Beyond Horror and Fear: Exploring Player Experience Invoked by Emotional Challenge in VR Games

Xiaolan Peng
University of Chinese Academy of Sciences
Institute of Software, Chinese Academy of Sciences
Beijing, China
xiaolan@iscas.ac.cn

Jin Huang
Institute of Software, Chinese Academy of Sciences
Beijing, China
huangjin@iscas.ac.cn

Linghan Li
Chen Gao
University of Chinese Academy of Sciences
Beijing, China
{lilinghan,gaochen}@iie.ac.cn

Hui Chen
Feng Tian
Hongan Wang
University of Chinese Academy of Sciences
Institute of Software, Chinese Academy of Sciences
Beijing, China
{chenhui,tianfeng,hongan}@iscas.ac.cn

ABSTRACT

Digital gameplay experience depends not only on the type of challenge that the game provides, but also on how the challenge be presented. With the introduction of a novel type of emotional challenge and the increasing popularity of virtual reality (VR), there is a need to explore player experience invoked

CHI'19 Extended Abstracts, May 4–9, 2019, Glasgow, Scotland UK

ACM ISBN 978-1-4503-5971-9/19/05.
https://doi.org/10.1145/3290607.3312832

by emotional challenge in VR games. We selected two games that provides emotional challenge and conducted a 24-subject experiment to compare the impact of a *VR* and *monitor-display* version of each game on multiple player experiences. Preliminary results show that many positive emotional experiences have been enhanced significantly with VR while negative emotional experiences such as horror and fear have less been influenced; participants' perceived immersion and presence were higher when using *VR* than using *monitor-display*. Our finding of VR's expressive capability in emotional experiences may encourage more design and research with regard to emotional challenge in VR games.

KEYWORDS

Player Experience; Emotional Challenge; Virtual Reality; Games; Emotion.

INTRODUCTION

Recent work introduced the notion of emotional challenge as a fertile ground to explore more unique and diverse player experiences in digital games [1]. Emotional challenge [3] "*confronts players with emotionally salient material of the use of strong characters, and a captivating story, and wherein the core pleasure is the resolution of tension within the narrative, emotional exploration of ambiguities within the diegesis, or identification with characters*". Beyond the frustration-fiero cycle typical of more 'conventional' challenge, emotional challenge holds great promise in understanding a wider range of gaming experiences, especially with respect to those evoked by emotional spectrum games [1]. As a result, it has immediately attracted HCI researchers' attention, particularly in the study of player experience [1] and challenge measurement [4] in digital games.

A growing number of VR games are providing players with the type of emotional challenge characterized by narrative materials and emotional ambiguities. On one hand, many existing digital games, especially the horror-adventure type, are ported to work in VR [6]. On the other, games of novel forms such as narrative and storytelling games are emerging in VR platform. VR's strength in offering great realism and immersion may endow it with a great capability to present emotional challenge in game settings. However, emotional challenge in VR games has so far received little attention, it is still unknown how VR will affect the player experience invoked by emotional challenge and whether the effects are similar across different types of games.

To explore these issues, we selected a narrative-storytelling game (*A Show of Kindness*) and a horror-adventure game (*Run Rooms*) that provides emotional challenge, and then conducted a between-subjects experiment (N=24) to compare the effects of a *VR* and *monitor-display* version of each game on survey scales. We find that the typical experiences of horror and fear induced by *Run Rooms* have not been strengthened in VR. On the contrary, many positive emotional experiences evoked by *A Show*

Figure 1: A sample of participant in VR settings

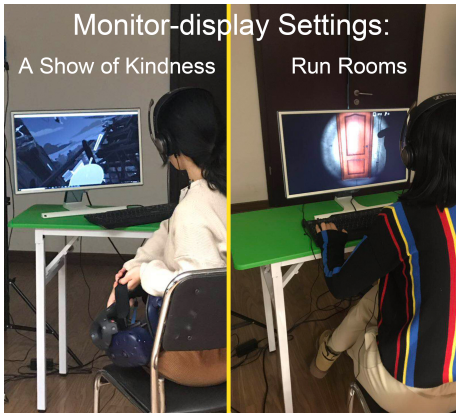

Figure 2: Sample of participants in monitor-display settings

of Kindness using *VR* are much more intense than using *monitor-display*. In both games, participants perceived higher level of immersion and presence when using *VR* than using *monitor-display*.

RELATED WORK

The notion of 'emotional challenge' was first proposed by Cole et al. [3] as a complement to more 'conventional' types of challenge. In their work on analyzing professional critics' game reviews, they found the aspects linked to 'emotional challenge' offered by reviewing avant-garde games (e.g., To the Moon, Gone Home) are mutually distinguished from those linked to 'functional challenge' offered by core games (e.g. Gears of War 3, Grand Theft AutoV) [3]. Emotional challenge requires players to deal with emotionally salient material or comprehend ambiguous elements by using cognitive effort rather than skill and dexterity. As a result, Denisova et al. [4] included emotional challenge as an important complement to cognitive and physical challenges to measure challenge in digital games. Bopp et al. [1] conducted an online survey to compare game players' emotionally challenging and conventionally challenging experience. They found that emotional challenge evoked more negative emotions than conventional challenge and the negative emotions were appreciated more by players.

With the release of the first consumer VR head-mounted display in 2016 [6], user experience in VR games has aroused new discussion and attention. Rogers et al. [8] studied the effects of game audio perception on player experiences in VR by using the horror-adventure game "The Vanishing of Ethan Carter". Porter III et al. [6] investigated how the use of motion controls in VR altered user experience when playing "Minecraft". Wilson and McGill [11] compared users' experience of playing the horror video game "Resident Evil 7" in VR and TV and found that VR lead to higher presence than TV. Shelstad et al. [9] found that playing "Defence Grid 2" with VR resulted in moderate increases in user enjoyment and aesthetic appreciation versus playing with non-VR version. Aforementioned research on user experience focused on using VR games that mainly convey functional challenge, or providing players with limited feelings of horror and fear. However, none of them has explicitly explored player experience that typically invoked by emotional challenge in VR games.

EXPERIMENT

Twenty-four participants (14 female, age M=26.7, SD=4.32) were evenly divided by gender in *VR* and *monitor-display* groups. Each played two games (see Figure 1 and Figure 2) in a counterbalanced order. All of them reportedly had digital gameplay experiences and about half of them play at least every day. Seven of them had VR experience for half an hour in their entire life and the rest had never used VR.

A Show of Kindness is a short and touching game requiring the player to navigate three scenes of a story. The story is narrated through character expressions and body language, with a spritely bit of background music but not any dialogues. *Run Rooms* is a first person indie-horror game requiring

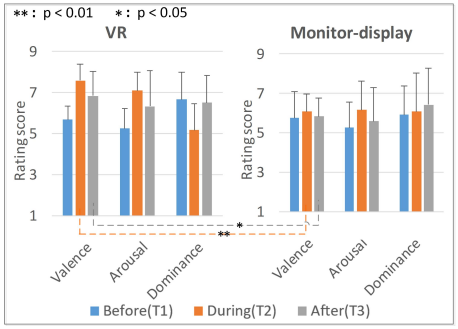

Figure 3: SAM of "A Show of Kindness"

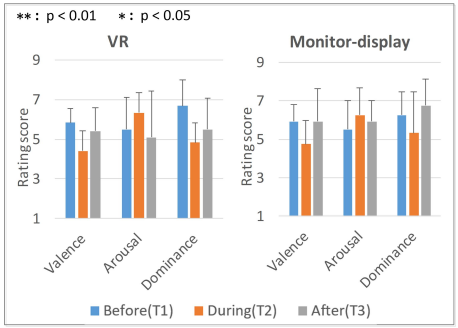

Figure 4: SAM of "Run Rooms"

Table 1: Valence, arousal and dominance (VAD) changed with time

Game	Dimension	T2-T1	T3-T2
A show of Kindness	VR_V	1.917**	-0.750*
	VR_A	1.833**	
	VR_D	-1.500*	1.333**
Run Rooms	VR_V	-1.417**	
	VR_A		
	VR_D	-1.833**	
Run Rooms	$Monitor_V$	-1.167**	1.167**
	$Monitor_A$		
	$Monitor_D$		1.417*

the player to carefully travel and explore many sealed rooms to run away from the hack of a terrible mask man. These two games were selected based on two considerations. On one hand, the two games both convey more characteristics of emotional challenge [3] than functional challenge (the functional challenge of *Run Rooms* has been reduced in a written introduction in our experiment): they focus more on the narrative materials, stories and themes rather than skill and dexterity; players care more about "How do I feel?" rather than "What can I do?"; they are more qualitative and unique than being quantitative and re-playable. On the other, the two games are designed to provide players with both positive and negative emotional experiences, so that a wider spectrum of emotional experiences beyond horror and fear can be explored in our study.

Players' dimensional affective states (valence, arousal and domination) before, during and after the play of each game were measured by using SAM [2]. Players' discrete emotional states were measured through Gross's rating items [5]. Immersion level was measured by using IEQ [7]: five factors (cognitive involvement, challenge, control, real-world dissociation and emotional involvement) through 31 items. One seven-point Likert question of "In the computer generated world I had a sense of being there" [10] was used to measure presence.

An introduction was given to participants followed by the obtain of a written consent, their demographic information and gaming experiences. After a written introduction of the games and operations, the experiment proceeded as follows: (1) Participants filled in SAM before playing. (2) They played one of the games to completion with the *VR* or *monitor-display* version. (3) They filled in SAM and Gross rating items by recalling their experiences during the gameplay. (4) They filled in SAM, IEQ and received a short interview. (5) They rest for 30 minutes to play the other game. Although each game can be completed in about 10 minutes, we still reminded participants to inform the researcher if they experienced any simulator sickness.

RESULTS

Dimensional affective states before, during and after gameplay

For *A Show of Kindness*, as shown in Figure 3, Generalized Linear Model measures showed that participants' perceived valence, arousal and dominance changed significantly with time (before: $T1$ vs. during: $T2$ vs. after: $T3$) and these significant changes occurred only with *VR* condition (see Table 1). Moreover, a main effect of condition on valence was found. Specifically, at T2 and T3, the perceived valence *VR* (M=7.583 and M=6.833) were significantly higher (both p<0.05) than those with *monitor-display* (M=6.083 and M=5.833). No interaction effect was found.

For *Run Rooms*, as shown in Figure 4, the valence, arousal and dominance changed significantly with time and these changes occurred with both *VR* and *monitor-display* conditions (see Table 1). Neither condition nor interaction effect was found.

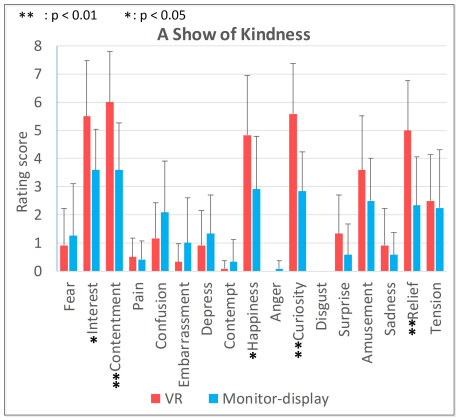

Figure 5: Participants' discrete emotional states when playing "A Show of Kindness"

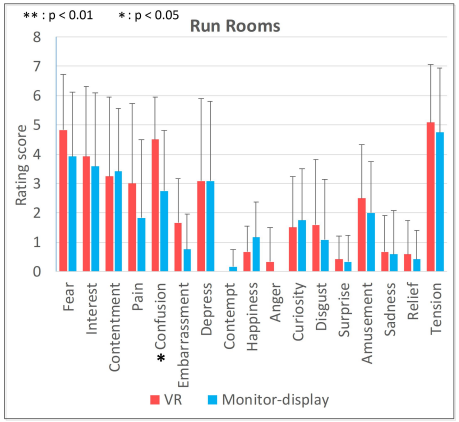

Figure 6: Participants' discrete emotional states when playing "Run Rooms"

Finding 1: *A Show of Kindness* provided participants with pleasant feelings while *Run Rooms* provide them with unpleasant feelings. Their dominance level both decreased when playing the two games. For *A Show of Kindness*, *VR* presented participants significantly higher level of experiences than *monitor-display* while this difference did not show up with *Run Rooms*.

Discrete emotional states during gameplay

For *A Show of Kindness*, as shown in Figure 5, participants perceived significantly higher (all p<0.05) emotional states of interest, contentment, happiness, curiosity and relief with *VR* (M=5.500, M=6.000, M=4.833, M=5.583 and M=5.000) than those with *monitor-display* (M=3.583, M=3.583, M=2.917, M=2.833 and M=2.333), respectively. For *Run Rooms*, as shown in Figure 6, only perceived confusion with *VR* (M=4.500) was significantly higher than that with *monitor-display* (M=2.750, p<0.05).

Finding 2: *A Show of Kindness* mainly provided participants with experiences of interest, contentment, happiness, curiosity, amusement and relief, for most of which *VR* presented a significantly higher level than *monitor-display*. *Run Rooms* provided experiences of fear, interest, contentment, confusion, depress and tension while *VR* only presented a significantly higher level of confusion than *monitor-display*.

Immersion and Presence

For *A Show of Kindness*, as shown in Figure 7, participants' perceived emotional involvement, real-world dissociation and presence with *VR* (M=4.450, M=4.958, M=5.292 and M=6.633) were significantly higher (all p<0.05) than those with *monitor-display* (M=3.475, M=3.729, M=3.104 and M=3.167), respectively. No significant difference was found with factors of control and challenge. For *Run Rooms*, as shown in Figure 8, the perceived real-world dissociation and presence with *VR* (M=4.937 and M=6.183) were significantly higher (both p<0.01) than those with *monitor-display* (M=3.667 and M=4.683). No other significant difference was found.

Finding 3: For *A Show of Kindness*, participants perceived significantly higher emotional involvement, cognitive involvement, real-world dissociation and presence with *VR* than with *monitor-display*, while for *Run Rooms*, the difference only existed with respect to real-world dissociation and presence.

DISCUSSION AND FUTURE WORK

This study investigated the effects of VR on player experience that invoked by emotional challenge in two different games. We find that the typical experiences of horror and fear induced by *Run Rooms* have not been strengthened in VR. On the contrary, many positive emotional experiences evoked by *A Show of Kindness* in *VR* version are much more intense than in *monitor-display* version. In both games, participants perceived higher real-world dissociation and presence in *VR* condition than in *monitor-display* condition. Although it maybe unconvinced to directly compare effects of

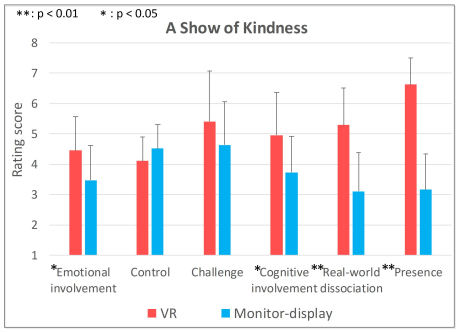

Figure 7: Participants' perceived immersion and presence when playing "A Show of Kindness"

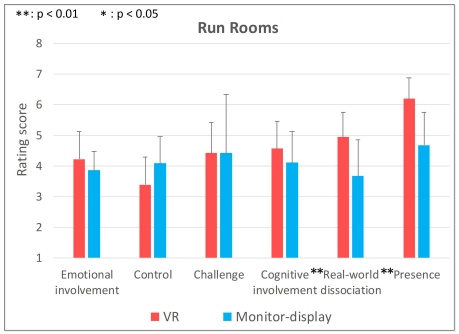

Figure 8: Participants' perceived immersion and presence when playing "Run Rooms"

the two games due to the different levels of emotional challenge that each game might provide and the different settings used in monitor-display condition, our preliminary finding of VR's expressive capability in emotional experiences may encourage more design and research with regard to emotional challenge in VR games. As a result, several interesting questions would be addressed in our future work: 1) What factors may lead to the different effects on the two games? 2) Whether interview results and physiological signals will show consistent findings? 3) Whether positive emotional experiences provided by other type of games can also be strengthened in VR?

ACKNOWLEDGMENTS

This work was supported by National Key R&D Program of China (Grant No. 2016YFB1001201), the National Natural Science Foundation of China (Grant No. 61802379, 61661146002) and Key Research Program of Frontier Sciences, CAS (Grant No. QYZDY-SSW-JSC041).

REFERENCES

[1] Julia Ayumi Bopp, Klaus Opwis, and Elisa D. Mekler. 2018. "An Odd Kind of Pleasure": Differentiating Emotional Challenge in Digital Games. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, CHI 2018, Montreal, QC, Canada, April 21-26, 2018*. 41. https://doi.org/10.1145/3173574.3173615

[2] Margaret M Bradley and Peter J Lang. 1994. MEASURING EMOTION: THE SELF-ASSESSMENT MANIKIN AND THE SEMANTIC DIFFERENTIAL. *Journal of Behavior Therapy and Experimental Psychiatry* 25, 1, 49–59.

[3] Tom Cole, Paul A. Cairns, and Marco Gillies. 2015. Emotional and Functional Challenge in Core and Avant-garde Games. In *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play, CHI PLAY 2015, London, United Kingdom, October 5-7, 2015*. 121–126. https://doi.org/10.1145/2793107.2793147

[4] Alena Denisova, Christian Guckelsberger, and David Zendle. 2017. Challenge in Digital Games: Towards Developing a Measurement Tool. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, Denver, CO, USA, May 06-11, 2017, Extended Abstracts*. 2511–2519. https://doi.org/10.1145/3027063.3053209

[5] James J Gross and Robert W Levenson. 1995. Emotion elicitation using films. *Cognition Emotion* 9, 1, 87–108.

[6] John Porter III, Matthew Boyer, and Andrew Robb. 2018. Guidelines on Successfully Porting Non-Immersive Games to Virtual Reality: A Case Study in Minecraft. In *The Annual Symposium on Computer-Human Interaction in Play, CHI PLAY 2018, Melbourne, VIC, Australia, October 28-31, 2018*. 405–415. https://doi.org/10.1145/3242671.3242677

[7] Charlene Jennett, Anna Louise Cox, Paul A. Cairns, Samira Dhoparee, Andrew Epps, Tim Tijs, and Alison Walton. 2008. Measuring and defining the experience of immersion in games. *Int. J. Hum.-Comput. Stud.* 66, 9, 641–661.

[8] Katja Rogers, Giovanni Ribeiro, Rina R. Wehbe, Michael Weber, and Lennart E. Nacke. 2018. Vanishing Importance: Studying Immersive Effects of Game Audio Perception on Player Experiences in Virtual Reality. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, CHI 2018, Montreal, QC, Canada, April 21-26, 2018*. 328.

[9] William J. Shelstad, Dustin C. Smith, and Barbara S. Chaparro. 2017. Gaming on the Rift: How Virtual Reality Affects Game User Satisfaction. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting61*. 2072–2076.

[10] Mel Slater, Martin Usoh, and Anthony Steed. 1994. Depth of Presence in Virtual Environments. *Presence* 3, 2, 130–144.

[11] Graham A. Wilson and Mark McGill. 2018. Violent Video Games in Virtual Reality: Re-Evaluating the Impact and Rating of Interactive Experiences. In *The Annual Symposium on Computer-Human Interaction in Play, CHI PLAY 2018, Melbourne, VIC, Australia, October 28-31, 2018*. 535–548.