectation is confirmed. Fourth, they form a satisfaction, or affect, based on their confirmation level and expectation on which that confirmation was based. Finally, satisfied consumers form a repurchase intention, while dissatisfied users discontinue its future use.

Satisfaction is viewed as the key to building and retaining a loyal base of long-term consumers. Research using the ECT theory demonstrates that that consumers' intention to repurchases a product or continue use of a service is influenced primarily by their satisfaction with the prior use of the product or service (Anderson and Sullivan 1993; Oliver 1980,1993).

Locke (1976, 1300) initially defined satisfaction in the context of job performance as "a pleasurable or positive emotional state resulting from the appraisal of one's job." Oliver (1981, p. 29) expanded this definition to the consumption context as "the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience." Both definitions focus on the psychological state related to and resulting from a cognitive appraisal of the expectation performance discrepancy (confirmation). As shown in Figure 2, confirmation is inversely related to expectation and directly related to perceived performance. A parallel to online news sites can be drawn from studies done in the field of online learning and student's expectations and the impact that has on their satisfaction and continuance intention. In online learning sites, much like online news sites, usability, perceived quality and perceived value play a role. Prior studies in online learning argue that student's perception of the salient attributes of the online learning service is an important determinant of satisfaction and that perceived usability, perceived quality and perceived value had significant effects on satisfaction, which in turn was a strong predictor of users' continuance intention (Hsu and Chiu 2004, Chiu et al. 2005, Mondri et al. 2008). The study results imply that gaining an understanding of what usability, quality, and value mean to readers offers the promise of establishing long-term user relationships, which is one of the goals of these interactive news stories.

However, the use of satisfaction as a construct is one of the criticisms of ECT as studies have presented varying and conflicting conceptualizations of satisfaction (Yi, 1990). Some researchers view satisfaction as synonymous with attitude and emotion, because all three constructs connote affect (LaTour and Peat, 1979). However, satisfaction is conceptually distinct from attitude in that satisfaction is a transient, experience-specific affect, while attitude is a

relatively more enduring affect transcending all prior experiences (Oliver, 1980). Tse and Wilton (1988) demonstrate that satisfaction and attitude differ in their predictive abilities, while Oliver (1980) observes that satisfaction temporally and causally precedes post-purchase attitude in the ECT model. Furthermore, Hunt (1977) argues that attitude is an emotion (e.g., pleasure), but satisfaction is an evaluation of that emotion (i.e., whether an experience was as pleasurable as expected). One may have a pleasant experience with a product or service, but still feel dissatisfied if it is below expectation.

A decision by a reader of online news sites to continue visiting the site is similar to consumers repurchase decision because both decisions (1) follow an initial (acceptance or purchase) decision, (2) are influenced by the initial use or experience of the online news story, and (3) can potentially lead to a change in initial thought about the product after the experience. Though the continuance decision for reading an online news story does not impose a direct monetary cost there is still a time cost by interacting with the online news story. Therefore, readers most likely go through a non-trivial decision process, similar to that in ECT, prior to making an informed decision choice. Since ECT postulates future use of similar online news stories is determined primarily by the reader's satisfaction with prior online story use, this theory is a good framework to include as part of this study.

Research Question and Hypotheses

The aim of the study is to assess the impact that medium interactivity in an online news story has on the reader's state of flow. Also, the effects that the components of these stories have on the reader's flow and their sense of confusion, disorientation and immersion, are explored with the help of the following research question:

RQ1: What impact does medium interactivity of an online news story have on a reader's state of flow?

Interactive features may be responsible for giving online news sites their “stickiness,” or increase the enjoyment of the experience. However, these features could also make the activity more effortful and confuse or overload the user with technical demands, unclear navigation requirements and reduce the reader’s likelihood of achieving flow. These issues could impair the user's original expectation from the experience and prevent the state of flow from being reached, leading to the following hypothesis:

H1: Medium interactivity in an online news story will negatively affect the state of flow achieved by a reader.

Unlike traditional media, online news media environments place an additional burden on a reader because the reader, not the content producer, controls the way in which the story is being navigated. Research has demonstrated that neither prior web experience nor the amount of time spent online reduces the proportion of processing devoted to this decision-making, or orientation (Eveland & Dunwoody, 2000). The additional cognitive load necessitated by these stories with medium interactivity lead to the following research questions:

RQ1: What is the relationship between expectation of medium interactivity and reader’s level of satisfaction?

RQ2: What is the relationship between expectation of medium interactivity and a reader’s level of flow?

RQ3: What is the relationship between level of disorientation of medium interactivity and a reader’s knowledge retention of the story’s content?

Method

Participants were randomly assigned to the same new story in either a high medium interactivity format (n=94) or a traditional format (n=113) i.e. text in the middle with thumbnails of images and videos sprinkled throughout the text in either the right or left hand margin. Despite there being a number of high medium interactivity stories available, selecting one was not simple or easy. Since studies have demonstrated that people remember strongly emotionalized stories (Burke, Heuer, & Reisberg, 1992; Hashemi, 2014) better than neutral stories and emotions can impact the information processing of a reader (Kühne & Schemer, 2015; Lecheler, Schuck, & de Vreese, 2013), a story which didn't invoke an emotional response or impact information processing needed to be selected to avoid impacting the participant's response. After examining the list of Snow Fall type stories from the list curated by Medium co-founder Bobbie Johnson, [a Guardian story about a wildfire, which destroyed much of the town of Dunalley](#), was selected as it did not involve a controversial topic and no one died.

The survey was developed using Qualtrics and participants were recruited using the Qualtrics Online Sample service. While participants were randomly assigned to one of the two story types, both groups were given the same scenario: You will be attending a social gathering this evening. It is a birthday party for a friend being held at a local restaurant. You do not know many of the guests in attendance. There has been a story trending on Twitter and Facebook and you know people will be discussing it at the party. Before getting ready for the party you decide to look at the story so you have enough information about it to discuss with the other guests. You will now browse the story for the next 20 minutes to develop talking points for the party. Read the story, then answer the questions on the following pages of the survey.

Prior to reading the high medium interactivity story, participants were given expectancy-value questions as well as gratification items similar to those used in prior online news studies, to measure the participants gratification sought level (Yoo, 2011). The items were prefaced by the statement “What would you expect out of an online interactive news story. Below are some expectations other people have given. Please indicate how much that expectation applies to you by clicking a corresponding radio button.” Respondents would then read each statement and answer on a 7-point Likert-type scale ranging from strongly agree to strongly disagree. Subjects who viewed the traditional online news story format were given this series of questions after they had viewed their version of the story.

After viewing either story, each participant completed a nonlinear media disorientation assessment scale adapted from a similar scale developed by Beasley and Waugh (1995). Subjects then completed psychometric scales adapted from Aranyl and van Schalk (2015) for both the content and presentation of the story followed by a user engagement scale, adapted from O’Brien and Cairns (2015) which captured the subject’s reaction to the story using experience. Finally, participants were asked 10 content questions about the story to check the knowledge and retention gained. Seven of the questions were asked to all participants and three were randomly assigned from a set of 18 questions. Questions were simple enough to be answered in a multiple choice format and covered content in both the text and videos of the story.

Results

A computer analysis, using the Statistical Package for the Social Sciences (SPSS), revealed the following. A one-way analysis of variance (ANOVA) was calculated on the participants' mean media disorientation score. The analysis was not significant, $F(1, 80) = 4.11, p$

= .522. The participants exposed to the high medium interactivity story (N=94) had a mean score of 3.44 as opposed to 3.37 for the participants (N=113) exposed to the traditional story.

A linear regression was performed to analyze RQ1 regarding the relationship between expectation of medium interactivity and readers level of satisfaction. A positive relationship ($B=.424, p<.000$) was shown for readers exposed to the traditional news story. A positive relationship ($B=.902, p<.000$) was also shown for participants exposed to the high medium interactivity story. To address RQ2 regarding the relationship between expectation of medium interactivity and a reader's flow state a linear regression was performed. A positive relationship ($B=.395, p<.000$) was shown for readers exposed to the traditional news story. A positive relationship ($B=.809, p<.000$) was also shown for participants exposed to the high medium interactivity story. A final linear regression was performed to analyze RQ3 regarding whether media disorientation was associated with a participant's knowledge retention of the story's content. The result was not significant ($B=.024, p<.819$).

Discussion

The current study investigated the extent to which the interactivity of an online news story impacted participants' level of media disorientation and participants expectation of medium interactivity had on their level of satisfaction, state of flow and knowledge retention of the story. The data revealed that those exposed to the high medium interactivity story had less media disorientation than those exposed to a traditional online news story. Examination of user experience with the stories revealed there was not a statistically significant result in participant's state of flow between those who viewed the high medium interactive story compared to those who had viewed the traditional online news story.

Much like the former standard of using a house icon to indicate the home link has changed with new technology and design standards, reader's experiences with online news stories have changed too. It may be that readers have grown accustomed to seeing some of the features of high medium interactivity stories in their other web experiences and it has been incorporated into their web use schema. The high level of education for the participants, with 55% of the participants having completed an associate degree or higher, may also play a role in the better media disorientation scores owing to higher digital literacy skills.

The results of the first pair of linear regressions demonstrated that if participants expected to see elements of a high medium interactive story they were more likely to have a higher state of satisfaction and better state of flow. Prior studies in online learning argue that student's perception of the salient attributes of the online learning service is an important determinant of satisfaction and that perceived usability, perceived quality and perceived value had significant effects on satisfaction, which in turn was a strong predictor of users' continuance intention (Hsu and Chiu 2004, Chiu et al. 2005, Mondri et al. 2008). The results from this study demonstrate the same can be said for online news stories, if usability and perceived quality are high, reader's level of satisfaction will be high as well.

Research by Bordwell & Thompson (1993), Seiter (1987) and Sherry (2004) demonstrate that users learn to expect a certain formal structure for film, television and books and if the expected structure is changed, it can impact an individual's ability to achieve a flow state. In the online medium, usability, or how easy it is to use a web site, is as critical as the formal structure for film, television and books and a site's usability can influence the individual's satisfaction level and belief about the credibility of the site. Zhang & von Dran (2000) found that individual's satisfaction of a site might lead to spending more time on a site, revisiting the site

and even recommending it to others. Wang and Emurian (2005) also documented that poor usability undermines overall site credibility. Usability, or lack of usability can be a key factor in determining if an individual will achieve a flow state in the online environment. By readers' having a certain expectation of elements of high medium interactive online news stories, just like a certain structure is expected of a film or book, it can help impact and encourage achieving an optimal flow state.

The not significant result of a participant's lower level of medium interactivity being positively associated with a participant's knowledge retention of the story's content can be related to the scenario participants were given. In the scenario, they were told they would be attending a social gathering that evening with many guests in attendance they would not know. They were asked to look at a story that had been trending on Twitter and Facebook for 20 minutes before getting ready for the party. Offering this scenario could have led to participants making a cursory scan of the story, perhaps only watching a few of the videos and jumping to different parts of the story instead of spending more time on the story and its contents.

Limitations

Some limitations of this research should drive further investigations. For example, the small sample size limits the ability to generalize these findings to the general populace. With services such as Qualtrics Online Sample, it is possible to achieve access to a larger sample size if sufficient funding is available. The story selected was meant to not trigger a highly emotional response, however studies have demonstrated that people remember strongly emotionalized stories (Burke, Heuer, & Reisberg, 1992; Hashemi, 2014) better than neutral stories and emotions can impact the information processing of a reader (Kühne & Schemer, 2015; Lecheler,

Schuck, & de Vreese, 2013). Would these results be replicable if the story was strongly emotionalized or addressed a highly controversial topic such as immigration or gun control. The use of web analytics such as time spent on page and what items are clicked on are a passive way to reconstruct a reader's web session and how they are navigating a web page. Several previous efforts to reconstruct the web user session and preferences during web site navigation have been realized (Zhang & Ghorbani, 2004; Román et al., 2014; Arce et al., 2014), but always from the approximation point of view, i.e., without being clear about the set of web objects visited, sequence, time spent, etc. This study related on self reported data by participants of their experiences with the web content and their mental state while experiencing the story. While this data is more insightful than web analytics, as Chan (2009) highlights, there are various measurement errors and limitations of self reported data such as various human cognitive and affective processes involved in interpreting and responding to question items based on language comprehension, information processing and motivation. As neuroscience technology continues to improve, future studies may look to rely on eye tracking and electroencephalogram (EEG) to get a more accurate and unbiased assessment of participant's behavior. Dimpfel and Morys (2014) used a combination of eye-tracking and EEG to perform an objective assessment of five commercial Web sites. The eye-tracking device tracked gaze movements, while diverse quantitative features were obtained from the EEG. These features tried to measure users' attention and activation and then these reactions were compared with a typical survey. The results showed that the use of EEG features could be helpful in web site analysis. Additionally, the work of Amaral et al. (2013) aimed to establish a relationship between EEG signals and the users' opinion about the usability of some Facebook privacy features.

Ethical Considerations

Journalism schools teach students to write in a style largely devoid of description and to focus on facts and objectivity (Schudson, 2001). The move to online journalism opens up a whole new world of reporting possibilities such as interactive graphics, videos, animations and immersive virtual reality experiences. These new storytelling tools can easily create strong emotional responses in the reader which, if used inappropriately, can lead to manipulation of the reader. This is not a new issue as McEntee, Coleman and Yaschur (2017) discuss the use of vivid writing in persuasive communication campaigns to manipulate the emotions of readers to the message of a campaign.

Scholars have described vivid writing as descriptive writing that highlights human qualities and uses high imagery language to help readers create a picture in their minds of what is being described. (Cupchik, Leonard, Axelrad, & Kalin, 1998; Kurby, Britt, & Magliano, 2005). Studies have described readers weighing vivid writing more heavily when making judgements (Taylor & Thompson, 1982) and improving readers recall of story elements and also creating strong emotions that persuade the reader (David & Kang, 1998; Keller & Block, 1997; Nisbett & Ross, 1980). Retention of vivid information has been shown to be higher in environments that have distractions or when a reader's attention is low, conditions that are common when individuals are consuming media on mobile devices (McEntee, Coleman and Yaschur, 2017). Vivid writing combined with photographs can shape information processing and impact a reader's judgement since visual and verbal systems are combined to increase the impact of the message being shared (Pavio, 1979).

Online multimedia storytelling has the potential to be even more immersive than the vivid writing and photography in the previously discussed studies. As journalists move into this new realm of storytelling it will be important to consider the ethical implications of developing

these immersive stories and to ensure they are not developed in a way that intentionally (or unintentionally) manipulates the readers of these stories to favor a certain viewpoint or experience. Cox (2017) writes of her experience teaching immersive journalism to the next generation of journalists and how the four tenets of the Society of Professional Journalists Code of Ethics is tailored to traditional reporters and does not offer clear guidance for immersive journalists developing stories whose multimedia format do not fit neatly into any of the four tenets.

Application to Practice

The results of this study revealed there was not a statistically significant result in participant's state of flow between those who viewed the high medium interactive story compared to those who had viewed the traditional online news story. While this finding might discourage journalists from investing the amount of resources needed to develop high medium interactive online news stories, it is possible that the result is a harbinger of the audiences journey to an increased understanding and acceptance of the high medium interactive online news stories becoming the standard format in online journalism.

Software studies is a nascent field that examines the social and cultural effects of software and posits that one needs to move away from seeing software applications, platforms and infrastructure as 'neutral' tools but instead view software as something that has agency and through its design and implementation dictates how users interact with it (Fuller 2008, Kitchin & Dodge 2011). Manovich (2013) expands on this notion with an example of cut, copy and paste; features ubiquitous in software, and how it encourages a particular way of working with the software and the way a user engages in their workflow with that software. The authoring parameters of a software tool also lead the end user of the tool's product to become acculturated

to a certain way of interacting with it. For example Timeline, a web based timeline development tool, only has a set number of parameters to determine the look and feel of the finished product. As more organizations use this tool to develop content, their audience becomes accustomed to the look and feel and get familiar with and begin to expect it every time they view an online timeline (Hight, 2017).

Just as users of online news sites have become accustomed to social media icons to share stories with friends and the ability to leave comments on stories users are growing accustomed to seeing some of the features of high medium interactivity stories in their other web experiences and it has been incorporated into their web use schema. The results of this study demonstrated that if participants expected to see elements of a high medium interactive story they were more likely to have a higher state of satisfaction and better state of flow. Prior studies in online learning argue that student's perception of the salient attributes of the online learning service is an important determinant of satisfaction and that perceived usability, perceived quality and perceived value had significant effects on satisfaction, which in turn was a strong predictor of users' continuance intention (Hsu and Chiu 2004, Chiu et al. 2005, Mondri et al. 2008). The results from this study demonstrate the same can be said for online news stories, if usability and perceived quality are high, participant's level of satisfaction will be high as well. The advent of tools such as Shorthand, Vev and Steller are making it easier for journalists to create high medium interactive stories without the need for computer or web programming experience. The results of this study demonstrate that the audience will not be negatively impacted by the features in this new method of storytelling and should encourage journalists to dip a toe into this new pool of creative storytelling potential.

Conclusion

The creation of new development tools such as Shorthand, Vev and Steller now allow journalists and news organizations to develop highly interactive long form stories without the need for advanced programming skills. News organizations are also starting to see an increase in popularity of long form interactive news stories by their readers. Dan Shewan (2017), a producer at WordStream, an online advertising firm, wrote how news sites such as Quartz have embraced long form online stories as they have been shown to increase user engagement and time spent on stories. He even documents his own company's experience stating that one of their longest stories, "Find Your Old Tweets: How to See Your First (Worst?) Tweet," has been their most successful. Despite its over 2,300 words, it has been viewed over 100,000 times with an average time on page of almost 8 minutes. While a larger study should be pursued, incorporating the use of tools such as eye tracking and EEG, to assist in verifying the results of this study, initial results seem to suggest that developing high medium interactivity stories is neither a waste of time or money and may in fact be the future of online journalism.

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