Towards a Framework for Composition Design for Music-Led Virtual Reality Experiences

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ABSTRACT

Virtual reality is an exciting new medium for artists and content creators, including composers. The ease of content delivery coupled with the capacity for immersive sound diffusion makes VR of particular interest to composers. However, a framework would be useful to support the composition and designing of music-led virtual reality experiences. This paper begins that process by exploring perspectives such as acoustic ecology, the phenomenology of embodiment, affordances and discoverability in design, instrument design, the techno-somatic dimension, and 20th century aleotoric compositional poetics that can help to establish a theoretical framework for composing engaging sonic experiences in virtual environments.

Keywords: Music Composition, Audience Engagement, Virtual Reality

CCS Concepts: Applied computing→Sound and music computing; Performing arts;•Arts and Humanities→Sound and music computing

1 INTRODUCTION

Virtual Reality is a tantalizing new platform for artists and content creators. VR as a creative platform can incorporate and deliver multiple forms of artistic media to an audience. This revelation proves particularly exciting for composers as VR provides the easy content delivery of software with the capacity to have a concert hall-like immersive presence in sound diffusion. In this new context, how can a composer write music for virtual reality that is engaging and immersive in an embodiment context?

As interest grows in audio-led virtual reality experiences, the authors believe that a framework would be useful to help guide composers towards best practices for music and design as it pertains to their virtual worlds, and the role(s) the audience plays within it. Before this framework is developed, a discussion on relevant compositional and design techniques would support the articulation of needs to create embodied sonic environments. We argue that the embodied relations between audience and music-led virtual experiences requires design considerations beyond the musical composition alone. This paper presents related theory as well as a discussion on embodiment, affordances, enchantment, and instrument design as a first step towards a framework for composition design for music-led virtual experiences.

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2 RELATED THEORY

A framework to guide composition design for music-led virtual reality experiences would support the ability to create enchanting interactive audience experiences. This framework would be useful, due in part, because of the reduced limitations provided by VR. In the real world, composers are often limited by sound systems, the number of musicians available to them, and environmental acoustic considerations. In virtual reality, the composer can expand their musical voice beyond these physical limitations in considerable ways due to the accessibility and affordability of software. Though, how does this new environment without physical limitations affect the audience's experience? The advantages offered by virtual reality over traditional screens and digital media exist in its ability to create presence, experience, and agency for the audience. To do this, the composer must balance the near limitless possibilities the technology affords their creative voice, while still providing agency to the audience as they experience and interact with the world the composer created.

Beyond technical considerations, this challenge can be approached by examining the compositional poetics of aleotoric and other 20th century composition techniques, then reconsidering them with the affordances available within virtual reality. We then ask the questions: How could we support the accessibility of composition in an interactive medium? What tools would support how a composer could create meaningful and engaging experiences from the audience's perspective? How does a composer work in this medium while still achieving their own musical goals?

This paper is the first step in a larger project to explore how composers of interactive, virtual reality-based music can better navigate their relationship with the audience and leverage it in their artistic pursuits. Through this paper, the authors outline the need for this framework and initial ideas towards its realization.

3 DISCUSSION

We are interested in working towards a framework of composition design for music-led VR experiences. Virtual reality is an immersive experience, and the sense of immersion is drawn in part from the phenomenology of embodiment [1]. This theory, developed by Heidegger and Merleau-Ponty, centers upon the notion that it is a unified body that anchors human experience. A central concept to the idea of embodiment is the process of perception. It is an awareness that an individual is a part of the world; being both subject and object simultaneously. As suggested by Corness [2], Merleau-Ponty goes further in establishing this duality as "being both a thing among things and that which sees and touches." Corness also proposes that this idea can be extended to "engage the world as one both hearing and being heard [2]. For the composer looking to create VR-based musical compositions, this notion is of great significance. A VR-based composition is a world the composer is asking the audience to experience and therefore it must be taken into great consideration that the audience will desire to engage with, and

immerse themselves within this world in the same way they do the physical world. This level of immersion requires seeing and touching; hearing and being heard - it requires interactivity.

3.1 Embodiment and soundscape

Embodiment within a sonic context is expanded upon further by the discipline of acoustic ecology. R. Murray Schafer, one of the earliest proponents of acoustic ecology, "suggests that we try to hear the acoustic environment as a musical composition and further, that we own responsibility for its composition." While the original intention of this statement and the discipline as whole was in response to noise pollution, its considerations for the composer of virtual reality experiences is worthwhile. Figure 1 outlines what Barry Truax describes as sounds ability to mediate between the listener and environment [3] recontextualized for the discussion of this paper. Virtual reality brings the audience into new worlds and composers of music-led VR experiences are bringing their audience into the process of creating new virtual soundscapes. Control over this soundscape, and its final form, is a negotiation between the linear components set into place by the composer and the manipulation of the interactive components by the audience. By viewing their work in this fashion, composers can provide their audience the agency to take responsibility for the musical composition that is the virtual soundscape as Schafer suggested.
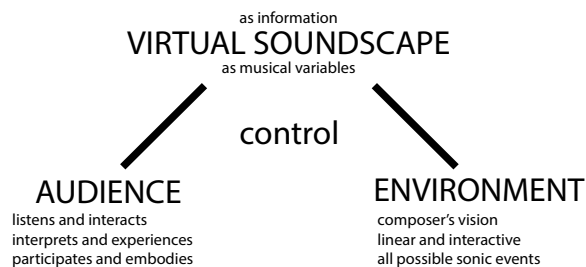

Figure 1: Virtual soundscape as mediator between audience and environment, as an extension of Wrightson's perspectives on acoustic ecology [3].

As composers design new virtual soundscapes to be experienced in VR, chosen compositional poetics can take into consideration how their audience navigate their everyday acoustic ecologies. Worthy of consideration is Schafer's notion of a "hi-fi" and "lo-fi" soundscape. Schafer connected these theories to the sonic density of industrialized soundscapes (lo-fi) and the lack of overlap of pre-industrialized soundscapes (hi-fi) [3]. This metaphor can be directly translated to the environment of a VR composition and the density of musical material present. A composer must consider if the density of the soundfield will encourage exploration and participation in the music or will the audience (quite literally, if the music is spatialized) attempt to escape from the density of the sound? If the soundfield is too dense, will the audience attempt to filter out the perceived "excess" in the same way that they would in the real world? How could this be used to a composer's advantage?

3.2 Designing for affordances and discoverability

To build these compositions, it may benefit the composer to acknowledge that VR still requires design concepts around discoverability and affordances that create functionality and intuitiveness in the real world [4]. "Norman Doors" is a term used

in design that references how door designs are not always intuitive to use, due to the design choices in handles and the direction a door swings. Composers must ensure that they do not build "Norman Doors" into their virtual worlds, but that they make design choices that are easy to understand and guide their audience. Beyond just interactions, composers have to consider the affordances of their virtual worlds. If composers need their audience to perform a certain gesture, move into a certain area, or interact with certain objects a premium should be placed on ensuring discoverability. This includes consider the relationship between feedback and kinesthesis [5] and the commonality of orientation metaphors [6] for the audience. By making obvious what is required of the audience, more focus can be placed on what they are doing as opposed to what they need to be doing.

3.3 Enchantment as a design goal

Composers designing their virtual worlds may be fearful that the choices they make surrounding their interactions could prove to be either too challenging or too boring for the audience. However, the authors propose that a focus on ensuring that audience enchantment is a high priority may prove to be a more sensible approach than worrying about overall difficulty. McCarthy, Wright, Wallace, and Dearden describe enchantment as "an experience of being caught up and carried away, in which, although we are disoriented, perception and attention are heightened" [7]. This idea of enchantment allows for both unfamiliarity and total engagement which are two spaces that composers may find themselves occupying as they build their music-led, virtual experiences. By focusing on enchantment, an emphasis can be placed upon the greater experience and it allows for the design of interactions that focus upon how the audience feels as opposed to what the audience is doing.

3.4 Exploring the Techno-Somatic Dimension

Taking enchantment into consideration, composers can still build interactions that ensure that functionality and intuitiveness are central to the virtual worlds they are composing and designing. Garth Paine, in considering musical interaction, has built upon the work of Merleau-Ponty and Don Ihde as it pertains to embodied relations to propose a new dimension for interaction design: the techno-somatic dimension [8]. This proposed dimension begins with the idea that individuals can embody certain technology, such as microscopes and reading glasses, to experience parts of the world that would be inaccessible any other way. In these instances, the technology becomes invisible and the user is at once fully capable with it and fully unaware of its existence. Paine likens this to the experience of playing a musical instrument: the performer is unaware of the motions of their body and the physicality of their instrument [8]. Instead, the performer's focus is on the feedback provided by their engagement with the instrument: the music.

Composers working within virtual reality should consider the techno-somatic dimension of their compositions just as much of a tool for artistic expression as timbre and dynamics. It is important to note however that whereas timbre and dynamics are tools for expression within the music, in VR the techno-somatic dimension can be a tool for embodiment. Consider a VR-based composition that seeks to express and explore the theme of isolation. A composer employing the techno-somatic dimension could consciously use the interactions of the audience, whether that may be gesture, movement or something else entirely, to alternately increase and limit their engagement with the musical world as a means of embodying the intended theme of isolation. If used correctly, a synergy could be formed wherein the techno-somatic

dimensions of a VR-based composition can amplify the traditional musical elements of the composition and vice versa.

To achieve an invisibility within the techno-somatic dimension and thus create the desired embodied experience, the interactions must be designed in a way that the audience can grasp quickly. However, there must also be a level of reward and challenge to the interactions to ensure continued engagement or else the audience may grow tired and disenchanted with the entire experience. It would then benefit the composer to design the interactions as if they were instruments to be played. If embodiment is achieved by hearing and being heard, the audience may as well join the ensemble.

3.5   Considerations from instrument design

Jorda suggests an analysis framework for designing digital musical instruments [19] that could easily be used by a composer looking to design interactions for their VR-based compositions. The framework for analysis focuses on efficiency and learning curve as the primary vehicles to achieve successful instrument design. A composer working to include audience interaction as part of their virtual world would do well to consider some of the building blocks outlined by Jorda as necessary for a musical instrument such as player freedom, player input complexity, and musical output complexity. When considering player enchantment these building blocks can help serve as a guide for setting up interactions.

Looking to compositional techniques from the 20th Century can help guide composers in balancing audience ability and artistic intent as their virtual worlds are experienced by a wide range of people. One of the benefits of VR is that the action of the audience does not have to directly correlate to the result. This can allow the composer to create simple interactions with enchanting musical results. Consider for a moment the event scores of Fluxus artists [10]. Each score consisted of a number of simple, and sometimes abstract, actions as a means of generating an experience for the audience. A composer working in virtual reality would be able to create a kind of event score for the audience to participate in that would result in actual musical output. Composers can also look to the works of Witold Lutoslawski as a way to include these interactions within the overall score [9]. In Lutoslawski's Venetian Games, the composer includes multiple sections the included no bar lines. This clever compromise allowed for Lutoslawski to know the general musical content that would be played during a given duration of time while granting the performers the performers the ability to control speed and exact timing [11].

4   Conclusion

A framework would be useful to guide composition design for music-led virtual reality experiences, especially when striving to create enchanting interactive audience experiences. By considering design and compositional techniques relevant to the embodied relations between audience and virtual world, a foundation can be established upon which this framework can be built. The authors discuss a range of techniques and disciplines to help composers consider the overall virtual world down to the feel and nature of interactions. The discussion included historical examples of aleotoric compositional practices, enchantment and embodiment as design goals, and instrument design and the techno-somatic dimension as vehicles for interaction design.

Further exploration is required to establish a complete framework for composition design for music-led virtual reality experiences. Future work includes developing a survey of compositional practices for immersive and interactive environments, analyzed alongside embodiment theories to reveal relevant themes to compose in VR. This paper is the first step in a larger project to explore how composers of interactive, virtual reality-based music can better navigate their relationship with the audience and leverage it in their artistic pursuits

References

[1]   Merleau-Ponty, M. (2002). *Phenomenology of Perception*. London: Routledge.

[2]   Corness, G. (2008). The Musical Experience through the Lens of Embodiment. *Leonardo Music Journal*, 21–24.

[3]   Wrightson, K. (2000). An Intro to Acoustic Ecology. *Soundscape - The Journal of Acoustic Ecology*, 1(1), 36.

[4]   Norman, D. (2013). *The Design of Everyday Things: Revised and Expanded Edition*. New York, New York: Basic Books.

[5]   Gibson, J. J. (1966). *The Senses Considered as Perceptual Systems*. Greenwood Press Reprint.

[6]   Lakoff, G., & Johnson, M. (2003). *Metaphors We Live By*. Chicago: University Of Chicago Press.

[7]   McCarthy, J., Wright, P., Wallace, J., & Dearden, A. (2006). The experience of enchantment in human–computer interaction. *Personal and Ubiquitous Computing*, *10*(6), 369–378.

[8]   Paine, G. (2015). Interaction as Material: The techno-somatic dimension. *Organised Sound*, *20*(1), 82–89.

[9]   Jordà, S. (2004). Digital Instruments and Players: Part I — Efficiency and Apprenticeship. In *Proceedings of the 2004 Conference on New Interfaces for Musical Expression* (pp. 59–63). Singapore, Singapore: National University of Singapore.

[10] Friedman, K., Smith, O. F., & Sawchyn, L. (2002). The Fluxus Performance Workbook (Fortieth anniversary ed edition). Performance Research e-Publications.

[11] O'Brien, M. (2000). Witold Lutoslawski's Venetian Games. Library of Congress, Washington, D.C. The Rosaleen Moldenhauer Memorial. Music History from Primary Sources: A Guide to the Moldenhauer Archives. Retrieved from https://www.loc.gov/item/molden000180/