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## News in Virtual Reality

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News in Virtual Reality

Samantha K. Macy

Western Michigan University

## Abstract

## News in Virtual Reality

## Abstract

Virtual reality (VR) is the next frontier of news media, but we know little about the impact it has on viewers. The goal of this experiment is to gain a better understanding of the social presence and information retained by watching news in VR. Participants will either consume news in a VR setting, a highly interactive online format, or print. Then, using a survey, social presence and information retention were assessed. Research participants were undergraduate students at a large Midwestern university. It is expected that VR news will result in higher social presence and information retention than news in highly interactive online or print formats. Results indicated that measures of social presence were not reliable, and that VR resulted in significantly higher credibility than the print format.

*H<sub>1</sub>: News in virtual reality will result in higher social presence than highly interactive online news or print formats.*

*H<sub>2</sub>: News in virtual reality will result in higher credibility than highly interactive online news or print formats.*

### **News in Virtual Reality**

VR is the newest frontier in digital journalism, and it offers endless possibilities.

However, we know very little about the details of how VR impacts viewers differently than more conventional news formats. Recent advancements in VR have made it practical to tell a wide variety of stories in VR, and the use of VR will grow rapidly. The goal of this research is to gain a better understanding of how news in VR differs from online text-based and interactive formats.

As editor-in-chief of the *Western Herald* and avid consumer of news, I'm interested in the ever-changing state of new media. I want to find out how the newest technology works, and how we can use it optimally to tell stories in the most accurate and unbiased way possible. I'm also concerned about the persuasive possibilities of VR news. Can it create a stronger emotional argument than traditional media? If so, what can we do to create VR news content that shares news in an unbiased fashion?

VR technologies use video and motion sensors to create a simulation of a physical presence in the real world or an imagined world. VR creates a mediated experience of presence, similar to the way in which telecommunications technologies create mediated communication. VR has been applied most often to video games, but it can be used to create a wide variety of media types.

The *New York Times* experimented with distributing Google Cardboard headsets to their subscribers in November 2015 (Hare, 2015). This was the first time a mainstream news outlet embraced news in VR on a large scale. This VR news experience was made accessible by the innovation of Google Cardboard, an inexpensive VR system that uses a cell phone application

with a cardboard headset to create a VR experience. This research used *New York Times* news content to compare the experiences of VR news to interactive and text-based online formats.

This research is applicable to journalists and organizations that produce news, to help them better understand how viewers react to and retain information from news in VR, and create effective VR news experiences. It will also be useful for those who consume news and want to understand how VR news may impact them, in comparison to other formats.

### **History of VR**

Ken Hillis writes that VR represents an ongoing motivation to alter conceptions of space, that VR is the result of desire to have disembodied, alienated experiences, and a desire for cybernetic transcendence (1990). VR, therefore, can be understood as a “machine to realize such desires for bodily transcendence” (Hillis, 1990, p. 43). Hillis believes that this is a pervasive cultural longing that propels advancement in VR. Hillis also points to flight simulators, which first became effective in the 1960’s, as early VR. Flight simulators mimicked the cockpit of an aircraft and used pneumatic devices to approximate the sensation of flying. A screen portrayed what a pilot would see in a cockpit, but until more complex algorithms were invented, the simulations were inadequate.

VR can be traced to academic ideas of cyberspace in the 1990’s, when scholars speculated that cyberspace would be a place where users would go to interact with others (Hillis, 1999). In the early 1990’s VR technology existed, but here were constraints to the technology that prevented VR technology from being widely adopted. Heavy headsets and cords that got wrapped around a user's legs served as a reminder of the mediation of VR, thereby preventing presence (Wexelblat, 1993, p. 12). VR generated a great deal of excitement, but applications for

it were not yet clear. In the mid 1990's, the first attempts at applying VR technology to video games became possible, with Nintendo's VirtualBoy and Ultra64. In that era, Sega and Hasbro also initiated VR projects, but did not bring them to market. Over the past 20 years, VR has made vast improvements, both in technology becoming more advanced and less expensive, thereby accessible to a wider audience.

### **Current VR Technology**

The primary consumer-level VR technology currently on the market is the Oculus Rift, which is targeted to gaming (<https://www.oculus.com/>). The system consists of the Rift, a headset attached to a computer, with Constellation, a tracking system that uses LEDs to communicate the movements of the Rift back to the computer. Integrated headphones and 3D audio effects add to the depth of the experience.

The Gear VR headset connects to the Samsung Galaxy phone, allows users to navigate in a VR environment with the motion of the headset, along with a touch pad on the headset. Similar products include the Zeiss VR ONE and the Freefly. The Google Cardboard headset is the most basic VR option. It's a cardboard headset with lenses that holds a cell phone close to the user's face, while a 360° video plays on the phone. As the cheapest option, the Google Cardboard is the most accessible to the widest audience. When creating VR videos, journalists may assume that the majority of their audience is watching on the Google Cardboard or similar devices. The Google Cardboard does not create an experience that is seamless to the extent that the Oculus Rift does. Most VR news content is in the form of 360° degree video, which can be filmed with cameras like the Ricoh Theta, the Bublcam, and the 360fly. These are all devices that have

multiple cameras facing in different directions. Video from all of the cameras is stitched together using software, usually in the form of a smartphone app.

### **Potential Uses of VR**

VR has a wide variety of applications, from entertainment to therapy. Much of the current VR technology was developed for use in video games. This study focused on the journalistic applications of VR technology. In a journalistic context, VR is most likely to be useful in telling stories that appeal to emotion, lend themselves to visual argument, and in sharing stories that occur in an environment that is distinctly different from that in which the audience resides. VR is less useful in data journalism or stories heavily focused on documents. Additionally, VR may be better applied to feature stories than straight news stories.

### **Potential Problems in VR**

Because of the immersive nature of VR, it is possible that viewers may not be critical of bias in journalism to the degree that they are in more conventional formats. In print media, information may feel less immediate, thereby more open to questioning. In the context of virtual reality, there is little space to tell multiple angles of a story. It's a fully immersive experience, which is likely to be more disturbing to viewers than other forms of media.

### **Interactivity in News**

To understand news in VR, it is important to understand other ways that news engages with viewers, beyond a one way, newspaper-type experience. "Traditional media provided the information for the audience who merely consumed the information, such as in television. However, with new media, notably the internet, the audience can make active choices in the kinds of information they wish to consume. They can become involved users of information.

News stories can be experienced through multiple channels, through video, audio, and multimedia galleries - whichever the user finds interesting” (Chung, 2008).

The introduction of interactivity and the internet fundamentally changes the one-way flow of news and allows users to participate in the production of information. It transforms traditional journalism through online news. This brings up a variety of other questions, such as: How much do news audiences engage with interactivity? Who engages with interactivity? Where does civic journalism stand now that we have interactive engagement with newsrooms and communities (Chung, 2008)?

In a media system where journalists and readers have Twitter accounts, and every article has a comments section, dialogue between readers and journalists becomes a valuable part of the news experience. Interactivity is the conversational ideal. Some features are medium interactivity, the technology allows users to exert control and is considered a lower level of interactivity. Medium interactivity are things like send-article-to-friend options, audio and video downloads, and photo galleries (Chung, 2008). Visual images mediated through the Web are no longer static—increasingly, they are offered as an interactive experience that invites and requires user assent and participation (Usher, 2009). This changes the discourse, but that discourse happens through individualized experiences.

### **Background on Presence**

Presence is key in VR differentiating between existing in a virtual environment and watching a 3D movie. The International Society for Presence Research defines presence as a “psychological state in which even though part or all of an individual’s current experience is generated by and/or filtered through human-made technology, part or all of the individual’s



perception fails to accurately acknowledge the role of the technology in the experience” (<https://ispr.info/>, 2000). In other words, we experience presence when we have are using technology and cease to understand how much of our experience is created by technology.

Riva goes on to distinguish between presence and social presence, with “presence” defined as “the non-mediated (prereflexive) perception of successfully transforming intentions in action (enaction) within an external world.” And “social presence” as “the non-mediated perception of an enacting other (I can recognize his/her intentions) within an external world” (Riva, 2009, p. 160). Riva wrote that virtual reality should focus on simulating as closely as possible the experience that humans experience in perceiving the natural world, calling this perspective ingenuous realism.

A more classical definition of presence is Lombard and Ditton’s 2006 definition, the “perceptual illusion of non-mediation” (Lombard & Ditton, 2006, p. 0) This definition does not mention intention, merely the sense that an experience is non-mediated. Presence is defined as the feeling of existing in a virtual environment, and social presence is the feeling of existing in a virtual environment with others. Presence is dependent upon a variety of factors, including social richness and realism. Presence can also be defined as non-mediation, the perception that despite mediated state, the experience is not mediated. (Schuemie, 2001) Much of the existing research on presence includes action, showing that presence is somewhat dependent on action. Users experiencing VR generally feel present in environments where they can take action. (Riva, 2009) In VR news environments, users can feel as though they exist in virtual environments, but they are observers and cannot take action. This research will examine presence in the absence of action.

## Methodology

Using an experiment, I studied participants' ratings of social presence in VR settings and their intention to act on the issues depicted in the news piece. I used a story from the New York Times for each condition, and administered a survey to assess participant experiences. I expected that VR news would result in higher social presence and credibility than news in interactive online or print formats. It is also expected that VR news would result in lower social presence than VR experiences in which a user can take action in the virtual environment.

*H1: News in virtual reality will result in higher social presence than interactive online news or print formats.*

*H2: News in virtual reality will result in higher intention to act than interactive online news or print formats.*

## Participants

The sample was composed of 52 undergraduate students enrolled in a large Midwestern university. Thirty-eight percent ( $n = 20$ ) of participants were male, whereas 61.5% were female. A majority (63.5%,  $n = 33$ ) identified as Caucasian, followed by African-American (23.1%,  $n = 12$ ), and Hispanic (5.8%,  $n = 3$ ). Their ages ranged from 18 to 34 years, with a mean of 21.13 ( $SD = 2.635$ ) and a median of 21 years. The largest percentage of participants classified as juniors (40.4%,  $n = 21$ ), followed by sophomores (26.9%,  $n = 14$ ), seniors (21.2%,  $n = 11$ ), and first years (11.5%,  $n = 6$ ).

Participants were recruited through the School of Communication's SONA tool, from COM 1000 and COM 2010 classes. They received class credit for their participation, but were not compensated in any other way.

## **Apparatus**

The VR tools used were the Samsung Galaxy S7 and the VR Box. Initially, I planned to use the Gear VR headset connected to the Samsung Galaxy S7. However, when I tested the technology, I realized that the Gear VR headset has to be used with the Gear VR app, which is not compatible with the NYT VR app. Because of this unexpected complication, I used the VR Box headset instead.

## **Procedure**

After participants provided informed consent, they were either given an iPad with the print or interactive conditions, or a VR headset to wear, depending on their randomly assigned condition. After the stimulus material was administered, they were asked to respond with a survey about their experience. When they finished the survey, they were thanked for their participation and debriefed with a message explaining that some conditions had been manipulated. Please see Appendix A for news stimuli and survey items.

## **Instrumentation**

The independent variable was the medium of news participants were exposed to, either print or interactive, each shown on an iPad, or VR, shown in the VR Box headset. The VR condition used “The Displaced” a VR news experience in the *NYTVR* application. This was chosen because it was the first piece of content that was provided with the *NYTVR* app. The content focuses on children who are refugees, an issue that most participants would be aware of, but not necessarily have a detailed understanding.

Data will be analyzed using a variety of research measures, including an adapted social presence scale (Short, Williams, & Christie, 1976) which included statements like “I feel

connected to the subjects of the news content” and “the news content I viewed was impersonal” which participants responded to with a Likert Scale.

The print and interactive conditions were fabricated through the use of tumblr pages and content copied and compiled from various *New York Times* news articles. *The New York Times* published extensive articles detailing the experiences of three different refugee children, each of whom were shown in “The Displaced.” These articles were published as a series, with several pictures of each child and the environment they’ve been displaced to. From each of these articles, I copied the text, compiled them, then edited them down to create one article that followed the same sequence that the VR experience followed. In the interactive condition, I added a series of animated gifs that I created, using screenshots from the VR content.

Dependent variables were the responses to the survey, which included measures of social presence, intended action, perceived quality of the content, perceived learning, and comfort with the content.

### **Experiment Details**

For the print and interactive conditions, I used an iPad and two tumblr pages. The tumblr pages were compiled from online articles from the *New York Times*, edited to be more concise. The text was the same in the interactive and print conditions, but the interactive condition featured gifs, made from the NYT VR content. For the VR condition, a Samsung Galaxy S7 was used, showing the NYT VR content, “The Displaced” along with a VR Box Headset.

### **Results**

In order to test the hypothesis that news in VR results in higher social presence than interactive online or print news, participants responded to survey questions about impersonal

qualities of the news content. Therefore, one-way analysis of variance (ANOVA) was conducted. The ANOVA was significant,  $F(2, 49) = 1.003$ ,  $p < .05$ . Post hoc tests using Fisher's LSD were conducted to evaluate pairwise differences among the means.

In order to test the hypothesis that news in VR results in higher intention to act than interactive online or print news, Cronbach's Alpha was tested, which returned a result of .759, meaning that the scale was a reliable measure. Therefore, a one-way analysis of variance (ANOVA) was conducted. The ANOVA was significant,  $F(2, 49) = 5.304$ ,  $p < .05$ . Post hoc tests using Fisher's LSD were conducted to evaluate pairwise differences among the means.

### Discussion

A one-way analysis of variance (ANOVA) was conducted on many other variables tested, including credibility, importance of the content, impersonal qualities of the content, desire to discuss the content, interest in learning more about the content, and belief that the topic of the content is important. Because credibility was based on a combination of perceived importance of content, quality of content, and perceived importance of the issue, Cronbach's Alpha was calculated and found to be .685, meaning that the measure was reliable.

DV	VR Mean	Print Mean	Mean Difference (I-J)
Credibility	13.632	9.82	-1.867
Importance of content	4.63	3.82	.808
Desire to discuss	4.00	3.00	1.000
Interest in learning	4.00	3.35	.647
Importance of topic	4.68	4.24	.449

Participants in the VR news condition reported that they perceived the content to be significantly more credible when compared to participants in the print condition. Participants in the VR condition responded significantly more that the content was important when compared to participants in the print condition. Participants in the VR condition responded significantly more that they were interested in discussing the content and learning more about the content when compared to participants in the print condition. Participants in the VR condition also believed that the topic of the content was important significantly more when compared to participants in the print condition.

This study was limited by the relatively small sample size, and by the quality of the interactive and print conditions. In future studies, I would like to dig deeper into the issue of presence in VR, and further investigate bias. Presence is vital in VR, but I didn't delve very deeply into it. I think a whole study could be conducted to compare presence across different types of VR content, and using different VR technologies. I did not find any significant difference in the level of bias between conditions, which is interesting in itself. I think that people may be fail to be critical of media experiences in VR, and may not notice bias in VR news. Further experiments focusing on bias could be conducted by using biased news articles and VR content, then comparing perceptions of bias by participants. I am also interested in further research on the way VR content causes users to feel distressed or disturbed, and how that may differ from other formats of news.

An area that has minimal research is the normalization of VR. As VR becomes more common, it will no longer be a novel experience for most users. It seems as though this would

change viewer perceptions of VR news, but I'm unsure of how that change in perceptions might play out, and I am interested in researching it more.

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## Appendix A

### Stimulus material

#### VR



#### Interactive

##### The Displaced

Chuol was only 5 in 2011, the year South Sudan, after decades of war, became the world's newest nation. He was living with his parents, grandparents and other relatives in a village near the city of Leer, not yet old enough to understand the hope and joy sweeping through the small East African country.



One night in May, the fighting came to Chuol's village.

For weeks, he and his grandmother swam and waded through snake-infested waters, dodging crocodiles, eating little more than grass. Chuol was constantly afraid that he might die.

If a soldier did not kill him, he thought, an animal surely would.



“We would swim for so long until we could swim no more,” he recalled. “But we could sometimes still hear the gunfire and needed to keep moving. So we pulled ourselves along by the reeds.”

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Oleg Teryokhin was living with his mother and father in Nikishino, a rural village of fewer than 1,000 coal miners, farmers and their families in eastern Ukraine, when fighting broke out in April 2014. Hastily formed separatist militias, goaded and armed by Moscow, rose up in a rebellion against a new, pro-Western government in Kiev. In the first months of the conflict, the fighting was far from Nikishino, and Oleg, then 10, spent the early summer tearing about the village on his bicycle, zipping past its old brick cottages and apricot orchards. Then, in July, scorched scraps of clothing and bits of paper with foreign writing blew through the village — debris from the crash of Malaysia Airlines Flight 17, the passenger jet that was shot down,

killing hundreds of people whose bodies lay in fields just south of the village. When Oleg carried some of these items home, his mother, Galina, was horrified that the conflict had come so close.



A few weeks later, she and Oleg left their village, seeking shelter elsewhere in Ukraine. Oleg's father, Aleksandr, a coal miner, stayed to tend to their two cattle and Galina's elderly father. But by November the fighting had intensified, and a front line separated Aleksandr from the home of Galina's father. He abandoned the livestock and joined his wife and son and the more than 130,000 internally displaced people in the Kharkiv region of Ukraine. The family spent most of the winter in a small, drafty cottage that they rented, struggling with boredom and a shortage of firewood.



Battles raged in and around Nikishino in the ensuing months, and the separatists eventually took control. Oleg's family heard nothing from Galina's father. As cease-fire talks halted the worst of the fighting in February, Oleg's family, along with a few dozen others, returned to the village. They discovered her father's body in the backyard of his house. He had probably been killed by shrapnel and had lain frozen outside for months. "Before the war, I visited him every day," Oleg, now 11, said. "Now I visit his grave."

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At 4:45 in the morning on a Saturday in early August, stars were still bright in the sky above a refugee settlement in rural Lebanon where Hana Abdullah, a 12-year-old girl from Syria, now lives. The morning call to prayer floated down a dusty road and wound its way around the mostly silent tents. At 5 o'clock, Hana was still sleeping on her bamboo mat by the edge of her family's tent, her arms folded, her hands under her head. Her baby brother and three of her four



sisters slept nearby. Many mornings Hana was up at 4 o'clock. She worked in the nearby fields of Lebanon's Bekaa Valley, picking fruits or vegetables, and everyone started early. But today the truck that would take her there was late. Now came its familiar rumble, next the crunching of gravel: She stirred, her mouth twitched, her eyelids fluttered. Then she was up, vertical in one swift movement, stretching, pulling on a hat from a stash of her belongings. She grabbed lunch — a tomato, and a pita she folded around a potato — and ducked outside to wait on one of the benches in front of her tent.



Mustafa, Hana's 10-year-old cousin, arrived moments later, along with his mother, Suraiya, who began tying the purple laces on his sneakers. He still wore the same green flannel pajamas he had worn for days; clothing was in short supply. Five minutes later, Hana's 10-year-old cousin Ala'a arrived, prompting Hana's first smile of the day. A small crowd quickly formed. Soon enough, the temperature would begin to soar, but now there was a chill in the air,

and when people started moving toward the truck, Hana ran: She and Mustafa liked to sit with their backs against the cab, so the others would shelter them from the wind.

Today they were picking cucumbers. Earlier in the season, which began in the spring, they picked almonds, a job Hana sometimes missed — at least the trees offered some shade from the sun. Then again, the almonds were stubborn, resisting her fingers. Almonds wanted to stay where they were, attached to the branches that were attached to the anchoring trunk.

At 5:45, they arrived at the cucumber field and spread out along the rows of vegetables. They would work there for the next five or six hours, until they went home for their midday break.

Hana was a carrier. She walked up and down the rows of cucumbers, stopping at each picker who had a full bucket. The pickers dumped their vegetables into Hana's crate, and then, when that was full — it sometimes weighed 20 pounds or more — she carried it on her bony shoulder, heading toward Suraiya, Mustafa's mother, who sat at the edge of the field and sorted the cucumbers by size. Back and forth Hana went along a 50-yard path, zigzagging, sidestepping roots and cucumbers. In the early morning, with a frosty white moon still hanging in the pink sky, the walk to unload the cucumbers was not far. But with every trip, the temperature rose, the trek grew longer and Suraiya seemed to get smaller. By midmorning, Hana's shoulder and back ached, and she was thirsty — there was never enough water. Time sometimes crawled at the settlement, but here, in the fields, its pace felt willfully slow, punishing. By 10:30 a.m., the temperature was high, and Hana was staggering ever so slightly, her breath loud.

**Print**



## The Displaced

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### Survey

The news content I viewed is important

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

The news content I viewed was impersonal

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I felt comfortable viewing the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I feel connected to the subjects of the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I would like to talk about the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I have learned more about the subject of the news content than I knew before

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I have an opinion about the subject of the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

The news content changed my opinion on the topic of the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

The news content was high quality

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

The news content was biased

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I would like to learn more about subject of the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

The issues brought up in the news content are important

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I would like to take action to change issues brought up in the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

I was disturbed by the news content

Strongly Disagree    Disagree    Uncertain    Agree    Strongly Agree

Have you ever used Virtual Reality technology before?

Yes    No

If you have used Virtual Reality technology before, rate your past experiences.

Negative    1    2    3    4    5    6    7    Positive

Do you think that you will ever use Virtual Reality technology on a regular basis?

Yes No

How connected are events that you see in news media to your daily life?

Highly Disconnected 1 2 3 4 5 6 7 Highly Connected

How often do you consume news media?

Multiple times per day Daily Weekly Monthly Never

What type of news do you consume most often?

Video/TV Print Text-based online Social Media Other

Rate the importance you place on being aware of news.

Unimportant 1 2 3 4 5 6 7 Important

Demographic Information

Gender: Male Female Transgender Other

Ethnicity: White/Caucasian

Black/African American

Asian/Pacific Islander

Hispanic/Latino

Native American/American Indian

Bi or Multi-Racial

Other

Age:

College Classification: Freshman/First Year Sophomore Junior Senior