Designing a VR Lobby for Remote Opera Social Experiences

Sueyoon Lee
Centrum Wiskunde & Informatica (CWI)
Amsterdam, The Netherlands
sueyoon@cwi.nl

Alina Striner
Centrum Wiskunde & Informatica (CWI)
Amsterdam, The Netherlands
alina.striner@cwi.nl

Pablo Cesar
Centrum Wiskunde & Informatica (CWI)
Delft University of Technology
Amsterdam, The Netherlands
p.s.cesar@cwi.nl

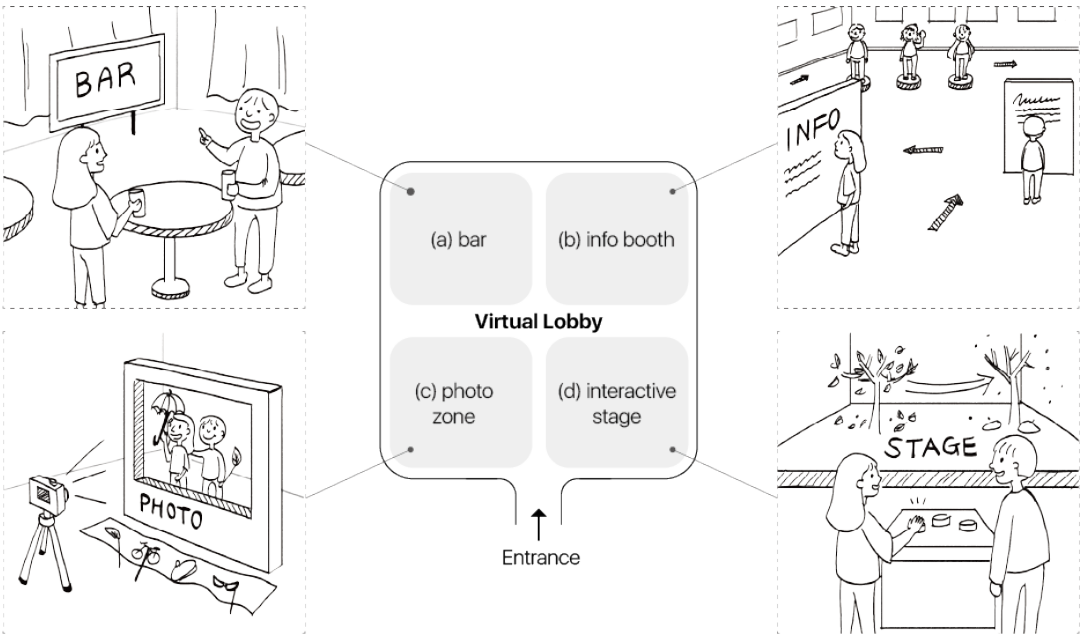

Figure 1: A sketch of a social virtual lobby design for post-show digital opera experiences, consisting of four rooms: a (a) Bar; (b) Info Booth; (c) Photo Zone; and (d) Interactive Stage.

ABSTRACT

Several social VR platforms support virtual entertainment events, however their value for post-show activities remains unclear. Through a user-centered approach, we design a social VR lobby experience to enrich four motivations of theatre-goers: social, intellectual, emotional, and spiritual engagement. We ran a context-mapping focus group session with professionals (N=6) to conceptualize the social VR space for digital opera experiences. Based on our findings, we propose a social VR lobby consisting of four rooms: 1) *a Bar* for social engagement, 2) an *Info Booth* for intellectual engagement, 3) a *Photo Zone* for emotional engagement, and 4) an *Interactive Stage* for spiritual engagement. Based on this work, we plan to experimentally evaluate audience experiences in each room in order to create a social VR lobby template for theater experiences.

IMX '22, June 22–24, 2022, Aveiro, JB, Portugal

ACM ISBN 978-1-4503-9212-9/22/06.
https://doi.org/10.1145/3505284.3532980

CCS CONCEPTS

• **Human-centered computing** → **Virtual reality**.

KEYWORDS

Opera, social VR, virtual reality, post-experience

ACM Reference Format:
Sueyoon Lee, Alina Striner, and Pablo Cesar. 2022. Designing a VR Lobby for Remote Opera Social Experiences. In *ACM International Conference on Interactive Media Experiences (IMX '22), June 22–24, 2022, Aveiro, JB, Portugal.* ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3505284.3532980

1 INTRODUCTION

As physical experiences are substituted with virtual simulations, theater has become of few places "where five-hundred people can laugh or cry, sigh or breathe together, side by side, in acknowledgement of [their] humanity" [11]. As theater moves online [24], we consider how to support virtual experiences through the design of a social VR lobby.

In this paper, we employ a user-centered approach to design a virtual lobby for post-show digital opera experiences. First, we review the fundamental motivations of attending theater, and describe use cases for social VR experiences. Then, we conduct a

context-mapping [26] focus group with VR and opera experts (N=6) to conceptualize the social VR lobby for a post-show opera experience. Next, we design and prototype a four-room social VR lobby for a digital opera produced by the Irish National Opera (INO)[1] (Figure 1). Our work offers two primary contributions: (1) focus group results to support the design of the social VR lobby, and (2) a preliminary lobby design with four rooms—a Bar, an Info Booth, a Photo Zone, and an Interactive Stage—that satisfy the social, intellectual, emotional, and spiritual motivations of theater audiences. Following this work, we plan to experimentally evaluate the value of the lobby for different opera events in order to create a social VR lobby template and guidelines for post-show theater experiences.

2 RELATED WORK

2.1 Audience Motivations for Attending Theater

Audience motivations for attending opera and theater are complex. Walmsey [27] identifies several motivational typologies: escapism and entertainment, edutainment, personal enrichment, and social hedonism. These map onto four high-level motivations for attending; *spiritual, emotional, intellectual*, and *social* goals, that in turn map to Maslow's hierarchy of needs [16, 17]. Spiritual and emotional motivations are often driven by immersion in sensory experiences, that evoke visceral or "gut" reactions, and help audiences feel complex emotions [27]. In parallel to sensory experiences, audiences are driven by intellectual drivers such as academic interests, hobbies, and self-improvement goals.

The fulfillment of these motivations may be measured through validated tools. Spiritual and emotional engagement can be assessed using the theater experience scale [4, 7] that ask audiences about immersion, flow, and connection to the story, actors, and the performance. In complement, intellectual motivations may be measured by asking participants to recall information about the experience, similar to Krokos [12]. Finally, social motivations may be assessed using the Brief Sense of Community Index (BSCI) [19], that asks users to respond to questions about feeling a sense of connection and belonging within a community.

2.2 Social VR

Social Virtual Reality (Social VR) refers to virtual environments that allow multiple users to interact in VR. Commercial social VR platforms such as *AltspaceVR*[2], *VRChat*[3], and *Bigscreen*[4] enable immersive and remote social interactions with unique social mechanics. *AltspaceVR*, for instance, supports group meetups, live concerts, and classes. Likewise, *VRChat* is known for highly customizable avatars and world creation, and *Bigscreen* specializes in social movie and game experiences. The increasing popularity of these platforms illustrates the value of social VR for remote communication.

Gunkel et al. identifies four use cases for social VR: video conferencing, education, gaming, and watching movies [8]. Research has likewise explored the potential of social VR in areas such as health care [14], food [18], learning and training [1, 13, 29]. In entertainment, Rothe et al. explored the social viewing of movies in VR [21], and Li et al. considered watching photo-realistic movies in a social VR environment [15], however research has not yet explored the social space following show experiences. This paper thus envisions a social VR lobby to support an enriching post-opera experience.

[1]https://www.irishnationalopera.ie/
[2]AltspaceVR: https://altvr.com/
[3]VRChat: https://hello.vrchat.com/
[4]Bigscreen: https://www.bigscreenvr.com/

3 FOCUS GROUP

Using context mapping, we conducted a focus group session to reflect on the current state of opera watching experiences, and to envision a VR opera lobby. The following sections describes our study method and focus group results.

3.1 Participants

Six (3M, 3F) participants were recruited through email to participate in the focus group session. Three were experts in opera production, and three were experts in VR (two employed in industry, one as researcher). All participants had at least two years of experience in collaborative work for VR and opera.

3.2 Method

3.2.1 Materials. A presentation slide (Figure 2(b)) was shown to participants to indicate the flow of the session, and to provide core and relevant information. Activity sheets (Figure 3) and materials were distributed to participants at the beginning of each part so that they could focus on the given task in each stage.

3.2.2 Procedure. A face-to-face focus group was conducted at a Digital Hub in Dublin, Ireland (Figure 2(a)) over a one-hour and forty minute session. One moderator led the focus group and facilitated the session, while two assistants observed and recorded the session with audio recordings and photos. The focus group was structured as following:

- Introduction (10 minutes)
- Warm-up activity (10 minutes)
- Part 1: Current opera watching experience (30 minutes)
- Part 2: VR opera lobby ideation (35 minutes)
- Conclusion and Debrief (15 minutes)

Introduction. The session began with the moderator and participants introducing themselves, and the moderator providing an overview of the session. Participants then signed the consent form and fill in a demographic questionnaire.

Warm-up activity. The moderator asked participants to describe enjoyable musical experiences they had previously experienced. These were not confined to opera so that they could bring a broad range of ideas to the discussion.

Part 1: Current opera watching experience. Focus group participants were asked to draw a user journey of a past opera-watching experience with a companion, from the moment of leaving home for the opera, to arriving back home. Participants individually marked the social aspects of the experience on the timeline with stickers, and then compared one another's experiences in pairs(Figure 3(a)). After this, the whole group shared their results, and discussed valuable social moments that could be included in a social VR experience.

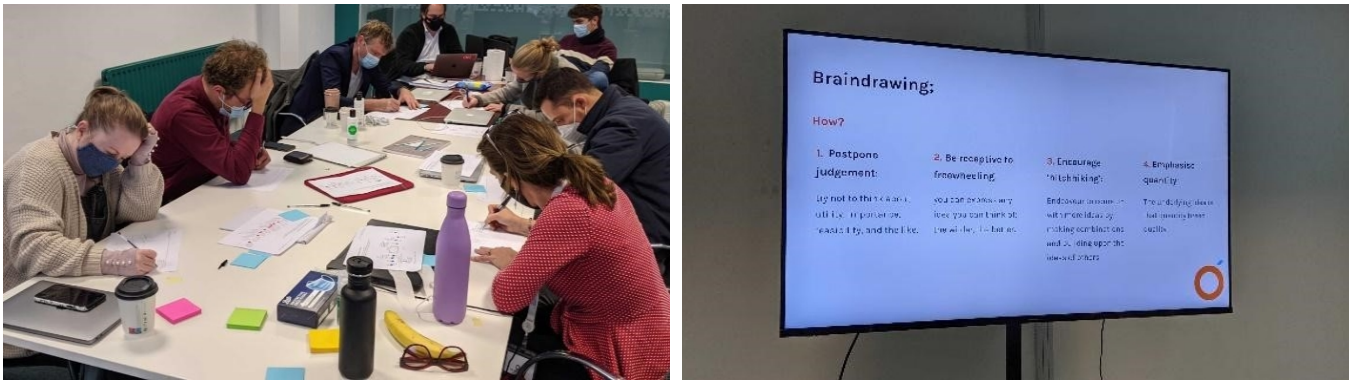

Figure 2: (a) Focus group setup (b) Sample presentation slide.

Part 2: VR opera lobby ideation. We used the 'Braindrawing' method [25] to brainstorm a VR opera lobby. First, each person drew their idea onto a paper and passed it to the next person, who continued drawing on top of that idea. This process was repeated until each participant received their first sheet back (Figure 3(b)). At the end of the activity, participants shared their final drawings with the group, and worked together to assign a title to each idea.

Conclusion and debrief. Together, the moderator and participants reflected on the outputs of the user journey and braindrawing activities, and discussed emerging ideas for the VR lobby.

3.2.3 Data Analysis. Focus group data was analyzed using thematic analysis [5, 22]. The moderator first collected the ideas from the activity sheets and transcribed handwritten text into an Excel document. Findings from the first activity were then grouped into a timeline; before, during, and after the performance. In complement, findings from the second activity were open-coded based on key words, and grouped into similar themes. These themes appear as italics in section 3.3.2.

3.3 Results

3.3.1 Social Interaction in Opera Watching. Table 1 summarizes the social interactions during the opera-watching experiences. Participants may meet theater companions before the show, or may run into unexpected friends at the theater. Some participants have a drink or grab snacks, while others prepare for their experience by learning about the show and building their excitement (e.g., by reading the program, or checking social media). Social interactions during the opera are more limited; these may include bi-directional interactions with companions (e.g., whispering or touch), or interactions with the stage (e.g., applauding the conductor). After the opera, many participants discuss the show with their companions on their way home or at the bar, by reflecting on their favorite moments or favorite songs. Such social interactions are expanded to through social media; participants may Google the show after the opera, or share their experience online.

3.3.2 New Experience in VR Opera Lobby. Many study participants wanted to *revisit* an opera scene, either to *interact with* or *alter* elements from the opera, such as changing the music and atmosphere,

Timeline	Activities
Before the opera	• Meet companions • Meet unexpected friends • Have a drink (pre-show) • Learn about the show • Build excitement towards the show
During the opera	• Interact with companion • Interact with the stage
After the opera	• Have a drink (post-show) • Have a discussion about the show • Plan for next event • Check or post on social media

Table 1: Social interaction in opera watching based on a timeline

or watching alternative endings. They also looked forward to *communicating* with others in the VR space, through direct methods such as visiting the space and playing interactive games together, as well as indirect methods such as leaving feedback via voice notes or drawing and writing comments. Participants also wanted to *learn more* about the opera, such as through a gallery with information about the opera. Participants also wanted to *save* their opera experiences, and to *share* them outside of the VR environment, by taking photos inside the scene, saving interaction materials in a personal wallet, or exporting and sending them via email.

4 SOCIAL VR LOBBY DESIGN

4.1 Design Decisions

We chose to narrow down our design space to a post-show experience because we found clear differences between social activities that happened before, during, and after the show. Then, we constructed a 'social VR lobby' prototype based on the high-level motivations of attending theater experiences [27].

4.2 Rooms Design Specification

We present a social VR lobby template design based on the literature and findings from the focus group session. The social VR lobby for opera consists of four rooms, each focusing on a different type of audience engagement; a Bar for social engagement, a Info Booth for

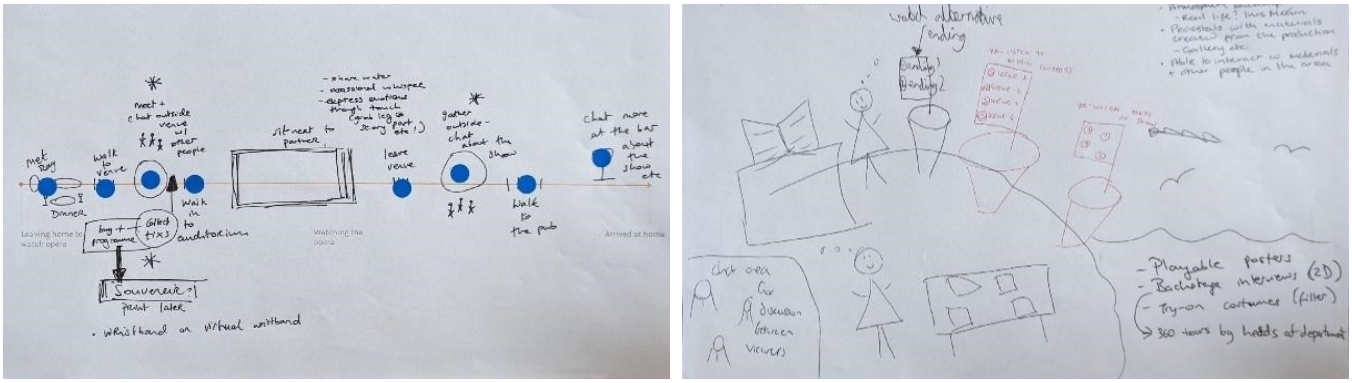

Figure 3: Activity sheets: (a) Part 1 result example (b) Part 2 result example.

intellectual engagement, a Photo Zone for emotional engagement, and an Interactive Stage for spiritual engagement (Figure 1).

Bar for Social Engagement. The Bar (Figure 1(a)) provides users with a socializing space in the form of a bar. From the focus group, all participants (n=6) mentioned going to a pub, or have a drink either before or after watching operas with their companions. Such community experiences motivate social theater experiences [6, 27] by allowing audiences to have a good time with friends and family, and to feel included and welcome. Further, giving audiences a chance to discuss the experience after the event allows them to consider details they may have missed [20].

Info Booth for Intellectual Engagement. The Info Booth (Figure 1(b)) provides background information about the opera through text, images, and 3D models. This is motivated by focus group participants wanting an 'information board about the opera' and the ability to 'play 2D videos from the creative team.' These findings are supported by Walmsley's [27] motivations of 'self-improvement,' and 'learning about history or current issues,' and by Kilpatrick [11], who recommends using lobbies to frame productions within a larger context.

Photo Zone for Emotional Engagement. The Photo Zone (Figure 1(c)) offers an opportunity to capture and save the experience by taking photos. This is motivated by focus group participants wanting a 'personal archive or wallet' and imagining a 'selfie booth to take photos in the scene.' These findings are supported by literature on nostalgia and souvenirs; people experience strong nostalgic bonds to objects surrounding social and cultural events [9]; photos [3] and other personalized souvenirs [10, 11] associated with such experiences may be used to re-live past events.

Interactive Stage for Spiritual Engagement. The Interactive Stage (Figure 1(d)) allows audience members to interact with props from the opera, and to change scene elements. This is motivated by focus group participants wanting to physically engage with the opera by grabbing or touching the set, or by controlling the plot (e.g., through alternative endings). This speaks to spiritual motivations described by Walmsley [27]; the sense of agency created through interactivity [23] fulfills 'escapism and immersion' goals. Likewise, the stage gives audiences a chance to reflect on ambient characteristics of the performance; Cova and Caru [3] found that the space layout of the concert (e.g. a softer setting for an acoustic concert vs. a lit up electric concert) changes the overall dynamics of a show.

5 DISCUSSION

Here we describe the status of the social VR implementation, and further design considerations, including how to evaluate the lobby, whether to control the user path, and what audience relationships to evaluate.

5.1 Status of Implementation

This section illustrates the current development status of the social VR lobby, depicting the setup and assets of the bar and info zone. Two other rooms, the photo zone and interactive stage, are currently under development.

The social VR lobby template was implemented in Unity3D[5]. All 3D avatars and models were built with Blender[6], and some of the environment 3D models were sourced from Sketchfab[7]. The contents were based on the opera <Close>[8], created as part of '20 Shots of Opera', which was conceived, composed, recorded, and filmed by INO in 2020 during the COVID-19 pandemic. This piece was chosen for its relatively short length (8' 48"), so that it could be used in a later experiment. While the lobby is customized for the opera <Close>, we consider it a use case for a VR lobby template that may be easily customized and adapted to other theater experiences.

The Bar consists of a playable quiz screen, grabbable beers and fries, chairs and table sets, and an animated jazz band (Figure 4(a)). The quiz screen contains a list of questions (e.g., *Can you relate to the protagonists in the opera, Do you think the opera is relevant for audiences today?*) provided by INO, to provoke and guide audience reflection and discussion. To create the ambiance of a real bar, we implemented a band with rigged 3D avatars as a background, and interactive food props. The *Info Booth* includes text and images panels related to the opera, as well as 3D animated, standing figures of the opera production team (Figure 4(b)). Here, audience members can learn background information about the opera as they walk around; they can read text summaries and view photos of the

[5]Unity: https://unity.com/
[6]Blender: https://www.blender.org/
[7]Sketchfab: https://sketchfab.com/
[8]Opera <Close>: https://www.irishnationalopera.ie/20-shots-of-opera/close/

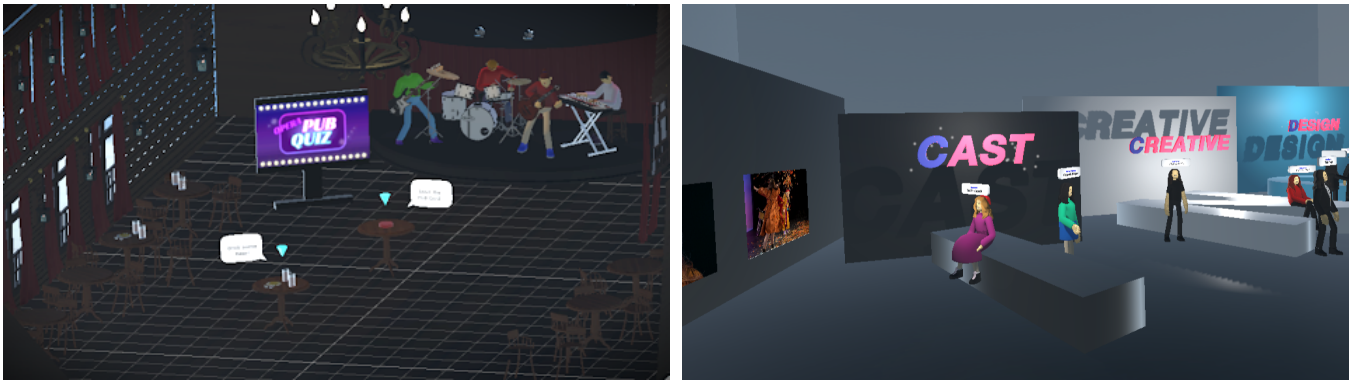

Figure 4: (a) Bar (b) Info booth.

different scenes. Each 3D avatar is surrounded by interactive pop up buttons with extra information about the person.

5.2 Further Design Considerations

In complement to designing the VR lobby, we consider how to evaluate the social dynamics that happen in the space. These considerations include whether to evaluate the entire lobby or separate rooms, whether to control the user path, and whether to evaluate audience relationships with friends or with strangers.

5.2.1 Evaluating the Entire Lobby vs. Separate Rooms. Multiple approaches can be taken to evaluate our lobby design. First, we plan to compare the audience experience of watching digital opera together with and without the social VR lobby. As there is yet no virtual space built specifically for post-show opera experiences, we can make qualitative assessments of the audience experience through a series of survey questions. A second approach would be to evaluate the value of each room based on the design motivations described in Section 4. We can assess these using the validated tools described in the literature; social engagement in the Bar [19], intellectual engagement in Info Booth [12], emotional engagement in the Photo Zone, and spiritual engagement in the Interactive Stage [4, 7].

5.2.2 Controlling the User Path. Whether or not to control the user path should likewise be considered in our design. Benford [2] suggests that the trajectory through a virtual world affects the user experience; in line with this, our four rooms provide distinct experiences, and having one before another may influence an audience member's experience. For instance, going to the Bar before or after the Interactive Stage may result in different types of conversations between audience members. The amount of time spent in each room can be controlled to minimize the consequences of the exposure effect [28], however it may also be used as a measure of user preference for each room.

5.2.3 Engaging Friends vs. Strangers. The relationships of audience members may likewise influence the lobby experience [11]; interaction between friends motivated by social interaction will likely be different than that of two individual avid theatre-goers. For instance, a conversation between friends may lead to in-depth emotional reflections [3, 20, 27], whereas engaging with strangers may help audiences feel included to a larger community [6, 27]. Our evaluation could limit the pool of participants to a specific type of relationship between the audience members, or could measure individual motivations before the experiment, and account for these as a factor in our analyses.

6 CONCLUSION

This work conceptualizes a social VR lobby through literature and a focus group study. We designed the social VR lobby as four rooms, each with different functions that support and enrich audience motivation of theatre-going: 1) a Bar for social engagement; 2) an Info Booth for intellectual engagement; 3) a Photo Zone for emotional engagement; and 4) an Interactive Stage for spiritual engagement. Future work will test the social VR lobby with several opera experiences, and consider the social dynamics of different types of users and paths through the space. Ultimately, our work will create a social VR lobby template for future VR theater experiences.

ACKNOWLEDGMENTS

This Project has received funding from the European Union Horizon 2020 research and innovation programme under grant agreement No 870610.

REFERENCES

[1] Sara Arlati, Vera Colombo, Daniele Spoladore, Luca Greci, Elisa Pedroli, Silvia Serino, Pietro Cipresso, Karine Goulene, Marco Stramba-Badiale, Giuseppe Riva, et al. 2019. A social virtual reality-based application for the physical and cognitive training of the elderly at home. *Sensors* 19, 2 (2019), 261. https://doi.org/10.3390/s19020261

[2] Steve Benford, Gabriella Giannachi, Boriana Koleva, and Tom Rodden. 2009. From Interaction to Trajectories: Designing Coherent Journeys through User Experiences. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Boston, MA, USA) *(CHI '09)*. Association for Computing Machinery, New York, NY, USA, 709–718. https://doi.org/10.1145/1518701.1518812

[3] Antonella Carù, Antonella Caru, and Bernard Cova. 2007. *Consuming experience*. Routledge.

[4] Mei Ki Chan, Wing Tung Au, Hong Kong Repertory Theatre, and Chung Ying Theatre Company. 2017. Developing and validating a theater experience scale. *Empirical Studies of the Arts* 35, 2 (2017), 169–193. https://doi.org/10.1177/0276237416662737

[5] Kathy Charmaz. 2006. *Constructing grounded theory: A practical guide through qualitative analysis*. sage.

[6] Russell M. Dembin. 2016. Where the show begins in the lobby. https://www.americantheatre.org/2015/01/02/where-the-show-begins-in-the-lobby/

[7] Erik Geelhoed, Kuldip Singh-Barmi, Ian Biscoe, Pablo Cesar, Jack Jansen, Chen Wang, and Rene Kaiser. 2017. Co-present and remote audience experiences:

intensity and cohesion. *Multimedia Tools and Applications* 76, 4 (2017), 5573–5606. https://doi.org/10.1007/s11042-016-3879-z

[8] Simon Gunkel, Hans Stokking, Martin Prins, Omar Niamut, Ernestasia Siahaan, and Pablo Cesar. 2018. Experiencing virtual reality together: Social VR use case study. In *Proceedings of the 2018 ACM International Conference on Interactive Experiences for TV and Online Video*. 233–238. https://doi.org/10.1145/3210825.3213566

[9] Morris B Holbrook and Robert M Schindler. 2003. Nostalgic bonding: Exploring the role of nostalgia in the consumption experience. *Journal of Consumer Behaviour: An International Research Review* 3, 2 (2003), 107–127. https://doi.org/10.1002/cb.127

[10] Rohit Ashok Khot, Josh Andres, Jennifer Lai, Juerg von Kaenel, and Florian 'Floyd' Mueller. 2016. Fantibles: Capturing Cricket Fan's Story in 3D. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems* (Brisbane, QLD, Australia) *(DIS '16)*. Association for Computing Machinery, New York, NY, USA, 883–894. https://doi.org/10.1145/2901790.2901886

[11] David R Kilpatrick. 2010. *The theatre lobby experience: the audience's perspective*. University of Missouri-Columbia.

[12] Eric Krokos, Catherine Plaisant, and Amitabh Varshney. 2019. Virtual memory palaces: immersion aids recall. *Virtual reality* 23, 1 (2019), 1–15. https://doi.org/10.1007/s10055-018-0346-3

[13] Quang Tuan Le, Akeem Pedro, and Chan Sik Park. 2015. A social virtual reality based construction safety education system for experiential learning. *Journal of Intelligent & Robotic Systems* 79, 3 (2015), 487–506. https://doi.org/10.1007/s10846-014-0112-z

[14] Jie Li, Guo Chen, Huib de Ridder, and Pablo Cesar. 2020. Designing a Social VR Clinic for Medical Consultations. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI EA '20)*. Association for Computing Machinery, New York, NY, USA, 1–9. https://doi.org/10.1145/3334480.3382836

[15] Jie Li, Shishir Subramanyam, Jack Jansen, Yanni Mei, Ignacio Reimat, Kinga Ławicka, and Pablo Cesar. 2021. Evaluating the user Experience of a Photorealistic Social VR Movie. In *2021 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*. IEEE, 284–293. https://doi.org/10.1109/ISMAR52148.2021.00044

[16] Abraham Harold Maslow. 1943. A theory of human motivation. *Psychological review* 50, 4 (1943), 370. https://doi.org/10.1037/h0054346

[17] Morris Hargreaves McIntyre. 2007. Audience knowledge digest: Why people visit museums and galleries, and what can be done to attract them. *Manchester: Morris Hargreaves McIntyre* (2007).

[18] Yanni Mei, Jie Li, Huib de Ridder, and Pablo Cesar. 2021. CakeVR: A Social Virtual Reality (VR) Tool for Co-Designing Cakes. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI '21)*. Association for Computing Machinery, New York, NY, USA, Article 572, 14 pages. https://doi.org/10.1145/3411764.3445503

[19] N. Andrew Peterson, Paul W. Speer, and David W. McMillan. 2008. Validation of A brief sense of community scale: Confirmation of the principal theory of sense of community. *Journal of Community Psychology* 36, 1 (2008), 61–73. https://doi.org/10.1002/jcop.20217

[20] Stephanie E Pitts. 2016. On the edge of their seats: Comparing first impressions and regular attendance in arts audiences. *Psychology of Music* 44, 5 (2016), 1175–1192. https://doi.org/10.1177/0305735615615420

[21] Sylvia Rothe, Alexander Schmidt, Mario Montagud, Daniel Buschek, and Heinrich Hußmann. 2021. Social viewing in cinematic virtual reality: a design space for social movie applications. *Virtual Reality* 25, 3 (2021), 613–630. https://doi.org/10.1007/s10055-020-00472-4

[22] Anselm Strauss and Juliet Corbin. 1998. Basics of qualitative research techniques. (1998).

[23] Alina Striner, Sasha Azad, and Chris Martens. 2019. A spectrum of audience interactivity for entertainment domains. In *International Conference on Interactive Digital Storytelling*. Springer, 214–232. https://doi.org/10.1007/978-3-030-33894-7_23

[24] Alina Striner, Sarah Halpin, Thomas Röggla, and Pablo Cesar. 2021. Towards Immersive and Social Audience Experience in Remote VR Opera. In *ACM International Conference on Interactive Media Experiences* (Virtual Event, USA) *(IMX '21)*. Association for Computing Machinery, New York, NY, USA, 311–318. https://doi.org/10.1145/3452918.3465490

[25] Annemiek Van Boeijen, Jaap Daalhuizen, and Jelle Zijlstra. 2020. *Delft Design Guide: Perspectives, models, approaches, methods*. BIS Publishers.

[26] Froukje Sleeswijk Visser, Pieter Jan Stappers, Remko Van der Lugt, and Elizabeth BN Sanders. 2005. Contextmapping: experiences from practice. *CoDesign* 1, 2 (2005), 119–149.

[27] Ben Walmsley. 2011. Why people go to the theatre: a qualitative study of audience motivation. *Journal of Customer Behaviour* 10, 4 (2011), 335–351. https://doi.org/10.1362/147539211X13210329822545

[28] Robert B Zajonc. 1968. Attitudinal effects of mere exposure. *Journal of personality and social psychology* 9, 2p2 (1968), 1.

[29] Chiara Zizza, Adam Starr, Devin Hudson, Sai Shreya Nuguri, Prasad Calyam, and Zhihai He. 2018. Towards a social virtual reality learning environment in high fidelity. In *2018 15th IEEE Annual Consumer Communications Networking Conference (CCNC)*. 1–4. https://doi.org/10.1109/CCNC.2018.8319187