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Convergence of Virtual Reality and Real Virtuality: The New Ethical Thinking on Immersive Journalism

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Abstract

Virtual Reality (VR) technology has advanced and been applied in journalism. The so-called immersive journalism is a new kind of journalism for professionals to explore. Due to virtual reality technology, people could feel the presence, empathy, and experience immersive in the digital environment. Even the virtual is characterized as the opposite of the real, the notion "real virtuality" that virtual embodiment is a part of reality for participants. Convergence is a popular word and has created numerous ideas for digital development in the digital age. The convergence of virtual reality and real virtuality is an interesting issue in immersive journalism when the boundary is blurred. According to the results of surveys and in-depth interviews, this paper analyzes the data from 244 persons who have worn a headset to watch a computer-generated immersive reporting. The qualitative data from 8 professionals in the UK, including journalists, engineer, and producer, who discussed the process and ethical questions in creating real virtuality in virtual reality is included. This paper suggests a theoretical framework to make virtual processes of meaning making more apparent. It also requires modern journalists to rethink the ethical code when they conduct computer generated (CG) reporting which could create a real feeling about virtuality.

Keywords: virtual reality, real virtuality, immersion, journalism, convergence

Introduction

Undoubtedly, traditional journalism is undergoing a paradigm shift into digital journalism. Herbert (2000) argued journalism is taking on a new style in the digital age. Kawamoto (2003) said the definition of digital journalism is "the use of digital technologies to research, produce, and deliver news and information to an increasingly computer-literate audience." There have been massive changes to the way in which news is produced and journalism performed in 21th century. The journalists could have many kinds of tools to produce news stories. During the recent decade since 2009, virtual reality technology has advanced and been applied in journalism. Virtual reality is once widely-discussed.

The so-called immersive journalism is a new type of journalism for professionals to explore. There are two different immersive VR journalistic works to establish a sense of presence. One is 360 video like "*Clouds Over Sidra"* which was conducted by Chris Milk. People could watch 360VR with headsets, Google Cardboard or computers. Audience could watch the scene in 360-degree videos and obtain all the details. The other type of immersive journalism is 3DVR or CGIVR, primarily seen in the work of de la Peña (2015), and involves animated scenes based on real videos and audio footages that the viewer inhabits through the moveable embodiment of an avatar (Kool, 2016). Virtual reality environments are created by programmers using computer-generated imagery (CGI). There are both advantages and limitations in immersive journalism when applying materials with immersive CG or 360° video. How effectively immersive journalists use them will ultimately decide which medium, if either, becomes the standard. The goal of this study is intended to discuss and improve journalists to take steps toward better immersive journalism practices (Hardee & McMahan, 2017).

In CGI, people's physical environment is completely replaced by a digital environment (Keshav, 2018). CGI started from *Hunger in Los Angeles* which is made by de la Peña and is a true story based on the real sound and created scene imitating from the real. The other works *Use of Force, Project Syria*, such as the deep immersive journalism concept of the work lead by de la Peña et al. (2010). The subjects have the sensation that their body occupies a space created by digital technology and that they can move around the stage created by a computer (Dominguez, 2017).

De la Peña et al. (2010) introduced the concept of immersive journalism, which is the production of news in a form in which people can gain first-person experiences of the events or situations described in news stories. She argues the fundamental idea of immersive journalism is to allow the participant to actually enter a virtually recreated scenario representing the news story. A participant will be typically represented in the form of a digital avatar, an animated 3D digital representation of the participant, and see the world from the first-person perspective from the avatar. It is necessary for virtual reality to move out of the laboratory and to take on more of the characteristics of a mass medium. The CGI is used in reporting such as *We Wait* of BBC.

To explore CGI journalism, Lin Chao Chen, the professor of National Taiwan University and the professionals have cooperated and created the first CGI

VR news feature "*The Offshore Wind Power"* in Taiwan. It is a story about hundreds of wind turbines will be built along the west coast in the coming years in Taiwan. It is hard for people to realize the green energy and the harm of the environment because it has not happened yet. As a media technology, virtual reality could conquer time and space and create dramatic effects for people to immerse in a "boring" scientific reporting. In *The Offshore Wind Power*, individuals can fly in the sky and listen in the sea with VR technology through an avatar. People are able to glimpse impossible experiences. *The offshore wind farm* is the milestone of both sustainable resources and the development on marine engineering. With the technique of AoEs^{+} (Area of Elements^{+})[1], *The offshore wind farm* will be able to provide users the feeling of wind blow and make the news more immersive. When the users put on the headset, they can feel the wind blowing as if they were flying over the offshore wind farm and experience the process of power generation. Haptic perception could increase presence and make real virtuality to become true in the whole environment. At this scenario, real virtuality can be defined as a true high-fidelity and multi-sensory virtual environment that evokes the same perceptual response from a viewer as if he/she was actually present, or "being there", in the real scene, which also known as "there-reality" that environments are interactive and based on physics. All five basic senses (touch, sight, hearing, smell and taste) are concurrently stimulated to deliver real world modalities naturally in real time (Chalmers, Howard, & Moir, 2009). Real virtuality opens up a broad remit of applications. This phenomenon also reminds us to rethink what Manuel Castells addressed real virtuality by virtual reality. Castells (2010, p. 403) has said "there is no separation between "reality" and symbolic representation…the electronic integration of all communication modes from the typographic to the multi-sensorial, is not its inducement of virtual reality but the construction of real virtuality."

The convergence of virtual reality and real virtuality will create a new communicative process for audience. During the process, on one hand, the audience could understand the reality when they immerse in a virtual reality environment. This suggests that virtual reality has overcame the confines of the machine and reach real virtuality. On the other hand, the audience might be suspicious what reality is when virtual reality and real virtuality has been converged.

Literature Review

Virtual Reality

The term virtual reality (VR) is popular and commonly used to describe a digital world where could provide users first person experience. "Virtual Reality" seems to be an oxymoron due to the apparent contradiction between the adjective virtual and the noun reality. Virtual reality has the potential to make the artificial as the real. In this interpretation, virtual and reality are considered as equal halves

[1]AoEs^{+} Techonology. https://youtu.be/-QdGDcumVCs

and the term virtual reality is becoming a pleonasm for a new understanding of reality (Steinicke, 2016). It is convenient to partition a virtual world system into three separate worlds - visual, auditory and tactile. Successful exploitation of virtual reality systems relies on maintaining a close integration coupling between key VR subsystems and the human operator (Kalawsky, 2002).

Virtual reality is defined to be a computer-generated digital environment that can be experienced and interacted with as if the environments were real. Virtual Reality could be viewed as "an artificial environment which is experienced through sensory stimuli (i.e., sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment" (Jerald, 2016).

There are many researches explore the special function of virtual reality. What virtual reality does best as a medium is to offer users the opportunity to "see for yourself" and "be there" (Rodríguez, 2018). Ryan (2015) proposes two criteria for classifying interactivity and argues virtual reality is the latest technology that attempts to create a believable experience. Murray (1997) emphasizes the role of agency occurs when interactivity is meaningful and users directly see the influence of their actions. Wilson and Soranzo (2015) declare virtual reality creates the illusion that the viewer can see objects in a virtual space. According to the experience of BBC, it argues VR can deliver four related illusions that together go beyond just 3D surrounding content, that is, place illusion, plausibility illusion, body ownership illusion and agency illusion. In the case of each illusion, undoubtedly, viewers know what they saw are illusions yet their responses at many levels are as if these were real (Steed, Pan, Watson & Slater, 2018). The combination of place and plausibility illusions often induces physical reactions (Steinicke, 2016). Those illusions occur despite the fact that the user is aware that the virtual environment is merely a simulation. Furthermore,

For researchers throughout the 1990s, VR was largely defined by the technological hardware that facilitated it. Comparing this to the second generation, a significant degree of similarity can be observed. VR remains a predominant technology/hardware-focused concept but with pockets of thought describing VR as an experience (Garner, 2017). The first reaction of most viewers to VR storytelling is a sense of presence: "It feels like being there." The subsequent reaction involves human emotional states: developing feelings such as empathy, compassion, and embodiment (Shin, 2018). At a basic phenomenological level, empathy denotes an emotional response to the directly perceived, imagined, or inferred feeling state of another being (Decety & Ickes, 2009), sometimes described as an emotion (Keen, 2006). In VR, the main characteristic feature of interactivity is that both the system and its user can alternate their roles as sender and receiver in that dialogue. This is a property directly attributable to the system that facilitates this switching of roles (Perez-Montoro, 2018). All the elements of virtual reality are more than technology. These virtual reality media are meta-media that can dynamically simulate rather than merely statistically represent (Lauria, 2001).

Although the concept of immersion with VR technology has been widely covered in fields such as computer science or media studies, the technology is

addressed in VR stories and how people experience and react to immersive journalism pieces (Soler-Adillon, & Sora, 2018). As a term, immersive technology is used to refer to several different technologies, such as VR, AR, and mixed reality (MR). Immersive technology (e.g., head-mounted displays, computer-generated kinesthetic and tactile feedback) tends to increase the users' subjective sense of presence – "the subjective experience of being in one place or environment (Soliman, Peetz, & Davydenko, 2017). In this situation, the line between the physical and virtual world is blurred.

Real Virtuality

As Kalawsky (2002) reminds us that the human operator is least understood, and what he talks about is the real feeling of reality or real virtuality. If we change the adjective into real and the noun virtuality, real virtuality would seem to be another oxymoron compared with virtual reality. Interestingly, real virtuality is been discussed widely in some ways. Virtual Reality systems attempt to deliver high levels of interactivity in realistic looking environments (Chalmers, Howard, & Moir, 2009). However, as VR technology has advanced, present VR research studies include a varying of levels and combinations of multi-modal sensory input, allowing audio, haptic, olfactory, and motion to be experienced simultaneously to the graphically rendered environments or objects. This greatly increases the user's sense of immersion in the virtual environment and allows the experimenter to create protocols that would not otherwise be possible (Wilson & Soranzo, 2015).

Real virtuality could help users immerse thoroughly through virtual reality technology. The senses may influence each other significantly. For example, previous researches have shown that high-quality sounds coupled with visual stimuli increase the perceived quality of the visual displays. Sound is described as a phenomenon, acknowledging the distal (object/event), medial (event/medium) and proximal (listener) perspectives as pieces of a whole (Garner, 2017). If virtual environments are regularly as a valuable tool to experiment would be experienced in the real world, as if we are "there" in the real world; It is so-called "there reality" or real virtuality (Chalmers & Ferko, 2008). To be a widely adopted disruptive technology, real virtuality must revolutionize the way in which business is conducted by providing low-cost, high confidence, high-quality multi-sensory knowledge directly to a user's current location (Chalmers, Howard, & Moir, 2009). In the *The offshore wind farm*, producers try to create multi-sensory environments and the feel of cool wind which is delivered in real-time. A human's sense of feel originates in the dermis layer of our skin. The dermis is filled with nerve endings of many sensory neurons. There are about 20 different types of "feel senses", the most common of which are heat, cold, pain, and pressure or touch receptors. Some areas of the body contain more sensors than others, making these areas more sensitive feelings.

The other definition of real virtuality, which was proposed by Manuel Castells (2010), means that all realities are communicated through symbols. Regardless of the medium, all symbols are somewhat displaced in relation to their assigned semantic meaning. In a sense, all reality is virtually perceived. Manuel Castells

(2010, p. 404) generated real virtuality and said:

> *It is a system in which reality itself is entirely captured, fully immersed in a virtual image setting, in the world of make believe, in which appearances are not just on the screen through which experiences communicated, but they become the experience.*

Roland Barthes, Jean Baudrillard, and Castells all agreed there is no separation between reality and symbolic representation, therefore, all the communication is the construction of real virtuality (Castells, 2010). When digital virtuality increasingly became daily phenomena, they also can be defined as the opposite of "real" (Welsh, 2011).

Convergence of Virtual Reality and Real Virtuality

Convergence is typically regarded as a metaphor for technology development. Pavlik (2001) argued that convergence can facilitate "a better, more efficient, and more democratic medium for journalism and the public in the twenty-first century". According to Küng, Picard, and Towse (2008), media convergence is a broad concept based on various developments. Henry Jenkins (2006) emphasizes that convergence is an ongoing process, that is, convergence could be perceived as the process of socially constructing a new technological system for news production (Spyridou & Veglis, 2016).

Figure 1. The convergence model 1

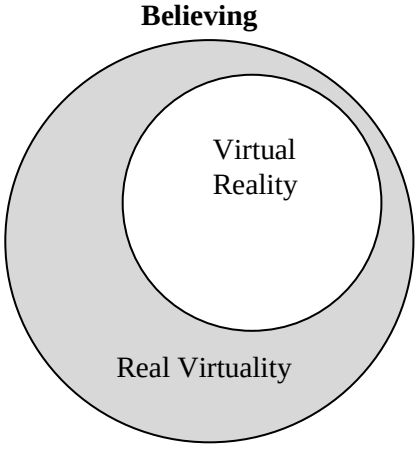
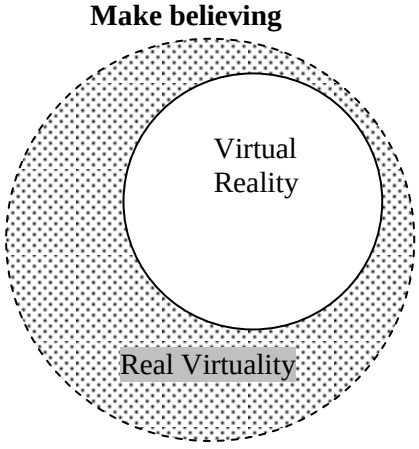


Figure 2. The convergence model 2



As to the definition of real virtuality, there are two different kinds of interpretations of convergence about virtual reality and real virtuality. Based on the perspective of Chalmers, Howard, and Moir (2009), real virtuality is defined as a true high-fidelity multi-sensory virtual environment to deliver real world modalities naturally. Virtual reality functions through visual and auditory relating to the sense of touch is also included. In the concept, the convergence of virtual reality and real virtuality points to a better communicative process for audience to believe what they

saw (Figure 1). According to Castells (2010), the culture of real virtuality where make-believe is in the making. The reality could only be viewed as symbols. The convergence of virtual reality and real virtuality in an immersive environment is a new type of convergence journalism which make CGI and VR immersive journalism is a trend for the audience could have a much better presence in journalism (see Figure 2).

Immersive Journalism on CGI

The term "immersion" has become popular since the emergence of VR technology, especially from the perspective of user experience (Shin & Biocca, 2018). Immersion is an objective description of the technical capabilities of the VR system that describes the level of detail with which a virtual environment can be rendered whereas presence describes the user's psychological response to said environment (Wilson & Soranzo, 2015). Although by definition the user's input is a vital aspect of interactivity, immersive experience is something which must be accommodated or allowed for, rather than forced; it is useful to consider how interactivity might be crafted and designed as a means to lowering barriers to immersive experience (Biggin, 2017, p. 62). Immersive Journalism could present news stories in a form which people can have first-person experiences of the situations. When users confirm the qualities and obtain satisfaction from the qualities, immersion is ecologically reconstructed, integrating quality, cognition, and context. Immersion elicits these cognitive processes and helps users to empathize and embody; however, the final decision is made by the users (Shin & Biocca, 2018).

The current of work calling itself 'immersive' reflects a valorization of cultural forms that offer the chance to do more than 'just' observe or study; they offer the chance to interact with, even to become, the object of attention (Frieze, 2016, p. 16). 'Immersive' that focus on modes of productivity that are assigned to audiences in immersive settings, and to which audiences are invited to posit themselves as productive participants. You will find a narrative that seeks to identify what produces a sense of immersion (Alston, 2016, p. 6). Early adopters of the VR technology have seen advances in training, educating and entertaining. VR as a form of immersive journalism is rapidly becoming a unique form of news production.

Immersive journalism is a new medium that could be effectively used to foster social empathy by means of virtual reality stories in journalism (Rodríguez, 2018). As developing immersive journalism — first-person, interactive experiences of news events, three essential elements, i.e., flow, cognitive absorption, and presence, are required for creating immersion (Brautović, John, & Potrebica, 2017). Presence is used to describe the psychological and phenomenological sense of being in a virtual environment and having a first-person experience of a computer-generated world or simulation (Hardee & McMahan, 2017). The idea of what an immersive format consists of is influenced by both the notion that the users can interact somehow with the story and have a feeling of presence in a place (Dominguez, 2017).

One of the most remarkable aspects of immersive virtual environments is that people tend to respond realistically to virtual situations and events even though they know that these are not real (de la Peña et al., 2010). De la Peña, considered the "godmother of virtual reality," has shown her work in *Use of Force*, *Project Syria, and Kiya*. De la Peña bases her report on authentic recorded material to recreate the incident in detail (Dominguez, 2017). *We Wait* made by BBC, gives people an immersive experience of the 18 plights of refugees waiting to be picked up by a boat on a shore in Turkey and being illegally taken to Europe by crossing a dangerous stretch of sea. This was based on BBC news reporting of the 20 refugee situation but

deliberately depicted as an animation with cartoon-like characters 21 representing the refugees. The script of *The Offshore Wind Power*, applied in the survey of this study, is based on real interview. Producers of *The Offshore Wind Power* present three different points of views from fisherman, engineer and environment protecting. After watching it, audiences have their own attitudes and various opinions. The narrative of this reporting is following the ethic principle of objectivity. Objectivity is a standard that requires journalists to try to put aside emotions and prejudices (Smith, 2008). Even so, t is reported in CGI. To improve the immersive experience for audience, people could fly to the sky and listen under the sea to see the whole phenomenon dramatically. Interestingly, no one argued the truth of flying but concentrate on the dilemma about wind power and environments. As the media landscape has expanded, different CGI types of immersive journalism have come under increasing technology optimism. Good media practices and good journalism are based and to some extent thrive on a diversity of perspectives to the public (Spence, Alexandra, Quinn, & Dunn, 2011).

To provide users with embodied presence, this paper focused VR news stories created in a computer-based animation with avatars, which participants can move freely through the virtually reconstructed scenario that represents the news story. This animated 3D digital representation affords the participants to see the world from the first-person perspective of that avatar.

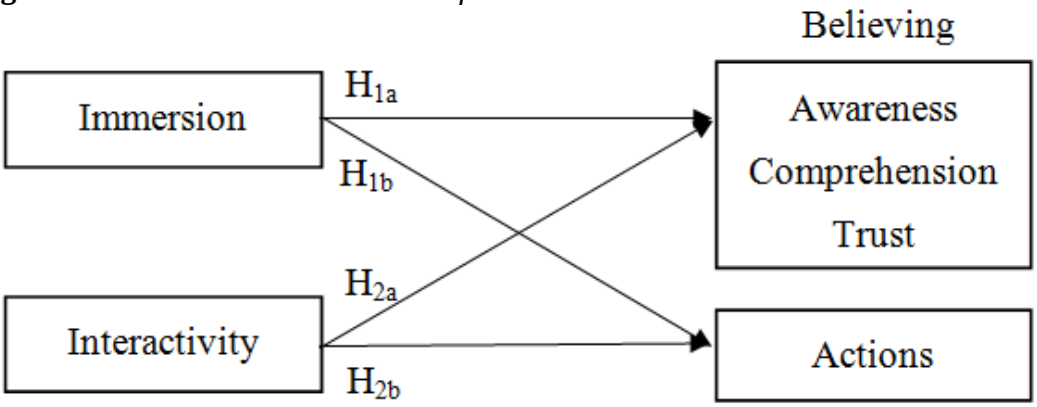
Methodology

Method and Sample

A survey and an in-depth interview with professionals in UK were applied in this study to examine the research questions and hypotheses. To understand the audience' perspective and attitude toward immersive journalism (see Figure 3), the experimental survey was conducted in Taiwan with a stimulus called "The offshore wind farm", which is created by CGI. Based on the characteristics of immersive journalism, two hypotheses are proposed to understand the formation of believing and actions in the future:

H1. Level of perceived immersion will be positively related to (a) believing in VR news and (b) actions.
H2. Level of interactivity will be positively related to (a) believing in VR news and (b) actions.

Figure 3. *The Research Framework of ACCEPTANCE towards VR News*



Testing of hypotheses relied on data collected from a survey of a random sample in northern Taiwan. A total of 244 samples were invited to participant this study when they joined the exhibition in Taipei. Of the sample, more females (53.7%) than males (43.9%). In terms of age, 4.1% was from 12 to 17 years old, 56.8% aged from 18 to 29, 17.2% was from 30 to 39, 11.1% was from 40 to 49, and 3.3% reported their age was 60 years old and above. As to the education, 4.1% attained elementary school, 2.9% finished high school, 59.8% had college degree, and 32.8% had graduate degree.

For the in-depth interview, which conducted by the author, eight British CGI professionals were invited to discuss guidelines for producing CGI immersive journalism. When immersive technology developed, furthermore, when immersive journalism developed, there are some questions happened. First, we need to think about how to make audience immersive in a "journalistic" environment but not a fictional film? It means the producers need to highlight the "truth" about VR content. Second, due to the presence and empathy of VR, the producers need to draw a line between drama and truth to make audience immersive in a dramatic situation but still could catch the elements of facts. Third, the purpose for immersive journalism is to explore advanced technology and still could receive accountability from the audience. It means even audience are interactive with CGI, they still could trust the journalistic thinking even they couldn't see the journalists in the content. It highlighted some ethical challenge in CGI Journalism. When we discussed the related issues, we especially focus on CGI works made by BBC, such as *We Wait* and *1943 Berlin Blitz*. Both of these two works could be watched on Oculus. There are 3 questions in-depth interview with:

RQ1: How to rebuild the fact and tell the truth in CGI?
RQ2: How to produce a proper immersive situation for audience?

Measure

According to the research framework, four essential concepts were applied in this study: Immersion, interactivity, and understanding. This

framework enables us to explore the acceptance of audiences towards virtual reality in news. Furthermore, the process of believing toward the news story with virtual reality technology were revealed as well.

Immersion. The measurement of immersion was modified from the scale of Shin and Biocca (2018). Respondents were asked to indicate their perception of immersion after they experienced the news in virtual reality. Two items with a 5-point Likert scale, which ranged from "1" strongly disagree to "5" to strongly agree, were used in the questionnaire: "When I watch the news, "*The Offshore Wind Power",* with the VR device, I found myself become so involved with the topic and VR news," and "When I watch the news, "*The Offshore Wind Power"* with the VR device, I have a more strong feeling toward more the related topics as if I was in the reality." The score of immersion was constructed by averaging the two items (M= 4.25, SD =.596, α = .64).

Interactivity. To capture the perceived interactivity, one item on a 5-point Likert scale was adapted (Biggin, 2017). Participants were requested to provide their opinions on the news with virtual reality: "I was attracted to the interactivity in the VR news when I'm watching the "*The Offshore Wind Power"* with the VR device." (M= 4.24, SD =.827).

Believing. The scale consisted of three items, which included different levels of believing, that is, awareness, comprehension, and trust in the news, which were viewed as the process of believing the story was the reality. This concept was applied to examine how audiences perceive the VR news, how the news influenced the interpretation of audiences, and how VR news creates a sense of perceived reality via VR technology. On 5-point Likert scale, the three items were: "I'm aware that the content was created based on virtual reality technology," "I believe I could know the truth better when the news is presented by using virtual reality technology," and "I believe the news produced by virtual reality technology can gain the trust from audience." (M= 4.29, SD =.514, α = .62).

Actions. The concept of action was considered as the outcome after the audiences experienced the VR news. Whether the news created by VR technology will facilitate the action of audiences to the related topics, content, or even VR news. Participants were asked to share their agreement on two statements: "After watching the news with a VR device, I care about the topics more," and "I am interested in watching the interactive 3D news in the future after using the VR device watching news." (M= 4.37, SD =.518).

Demographics. Demographics such as gender, age, and education were included as the control variables.

Results

To understand the perception of audiences toward VR news fully and the formation of believing after watching VR news, the phenomenon is interpreted by both quantitative and qualitative data, that is, a survey and an interview with 8

professionals in United Kingdom.

Quantitative data. To test the hypotheses, correlation analysis was applied. The results demonstrated that immersion (r = .561, p < .01) and interactivity (r = .401, p < .01) were both positively related to believing. The more immersion, the greater believing toward VR new. Meanwhile, the interactivity in VR news could facilitate the forming of believing as well. Therefore, H_{1a} and H_{2a} were supported.

In addition, the results of correlation indicated that not only the immersion (r = 659, p < .01) but also interactivity (r = 484, p < .01) were positively related to action. The perceived immersion and the interactivity in VR news could facilitate action in the future, that is, people will pay more attention to the related topics and willing to receive news presented with virtual reality technology. Therefore, H1b and H2b were supported. The correlation results among the four essential concepts were shown in Table 1.

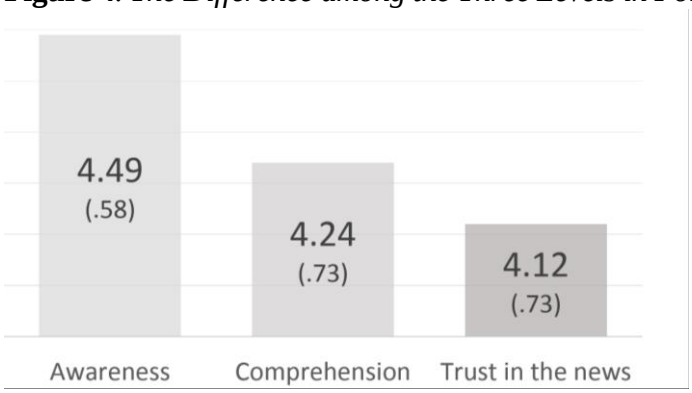
Table 1. *Means, standard deviations, and correlations*

	Mean	*SD*	Immersion	Interactivity	Believing	Action
Immersion	4.25	.596	-			
Interactivity	4.23	.827	.484***	-		
Believing	4.29	.514	.561***	.401***	-	
Action	4.37	.518	.659***	.484***	.597***	-

Note: * p < .05; ** p < .01, *** p < .001; N = 244

After testing the hypotheses, differences were examined among the four variables by education and gender. However, there were no significant differences in each variable among educational groups nor between male and female. Interestingly, by applying the paired samples T-test, the results indicated there were significant differences among the three different levels of believing (awareness, comprehension, and trust in the news). Compared to comprehension (M = 4.24, SD = .73, t(243) = 4.78, p < .001) and trust in news (M = 4.12, SD = .73, t(243) = 7.12, p < .001), the scores of awareness is greatest (M = 4.49, SD = .58). Further, the difference between comprehension and trust in the news was statistically significant, t (243) = 2.41, p < .01. The score of comprehension (M = 4.24, SD = .73) is greater than the trust in the news (M = 4.12, SD = .73).

Figure 4. *The Difference among the Three Levels in Formation of Believing*



In-depth Interview and Discussion

According to our quantitative survey, users could feel empathy and presence in the first-personal immersive narrative environment. It also reminds us to make the sound experience, the visual images and haptic sense as real as possible, then people are more likely to forget they have a headset on, and are watching a film. The audience's eyes are getting fed signals as you move your head. Then they are more immersed, and more likely to have a presence in the features of VR. They want to find the truth in the story by themselves.

Truth is a big issue in philosophy and journalism. Empiricism and rationalism have developed two kinds of truth. Philosophers of empiricism contend people could learn the truth by using their senses of sight, smell, touch, and hearing. Philosophers of rationalism argue our senses are fallible. The use of reason and experience is a better way to obtain the truth (Smith, 2008). But, what the truth is in journalism? It seems more close to empiricism. For example, journalists took video to catch the truth and reflect it as a mirror. In *We Wait*, BBC put the audience in a boat with a Syrian family about to embark on their second to across the see to Greece. Based on BBC News interviews with migrants, *We Wait* is a dramatized story which transports the audience to the heart of the crisis. The narrative of this story is told by animated characters. It's kind of story and is mainly generated in CGI. The respondent A stated:

> *In CGI, I think to call it exact truth is nonsense. It's something to help you understand the truth; but lots of those can help you understand the truth about things too, and about human nature; so these things are all on the scale.*

In *We Wait*, audience could realize what happened to those peoples on the beach waiting for boats to take them, and then the boats capsized, and then been rescued by coastguards. It's a report of real events happened, but sort of dramatized in CGI, and reproduced in a way as real as possible, so the viewers can feel what it's like to go through that, and get more understanding of the story. It is also a new interpretation about what is true in journalism. It means journalists could recreate a truth with digital technology. The respondent stated:

> *We Wait is a CGI experience, it's a great way to create environment and to tell story immersively in a way that traditional journalism wouldn't be able to do. It adds additional dimension to journalism. There is a chance to engage them, because they're rejecting the traditional formats. There's an opportunity like not dumping down the issues, but entertainment value is increased. People who are more digitally engaged might want to take that experience more than just watching a video of the news.*

According the arguments above, the truth from the convergence of virtual reality and real virtuality is more close to model 2. Based on VR technology, the reality is viewed as symbols and won't bother the audience. That's why audience could catch the journalistic ideas when they immersive in a good content in CGI. It

is a new journalism which is so called immersive journalism (Dominguez-Martin, 2015; Hardee, 2016; Sirkkunen, Väätäjä, Uskali, & Rezaei, 2016) or virtual reality journalism (Aronson-Rath, Milward, Owen, & Pitt, 2016).

Let's discuss another CGI work also made by BBC.*1943 Berlin Blitz* made from a piece of archive of an intrepid journalist who got on a Lancaster bomber went to a bombing raid over Bern and Berlin during WW2. Peter Rippon, the editor of BBC Archive, says: "We have been overwhelmed by the response to Berlin Blitz so far. People are finding it profoundly moving. The authenticity of the audio and the nobility of the characters involved, combined with virtual reality means audiences can now relive with past with an intensity not previously possible (BBC, 2018). The "*1943 Berlin Blitz"* is a real story copied in CGI. The respondent said:

> *In Berlin blitz, we have recreated a very accurately a Lancaster bomber, we used a piece of audio which was created by a BBC war journalist, he was on a Lancaster bomber plane bombing Berlin in 1943, so it's real, real audio from that event, and we recreated the plane with great accuracy. You can see the streets of Berlin been bombed, we do as much research we can to make sure it's as accurate as we can make it. Yes, we've reconstructed it, but it's a very accurate reconstruction in CGI.*

In *1943 Berlin Blitz,* it is more close to convergence model 1. Journalists have the responsibility to bring the fact to audience. It is easy to explain in camera or video. CGI is a new technology that never been discussed before. The technology is borrowed from online game (Jennett, Cox, Cairns, Dhoparee, Epps, Tijs, & Walton, 2008; Hou, Nam, Peng, & Lee, 2012; Burns & Fairclough, 2015). Besides the issue of truth or authenticity, journalists also concern how to rebuild the truth through media technology. The core of the CGI technology is to create an experience for truth. It is quiet important for journalists and engineers to realize the issue of protecting the users in CGI environment. As we know, audience in an immersive situation might forget the technology they used. It is having as many senses as possible, convinces that something is real, makes it more immersive, and then audience forget there is a headset on, and they are watching a story.

Meanwhile, how to build a proper immersive environment for audience? This issue becomes more serious when the developments of CGI immersive journalism start. It enhances some new ethic issues when we explore the new technology. Except we highlight the works of BBC, we have heard some bad experiences. The respondent stated:

> *There is a very early example where you had a headset, one of the first thing is you are standing on the edge of a building, the graphics are actually terrible, like really poorly rendered, but people were afraid every time. They put a level plank of wood on the floor, with a lip like this high, your toes hang over the edge, make you feel like on the edge of a building, and everyone's heart rate went up, and people were afraid of things obviously not real at all.*

After CGI applied in journalism, these kinds of questions still happened. There is the ethics concern over what is it real feels like to be in a story. If journalists are doing something in a war zone and the audiences experiencing that, do they then need the same consulting and all of the support you will get if you're actually in the war zone? What you do then for immersive journalism, what you do for VR? The respondent stated:

> *A number of journalistic pieces I've seem where people of very private going on to war zone for instance to capture the moment of "this is it you can get if I can put somebody right there where I was.", so they can really understand how terrifying it is. This desire to capture the absolute realistic thing in same way we do traditionally in game is not just the question of..., I guess the ethics of journalism, or the integrity of journalism is a question as well.*

Surely, this kind of journalistic ethics is very much untouched, which needs a lot of debate. It also needs some kind of control to protect the audience but without discussing until now. The respondent stated:

> *One thing I always been quite worried by is the kind of empathy driven content, where it's very much VR for good, there's no denying there're very worthy causes, but I feel like it's... one line is been used all the time, and people have been encouraged to act on that, or make donation on that name. That's not really news to me. That's not really journalism., Because as a journalist you would be there telling the story, giving the facts, not trying to pull on people's heart string for empathy; I think that's where I get quite worried about the technology.*

As mentioned above, we need further discussing about the convergence 1 in immersive journalism. When a reporting is made by CGI, it is important to think seriously the impact of VR technology Soliman, Peetz, & Davydenko, 2017; Lee, Chung, & Lee, 2013).

Conclusion

According to the results of quantitative and qualitative data, this study revealed that virtual reality is a new technology that the audience could immersive in that virtual environment and still believe the content made by journalists. In the quantitative survey, we found the audience could form their understanding toward the story of news and empathy from the convergence of virtual reality and real virtuality. Under this circumstance, virtuality is not virtual, it is real for the audience to believe the journalistic content in it.

We now explore those sort of instinctive things in a way. There is a gray area in a way of what you've been doing much more so than watching on a flat screen. Once people put on a headset, the world responds to his or her move and much more involved in the stories. The CGI producers need to keep in mind that how

focus they are on what are shown them. It means we need to establish a clear professional principle and rethink the ethics of reporting to guide journalists produce stories through CGI.

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