Effects of Virtual-Reality News Video on Transportation, Attitudes, Fact-Recall and

Intentions to Act

Abstract

Virtual reality (VR) devices allow the news media to engage with audiences in new ways by putting viewers "into" the story. An experiment compared the effects of VR with print and traditional broadcast modes on attitudes, behavioral intent, fact recall and transportation. Results indicated that those in the VR condition demonstrated lower transportation than those in the print or broadcast conditions, and showed no more empathy, intent to act, or knowledge recall. Implications are discussed.

Effects of Virtual-Reality Video News on Transportation, Attitudes, Fact-Recall and

Intentions to Act

Virtual reality (VR) video introduces new avenues for news consumers to experience stories beyond the page of a newspaper or the screen of a television. The immersive power of VR allows users to view news in 360 degrees, creating visual environments that can be actively explored while narrative unfolds. Such technology has the potential to change the way we consume news, as well as how we feel, understand, recall facts, and empathize with news subjects.

Virtual reality as a news medium is distributed in a variety of ways. In November 2015, *The New York Times* released one million Google Cardboard devices to its home-delivery subscribers, allowing passive viewing of 360-degree video (Marron, 2015). The first story the *Times* released with the VR launch, "The Displaced," chronicles the lives of three refugee children in an 11-minute film that allows viewers to experience the harsh realities of forced migration (Marron, 2015).

More interactive virtual reality journalism, such as that produced by pioneer Nonny de la Peña, allows viewers to enter the story in a head-tracked head-mounted display (HMD) and experience news as "part of the story" through a computer-generated avatar (de la Peña et al., 2010). Most recently, social media platforms have allowed 360 video to be viewed on desktops and mobile devices and, although not immersive in the same way as an HMD experience, allows viewers to scan through scenes in every direction by scrolling a mouse over the video.

By enhancing storytelling abilities, new media such as VR could affect audience empathy and understanding of time, place, and scale. Heightened engagement could also

have the power to change attitudes, improve fact recall and possibly increase intent to act through civic engagement. Previous studies already have explored how transportive media, including VR, can affect attitudes and change in behavior (Ahn, 2015; Bilandzic & Busselle, 2008; Hammick & Lee, 2014; Green and Brock, 2000; Oliver, et al. 2012; Peng, Lee, & Heeter, 2010; Slater, 2009).

There is a noticeable gap in virtual reality research concerning its uses as a news-reporting tool and how viewers are affected by VR compared to traditional print and broadcast-news video. Although observations have been made on how users react to highly interactive journalistic VR experiences, in which active agency and choice making are also involved, little research has examined behaviors and reactions of users to widely distributed VR mediums such as those released by *The New York Times* and other mass media outlets. Can this technology change the way people think about the news and the people reported in the news? Can VR impact how people see the world and affect their intentions to make it better?

The goal of this study is to ascertain what effects, if any, VR video has on attitudes, empathy, fact recall, transportation into the story, and intent to act through civic engagement, in comparison to traditional print and broadcast-news video.

Literature Review

Virtual reality as a journalistic medium is largely unexplored in academic literature. Some research regarding VR has focused on its effects on changing health behavior (Ahn, 2015), video game engagement (Gee, 2010) and communication patterns among shy people in VR environments (Hammick, 2014). Some research also has explored the effects of such technologies as "news games," as a means of engaging

audiences. Gee (2010) postulates that learning is inherently different between content-driven and choice-driven media, the latter proving more effective in encouraging audiences to consider all sides of an issue while making decisions within the interaction (p. 52). These choices within game and game-like experiences thus enable users to make decisions based on their own firsthand experiences within the immersive experience (Gee, 2010, p. 53). From a journalistic standpoint, "digital media enable journalists to devise games as a platform for sharing news" (Gee, 2010, p. 54), one that, arguably, has the capacity to affect learning and absorption in a positive way.

Transportation Theory

Recent work centered on VR media effects relies upon transportation theory, which focuses on changes of emotions and attitudes when viewers "get into" a story. Transportation explains what viewers take away from narratives and how their beliefs can change based on their level of immersion in a story (Gerrig, 1993, Green and Brock, 2000). Green and Brock define transportation as the process which occurs when real world facts are forgotten or disregarded when what's going on in a narrative consume the viewer's "mental systems and capacities" (p. 701). Although traditional transportation theory focuses on literary narratives, transportation effects are not limited to words on a page, and can be applied more broadly to other media, like video (p. 702).

Bilandzic and Busselle (2008) use transportation theory to expand upon traditional media-effects cultivation research, on how viewers of films or television shows acquire certain perceptions, tastes, and knowledge when experiencing high levels of transportation. They postulate that during heightened transportation, viewers have less capacity to think in critical, counter-argumentative ways toward the narrative viewed,

meaning they are more likely to absorb the narrative's core messages into beliefs and behaviors in real life (Bilandzic & Busselle, 2008). Among their findings, they discovered that higher levels of transportation, at least in some of the visual genres tested, were associated with "positive changes in attitudes" (p. 523).

A study by Oliver et al. (2012) found that narrative news formats promoted more empathic feelings and positive attitudes toward stigmatized groups, due to the medium's higher levels of transportation compared to non-narrative based stories (Oliver, et al., 2012). By taking the perspective of the stigmatized groups through narrative-based pieces, viewers were more likely to show more compassion and adopt more favorable attitudes, even as far as "behaving in ways that benefitted the group" (Oliver et al., 2012, p. 216).

When trying to discover how empathy can be useful in storytelling, it is worth mentioning studies linking empathy with changing attitudes toward specific groups. Batson's (1997) three-experiment study on attitudes toward stigmatized groups found that increased empathy for certain members of a stigmatized group can improve overall attitudes toward the group as a whole. Desire to take action (behavioral intent) has also been found to be affected by other immersive-type media, such as video games, when narratives are presented in a way in which the consumer takes a more active role (Peng, W., Lee, M., & Heeter, C., 2010). Their study found that participants who played a role-taking game in the Darfur crisis showed greater willingness to help the Darfurian people than those who engaged with text material (Peng, et al. 2010).

The literature on immersive media shows that transportive media can induce greater feelings of empathy, and at times, can inspire willingness to behave in certain

ways or feel certain attitudes toward represented groups. Journalists, by choosing formats

under the knowledge that some mediums have such consequences on feelings and

behavior of consumers, could influence how people perceive and act toward subjects

(Oliver et al., 2012). By that same argument, the transportive effects and narrative

engagement of VR news mediums could have a significant impact on how people choose,

consume, perceive, and act on the news they receive.

Sensorimotor Contingencies

To apply transportation theory to the potential effects of VR, it is useful to touch

on Slater's (2009) explanation of why people respond "realistically" in virtual

environments – the "how" and "why" viewers react to VR technology based on mental

and physical cues. Immersive systems like VR news films "can be characterized by the

sensorimotor contingencies (SCs) that they support," meaning the physical actions taken

by the user to "perceive" things, such as bending down or turning upward to look under

something (Slater, 2009, p. 3550). Essentially, VR is immersive because it promotes SCs,

which are the physical reactions humans experience when they are recognizing and

interpreting something they see.

In order for SCs to occur, "place illusion" and "plausibility illusion" must be

present in the experience. (de la Peña et al., 2010; Slater, 2009). "Place illusion" (PI) can

be defined as "the strong illusion of being in a place in spite of the sure knowledge that

you are not there" (Slater, 2009, p. 3551) and "plausibility illusion" (Psi), as "the illusion

that what is apparently happening is really happening (even though you know for sure it

is not)" (Slater, 2009, p. 3553). Slater says that, with the right combination of PI and Psi,

the body will react to the experience as if it is really in the location that is being

simulated. This results in RAIR, "response as if real," by the user of the VR system (Slater, 2009; de la Peña et al., 2010).

Other studies, utilizing the realistic effects of VR, explore how it can be used to change attitudes or behavior. One such study incorporated VR elements into the promotion of healthy eating habits in combination with traditional methods, like print pamphlet distribution (Ahn, 2015). The study utilized VR as a means to "reduce social distance and increase personal relevancy of the risk" of obesity following poor eating habits (Ahn, 2015, p. 546). During the VR experience used in the research design, participants entered the VR world through a head-mounted display and were introduced to their avatar, who holds a soft drink bottle. During the experience, the avatar drinks the soft drink while a digital clock in the background ticks off the passing of time, until 2 years pass and the avatar (representing the participant) has gained 20 pounds, which is also visually represented through mounds of yellow fat accumulated on a scale next to the avatar (Ahn, 2015). The study found that participants, after viewing VR depictions of the negative consequences of soft drink consumption, generally reduced soft drink consumption 1 week following the experiment (Ahn, 2015, p. 552). Results also suggested that using the VR along with "traditional messages in health promotion campaigns yielded longer lasting message effects" (Ahn 2015, 552).

Nonny de la Peña, one of the first pioneers of immersive journalism, builds on the idea of VR as a form of immersive journalism, in which users are able to enter reality-inspired scenarios and make choices based on their experiences using an HMD. In one such observation, she exposed users to a VR scenario mimicking that of a Guantanamo Bay prisoner, although she did not tell users ahead of time that the model was created

from evidence released by the U.S. government from the prison (de la Peña et al., 2010). In the experience, which was entirely computer generated using audio and video from actual sounds gathered from declassified prison media, the user assumes an avatar, who could be assumed to be a prisoner, in a "stress" position, crouched over, standing on a wooden crate. The experience begins by allowing the user to view the avatar in third person, then switches gaze to first-person, allowing the user to view the avatar in a mirror off to the side if they turned and faced in that direction with the headset. She found that the immersive environment simulated the physical effects of "being there" outlined by Slater's virtual immersion research, thus giving viewers a sense of actually being in the place simulated by the VR experience (p. 297). De la Peña states that VR journalism allows facts to be represented in such a way that viewers are also able to experience them in active ways, versus the passive nature of traditional media, which risks "underrepresenting" reality (de la Peña et al., 2010, p. 299).

Hypothesis and Research Questions

There is a noticeable gap in virtual reality research concerning its uses as a news-reporting tool and how viewers are affected by VR news experiences. This study aims to find connections between potential transportation effects of VR as a news story, and changes in attitude, empathy, and fact-recall as compared with traditional print and broadcast-video news. Based on the literature, transportation theory, and gaps in the understanding of VR within the news media, this study aims to answer one hypothesis and four research questions:

H1: VR video will result in greater *transportation* than traditional print and broadcast news video formats.

RQ1: How does VR video affect *attitudes* toward stigmatized groups in relation to

traditional print and broadcast news video?

RQ2: How does VR video affect *empathy* toward stigmatized groups in relation to

traditional print and broadcast news video?

RQ3: How does VR video affect *intentions to act* regarding stigmatized in relation to

traditional print and broadcast news video?

RQ4: How does VR video affect *knowledge recall* in relation to traditional print and

broadcast news video?

Methodology

This study employed a one-factor between-subjects experiment in March 2017

with three conditions as the independent variable: VR video, print, and broadcast video.

Participants

Participants were recruited from undergraduate classes from a variety of majors at

a Western public university following human subjects approval. Recruitment consisted of

class visits and word-of-mouth, and sign-ups were made available to participate on an

appointment basis. Raffles for gift cards were provided as an incentive to participate. In

all, 60 participants completed the experiment, 36 females (60 percent) and 24 males (40

percent), between the ages of 18 and 58, with a mean age of 22 ($SD = 6.44$). Of the

participants, 67 percent were white, 22 percent Hispanic, 10 percent black and 1 person

did not respond. The sample skewed slightly liberal (on a 1-6 scale with conservative

high, a mean of 2.57, $SD = 1.25$) and slightly religious (1-6 scale with 6 very religious,

mean of 3.22, $SD = 1.51$).

Procedures

The same news story, about the Syrian refugee crisis in Lebanon, was created in three different media modes – VR, print and broadcast video. All three stories included the same facts, quotations, and sources, and information presented in the same order to ensure all participants received the same content – only the physical medium varied. One of the study authors shot the video for both the VR and broadcast stories in Lebanon at the same time and from the same locations, and both video story versions lasted 2 minutes, 38 seconds. The print story was 388 words long, and served as the voice-over script for the videos (see Appendix A for the print story).

Participants were randomly split into three groups of 20 each, using Microsoft Excel's random number generator, and separated into different rooms for each type of medium. The first group watched the story in virtual reality using a Google Cardboard device, the second group watched the story in traditional broadcast-news-style video on a computer monitor, and the third group read the story in print. Participants were told that the purpose of the study was to measure effects of various news media, but were unaware of the other modes being tested. After reading or watching the news story, each participant filled out the same paper questionnaire, which included a total of 49 questions regarding 1) Empathy, 2) Story-Specific Attitudes, 3) Behavioral Intent, 6) Fact Recall, and 4) Demographics.

Measures

The independent variable for this study was the media mode – VR, print or broadcast. Various dependent measures based on Likert-type scales were employed to answer the hypothesis and research questions, all derived from previous research (Oliver

et al., 2012; Peng, W., et al. 2010; Batson, C. D., et al., 2002; Green, M. C., & Brock, T. C. (2000):

Transportation. Transportation was measured through a modified version of Green and Brock's (2000) index, with statements rated on a scale of 1 (not at all) to 9 (very much). The six-item index included such statements as "I was mentally involved in the story while reading/watching it."[1] The mean of the six scores was calculated to create the index ($M = 5.54$, $SD = 1.29$, Cronbach's alpha $= .68$).

Attitudes toward stigmatized groups. This index comprised the mean of the scores for seven statements regarding attitudes toward Syrian refugees, rated from 1 (strongly disagree) to 9 (strongly agree). Questions included "Most Middle Eastern refugees and migrants are better off in their own countries," and "It is the immigrants' own fault that they find themselves in hard times."[2] ($M = 7.32$, $SD = 1.34$, Cronbach's alpha $= .90$)

Empathy. A scale derived from Batson (2002) asked participants to rate twenty feeling descriptors on a scale from 0 (not at all) to 7 (extremely). Based on Batson's prior work, the mean of six items was calculated to represent empathy: "sympathetic,"

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[1] The six transportation items were (scale 1-9 with 9 indicating higher transportation): I was mentally involved in the story while reading/watching it ($M = 6.68$, $SD = 1.62$); I could picture myself in the scene of the events described in the story ($M = 5.93$, $SD = 2.23$); After finishing the story, I found it easy to put it out of my mind (reverse-coded, $M = 5.45$, $SD = 1.87$); The story affected me emotionally ($M = 5.20$, $SD = 2.19$); I found my mind wandering while reading/watching the story (reverse-coded, $M = 5.98$, $SD = 2.29$); The events in the story are relevant to my everyday life ($M = 4.00$, $SD = 2.29$).
[2] The seven items were (scale 1-9 with 9 indicating most support for refugees): Most Middle Eastern refugees and migrants are better off in their own countries (reverse-coded, $M = 7.46$, $SD = 1.62$); It is the immigrants' own fault that they find themselves in hard times (reverse-coded, $M = 8.45$, $SD = .93$); I personally care about the plight of Middle Eastern immigrants ($M = 6.83$, $SD = 1.94$); Our society doesn't do enough in support of refugees and migrants from the Middle East ($M = 7.03$, $SD = 2.12$); Compared to other social problems we face today (e.g., crime, homelessness, environmental protection, etc.) helping refugees and migrants from the Middle East is important ($M = 6.67$, $SD = 1.91$); Our society should do more to protect the welfare of Middle Eastern refugees and migrants ($M = 7.08$, $SD = 1.94$); In general, I feel positive towards Muslim refugees and migrants ($M = 7.50$, $SD = 1.73$).

"compassionate," "soft-hearted," "warm," "moved," and "tender"[3] ($M = 4.08$, $SD = 1.32$, Cronbach's alpha = .85).

Intentions to act. Behavioral intent measures, seven in total, were modified from Peng, Lee, and Heeter (2010) and were rated on a scale of 1 (not at all) to 9 (very much). The index included "Donate money to help fund awareness and advocacy programs for migration issues" and "Sign a petition to push for government leniency towards refugees and migrants."[4] ($M = 5.72$, $SD = 1.87$, Cronbach's alpha = .90)

Knowledge recall. Finally, fact recall consisted of eight story-specific multiple-choice questions coded as 0 (incorrect) and 1 (correct).[5] The correct answers were summed to create a total score, from 0 to 8. ($M = 6.05$, $SD = 1.53$).

Demographic and attitudinal control items included gender, age, race, religiosity, and political ideology.

VR Ethics

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[3] Means for individual items were sympathetic ($M = 5.05$, $SD = 1.47$); compassionate ($M = 5.12$, $SD = 1.43$); soft-hearted ($M = 4.05$, $SD = 1.95$); warm ($M = 2.86$, $SD = 1.77$); moved ($M = 4.58$, $SD = 1.82$); and tender ($M = 2.85$, $SD = 1.95$).

[4] The seven questions rated 1-9 with higher ratings indicating more intent to act, were: Donate money to help fund awareness and advocacy programs for migration issues ($M = 4.45$, $SD = 2.38$); Sign a petition to push for government leniency towards refugees and migrants ($M = 6.37$, $SD = 2.56$); Discuss issues of refugees and migration with friends and family ($M = 7.05$, $SD = 2.06$); Forward links to advocacy groups to friends and family on social media ($M = 5.80$, $SD = 2.50$); Contact your local congressional representative about issues of refugees and migrants ($M = 4.50$, $SD = 2.23$); Join a volunteer group for migrant/refugee advocacy ($M = 4.87$, $SD = 2.60$); and Vote for laws supporting migrant/refugee rights issues ($M = 7.00$, $SD = 2.30$).

[5] The eight multiple-choice questions were: In what country does the story take place? (Lebanon, Turkey, Germany, 98 percent got it correct); In what part of the country does the story take place (Mount Lebanon, Bekaa Valley, Beirut, 88 percent correct); What is the name of the refugee mentioned in the story? (Raina, Laila, Fatima, 85 percent correct); Which member of her family was injured in the war? (husband, son, brother, 78 percent correct); How many people from Syria have been displaced? (500,000, 4 million, 2 million, 53 percent correct); Which aid organization was quoted saying over 65.3 million people were displaced in 2015? (UNHCR, UNICEF, Red Cross, 64 percent correct); Elsie Abu Diwan is from which organization? (Peace Corp, Human Rights Watch, International Medical Corps, 53 percent correct); How long was the U.S. travel ban? (1 year, 90 days, 10 months, 87 percent correct).

Although general VR studies have been around since the early 1990s, it is useful to briefly explore the ethical and practical considerations that have arisen alongside evolution of the technology. Behr, et al. (2005) identifies four potential risks to the safety of research subjects in VR experiments: (1) motion sickness, (2) information overload, (3) intensification of experience, and (4) re-entry into the real world. Motion sickness, also labeled "cybersicknes," can occur when the VR experience is physically different from the reality of the viewer (Behr, et al. 2005, p. 670). For instance, if the viewer is stationary in reality, a VR experience with them running through a field could induce motion sickness. Similarly, information overload occurs when the viewer is unable to handle all the visual information coming at them in a 360 experience, which can cause stress and disillusionment (Behr, et al. 2005, p. 671). If users find the experience too intense or real, they can also experience "re-entry" problems, and have trouble coping with reality for a bit after they exit the headset (Behr, et al. 2005, p. 671). While this experiment utilized VR video, there was no element of choice, role-play, or body replacement through avatars in the technology utilized, therefore there was no risk of psychological issues with re-entry or information overload. However, motion sickness is a problem common across all VR practices and modes and that risk was made known to participants before their informed consent.

Results

We hypothesized, based on previous studies in transportation theory, that those in the VR condition would express greater transportation than those in traditional print or broadcast news video formats. Contrary to the hypothesis, the mean for the VR group on a 1-9 scale with 9 indicating more transportation was 4.99 ($SD = 1.14$), while the mean

for the print group was 5.61 ($SD = 1.45$) and the mean for the broadcast video group was

6.03 ($SD = 1.12$). Analysis of variance found the difference to be statistically significant,

$F(2,59) = 3.497$, $p = .037$. In post-hoc regression analysis, the relationship between

transportation and medium disappeared when controlling for gender, age, political

ideology, and religiosity. The hypothesis was not supported – the VR mode did not

demonstrate higher transportation among the participants compared to those in the print

or broadcast video conditions.

The first research question asked how VR video would affect attitudes toward

stigmatized groups in relation to traditional print and broadcast news video. On a scale of

1 to 9 with 9 indicating more positive attitudes toward stigmatized groups (Syrian

refugees), the means for all three groups were virtually the same. Those in the VR group

averaged a mean of 7.14 ($SD = 1.17$), the print averaged 7.36 (SD 1.46) and the broadcast

news group averaged 7.47 ($SD = 1.41$). The differences were not statistically significant

($F(2,59) = .302$, $p = .74$).

The second research question asked how VR video would affect empathy toward

stigmatized groups in relation to traditional print and broadcast news video. Similar to

previous results, the VR group actually appeared less empathetic toward the Syrian

refugees. Those in the VR group averaged an empathy mean of 3.71 ($SD = 1.57$), the

print averaged 4.21 (SD .89) and the broadcast news group averaged 4.34 ($SD = 1.35$).

The differences were not statistically significant ($F(2,58) = 1.30$, $p = .28$).

The third research question asked how VR video would affect the intentions of

participants to act in regards to the stigmatized groups, as compared to those in the print

and broadcast video conditions. Again, those in the VR group reported little differently

than those in the other conditions. Those in the VR group averaged a mean of 5.39 (SD = 1.64), the print averaged 5.98 (SD 2.10) and the broadcast news group averaged 5.79 (SD = 1.88). The differences were not statistically significant ($F(2,59)$ = .506, p = .61).

Finally, the last research question asked how VR video would affect knowledge recall in relation to traditional print and broadcast video. Again, those in the VR group reported little differently than those in the print condition. Those in the VR group averaged an empathy mean of 6.1 (SD = 1.21), the print averaged 6.65 (SD 1.60) and the broadcast news group averaged 5.40 (SD = 1.57). The differences were statistically significant ($F(2,59)$ = 3.63 p = .03), because of the lower scores achieved by the broadcast-news group. Differences between VR and print, however, were not statistically significant.

Discussion

The findings of this study, in general, support previous research regarding the effects of various traditional media modes, such as print medium increasing fact recall and broadcast/film video evoking more emotions and immersion into a narrative. This study, however, indicates an intriguing and counter-intuitive revelation about virtual-reality news technology.

Based on previous transportation research, the higher the transportation, the more likely people will change thought or opinion based on the narrative. Because of the immersive nature of VR, it was hypothesized that VR news stories would produce greater levels of transportation than other news mediums, thus inducing changing attitudes or behavior based on findings from previous transportation research. This experiment found no such relationship. If anything, the results indicated an opposite effect – that the VR

story actually inhibited transportation compared to the print and broadcast-news stories, although the difference was not statistically significant when controlling for demographic variables.

Additionally, there was no statistically significant difference in feelings of empathy, intent to act, or attitudes towards stigmatized groups for the VR group. Virtual reality's lack of effect in transportation, empathy, attitudes, and intent to act might be explained by the simple fact that the newness and novelty of the technology might have overwhelmed the participants' ability to immerse themselves in the story. The wonder of the electronics distracted viewers from the facts and narrative.

VR as a news medium is still a curious delivery mode of stories for most people. Many of the participants in this study commented to the researcher that they had actually never used a VR headset like Google Cardboard before, one even remarking that it was difficult for him to recall the facts of the story because he was "so into" moving around within the new technology. Participants ooh'd and ahh'd at the ability to look up, look down, look all around, distracting them from the actual story. According to transportation theory, it is the immersion into the facts and realities of the story itself that induces transportation effects. If this is the case, the novelty and mild shock factor of VR equipment could bar viewers from fully receiving the facts of the narrative.

Also, the VR technology used in this study, as disseminated by *The New York Times* and other media companies, differs from the technology used in other research that supports 360 experiences, in that it does not give the viewer agency within the experience via a computer-generated avatar. Thus, the experience is less choice-based, which could

have contributed to the lack of "response as if real" effects typical of more immersive experiences.

What does this mean for media practitioners and the future of VR technology in news reporting? This study would suggest that VR currently is not, on its own, an effective method for delivering facts and information about important issues. News organizations might instead consider it as a supplement to their reporting, bolstering print stories and broadcast-news video. Perhaps, someday, VR technology will be so routine in everyone's lives that users will be able to focus on the story rather than the medium. Or, perhaps VR will continue to play the role as a vivid supplement to let users view a panoramic scene of a news event in addition to reading the key facts of a story in writing and viewing an engaging video narrative in the style of broadcast-news or film.

Limitations

One limitation of experiments is that they are less generalizable to day-to-day activities. It can be challenging mimicking experiences of immersion and transportation in a campus lab, which might differ from one's home couch or other location where they might read or view news stories. Also, it is possible the topic used in this study – Syrian refugees - might be of less interest to college students than more experienced news users and globally aware citizens. An experiment employing participants fully experienced in VR technology might yield different results, although would be less generalizable to today's news consumer who is still likely to be unfamiliar with this relatively new technology.

Conclusion and Future Research

Future studies could compare virtual reality media to themselves, rather than across mediums. Similar research has already been done in a non-journalism capacity, comparing VR experiences that include an avatar versus those who do not have an avatar. It could be interesting to apply this to a news setting, comparing experiences like de la Peña's VR work to more passive viewing experiences without an avatar like in *NYT*'s "The Displaced." It also could be useful to test transportation levels between VR as experienced on a headset versus mobile VR accessed on a computer monitor. This could have an effect on participants' abilities to become more fully immersed in the story itself, rather than the novelty of the technology.

Future experiments also should conclude with interviews and focus groups, as well, to better assess what participants thought as they used VR technology. Also, it would be good to test the effects of VR video integrated in a package with print and broadcast video methods – a true multimedia experience. Finally, future research should test a much longer news story, perhaps 15 minutes or longer, to provide more opportunity for immersion and "getting into" the narrative.

The findings of this study indicate that non-choice based, passive viewing VR video does not lead to heightened transportation – and no discernable changes in behavior or attitudes – in news stories as compared to other traditional storytelling methods. That does not mean VR is not valuable or useful in news dissemination. Although the novelty of VR technology might have contributed to its lack of performance within a transportation theory framework, VR appears here to stay within news storytelling, making the possibilities for further research exciting and rich.

References

Ahn, S. J. (2015). Incorporating immersive virtual environments in health promotion

campaigns: A construal level theory approach. *Health Communication, 30*(6),

545-556.

Batson, C. D., Chang, J., Orr, R., & Rowland, J. (2002). Empathy, attitudes, and action:

Can feeling for a member of a stigmatized group motivate one to help the group?

Personality and Social Psychology Bulletin, 28(12), 1656-1666.

Behr, K., Nosper, A., Klimmt, C., & Hartmann, T. (2005). Some practical considerations

of ethical issues in VR research. *Presence: Teleoperators & Virtual*

Environments, 14(6), 668-676.

Bilandzic, H., & Busselle, R. W. (2008). Transportation and transportability in the

cultivation of genre-consistent attitudes and estimates. *Journal of Communication,*

58(3), 508-529.

Busselle, R., & Bilandzic, H. (2009). Measuring narrative engagement. *Media*

Psychology, 12(4), 321-347.

De la Peña, N., Weil, P., Llobera, J., Giannopoulos, E., Pomés, A., Spanlang, B.,

Friedman, D., Sanchez-Vives, M., Slater, M. (2010). Immersive journalism:

Immersive virtual reality for the first-person experience of news. *Presence:*

Teleoperators & Virtual Environments, 19(4), 291-301.

Dominguez-Martin, E. (2015). Immersive journalism or how virtual reality and video

games are influencing the interface and the interactivity of news storytelling.

Profesional De La Informacion, 24(4), 413-423.

Gee, J. P. (2010). Video games: What they can teach us about audience engagement.

Nieman Reports, 64(2), 52-54.

Gerrig, R. (1993) *Experiencing Narrative Worlds: On the Psychological Activities of*

Reading. Yale University Press.

Hammick, J. K., & Lee, M. J. (2014). Do shy people feel less communication

apprehension online? the effects of virtual reality on the relationship between

personality characteristics and communication outcomes. *Computers in Human*

Behavior, 33, 302-310.

Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of

public narratives. *Journal of Personality and Social Psychology, 79*(5), 701-721.

Marron, M. B. (2015). Watershed moments in journalism. *Journalism & Mass*

Communication Educator, 70(4), 351-353.

Nash, E. B., Edwards, G. W., Thompson, J. A., & Barfield, W. (2000). A review of

presence and performance in virtual environments. *International Journal of*

Human-Computer Interaction, 12(1), 1-41.

Oliver, M. B., Dillard, J. P., Bae, K., & Tamul, D. J. (2012). The effect of narrative news

format on empathy for stigmatized groups. *Journalism & Mass Communication*

Quarterly, 89(2), 205-224.

Peng, W., Lee, M., & Heeter, C. (2010). The effects of a serious game on Role-Taking

and willingness to help. *Journal of Communication, 60*(4), 723-742.

Slater, M. (2009). Place illusion and plausibility can lead to realistic behaviour in

immersive virtual environments. *Philosophical Transactions of the Royal Society*

B: Biological Sciences, 364(1535), 3549-3557.

Slater, M. D., Rouner, D., & Long, M. (2006). Television dramas and support for

controversial public policies: Effects and mechanisms. *Journal of*

Communication, 56(2), 235-252.

Appendix A

Print News Story About Syrian Refugees

Against the grey-green silhouette of Lebanon's snow-capped mountains, small seas of tent villages line the countryside of the lush Bekaa Valley. Children run along dirt roads, following small streams of water and drainage from the camps they call home, while women carry produce on their back between lines of drying laundry.

Raina, a refugee from Holms, fled Syria with relatives after her son was injured by a missile. Small pieces injured his neck and leg, and he was left permanently disabled. She lives in a chicken farm that has been converted into a makeshift camp, and crossed the border into Lebanon hidden in an oil rig.

Now in its sixth year, the Syrian Civil War has left over 4 million people, like Raina, displaced from their homes since 2011. Nearly one in four people in Lebanon are refugees, and the country has struggled to maintain stability in the wake of overpopulation.

Although refugee flow into Lebanon has slowed, refugees from Syria, and other global crisis centers, continue to cross borders as forced migrants into other areas of the world. According to the UNHCR, 65.3 million people migrated due to forced displacement in 2015.

Sustainable care refugees is part of assistance that representatives like Elsie Abu Diwan, community health program manager at International Medical Corps, or IMC, in Lebanon, strive to create within communities of forced migrants. Diwan is part of an IMC program that educates members of refugee communities on healthcare.

"Whenever we leave, if we ever leave, we have built the capacity of the community itself and we have built the capacity of key people in the community that know a lot about primary healthcare services," she said. "International NGOs will not be here forever, they will have to leave someday."

Lebanon is home to various NGOs that work to create sustainable aid systems within the government, but politics in other parts of the world prevent such care from being comprehensive. Politics in many western countries have stalled many forced migrants and immigrants from entering altogether. The recent United States immigration ban prevented immigrants and refugees from seven predominately Muslim countries, including Syria, from crossing into the U.S for 90 days.

For now, millions still live precariously in places like the Bekaa Valley, hoping to migrate to more accommodating countries or, someday, return home.