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The Effects of Virtual Reality From Different Visual Perspectives on Empathy

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ABSTRACT

Virtual Reality (VR), as a modern technology, can embody perspective-taking, making people see the world through the eyes of others. Many research has found that VR can be an effective medium to facilitate empathy; besides, some studies have investigated the underlying mechanism of empathy facilitation through VR devices. The current research examines whether the difference in visual perspective, which are represented as the first or third-person point of view, would affect the empathy facilitation of VR users. We invited forty people, separated into two groups as the first-person perspective group (1PP) and the third-person perspective group (3PP). The subjects were asked to watch the video through VR devices with same contents but from different points of view. The results indicated that there was no significant difference in empathy facilitation between the two groups. However, after dividing empathy into two dimensions, affective and cognitive empathy, the former showed a significant difference. Experiencing from the third-person perspective, the subjects aroused more emotions, such as guilty and compassion, thereby cultivating empathy toward the character of the video. Furthermore, for the feelings of the VR experience, the subjects of 1PP and 3PP displayed great disparity as well. Most of the subjects of 3PP subjectively considered the experience good, while the others felt neutral.

Keywords: Visual perspective, Affective empathy, Third-person perspective, Virtual reality

INTRODUCTION

How to "put ourselves into other's shoes" has been a topic widely discussed. As an emerging technology, Virtual Reality (VR) can present other people's perspectives, allowing us to be in the world viewed by others (Milk, 2015). Therefore, VR has been considered as an effective medium to deliver storytelling experiences (Shin, 2018). Also, lots of studies have found that VR is a powerful tool to enhance people's empathy and regarded it as an "empathy machine" (Farmer & Maister, 2017; Gerry, 2017; Herrera et al., 2018; Shin, 2018; Kandaurova & Lee, 2019).

VR being a head-mounted display (HMD), the visual aspect is the primary cognition of the users (Mantovani et al., 2003; Kardong-Edgren et al., 2019). Past research has investigated the underlying mechanism of empathy facilitation through VR devices, such as different virtual embodiments and different fields of view (Herrera & Bailenson, 2021; Schutte and Stilinović, 2017).

Some researchers have also suggested that people tend to take a specific visual perspective when observing things (Gander & Gander, 2021). However, other studies claim that watching 360-degree videos through different kinds of media, not only by VR devices but also by computers or smartphones, can induce user's immersive feeling (Bang & Yildirim, 2018; Bindman et al., 2018). Moreover, videos presented by VR with different fields of view, like 360-degree, 180-degree, and two-dimensional (2D), facilitate same amount of empathy (Aitamurto et al., 2018; Barreda-Ángeles et al., 2020). The above-mentioned contradiction may result from the design of the media or the factors of the subjects, which still needs to be discussed further.

VISUAL PERSPECTIVE

Previous research focused on the effects of different user's fields of view on empathy facilitation; however, few studies made further discussion about visual perspective, the effects of different points of view on empathy facilitation. Speaking of visual perspective, first and third-person points of view are the concepts often discussed. The definition of these can be interpreted through the First-Person Methodologies presented by Varela and Shear in 1999. On the one hand, the first-person perspectives are the subjective experiences relating to cognitive and mental events, which associate with and demonstrate a "self" or "subject". On the other hand, the third-person perspectives, which associate with and represent the "outside" or "object", are objective descriptions, meaning that self has no direct but indirect connection to the human agents (Varela & Shear, 1999).

The first-person point of view is like to experience with a person's own eyes, while the third-person is like to observe outside from the situation (Gander & Gander, 2021). Visual perspective can be thought of as different narrative points of view as well as different viewing directions. Past research about visual perspective on VR mostly investigated the aspect of visual memory accuracy. It has been found that different visual perspectives have no different effects on memory accuracy or vividness but on user's experiences. Studies have also suggested that the first-person perspective, comparing with the third-person, brings about more illusion of virtual body ownership (IVBO), which makes people project themselves on the virtual character and feel more sense of presence in the virtual world (Iriye & St Jacques, 2021).

EMPATHY

The current study is to determine whether the difference in visual perspectives, the first and third-person point of view, would affect the empathy facilitation of VR users. Empathy, as an ability to understand others and share their feelings (Smith, 2006), can improve interpersonal relationship, build social connections, enhance prosocial behaviors, and promote social development through cooperations (Decety, 2010; McCall & Singer, 2013; Cuff et al., 2016).

As for the intension of empathy, based on the previous studies, it does not have just single but multiple dimensions (Dziobek et al., 2011;

Schwenck et al., 2012; Zaki & Ochsner, 2012). Specifically, empathy is commonly divided into two types: cognitive empathy and affective empathy (Strayer, 1990; Davis et al., 1996; Hoffman, 2001; Singer, 2006; Shen, 2010).

People tend to utilize their own observation and imagination to understand, even predict, the behaviors and emotions of others (Smith, 2006). Cognitive empathy, also known as theory of mind or mentalizing, is these emotional reactions to perceive others' experiences (Smith, 2006; Zaki & Ochsner, 2012; Bloom, 2017). It can also be defined as the ability to understand others' points of view, or to find and know their intentions (Reniers et al., 2011; Schwenck et al., 2012).

Aside from cognitive empathy, there is another kind called affective empathy or emotional empathy, which people use to relate to others through emotional contagion. Some experts suggest empathy be more like an emotional reaction which derives from people's understanding of others' emotional states, in order to keep up with their feelings and anticipatory behaviors (Eisenberg, 2000). Different from cognitive empathy, affective empathy can be seen as the ability for people to share others' emotional experiences while identifying that these feelings do not belong to their own. (Reniers et al., 2011; Schwenck et al., 2012; Hadjikhani et al., 2014.)

METHOD

Our study examines the effects of different visual perspectives on VR. Before conducting the experiments, we have suggested a hypothesis that there would be a significant difference in empathy facilitation between watching VR through first and third-person points of view.

PARTICIPANTS AND PROCEDURE

There were 40 Taiwanese college students in our experiment, 11 males and 29 females, all of whom have read and completed the informed consent form before participating in the project. We first asked the participants to finish a questionnaire to assess their empathy level as the pretest 48 hours before the experiment. According to the collected data, we separated the subjects into two groups: the first-person perspective group (1PP) and the third-person perspective group (3PP). They were then asked to watch a same video through VR devices but from different points of view based on the group they were designated to.

MATERIAL AND MEASURES

For the video material used in our experiment, considering that all the participants were undergraduates, we decided the theme to be the daily life of a custodian in our school. School custodians are the people whom the participants are familiar with and see every day, but the life of a custodian is the thing they have barely ever experienced. The video was a 360-degree situated video filmed with two Insta 360 ONE RS's, one of which was set up in front of the custodian's forehead as the first-person point of view, while the other

equipped one meter directly behind the custodian's eyes using a waistband and a selfie stick as the third-person point of view (Figure 1).

The video was filmed in one shot, five minutes long, and without any trimming or effects. The contents were about the daily work of a custodian, such as mopping the floor, cleaning the sink, washing and recycling the trash in the pantry room, and so on (Figure 2, 3).
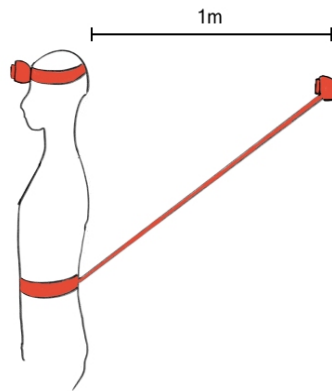

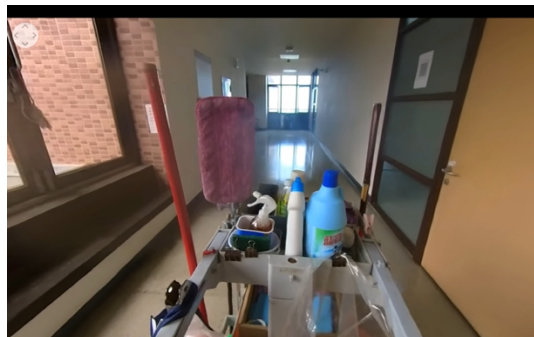**Figure 1**: The diagram of the placement of two cameras.

Figure 2: An image captured from the video that 1PP watched.

Figure 3: An image captured from the video that 3PP watched.

For the indexes applied in our experiment, we used Interpersonal Reactivity Index (IRI) for the pretest (Table 1). The measure had four subscales, and each made up of six different items answered on a five-point Likert scale, which were 24 items for total. The items were devised to measure Fantasy, Perspective Taking, Empathic Concern, and Personal Distress, respectively (Davis, 1980).

Table 1. The descriptive statistical data of IRI.

Visual Perspective	IRI		
	N	**Mean**	*SD*
First person	20	3.59	0.31
Third person	20	3.62	0.34
Total	40	3.61	0.33

We also designed a posttest questionnaire was to examine the subject's familiarity of the material and the self-assessment of their VR experience after the experiment. The items included the familiarity with the situation in the video and the subjective rating of whether they empathized the character in the video. Besides, for the empathy measurement, we referred to the methods presented by Schutte and Stilinović (2017). The items were based on IRI of Davis (1980), and were answered on a five-point Likert scale. The questionnaire were comprised of eight items, four for cognitive empathy and another four for affective empathy, and the descriptions of each item were adjusted according to different groups. For the reliability analysis, the Cronbach's α of the eight items was 0.82.

Table 2. The items of the posttest.

Before the experiment, were you familiar with the job description of the custodian?
Before the experiment, were you familiar with the working environment of the custodian?
I consider it easier to facilitate empathy on VR than other media.
I empathize with the custodian after watching the video.

I imagined myself to be in the custodian's situation. (PT)
I felt as if I were in the custodian's shoes. (PT)
I felt touched by the custodian's situation. (EC)
I felt sorry for the custodian. (EC)
I tried to see things from the custodian's point of view. (PT)
I felt compassion for the custodian. (EC)
I tried to take the perspective of the custodian. (PT)
I felt protective towards the custodian. (EC)

Note. EC = Empathy concern; PT = Perspective taking

RESULTS

We conducted an independent samples t-test to study the effects in visual perspective on empathy facilitation through VR. Though the average empathy

score of the overall participants was 29.23 ($SD = 4.10$), our results indicated that there was no significant difference in empathy facilitation between 1PP and 3PP ($t = -1.041$, $df = 38$, $p = .304$), which includes perspective taking in cognitive empathy ($t = -.128$, $df = 38$, $p = .898$) and empathic concern in affective empathy ($t = -2.016$, $df = 38$, $p = .051$). Therefore, we parted the two types of empathy and analyzed them separately for the in-depth study. The results showed that there was still little difference in cognitive empathy facilitation, but two items about affective empathy facilitation showed great disparity (Table 3). Specifically, the two items were "I felt sorry for the custodian ($t = -2.915$, $df = 38$, $p = .034$)" and "I felt compassion for the custodian ($t = -2.276$, $df = 38$, $p = .029$)". We assumed that participants could arouse more emotions, such as guilty and compassion, by watching video from the third-person perspective, thereby cultivating empathy to the character in the video. Namely, the results were partly the same as our hypothesis.

Moreover, though the subject's familiarity with the material showed little difference, the subjects of 1PP and 3PP had different results on the self-assessment of their VR experience. Specifically, the items were "I consider it easier to facilitate empathy on VR than other media ($t = -2.308$, $df = 38$, $p = .027$)" and "I empathize with the custodian after watching the video ($t = -2.226$, $df = 38$, $p = .032$)". Most of the subjects of 3PP subjectively considered the experience good and easier to enhance their empathy comparing with other devices; that is, they could empathize with the custodian more. From the participants' feedback, we presumed that the probable cause may be dizziness, which the subjects of 3PP experienced relatively less than

Table 3. Independent samples t-test of 1PP and 3PP empathy scores toward each item.

Independent Sample t-test			Mean	SD	df	F	p
Affective empathy	EC1	First person	3.25	1.16	38	−0.307	0.76
		Third person	3.35	0.88			
	EC2	First person	2.70	0.73	38	−2.195	0.034*
		Third person	3.30	0.98			
	EC3	First person	3.10	0.31	38	−2.276	0.029*
		Third person	3.40	0.50			
	EC4	First person	3.75	0.72	38	−1.045	0.303
		Third person	4.00	0.79			
Cognitive empathy	PT1	First person	4.00	0.73	38	0.59	0.559
		Third person	3.85	0.88			
	PT2	First person	3.85	0.88	38	0	1
		Third person	3.85	0.81			
	PT3	First person	3.95	0.76	38	−0.224	0.824
		Third person	4.00	0.65			
	PT4	First person	3.95	0.60	38	−1.061	0.295
		Third person	4.15	0.59			

*$p <.05$ **$p <.01$ ***$p <.001$
Note. EC = Empathy concern; PT = Perspective taking

those of 1PP. The less dizziness experienced in the experiment may make the subject immerse better in VR, which in turn strengthened the psychological effects of the participants.

CONCLUSION

Our research studied the effect on empathy facilitation of VR users from visual perspective. In general, VR surely could be an "empathy machine" from both first and third-person point of view, which corroborated the previous studies and viewpoints (Farmer & Maister, 2017; Gerry, 2017; Herrera et al., 2018; Shin, 2018; Kandaurova & Lee, 2019). Meanwhile, there was statistically significant difference between the two visual perspectives in affective empathy facilitation. The results indicated that watching VR from the third-person point of view could bring up more emotional reactions and that users could have better feelings for the VR experience, in comparison to watching VR from the first-person point of view. Though we cannot assert the findings are completely in accordance with our hypothesis, these can be a basis for the further research as well as the design of similar experiments. Furthermore, the results suggest the improvement in the emotional contagion of a video filmed from the third-person point of view, which can be taken into consideration when creating visual content for video creators and salespeople.

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