Multisensory Virtual Reality Artists and Media Dimensions
Toward Immersion: A Framework of Mediology for Understanding Professional Communication Rhetorics

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MULTISENSORY VIRTUAL REALITY ARTISTS AND MEDIA DIMENSIONS TOWARD IMMERSSION:
A FRAMEWORK OF MEDIOLOGY FOR UNDERSTANDING PROFESSIONAL COMMUNICATION
RHETORICS

by

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ABSTRACT

MULTISENSORY VIRTUAL REALITY ARTISTS AND MEDIA DIMENSIONS TOWARD IMMERSION: A FRAMEWORK OF MEDIODY FOR UNDERSTANDING PROFESSIONAL COMMUNICATION RHETORICS

D’An Knowles Ball
Old Dominion University, 2023
Director: Dr. Julia Romberger

Multisensory elements are increasingly being added to virtual reality (VR) environments, allowing for higher levels of immersion for users as well as expanded creative media opportunities for multisensory VR artists. Recognizing multisensory VR as a networked ecology between the designer, the system, and the user, this dissertation addresses a distinct absence of resources on design principles and artistic professional practices specifically for composing multisensory VR environments. In investigating processes of invention, choices, tools, and methods on the parts of the artists, this dissertation fills scholarly gaps across disciplines that tend to focus on systems and tools or the user’s experiences by exploring how immersion is conceptualized and composed through media composition for users from the perspectives of multisensory VR artists.

Using a mixed methods approach that collected data from surveys and interviews with multisensory VR artists, this research investigates media processes in relation to media dimensions from the perspective and narratives of the artists themselves through a framework of mediology. I identify and categories of professional situated knowledges by thematic analysis of distinct compositional considerations, decisions and methods involved in multisensory VR composition. The ways artists approach such dimensions as media use, economic constraints, aesthetic persuasion, available tools, digital literacy, and the user’s experience reveal the techno-rhetorical skills they incorporate into their compositions towards fashioning user immersion. These factors—broadly examined as technological, economic, social, aesthetic, archival, subjective and
epistemological—heavily motivate and mediate the creative process and the experience with final products.

By exploring and interpreting the methods, decisions and tactics of multisensory VR artists, the findings of this study offer crucial findings and recommendations that benefit both technical communications and media studies scholars as well as simulation practitioners and learners. The results of this research demonstrate that multisensory VR artists engage dimensions of virtual and material media in their design practices and decisions primarily by centering persuasive techno-rhetorical appeals, digital literacies, and collaborative co-constructive methods. They do so by drawing on considerations and processes that foreground accessibility, inclusive design practices, and a complex networked interpretation of agency. Findings expand mediology’s dimensional lens to new media and technical arenas, inform communities of practice toward more accessible and meaningful immersive experiences, and broaden investigations of artists’ positionality as well as the impact of their considerations and design decisions. Conclusions assert that multisensory VR is a rhetorically composed digitally designed experience but also a mode of technical and professional communication that requires as much attention on the compositionists as is placed on the system composition and the users of these systems.
For my mother, Barb Knowles, whose legacy is bravery, hope, and love.
“For, wherever you are, there will be my heart.”

For Patch, Ryan, and Laszlo, who made this work possible and make this world miraculous.
I would like to acknowledge and express my sincere gratitude to those who helped me accomplish this goal and made this journey possible. Primarily, I am indebted to the participants in this study for their willingness to share their time, knowledge, and perspectives. The VMASC Digital Senses Lab was also integral to making space and time to include me in amazing research opportunities that influenced this work. I am deeply thankful for the unwavering support and practical feedback of my Chair, Dr. Julia Romberger, who originally assured me that art critics and designers can (and should) get English PhDs, whose courses in my master’s program led me to immediately apply user-centered design in my career, who guided and grounded me in the multiple facets of composition. I also thank my committee members for their mentorship and guidance: Dr. Saikou Diallo, for shifting my paradigms and advising me to ask what if I plan for the best?; Dr. Marc Ouellette, for careful feedback, critical (dis)courses, and lively mentorship; Dr. Cheryl Ball, who I am honored to work with given how influential their scholarship and perspectives have been to my research and professional work for over a decade.

In addition, many encouraging and influential colleagues and mentors have formed my foundations and supported me throughout this process: Dr. Dana Heller, whose absolute brilliance developed out and fed my drive for a multidisciplinary and intersectional perspective of comparative literacies, culture, and contexts; Dr. Linda McGreevy, who welcomed me into a world of scholars over a decade ago and ensured I believed I was really part of it; Dr. Andrew Collins, Dr. Daniel Richards, and Dr. Avi Santo, who each fostered academic collaboration and cheered me on throughout this journey; Dr. David Metzger, who was happy to explore realms of “the rhetorical imaginary” possibilities with me; Dr. Kevin Moberly, who generously gave his time and whole mind to listen and discuss my many thought bubbles and was always in a front chair at my conference presentation; Dr. Candace Epps-Robertson, who told me on Orientation Day to get on the floor and play with my kids no matter how much I needed to read or write; and Dr. Pamela VanHaitsma, who
introduced me to deeper feminist rhetorical research practices that changed my approaches for the best. Collaboration and support have been key throughout, and I am thankful for the communal encouragement of my Ph.D. cohort members in the ODU English Ph.D. program—from conversations over coffee to colleagues in writing, professionalization, and conference panels, our scholar community has been a true gift.

As I’ve long explored ideas of aesthetic authenticity—how we sense it, perceive it, ground it as experience, and how it impacts our realities, emotions, cognitive expectations, and relating in our worlds—I truly thank my children, Ryan and Laszlo, who’ve made me understand concepts of authenticity and Self in the world in new ways. I have had the singular joy and opportunity of watching new people “come online” in this strange alien existence, to see the process of perception emerge and take forms. In ways both big and small, they have shaped my deeper paths, so it is no wonder they were the inspiration and impetus for this research. I am thankful for my partner, Patrick, who has been my rock of strength and greatest source of laughter and encouragement (also my sounding board, proofreader, and formatting editor) throughout.

In the process of this doctoral journey, I have lost three women who shaped me, educated me, lifted me up with unwavering support, and provided me with more love than perhaps one person is deserving of having in a given lifetime: my grandmother, Martha Alice Knowles (1917-2018), my mother, Barb Knowles (1946-2020), and my aunt, Mary Kate Knowles (1941-2023). Grief and loss teach many lessons—of that, I am now certain. Yet, in this world, it is also a certainty that it has been my greatest gift to have been blessed with their presence, their time, their love, and their wisdom. It is we, the living, who carry on the work of those who carried us forward—that work is rooted in community and hope.
TABLE OF CONTENTS

LIST OF TABLES ................................................................................................................. x

LIST OF FIGURES .............................................................................................................. xii

Chapter

1 INTRODUCTION .................................................................................................................. 1

1.1 RESEARCH CATALYST ................................................................................................. 3
1.2 LITERATURE & RESEARCH GAPS .............................................................................. 6
1.3 PURPOSE & RESEARCH QUESTIONS .......................................................................... 8
1.4 DEFINITION OF TERMS ............................................................................................ 12
1.5 OUTCOMES AND SIGNIFICANCE OF FINDINGS ...................................................... 17

2 LITERATURE REVIEW ....................................................................................................... 22

2.1 DEFINING VIRTUALITY ............................................................................................. 24
2.2 IMMERSION IN MULTISENSORY VR .......................................................................... 25
2.3 VIRTUAL RHETORIC AND MULTIMODALITY ........................................................... 30
2.4 IMMERSIVE DESIGN AND DESIGN THINKING ....................................................... 43
2.5 CONCLUSIONS .......................................................................................................... 49

3 METHODOLOGY ............................................................................................................... 51

3.1 THEORETICAL APPROACH ....................................................................................... 52
3.2 METHODICAL APPROACHES .................................................................................... 60
3.3 SURVEY DESIGN & OPERALIZATION ................................................................. 68
3.4 INTERVIEW DESIGN & OPERALIZATION ............................................................... 76
3.5 DATA CODING & ANALYSIS ................................................................................. 82
3.6 CONCLUSIONS .......................................................................................................... 90

4 RESULTS ........................................................................................................................... 92

4.1 SURVEY RESULTS & ANALYSIS ............................................................................. 93
4.2 INTERVIEW RESULTS ............................................................................................... 105
4.3 CONCLUSIONS .......................................................................................................... 127

5 EMERGENT THEMES & INSIGHTS ................................................................................... 130

5.1 THEME 1: TECHNOLOGICAL & ECONOMIC AFFORDANCES & CONSTRAINTS .... 131
5.2 THEME 2: ARCHIVAL & AESTHETIC NARRATIVE FACTORS AS EPISTEMOLOGICAL 140
5.3 THEME 3: SOCIAL & SUBJECTIVE AGENCIES ......................................................... 150
5.4 THEME 4: ACCESSIBILITY & INCLUSIVE PRACTICES ............................................ 158
5.5 CONCLUSIONS .......................................................................................................... 168
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>DISCUSSION OF THEMATIC CATEGORIES</td>
</tr>
<tr>
<td>6.1</td>
<td>ENGAGING DIMENSIONS OF MEDIA IN DESIGN PRACTICES AND DECISIONS</td>
</tr>
<tr>
<td>6.2</td>
<td>EMBEDDED CONSIDERATIONS AND PROCESSES OF MULTISENSORY VR COMPOSITION</td>
</tr>
<tr>
<td>6.3</td>
<td>CONCLUSIONS</td>
</tr>
<tr>
<td>7</td>
<td>CONCLUSIONS</td>
</tr>
<tr>
<td>7.1</td>
<td>SIGNIFICANCE &amp; IMPLICATIONS TO FIELDS</td>
</tr>
<tr>
<td>7.2</td>
<td>APPLICATIONS AND RECOMMENDATIONS</td>
</tr>
<tr>
<td>7.3</td>
<td>LIMITATIONS</td>
</tr>
<tr>
<td>7.4</td>
<td>SUGGESTIONS FOR FUTURE RESEARCH</td>
</tr>
<tr>
<td>7.5</td>
<td>REFLECTIONS</td>
</tr>
<tr>
<td>REFERENCES</td>
<td></td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>PEII MODEL</td>
</tr>
<tr>
<td>B.</td>
<td>IRB EXEMPT DOCUMENT</td>
</tr>
<tr>
<td>C.</td>
<td>CALL FOR SURVEY PARTICIPANTS</td>
</tr>
<tr>
<td>D.</td>
<td>FIGURE USE COPYRIGHT PERMISSIONS</td>
</tr>
<tr>
<td>E.</td>
<td>INFORMED CONSENT STATEMENT - SURVEY</td>
</tr>
<tr>
<td>F.</td>
<td>SURVEY RESULTS – RAW DATA REPORT</td>
</tr>
<tr>
<td>G.</td>
<td>INTERVIEW INSTRUMENT</td>
</tr>
<tr>
<td>H.</td>
<td>ADULT CONSENT FORM - INTERVIEWS</td>
</tr>
<tr>
<td>I.</td>
<td>INTERVIEW TRANSCRIPTS</td>
</tr>
<tr>
<td>J.</td>
<td>INTERVIEW MEMO NOTES – SAMPLE</td>
</tr>
<tr>
<td>K.</td>
<td>WORD CLOUDS FROM INTERVIEW TRANSCRIPTS</td>
</tr>
<tr>
<td>L.</td>
<td>CATEGORIES OF QUOTES FROM TRANSCRIPTS - SAMPLES</td>
</tr>
<tr>
<td>VITA</td>
<td></td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Survey Instrument: Questions and Design Rationale</td>
<td>70</td>
</tr>
<tr>
<td>2.</td>
<td>Interview Instrument: Questions and Design Rationale</td>
<td>77</td>
</tr>
<tr>
<td>3.</td>
<td>Participant Levels of Expertise and Focus Areas</td>
<td>106</td>
</tr>
<tr>
<td>4.</td>
<td>Participants’ most used terms in interviews</td>
<td>108</td>
</tr>
<tr>
<td>5.</td>
<td>Interview Q1: Excerpts that highlight definitions of multisensory VR</td>
<td>109</td>
</tr>
<tr>
<td>6.</td>
<td>Interview Q2. Excerpts of artists in describing experience with multisensory VR</td>
<td>111</td>
</tr>
<tr>
<td>7.</td>
<td>Typical technical tools used for Multisensory VR production as provided by participants</td>
<td>113</td>
</tr>
<tr>
<td>8.</td>
<td>Interview Q3. Examples of Participant Quotes highlighting key findings in discussing technologies artists most frequently employ for multisensory VR composition</td>
<td>114</td>
</tr>
<tr>
<td>9.</td>
<td>Interview Q4: Excerpts from participants highlighting methods or tactics beneficial to creating a sense of immersion</td>
<td>116</td>
</tr>
<tr>
<td>10.</td>
<td>Composition to Enable the User</td>
<td>118</td>
</tr>
<tr>
<td>11.</td>
<td>Interview Q6: Examples of Participant Quotes highlighting key findings when discussing how they digitally and physically construct the environment to make suggestions for use or to enable the user</td>
<td>119</td>
</tr>
<tr>
<td>12.</td>
<td>Interview Q7. Examples of Participant Quotes highlighting key findings on how the artists prioritize various design methods based on the needs of individual projects combined with considerations of the users, customers, and available resources</td>
<td>121</td>
</tr>
<tr>
<td>13.</td>
<td>Interview Q8. Examples of Participant Quotes highlighting key findings of artistic decision or design method that failed and/or were corrected in the design process</td>
<td>124</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>14. Interview Q9: Participant Quotes highlighting key findings of artists’ final thoughts.</td>
<td>127</td>
<td></td>
</tr>
<tr>
<td>15. Thematic Categories and Subcategories</td>
<td>131</td>
<td></td>
</tr>
<tr>
<td>16. Attention to Diverse Needs &amp; Hierarchy Structures</td>
<td>134</td>
<td></td>
</tr>
<tr>
<td>17. Accessible Interactions in Design &amp; Composition</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>18. Overcoming Privileging of Access</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>19. Equity, Access, and Inclusion as Supply/Demand Issues</td>
<td>139</td>
<td></td>
</tr>
<tr>
<td>20. Multimodal Considerations Through Phases of Development</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>21. Co-construction Through Composition Phases</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>22. Invention in Composition &amp; Form Through Sensory Methods</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td>23. Agency Through Accessible Narrative Reception &amp; Framing</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td>24. Artists and/as User Positionality</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>25. Interface Design towards subject formation, identity construction &amp; agency</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>26. Persuasion Expectation &amp; Agency</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>27. Inclusive Production Practices: Affordances &amp; Constraints</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>28. Conditions of Access when Producing (for) Bodies</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>29. Interactive Storytelling: Fostering Knowledge Literacy through Accessible Narratives</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>30. Participatory Design and Welcoming World-building</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>31. Research Questions &amp; Related Emergent Thematic Categories</td>
<td>169</td>
<td></td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
</table>
| 1.     | “Dimensions of a Medium.” Reprinted from Computers and Composition. 28, Turnley, M.  
“Towards a Mediological Method: A Framework for Critically Engaging Dimensions of a Medium,” p. 132, with permission from Elsevier. See Appendix D: Figure Use Copyright Permissions. | 56   |
| 2.     | Phase 2 Categories and themes as well as traces that emerged from data analysis. | 87   |
| 3.     | Thematic Explanatory Schema.                                                | 90   |
| 4.     | Visualization of results from Q1. Which of the following best describes your highest level of education and/or training? in survey responses | 94   |
| 5.     | Visualization of results from Q2. *Approximately how many VR environments have you been a part of composing (on a team or otherwise)?* in survey responses | 95   |
| 6.     | Data visualizations of results from Survey Q5 and Q6.                        | 97   |
| 7.     | Response data visualizations for Survey Q10 and Q11.                         | 98   |
| 8.     | Response data visualizations for Survey Q18 and Q19.                         | 100  |
CHAPTER 1

INTRODUCTION

Virtual reality (VR), as an assemblage of codes, platforms, and projections, is becoming increasingly ubiquitous as an influential and widespread medium for training and education purposes and is quite popular for social entertainment experiences. As a recent advancement in VR technologies, multisensory experiences are particularly persuasive in both theory and composition. Multisensory VR set-ups use a combination of live, virtual, and constructive (LVC) environments, a variety of tools, data feeds, and interface system components to engage multiple sensory channels. These highly balanced compositions allow the user to physically move about both a material and virtual environment at once. The multisensory system is designed to respond to user-interface (UI) actions that generate interactions with visualizations and aesthetic elements, sense triggers, and objects or artifacts, depending on what the user is drawn to explore in the experience.

In a multisensory VR experience, the user is continually immersed in many sensory experiences at once—visually exploring (common in a VR set-up), but also able to physically touch and manipulate objects, hear sounds, smell aromas, and feel temperature changes. These constructed media environments draw on foundational immersive qualities of presence, experience, interaction, and involvement to communicate to end users by not only converging technological tools and systems’ input/output but also a variety of sensory properties. User presence, experience, interaction, and involvement, when understood as compositional media effects consisting of persuasive constructive design methods and practices, become primary goals of immersive aesthetic production. For the artists, these goals are results of their skillfully executed tool sets they draw on to compose convincing engagements out of sense mechanics, materials, triggers, codes, pixels, polygons, narratives, and light. They are the mediation point between the systems and the users.
There are vast amounts of scholarship and approaches to studying sense-triggered immersion in VR, both theoretical and applied, across multiple disciplines. Most of this research is focused on the dimensionality of immersion, the use value of the systems, or the user's experience in and of the simulation. Yet, to date, a significant gap exists in research on how immersion is conceptualized and composed for users from the perspective of the artists who design multisensory VR systems. My research addresses this problem through examining the methods, tools, and design decisions of artists who work in multisensory VR design. I explore this gap by identifying professional situated knowledges and analyzing distinct construction experiences, decisions and procedures of multisensory VR design. Multisensory VR spaces are composed of persuasive techno-rhetorical immersive properties and relationships through specific means and methods that speak to broader dimensional contextual considerations of the media. In a broader fashion, this study identifies appeals artists utilize in their compositions to fashion immersion for users.

Multisensory VR artists deploy tool sets of aesthetic principles, materiality, and narratives (to name a few) in their compositions. Thematic analysis of shared understandings and praxis among this particular professional group also yield critical angles to view simulation as collaborative and co-constructive digital theater and invention’s place in immersive composition, wherein aesthetic engagements are applied in specific ways by artists to persuade users. To that end, through results and conclusions gleaned from the experiences, methods, and decisions of professional artists explored in this dissertation, I affirm that artists approach composition with considerations of digital literacies and accessible inclusive design practices that provide agency and accessibility for diverse users.

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1 Techno-rhetorical strategies, as adaptations or extensions of classical/traditional rhetorical appeals in the digital age, examine and address artifacts and modes of persuasion that are mediated, influenced, and/or transformed by digital technologies wherein digital space is understood to be inherently multimodal (combining text, images, sound, interactivity, and compositional form) (Kress, 2010; Eyman, 2015). I discuss these strategies and modes further in Chapter 2's sub-sections.
1.1 RESEARCH CATALYST

In 2016, Old Dominion University’s Virginia Modeling, Analysis and Simulation Center (VMASC) and Boston University’s Center for Mind and Culture began work on the Çatalhöyük Virtual Archeology Project, with the goal being to revive the 9000-year-old Neolithic city of Çatalhöyük in a multisensory virtual reality (VR) environment. Before entering the virtual immersive space, a person first enters a physical lab room and sees non-descript objects carefully placed within the space, sensors hanging from poles, cameras mounted along the ceiling, and small black boxes strategically hanging in the corners of the room. They put on the VR headset. The 20x20 physical space transforms into a vibrant township in 7500 BC; the user is transported 9000 years into the past to a day in the Turkish city of Çatalhöyük. They clap their virtual hands and wiggle their virtual fingers in front of their eyes, linking to their physical body to their new virtual body. They are surrounded by a mix of smells—soil, livestock, the sweat of people, and the stench of refuse. As they enter a small dwelling, they smell the hearth burning within and hear the soft sound of people conversing intertwined with animal sounds and crackling fires.

As the glow of the hearth draws the user closer, the heat of the fire warms their hands. They begin preparing a meal, pouring from heavy decorative grain bins into pots, then placing the pots on the hot fire to cook—the rich smell of the meal fills the dwelling. The user places more wood in the hearth—the heavy cords cause hot sparks to fly up. They move to a nearby wall in the dwelling and begin to paint a scene of hunters and animals, then they reach out to feel the smooth texture of the nearby animal horns mounted on the wall. The user hears slow drips and turns to see a leaky cistern in the corner; they place their hands beneath it and feel the cool water on their palms. Their surprise at each authentic sensation leads them to continue exploring, moving from space to space in the dwelling, picking up and examining objects in each room, connecting with daily life in an ancient time—learning about and becoming a part of one of the world’s first human settlements—through this immersive virtual aesthetic experience. Each aspect of the simulated experience has
been carefully composed by a team of artists working with programmers, developers, and researchers to elicit engagement and involvement, leading the person in the headset to suspend disbelief and feel immersed by a sense of wonder and exploration.

While simulation, VR, and 3D technologies as applied to Çatalhöyük have been and are currently being explored by researchers involved in digital archaeology (see Duke University, UC Merced, and Koç University ANAMED), this particular build is thus far the only Çatalhöyük simulation to incorporate multisensory VR components. VMASC’s Digital Senses Lab included these components to inspire empathy between digital beings and human beings through experimental use of aesthetics. Immersion built around sense narratives in this particular Çatalhöyük environment potentially affects deeper knowledge acquisition, empathy, and awareness of the Deep Past for the user beyond high resolution visual facsimile. For these reasons, Multisensory VR design is becoming more frequently used by museums, in public art, and by educational labs.

I foreground the experience of this particular immersive sense environment because the building and testing of the Çatalhöyük Virtual Archeology Project was of particular influence on this dissertation project’s exigencies. I consulted with the interdisciplinary team of researchers, project scientists, and artists in order to inform the rhetorical aspects of audience engagement, narrative construction, as well as material engagements that influence user experience (UX) in virtual spaces. While working on grant proposals and VR testing focused on the physical construction and design of the simulation, I found myself curious about the rhetorical ways the simulation artists carefully planned the use of the media to keep users engaged. They demonstrated how rhetorically constructed the conceptualization and surround of a meaning-making environment can be. In this way, I was drawn to further explore the artists’ methods, tools, perspectives, and place within the creative media composition of multisensory VR as a highly networked relationship between the designers, the systems, and the users.
For the past 20 years, principles of digital rhetoric and technical communication in the creative process have closely informed my work professionally in the field of multimedia design, UX research, and digital communication. My professional experiences have, in turn, closely informed my scholarly inquiries in visual rhetoric, digital design, and communication methods. As an instructor, critical pedagogical motivations, methods, and decisions of artists and designers—why and how we compose as we do for particular audiences and ways that viewers experience aesthetics—have been centered for my students in art criticism, art theory, and digital design courses. This research extends from my situatedness in new media methodologies, technical communication, and virtual rhetoric, specifically expanding on and informing rhetorical sensory effects and affordances in user experience and user interface engagements that emerge in immersive virtual environments.

Being embedded in VMASC’s Digital Senses Lab as a researcher rather than as a multimedia designer allowed me to more closely analyze the considerations, methods and processes used in building multisensory VR such as the Çatalhöyük Virtual Archeology environment. In later empirical research examining the UX of visual artists composing art pieces in VR (Rechowicz et. al., 2018b), the artists’ experiences and processes were again brought to center stage for me as a researcher. Keeping my own implicit biases and value sets about processes of traditional design in check, I wandered into this inquiry of multisensory VR artists’ iterations, choices, motivations and methods that continued to fascinate me. While scouring for secondary research, I found there to be a distinct lack of scholarly or practitioner-based resources on design principles, explicit techniques, or best practices for composing multisensory VR environments. Thus, I began to conceptualize what collecting such a resource would look like and how it might benefit future artists such as my

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2 Previous works I have co-authored on simulation visualization rhetorics have resulted in recommendations for design practitioners and engineers on the practical uses of rhetorical methods in their renderings (Collins & Knowles Ball, 2012; Collins, Knowles Ball & Romberger, 2015).
students, ultimately translating to 1) more effective system design processes for the teams and for the users of multisensory VR environments, and 2) an expansion of scholarly knowledge across disciplines of technical communications, media studies, digital rhetoric, and simulation studies.

**1.2 LITERATURE & RESEARCH GAPS**

Multisensory VR artists compose immersive environments by converging technological methods and media tools, to communicate with and immerse users through persuasive means that digital rhetorical theory and composition practices do address but haven’t yet investigated in the specific context of multisensory VR. Recent findings on the state of immersive technology research (Suh & Prophet, 2018) conclude that there is increased and predominant attention and trends primarily situated around 1) UX testing results, 2) dimensionality of immersion, 3) the user’s experience in and of the simulation, and 4) system compositions. What is strikingly absent is any investigation of or focus on the practitioners doing the composing. A significant gap exists in research on how immersion is conceptualized and composed for users from the perspective of the artists who design multisensory VR systems. This is an echo of traditional art critics who frequently speak of the final work as detached from the artists who produce them. However, traditional artists speak or write at length of their process, goals, drives, influences, and methods; they have an intimacy of experience and deep knowledge not only with their ideas about composition and form but also with the media they use. As an initial step to address this research gap, this study investigated the methods, tools, and design decisions of multisensory VR artists to foreground their embedded considerations throughout their compositional processes.

This research was designed as a generative investigation to 1) identify professional situated knowledges, and 2) analyze distinct construction experiences, decisions and considerations of multisensory VR artists through the use of quantitative and qualitative data gathering. In a broader fashion, this study contributes to building knowledge about this professional group’s methods of media use and the rhetorical appeals artists utilize when composing multisensory VR
environments. In order to evaluate and address compositional and technological media decisions made by multisensory VR artists, I initially grounded my approach by reviewing scholarship linking media and technology design to social and cultural effects (Lemke, 1989; Laurel, 1993; Manovich, 2001; Kress, 2003; Lunsford, 2007; Arola & Wysocki, 2012; Galloway, 2012). I then examined past scholarship across various fields that demonstrate how the aesthetic design and composition of technological tools make arguments for how they are used and their efficacy for the user (Steuer, 1992; Murray, 1997; Slater, 2003; Clark, 2003; Renfrew, 2001; Bowman & McMahan, 2007; Collins & Knowles Ball, 2012; Norman, 2013), particularly in terms of immersing the user.

Additional investigative heuristics and theories integral to my initial scholarship review included a) concepts from virtual rhetoric and simulation rhetoric that promote the analysis of how virtual environments are designed to communicate with users in particular ways to achieve a sense of immersion (Ulrich, 2011; Roundtree, 2013; Aczél, 2016), and b) immersive qualities of presence, experience, interaction, and involvement as toolsets of immersive appeals for composing multisensory VR experiences, as detailed in the model in Appendix A (Rechowicz, et. al., 2018b).

Finally, in my foundational review of scholarship, actor-network theory brought finer definition to agent positions and situated rhetorical relationships in closely networked human-computer assemblages to those present in multisensory VR engagements (Latour, 1996; Hayles, 1999; Haraway, 2003). Likewise, theories of mediology approach modes of media in ways closely related to multisensory VR composition through investigating technology, aesthetics, materiality, historical and cultural contexts, circulation, and lived practices as closely linked convergences (Debray, 1996; Turnley, 2011). When used as informing heuristics, these frameworks of dimensions and assemblages, which I cover in subsequent chapters, bring to light critical facets for researching the situated professional practices of artists and their considerations and approaches when designing a sensory immersive environment.
1.3 PURPOSE & RESEARCH QUESTIONS

I began formulating research questions and study design plans with a central hypothesis in mind: multisensory simulations enact a distinct genre of rhetoric in both theory and compositional practice, and immersion is persuasion by means of design methods. The goal was to discover where and how the artists fit into theory and compositional practice, and what their perspectives and experience would demonstrate or contribute. For artistic designers, invention and experience work hand-in-hand when approaching any composition, yet media, budget, aesthetic requirements, available tools, skill, and audience also heavily motivate and mediate the creative process and product. Multisensory VR artists deploy tool sets of aesthetic principles, materiality, and narratives (to name a few) in their compositions as well. In a broader fashion, this study also identifies the techno-rhetorical appeals artists utilize in their compositional ideation and strategies towards compelling user immersion.

I argue that an exploration that joins rhetorical and aesthetic media methods with technological, cultural and artistic decisions made by the artists who design these systems is necessary. As simulation technology expands, multisensory VR environment constructions will become more complex assemblages that will benefit from multidisciplinary approaches. Thus, this work takes a multidisciplinary approach to the diversity of scholarship applied throughout and to the significance of the findings as a result. This dissertation's insights locate implications for technical communication, digital and virtual rhetoric, and modeling and simulation engineering, as well as considerations for future directions wherein specific design considerations and methods of artists inform broader dimensional and contextual considerations in professional communication and media studies. Although theories of immersion I cover herein—its means, purposes, and affect—remain debated and complicated as a grand narrative leveraged by multiple media and studied across varied disciplines, it is important to conduct this research with multisensory VR system designers. Collecting narratives on the decisions and practices of VR artists—their methods,
tools, and means of representation—brings us closer to untangling critical considerations and shared practices in compositional design.

This study's significance is evidenced by its contributions in identifying professional situated knowledges and analyzing distinct multimodal composition-building experiences, decisions and procedures of multisensory VR artists. The importance of persuasive technical design to the construction of immersion is illuminated by my capturing, thematizing, and categorizing the viewpoints and practices of artists who create virtual worlds through sense engagements. This study's close focus on the artists who build multisensory VR worlds provide much needed perspectives on how immersion is constructed by the designer-as-rhetor—one who uses complex technological assemblages in highly contextualized situations yet also draws on cultural and symbolic associations and appeals to achieve certain goals with media.

To better understand the thematic dimensions of artists' decisions and approaches, the central questions I asked in this study were:

1. **In what ways do artists who design multisensory VR compositions engage dimensions of mediology in their design practices and decisions?**

2. **From the perspective of artists, what are the considerations and processes embedded within multisensory VR design?**

These were appropriately roomy inquiries, broad enough to begin to fill the gaps yet focused enough to yield rigorous analysis, useful results for future research, and significance to practitioners as well as scholars. In order to answer these questions, my research design was built around sub-investigations of technological aspects and methods artists use to design multisensory VR environments, design decisions artists factor into the construction, testing, and user experience (UX) of multisensory VR compositions, phases of composition and testing, and how the artist digitally and physically constructs the environment to make suggestions for use and/or that enable
the user. In order to rethink and expand on past approaches to extended reality media design, this work also explored the following:

- rhetorical tactics such as narrative construction,
- use of space and place,
- methods of using visual style and material content,
- persuasive sense aesthetics that practitioners employ to best achieve immersion.

### 1.3.1 Examining Multisensory VR Design Through a Mediological Framework

Concepts and frameworks of mediology primarily informed the theoretical framework I used for this research study. Although it has not been used prior to explore multisensory VR media and processes, I see in mediology a deep multidisciplinary view that addresses the many complex components evident in multisensory environment composition. The dimensions of mediology, as interpreted by Turnley (2011) and expounded on in subsequent chapters, guided my research design and categorical data interpretations to broadly thematize and assess artists’ processes of composition and embedded considerations. Mediology was strategically flexible, striking a balance between being categorical and also open to the blending and expansion of the research discovery process. It also mapped quite well to immersive media design processes and considerations, particularly for assessing 1) the perspectives of artists who work in multisensory VR composition and 2) the ways they define, design, and engage media tools in their professional craft. Their knowledge, perception, and practices are directly relational to the media contexts in which they work. In addition, the theoretical dimensions of mediology offered critical angles about the decisions artists employ towards persuasion in their sensory compositions as appeals toward user immersion. Wherein mediology is broad and expansive in its many facets of exploration, I found it necessary to employ actor-network theory as an overarching “umbrella” lens to 1) inform my understanding of complex networks at play in multisensory VR composition, 2) provide definition
to the actors involved, 3) view the relational nature of agencies, and 4) more tightly focus the scope of this dissertation's work.

After my research questions were defined to guide investigations into the ways artists engage various dimensions of media and their considerations embedded in the composition processes, combined with my informing blended methodologies, I fashioned my methods of approach to this research process. I applied a mixed methods approach as informed by Creswell (2013) and Charmaz (2006), because my questions and applicable theories required an informing overview of data that could then allow me to adapt and explore emergent data themes in closer more rigorous ways. By employing quantitative and qualitative methods—deploying surveys and then performing interviews—this work ultimately developed a rich generative applied understanding of the artists’ perspectives and how their methods and considerations are leveraged in multisensory VR design.

The nature of artistry and design paired with immersive technologies requires a blending of dimensions for understandings that consider relationships between the media, the creators, and the users (Kien, 2008). Such blending also required a mixed methods approach to data collection as well as coding and analysis of response sets to quantify and qualify numerical results and descriptive narratives in order for the results and conclusions to more accurately inform scholarship and professional practices of production (Saldaña, 2011). I then chose a generative approach to collecting, analyzing, and categorizing data. Through the use of thematic analysis, a rhetorical process of coding and categorization that investigates patterns of meaning, my investigations of media practices and processes as expressed by artists located important trends and patterns. Locating themes and sub-themes through this process of analysis ultimately led to the emergence of concepts and assertions for critical understandings of this professional group’s specialized composition methods and practices.
 Appropriately, processes of rhetorical invention also extend to the design of this study with a generative intent. In launching generative research, just as in investigative journalism, one does not write the story’s ending at the beginning; rather, one begins the steps to see where the story of multisensory VR artists will lead. It was important to me, as a researcher, that surveys, interviews, and data analysis primarily led the process of locating dimensional thematic markers and patterns expressed by artists who work in these highly situated context of composition. Thematic unfolding revealed dimensions of the technologies and methods artists use to design multisensory VR environments, design decisions artists factor into the construction, testing, and user experience (UX) of multisensory VR compositions, and how the artist digitally and physically constructs the environment to make suggestions for use that enable the user to feel immersed by activating multiple senses. Using theoretical heuristics of mediology and ANT and a mixed methods approach to data discovery through thematic analysis, this exploratory study presents as a beginning to deeper applied understanding of artists’ tactics, considerations, and methods, and how mediological dimensions can be leveraged as persuasive composition toolsets in investigating multisensory VR design.

1.4 DEFINITION OF TERMS

In the process of designing, operationalizing, and analyzing data for this dissertation, I found it necessary to define specialized terminology and concepts integral to my understandings and thematic applications, which will also continue to emerge in subsequent chapters of this work. In my exploration of multisensory VR environments and the artists who work to compose them, I found particular resonance with Milgram and Kishino’s (1994) conceptualization of “the virtual” as a spectrum. This notion enabled me in this study to perceive virtuality as a continuum of experiences, ranging from the purely physical to the purely synthetic. It provides a robust framework where the virtual and the physical interact, blend, and overlap. More recently, Aczél’s (2016) assertion that the virtual is always already rhetorical, and rhetoric is always already virtual
signaled a profound entanglement where the virtual and rhetoric continuously shape and influence each other. Therefore, virtual reality (VR), as viewed through this lens, is a potent rhetorical tool capable of creating immersive experiences that push the boundaries of traditional media. Virtual rhetoric, a term first coined by James E. Porter (2004), refers to the practice and study of communication in virtual and digital environments. It encompasses a broad array of digital, interactive, and networked communication technologies and spaces, and employs traditional rhetorical concepts—ethos, pathos, and logos—in novel digital contexts. The term also reflects a shift in rhetorical practice and scholarship, moving away from text-centric analysis towards considering more dynamic, multimediated, and multisensorial modes of persuasion (Warnick & Heineman, 2012).

My specific focus was on VR as an immersive technology that requires a head-mounted display (HMD) as the primary user interface (UI). Following Slater’s (2009) perspective, immersive technology encompasses not only VR but also augmented reality (AR) and mixed reality (MR). These technologies have a shared capability to provide the user with an abundance of sensory information, forging a sense of presence within a highly constructed, data-generated alternate environment. This transformative sense of presence brings the user face-to-face with experiences that blur the boundaries between the physical and the virtual.

In creating multisensory simulations, artists adopt an eclectic approach, utilizing live, virtual, and constructive (LVC) environments to stimulate multiple sensory channels. These simulations translate data feeds into VR set-ups, enabling the user to traverse both a material and a virtual environment. The concept of materiality—a critical factor that shapes our interaction with and interpretation of media—is at the forefront of this process (Drucker, 2013; Giaccardi & Karana, 2015). Materiality refers to the physical or tangible properties of media and their impact on how media are used and interpreted. It not only refers to the physical properties of a media artifact, but also the aesthetic design and the way these designs argue for their use and efficacy (Drucker, 2013).
In designing multisensory VR environments, artists aim to immerse the user in a panoply of sensory experiences. Users explore visually, interact physically with objects, and experience auditory sensations, olfactory cues, and temperature changes—all within a seamless composition. Composition in digital spaces is a practice and a field of study concerned with creating and sharing meaning in digital environments (Boyle, 2016). It involves the crafting of digital artifacts and experiences, where space, place, aesthetics, and narrative are conceived as a network of interconnected events. In addition, artists view the immersive qualities of presence, experience, interaction, and involvement as guiding principles in their design process (Rechowicz, et. al., 2018b). These serve as persuasive construction methods that inform the composition of these intricate multisensory VR experiences.

The intricate, sensory-rich nature of these immersive systems amplifies the significance of the user experience (UX). Coined by Don Norman and Jakob Nielsen, user experience (UX) refers to a person’s perceptions and responses resulting from the use or anticipated use of a product, system, or service (Norman, 1988). It is a holistic concept, encompassing the practical, experiential, affective, meaningful, and valuable aspects of human-computer interaction. Drawing from the pioneering work of Norman and Nielsen (1988), a sharp focus on the UX facilitates a more immersive and responsive environment. Cooper, et. al. (2014), from the field of UX design, define the user in the context of VR as the audience of the system. They emphasize the user-as-audience concept, as they have expectations of a highly contextual engagement which must be met by the artist-as-rhetor. Multisensory VR artists must consider the user and their expectations for highly contextual, engaging experiences. The artists-as-rhetors must respond to these expectations, orchestrating an immersive experience that not only captivates the user but also resonates on a deeply personal level.

In addition, as multisensory VR spaces are dynamic, multimediated, and multisensorial modes of persuasion, their multimodalities were also considered in relation to the artists that
create them. Multimodality refers conceptually to the utilization and analysis of multiple modes or channels of communication. These can include textual, audio, visual, and interactive elements. In both traditional and digital contexts, multimodality encourages an understanding of how these different modes interact, complement, and conflict with each other to produce meaning (Kress, 2010). This interplay of modes is key to producing layered, nuanced meanings that engage users on multiple sensory levels. An integral aspect of multimodalities is recognizing and leveraging affordances. Artists must consider the sociocultural and material conditions that shape user interactions with technology. Building on Gibson’s ecological psychology, Jenny Davis’ (2020) feminist critique of Actor-Network Theory (ANT) provided invaluable insights into these complex dynamics, urging design affordances that support effective user interactions within a multimodal environment. Davis problematizes the neutrality of affordances, emphasizing also the sociocultural and material constraints that mediate our interaction with technology (Davis, 2020).

Considerations of affordances and constraints call for attention to agency. The notion of agency, as conceptualized by Marilyn Cooper and critiqued by Jennie Davis, served as a reminder of the profound impact users can have within these digital spaces (Davis, 2020; Cooper, 2011). Cooper defines agency as referring to the capacity of individuals to act independently and make their own free choices within a network of relationships. Again, as reconceptualization of ANT tenants, Davis also emphasizes that agency is not apolitical, but rather something that is enacted and has impact (Davis, 2020; Cooper, 2011). Agency becomes a push-and-pull relationship.

The artists in this study are defined as a community of practice (CoP). In understanding the individuals who compose these immersive spaces, I align with Wenger and Lave’s (1991) concept of a community of practice (CoP) as a group of individuals who share a common interest and engage in a process of collective learning. This collective is built on a social system of learning, defined by its shared domain of interest, shared practice, and community engagement. For the purposes of recruitment in my research, I defined participants as individuals rooted in the Creative/Applied
Arts, with expertise in interactive media, immersive technology, and integrated media. Their backgrounds in digital technology and sense integration, coupled with their professional experience in the composing process of multisensory VR projects, enable them to bring unique perspectives to a shared learning space as a CoP. Additionally, the artists are embedded on teams of people with differing skills and work with users of varying abilities and literacies, valuing concepts and practices of co-construction. Co-construction here is defined as a sociological concept that underscores the mutual and interactive creation of meaning between individuals. It asserts that knowledge, identities, and social realities are not pre-existing, but rather they are dynamically constructed in interaction (Burr, 2003). Co-construction also brings with it both affordances and constraints of situated knowledges, a concept positioning knowledge as always produced from a specific standpoint. It critiques the notion of objectivity, asserting that the subject of the work being done is intimately involved in the knowledge production process (Haraway, 1988).

Lastly, as I navigated the intersections of multisensory VR artists in relation to technologies and human experience, my findings brought issues and significance of digital literacy, digital equity, inclusion, accessibility to the forefront. Digital literacy—the ability to find, evaluate, and comprehend information across digital platforms (Gilster, 1997)—is a crucial prerequisite for engaging with immersive experiences. It involves a working understanding of the digital environment, the ability to create and interpret digital content, and a readiness to navigate and participate in digital communities (Bawden, 2001). In a broader sense, as the artists in this study understand how digital literacy can shape the way content is understood, created, and shared, it allows users to engage effectively with digital tools and environments and is an essential skill in a progressively digital world. Artists also strive for digital equity and accessibility, ensuring that immersive experiences are available to all, regardless of their capabilities, proficiencies, and sociocultural or economic backgrounds (National Digital Inclusion Alliance, 2017; World Wide Web Consortium, 2018). Accessibility, within the context of digital or virtual environments, refers to the
degree to which a product, device, service, or environment is available to as many people as possible. It goes beyond mere access and involves making digital or virtual content understandable, navigable, and interactable to people regardless of their abilities or disabilities (Goggin, 2018).

When the aim is to communicate effectively to an audience, accessibility underscores the importance of designing digital content that is flexible enough to meet different user needs, preferences, and situations (Burgstahler, 2015). Similarly, digital equity is a concept focused on ensuring equal access and opportunity to digital tools, knowledge resources, and services, and the ability to use them effectively. This involves addressing disparities experienced by individuals who may not have sufficient access due to socio-economic factors, geographical location, educational background, physical barriers or other variables. Digital equity goes beyond physical access to digital technologies and includes factors like the ability to use the technologies and benefiting from the opportunities that these technologies provide (Warschauer, 2004). Inclusion, as a broader concept, extends to the digital or virtual realm as the active, intentional, and ongoing engagement with diversity. It ensures an environment where all individuals are treated fairly and respectfully, have equal access to opportunities and resources, and can contribute fully to successful outcomes (Roberson, 2006). Digital inclusion, thus, involves the attention and accommodations necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies (ICTs) (Helsper, 2012). I define these topics as socio-political issues, addressed as inequalities arising from the digital divide. However, the artists in this study address digital literacy, digital equity, inclusion, accessibility not only with technical acumen, but also critical thinking, invention and intent, socio-emotional awareness, and an understanding of digital ethics.

1.5 OUTCOMES AND SIGNIFICANCE OF FINDINGS

The inception of this study was driven by a need to uncover how multisensory VR artists navigate the multifaceted dimensions of media in their design practices. In acknowledging the
apparent lack of research considering the perspective of artists who contribute to the production of multisensory VR, I embarked on this research journey for my dissertation. It was their decision-making processes, methodologies, and tactics that piqued my interest—particularly, where they found their opportunities and limitations within their professional knowledge. My starting point was Turnley’s model of mediology, which laid the groundwork for my method of thematic analysis. This research was intended to bridge a conspicuous gap in the academic exploration of multisensory VR, shifting the attention from VR users and the technologies involved, to the artists responsible for creating these multisensory environments. A significant part of the VR field has remained in the shadows due to existing research largely overlooking these artists, and this study intended to remedy that by examining the considerations, thought processes, and approaches that these artists utilize in their designs.

My research provided valuable insights, showing that dimensions of mediology are integral to multisensory VR composition. Furthermore, studying the artists who create these multisensory VR environments allowed me to expand on mediology dimensions, incorporating considerations of accessibility and inclusion. It also confirmed the intertwined relationships between artists, systems, and users, shedding light on a new route for ANT investigations and applications. The insights also offered intriguing revelations on how artists utilize media dimensions in their VR compositions. Through creative interface design, sensory methods, and innovative composition and form, they facilitate interchanges of subject formation, identity construction, and user agency. This study also revealed how artists leverage interactive storytelling to promote knowledge literacy through accessible narratives. The practices they adopt are inclusive, keeping the affordances and constraints in mind, enabling agency through accessible narrative reception and framing. As I delved into the artists’ perspectives, there were thematic trends in the considerations and processes within their design approaches. They appeared to be profoundly multimodal, iterating through different phases of development, with a focus on creating persuasive expectations and
fostering user agency. This nonlinear, cyclical process involves continuous refinement of their compositions, anchored by ongoing testing and modification.

In creating multisensory VR compositions, artists also employ media dimensions in their design practices and decisions. They use interface design and sensory methods to advance invention in compositional forms, promoting subject formation, identity construction, and user agency. These artistic decisions and practices heighten presence, interactivity, participation, and engagement for the user. The artists also harness interactive storytelling to enhance knowledge literacy, ensuring that the sensory and aesthetic narratives they create meet the project’s objectives and are accessible and clear to the user. Additionally, they engage the social and subjective dimensions of media, striving for participatory design practices to cultivate more welcoming world-building. These artists place a high value on inclusive production practices. While technological and economic factors can impose constraints on these decisions and practices, the artists in this study confirm that attention to accessible interactions in design and composition methods provides affordances to their own creative processes. This allows them to overcome constraints and provides the users greater agency through accessible narrative reception and framing.

By exploring my dissertation’s central questions, this study allows for better understanding of how multisensory VR is compositionally designed as a multimodal communication tool from the perspective of the artists who make them. Additionally, the results of this study inform practitioners in simulation studies and design engineering about the dimensions and methods that go into fashioning multisensory VR systems and their impacts on new media and technical communication pedagogy as well as design composition and UX testing practices. The potential opportunities and benefits for the fields of digital rhetoric and technical communication to better understand how multisensory VR is compositionally designed as a multimodal tool from the perspective of artists are also significant. Similarly, the need for those in simulation studies and design engineering to understand the inherent rhetorical dimensions that go into fashioning
multisensory VR systems, from conception to final product, is also emphasized by this study's conclusions. Research extending from this study has the potential to help 1) advance understandings of rhetorical dimensions of immersive design in multisensory VR; 2) develop new media and technical communication pedagogy as well as design composition and UX testing practices in the field of modeling and simulation; 3) expand dimensions of mediology and virtual rhetoric into new areas of analysis; and 4) applied multisensory VR UX studies for practitioners.

Consisting of seven chapters, this chapter has introduced the exigencies, catalysts, and purpose of this study. Herein, I provided brief theoretical grounding of my approaches and definitions as interpreted and used from across various fields. I have also stated the questions this work seeks to address in order to fill evident knowledge gaps, along with an overview of the methodologies used to answer these research questions and a brief explanation of my study's design and methods of analysis. Chapter Two of this research engages in a comprehensive review of scholarship on immersive technologies, positioning them as mediaspheres that are ripe for composition inquiry. I provide a more in-depth discussion concerning the gaps across disciplinary research that this study fills. Drawing from diverse fields such as media studies, simulation studies, virtual and digital rhetoric, and technical communication, it aims to capture the breadth of assumptions and debates surrounding simulation and VR that have arisen within these academic disciplines. Moreover, I explore the compositional intricacies that are fundamental to multisensory VR—devices, interfaces, technical set-ups, coding, and designed system fidelity. I highlight how these technical aspects intersect with the principles and methods of mediology.

The next chapter also enters into the scholarly dialogues concerning multimodalities, interfaces, design studies, and the convergence of media within immersive technology. The importance of these discussions is situated within the broader context of VR composition and the implications they have for the creative process and final output. The chapter concludes by detailing how this dissertation approaches the multifaceted ways in which VR artists, seen as rhetors, design
their compositions. It delves into their consideration of sense factors, aiming towards the ultimate goal of persuasive immersion for the user. Though it does not completely encapsulate the essence of the VR artist's role and processes, a review of scholarly conversations provides a springboard for subsequent descriptions of this study's methodological concepts and processes, reporting of results, analytical interpretations, and discussions of significance ahead in chapters 3 through 7.
CHAPTER 2
LITERATURE REVIEW

In multisensory immersive virtual environments, artists merge technologies and narrative aesthetics to produce arenas of interactive space for rhetoric to work and play. This combination pushes at the boundaries of our perceptions of the artificial and the authentic. We can, of course, look to past scholarship to inform the trajectory of multimodalities and media interfaces to examine the nature of aesthetics and perception within immersive virtual spaces and simulations. In turn, virtual worlds and simulations can be applied as a tool of rhetoric to reframe and push rhetoric’s definitions. Virtual reality and simulations present enormous paradigm shifts in the very ways humans relate and communicate (Aczél, 2016). This chapter works to find the connections that other scholars have recently made along this journey by exploring links between recent rhetorical theories and approaches as applied to past scholarship on virtual reality and simulations. How do artists engage with aesthetics, communicative practices, and knowledge in immersive virtual spaces wherein users, designers, and tools each become complicit in alternative ways of experiencing nature and environments using technologies of representation and persuasion? In what ways have technical communication and rhetoric recently been involved in the media composition of virtual worlds and simulations?

Importantly, a recent report on the state of immersive technology research performed by Suh and Prophet (2018) reviewed 54 works of scholarly literature, both theoretical and applied, on immersive technologies across many fields. Their findings reported increased and predominant attention and trends primarily situated around UX testing results and system compositions. What was strikingly absent was any mention or focus on the practitioners doing the composing. My review of the literature across relevant disciplines foregrounds five main thematic terms of inquiry that informed my approach to engaging with multisensory VR artists: virtuality, sense immersion, virtual rhetoric, media interfaces, and immersive design.
In this chapter, I review scholarship that addresses our encounters with virtuality and immersive design from material, social, cultural, digital, scientific, and psychological investigative contexts. These texts highlight the complexities and symmetries of how rhetoric moves fluidly as a tool (Selfe & Selfe, 2013; Sauer 2003) for multisensory VR designers. Given the proliferation of virtual and simulated interactions we navigate on a daily basis, a richly detailed understanding of digital rhetoric and media communication from the artists’ perspectives provides us a better understanding of how we proceed in more effective approaches to both knowledge production, technical construction, and conceptual reconstruction. To inform, analyze, and engage virtual worlds and immersive sense simulations, I position these intersected works in conversation, highlighting past and current theories in this emergent research area in order to broaden approaches to research in rhetoric and simulation. In contemplating the manner in which we sense realness as a continuum (Merleau-Ponty, 1945; Milgram & Kishino, 1994; Heim, 2011), the aesthetic-embodied-imaginative process experienced through virtual media and simulations presents opportunities for multiple dimensions of rhetorical strategies to be located, providing a dynamic interplay between design, materiality, computation, and persuasion.

The sections to follow explore the theoretical concepts and applied affordances, constraints, and claims that have emerged at these intersections. First, I situate virtuality and its implications in VR design, and then discuss immersion in multisensory VR with a focus on sensory immersion specifically. Next, I explore virtual rhetoric and concepts of multimodalities, examining further how rhetoric is employed in VR and how concepts of multimodality intersect with this burgeoning sub-genre of rhetoric. This conversation leads to deeper discussion on the role of mediology in VR to explain interactions between media, socio-cultural contexts and VR experiences. As closely related, I then situate theories of how media interfaces affect VR experiences. Finally, I explore how principles of immersive design and design thinking are employed in VR, how ANT brings focus to
agency in multisensory VR, and insights from technical communications that highlight the importance of accessibility and inclusion in VR design.

2.1 DEFINING VIRTUALITY

Immersion and senses have long been central to debates on the designed nature of virtuality and those who create them. The parable of Zeuxis’ *trompe l’oeil* grapes (retold by Begam & Soderholm, 2015) as well as Plato’s (1992) ”Allegory of the Cave” (Book VII, *Republic*) situated early rhetorical debates surrounding the nature of mimesis in relation to authenticity, immersion, and constructions of knowledge as reliant on sense experiences. In both of these examples, the narrators go to great lengths to describe in detail how these simulated experiences, one of grapes and drapes and the other of backlit silhouettes on a cave wall, were composed to be persuasive. Likewise, Aristotle (1991), Al Fārābī (1969), and Isocrates (1956) each found particular focus on immersion—carefully constructed, stylized, and multisensory—instrumental to successful oration and instruction, classifying it as both action and techne, closely aligning memory and vividness with the senses, for both orator and audience.

Aristotle defined this process as a “bringing before the eyes” (1991, p. 11), which Kenneth Burke (1969) later attributed directly to enhancing human imagination. Concepts of virtuality later became instrumental to Protestant utopian ideals of virtuous immersion in religious faith and ritual (Shields, 2003). Additionally, Eco (1986) asserts that our visual perception completely mediates what we know as reality, placing us in a recursive state that “is not historical, but visual” (p. 31). However, Baudrillard (1993) contends that the hyperreal as designed and culturally manufactured “effaces the contradiction between the real and the imaginary” (p. 71). Both build around a Deleuzian concept of the virtual as energy, a potentiality that blends with “the real.”

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3 See also Kennedy on rhetoric as energy in his 1992 essay “A Hoot in the Dark: The Evolution of General Rhetoric.” *Philosophy & Rhetoric, 25*(1), 1-21
Breaking down binary thinking is critical in terms of approaching virtuality in a blending of both theoretical and applied ways. Milgram & Kishino’s (1994) frameworks of virtual spectrums collapse these boundaries by asserting that the virtual exists on a sliding scale inclusive of our practical realities and extending through augmented and mixed reality to virtual environments and extended reality. In a more technical sense, virtual environments do not depend on one technology but rather are dependent on how a combination of technologies are designed to allow cognition and perception to work together towards enhanced virtual immersion (Chertoff & Schatz, 2015). While Massumi (2002) locates form, events, and values as compositional properties of virtuality, and Brey (2014) focuses on broader dimensions outside of practical design considerations such as ontological, semantic, contributive, existential, and institutional, the predominant argument is that virtuality is composed with a toolset of properties or dimensions that operate subjectively through the senses (Lanier). Following Milgram’s conception of mixed reality, Steinicke defines a “reality–virtuality continuum as a continuous scale ranging between the real world, i.e., our reality, and a completely virtual environment, i.e., virtuality” wherein this scale “encompasses all possible variations and compositions of real and virtual objects” (5). Steinicke expands on Hayles’ challenges to our perceptions that cross worlds, wherein Hayles states, “Virtual reality technologies are fascinating because they make visually immediate the perception that a world of information exists parallel to the ‘real’ world, the former intersecting the latter at many points and in many ways” (14). For the designers, the necessity to achieve authenticity, presence, and immersion in VR stems from a desire to persuade an audience in a high-fidelity fashion through stimulating the senses. The blending between technologies, appeals and perceptions is worthy of further mining.

2.2 IMMERSION IN MULTISENSORY VR

Immersion is often misunderstood as a mysterious effect transmitted through deeper means other than our very own senses. Closely linked to virtuality, immersion is understood to be a psychological state of presence defined as a subjective sense of being there (McMahan, 2003; Slater,
As such, immersion has qualities and dimensions that are tied to sense stimulation, yet different disciplines connect these qualities and dimensions to the senses through a variety of approaches. Early designers of simulated sense compositions envisioned a multitude of uses for the persuasive immersion that alternate realities could provide outside of mere entertainment (Heilig, 1960; Sutherland, 1964). Immersion is also closely linked to the artistic illusion of theatre, wherein audiences suspend disbelief and consider the aesthetically composed and delivered illusion/performance to be a reality (Artaud, 1958/2014; Laurel, 1993). In turn, simulation visualizations require designers to focus on narratives and technical fidelity for users to understand and fashion presence in authentic story worlds (Steuer, 1992; Bowman & McMahan, 2007; Collins & Knowles Ball, 2012).

For the user, effective participant immersion is dependent on field of vision, display resolution and physical size, depth of rendering, correct lighting, as well as frame and refresh rate. Seemingly far removed from Plato’s allegory, this is the objective quantifiable hardware/software coding side of immersion between the input and output of data through the system to the user (Bowman & McMahan, 2007). While negotiating an immersive interface’s expectations and assumptions, the user-as-audience gains insight primarily through their senses to generate connections with narrative, subjective, and cultural meanings and affects (Aarseth, 2004; Anabel, 2018). As sense immersion is a primary practical goal of a VR artist, the methods of incorporating sense stimuli—most notably sight in VR, but also smell, sound, and touch employed in concert—join the technological system as built and the subjective experiences produced (Hillis, 1999; Liu et. al., 2008). Artists are also aware that users desire rewards in mediated immersive environments (Csikszentmihályi, 1990; Crary, 1999) as well as having their expectations met by the many facets of the tool’s design (McMahan, 2003; Lanham, 2006).
2.2.1 Sensory Immersion

Closely linked to virtuality, immersion is understood to have qualities and dimensions particularly relevant to sense stimulation, yet different disciplines connect immersion to senses through a variety of methodological lenses. Early designers of simulated sense compositions such as Morton Heilig (1960) and Ivan Sutherland (1964) envisioned a multitude of uses for the persuasive immersion that virtual worlds provide outside of mere entertainment. Artaud (1958/2014) remarked that illusion and reality are the same in theater, wherein audiences should suspend disbelief and consider the performance to be a reality as composed and delivered. In many early experiments by Heilig and Sutherland, the designerly immersion of theater was still primarily ever-present no matter the simulated situational context (Laurel, 1993). As informed by the field of media studies, users engage and gain insight through their senses via an immersive interface to generate narrative engagement as well as personal and cultural meaning while negotiating the tool’s expectations and assumptions (Aarseth, 2004). Similarly, as Collins and I point out, simulation visualizations require designers to focus on narratives and technical fidelity for users to understand and fashion authentic story worlds (2012). Yet the linked mind-body is our primary interface, as Anabel (2018) asserts, in response to immersion often being misunderstood as a mysterious affect transmitted through deeper means other than our very own senses.

For the fields of modeling and simulation and cognitive science, one of the primary goals of a VR artist is to create a sense of immersion for the user, though Steuer (1992) asserts that immersion is more closely linked to subjective experiences produced than to a technological system as built. As sensory effects are prized by VR designers, most research and development focus on the phenomena of immersive presence. Presence is defined as a subjective feeling of “being there” wherein designers generate user engagement primarily through stimulating the senses (McMahan, 2003; Slater, 2003; Chalmers, 2005) combined with “the objective level of sensory fidelity” designer into the VR system (Bowman & McMahan, 2007, p. 38).
Users also view and desire sense stimuli rewards in mediated immersive environments (Csíkszentmihályi, 1990; Crary, 1999), most notably sight (Hillis, 1999), but also smell, sound, and touch employed in concert (Liu, et. al., 2008). In addition, the user’s quality of immersion is impacted by experience, a psychological and emotional agency that emerges through aesthetic and narrative expectations met for the user by the tools (McMahan, 2003). Such multisensory stimuli included by artists in VR environments, as Lanham (2006) points out, encourage interactivity via attention immersion that matches desire with reward.

At the intersections of digital media and technical communications, both Murray (1997) and Manovich (2001) also distinctly locate sense immersion as a vital component of any digital technology’s ability to communicate. More recently, David Sheridan (2010) and Amy Propen (2012), though their work in rhetoric is not explicitly centered around VR or simulation, have recently advanced applications of embodied to distributed material rhetorical factors as necessary to meaning making through sense experiences. In addition, the material-social propositions of extended cognition assert that our minds are not body-bound. Indeed, haptically, in any given day, non-human agents carry sway and influence in our lives; we work and think through and with things more often than not (Clark, 2003). Thomas Rickert (2013) also advances the concept of ambience into linked sense experiences and ecologies, wherein sound, time and space/place rhetorically impact emotion and response. I find these disciplinary overlaps particularly useful for bridging gaps of rhetoricity when analyzing how artists build multisensory VR compositions.

Furthermore, in the technical sense, virtual environments are not dependent on one technology but rather operate as a combination of technologies designed to allow cognition and perception to work together towards enhancing immersion by drawing on the ontologies of practical and material reality. While some scholars locate very specific forms, events, and procedural values as compositional properties of virtuality (Massumi, 2002), others focus on broader dimensions outside of practical design considerations such as ontological, semiotic,
contributive, existential, and institutional (Hayles, 1999; Brey, 2014). Virtuality is composed with a toolset of distinct properties and theoretical dimensions that operate together, subjectively through the senses. For artists, the necessity to achieve virtual authenticity and immersion stems from the desire to persuade an audience with the tools and methods at their disposal. Therefore, dissolving boundaries to consider virtuality as retaining theoretical, compositional, and practical properties on a spectrum is critical to framing this study’s approach.

Sense immersion is a vital component of a technology’s ability to communicate. When immersed, a user experiences embodied responses that extend to material rhetorical factors. Advanced design applications that center technical, narrative, and material rhetorical affordances are necessary to meaning making through sense experiences, thereby enhancing engagement and interactivity (Murray, 1997; Manovich, 2001; Sheridan, 2010; Propen, 2012). At a foundational level, the aesthetic design of the tools we use make arguments for how they are used and their efficacy (Clark, 2008; Renfrew, 2001; Davis, 2020). As objects and environmental arrangements in our practical realities become cognitive extensions of our minds and bodies, the aesthetic design of multisensory VR compositions follow suit. Sense structures, ambient responses, visual arrangement of space, and material tool components allow the VR composition to become a communicative artifact, an ecology, wherein sense experiences combine with time and space/place to rhetorically impact use, emotion, and knowledge response (Foss, 2005; Edbauer, 2005; Bennett, 2010; Rickert, 2013). I find these disciplinary overlaps in addressing sense immersion particularly useful for bridging gaps of rhetoricity when analyzing how artists build multisensory VR compositions.

Studying sensory simulation design and digital tool interactivities crosses theoretical and applied research between the fields of cognitive science (Dahlstrom, 2014; Sutcliffe & Deol Kaur, 2008; Kaur, 2008) and modeling and simulation (Padilla et al, 2014, 2017; Rechowicz, et al 2018; Deuro, et al, 2017), with inquiries spilling into multimodal spaces in technical communication and visual rhetoric (Lunsford, 2007; Arola & Wysocki 2012; Blair, 2004). Here, crossovers do emerge in
acknowledgment of the link between designers, tools, and users. Virtual rhetoric, a burgeoning subfield of rhetoric, synthesizes these areas of focus further into linked rhetorical ecologies of study. Theoretical and applied approaches in virtual rhetoric foreground hybrid agent positions and their effects on assemblages as social groupings with agentive meaning and situated rhetorical relationships (Latour, 1996; Hayles, 1999; Haraway, 2003). Simulations, as actors, are never neutral and operate with material objects and human users to form associations, taking on alterable meanings through networked encounters and forming associations and attachments with other actors (Latour, 1973).

2.3 VIRTUAL RHETORIC AND MULTIMODALITY

Simulations also present a uniquely malleable genre of rhetoric which also does not fit neatly into common models of science, traditionally focused on systematic observation of “objects” with many of those “objects” produced in labs in conjunction with language and binary data (Roundtree, 2013). We engage with aesthetics, communicative practices, and knowledge in immersive simulated spaces, wherein users, designers, and tools become complicit in alternative ways of experiencing and generating knowledge. In terms of compositional invention, Geoffrey Hartman (1999) reminds us that “[r]hetoric in the service of mimesis, rhetoric as imaging power, is far from being imitative in the sense of reflecting a preexistent reality;” through simulation, “mimesis becomes poiesis, imitation becomes making, by giving form and pressure to a presumed reality” (p. 23). Following Barthes (1977), reading and navigating a simulation is a compositional act involving space and place as much as the operational design to construct the simulation is a compositional act.

The rhetorical communication of design and digital tool interactivities meshes theoretical and applied research from cognitive science and computer design into approaches in multimodal inquiries in technical communication and digital rhetoric (Lunsford, 2007; Arola & Wysocki, 2012; Gries, 2013). Designers embed arguments in their digital compositions for tools and content to be
used and experienced in particular ways. Furthermore, design choices activate highly situated social meanings and form assumptions between the tool and the user (Latour, 1996; Hayles, 1999; Haraway, 2003). Virtual rhetoric, a burgeoning subfield of rhetoric, advances understanding from technical communication and digital rhetoric that designers, virtual tools, and their users fashion a rhetorical ecology. Also foregrounded is how virtual environments rhetorically impact users, viewing simulation as a unique genre of rhetoric that is never neutral and communicates with particular persuasive appeals and constraints particular to immersive technologies (Ulrich, 2010; Roundtree, 2013; Aczél, 2016).

Ulrich seeks a definition of virtual rhetoric but also issues ethical warnings regarding seduction and alienation, focusing on the impacts to behavior by virtual rhetoric in immersive environments. He describes virtual reality as a “complex form of communication” and draws on visual rhetoric and game theory to locate rhetorically persuasive components in virtual spaces (6). Suggesting that virtual rhetoric is an augmented form of visual rhetoric, Ulrich sees the vivid and pathetic nature of virtual spaces tailored persuasively to users in what amounts to a higher order of behavioral manipulation. I align myself and this research with Petra Aczél, who conversely asks how we rhetorically become incorporated into the virtual, seeing virtual rhetoric as reaching beyond technological tool use to touch the human element of emotion and relationships when working with the environment rather than “using” it (11).

Aczél gives us three approaches to a virtual as rhetorical framework: practical (creation/design processes), visual (nature and capacity), and critical (reception, interpretation, intent, and outlay). She draws on Bogost (2010) to discuss suasory effects and procedural rhetoric in relation to virtual environments and on Selber’s (2004) approach to applying rhetoric to multiliteracies. These approaches are then used to explore rhetoric embedded in virtual spaces. The persuasive function is the conduit to experiences, wherein sensory intensity, pathos, judgment, and biases emerge rhetorically in virtual environments. This work importantly presents rhetoric as “a
virtuality that preceded digital technology with thousands of years” and concludes that virtual reality may very well be the next big shake up to the rhetorical canon (Aczél, 2016, p. 13). This provides vital conversation revolving around how media is moving rapidly towards immersion in more virtual modes, to a higher level via persuasive technologies and experiences. She argues that the nature of the virtual—with rhetoric, by nature and practice, as virtual—"obtains and offers a new way of embodiment, a new understanding of participation, a new interpretation of experience and an old logic of social discourse” (p. 3). Aczél confirms rhetoric as a necessary component of media and importantly center invention in the creation and design processes as well as in the reception, interpretation, and intent of VR. It is a text containing “intentionality, purpose, accessibility, constitutive power, shared symbols and meanings” necessary to constitute a unique rhetorical nature for investigation (p. 6).

Texts are, indeed, never finite because connotation and denotation are the starting point of a code wherein systems enable texts to operate like a game (Caillois, 1961; Wark, 2007; Conway & Trevillian, 2015), becoming interactive based on conventions informing how we interact and consume the text as a performance. When we recognize the plurality of texts within technologies, simulations operate as tools and compositions, requiring repositioning of rhetorical concepts to address “codes and conventions” that are “shaping our perceptions, values, and worldly perspectives” (Gumpert & Cathcart, 1985). Simulations, as actors, are never neutral and operate with material objects and human users to form associations, taking on alterable meanings through networked encounters and fashion associations and attachments with other actors (Latour, 2005). As an extension, the user of a simulation may become disembodied from the rhetorical situation when the nature, motivations, and circulations of the technology involved are discounted as actors. Hayles explains, “Questions about presence and absence do not yield much leverage in this situation, for the avatar both is and is not present, just as the user both is and is not inside the screen” (1999, p. 27). She suggests instead an analysis towards a semiotics of virtuality wherein
“the focus shifts to questions about pattern and randomness” that emerge and alter in associations and points of disruption (p. 27). A virtual world can be positioned as a rhetorical context of active engagements. Instead of a product or a simulation imposed on us as passive audiences, by focusing on “networked settings” of immersion such as interest, involvement, and interaction, conceptions of authenticity are as real in one world as in another with no distinction (Burbules, 2004, pp. 170).

Aczél also notes that memory, presence and enargeia are prime rhetorical tenets and are structurally necessary to virtual reality production and experience (p. 11). The persuasive function is the conduit to authentic experiences, wherein sensory intensity, pathos, judgment, and biases emerge rhetorically in simulated virtual environments. Arguing that simulations used in popular media formats are accepted as truth by audiences while scientists understand that what simulations show us is flexible rather than predictive in nature, Roundtree asserts that a simulation’s “vigor, vividness, energy in expression” is the substance that delivers the communicative act. With “virtual evidence” rendered and presented by way of enargeia, a simulation’s fidelity of sense experiences also becomes “truth” (2013, p. 37-38). Simulations, in the technological sense, are texts primarily composed of cognition and perception, jointly rendered through aesthetic experience (Roundtree, 2013).

Scholars such as Ulrich (2010), Roundtree (2013), and Aczél (2016) each emphasize how virtual environments and immersive simulations rhetorically impact users, asserting that simulations, for both researchers and designers, present a uniquely malleable genre of rhetoric outside of common models of science more traditionally bound by empirical observation and data. In reacting against the popular narrative of virtuality as a nascent technological innovation, Aczél (2016) importantly reaches back to Classical rhetoric to assert that rhetoric has always been virtual, and in turn, the virtual has always already been rhetorical. In advancing this argument in an applied way, she provides three analytical approaches to a framework of virtual rhetoric that centers invention: practical (creation/design processes), visual (nature and capacity), and critical
(reception, interpretation, intent, and outlay). In formulating methods (or “dimensions”) of rhetorical virtual analysis, coupling the creators of systems with rhetorical aspects of simulation, Aczél uses stylistic concepts drawn from Classical rhetorical canons. She proposes analytical methods centered around *Ars memorativa* (emotional memory through images), *Phantasia* (hyperreality), *Ingenium* (innate intelligence), *Enargeia* (vivid descriptions), *Ekphrasis* (descriptive unfolding), *Thaumazein* (sense of wonder) (p. 11-12).

I find the concept of multimodality critical to understanding and analyzing the work of multisensory VR artists. Multimodality, as elaborated by Kress (2010) and Van Leeuwen (2005), underscores the utilization and analysis of various modes or channels of communication, including textual, audio, visual, and interactive elements. In both traditional and digital contexts, this interplay of modes is key to producing a layered, nuanced meaning that engages users on multiple sensory levels. Multisensory VR artists incorporate and balance these different modes in their work. This includes examining how they manipulate and integrate visual, auditory, haptic, and sometimes even olfactory elements to create immersive experiences. Following Jewitt’s (2008) perspective, each of these modes brings its unique contribution to the overall experience. Artists, as Kress and Van Leeuwen (2001) suggest, face the challenge of blending them in a way that feels seamless and harmonious.

Multisensory VR artists also exploit the unique opportunities offered by VR to heighten the impact of multimodality. Drawing from Slater (2009), it is critical to recognize how different modes of communication can be presented concurrently and experienced in a deeply immersive manner in VR. This makes the interplay of these modes more intimate and impactful than in other mediums. As Ryan (2001) posits, this enhances the users’ sense of presence in the virtual environment and encourages a more profound engagement with the medium. Understanding how artists navigate the

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4 Thus far, Aczél’s dimensions have not been applied to analysis of multisensory VR design.
complexities of multimodality, illuminated through theories from scholars such as Kress (2010) and Bezemer & Kress (2008), provides a basis for creative processes that negotiate compositions—the interactions, complements, and conflicts between different modes to create compelling narratives and experiences. It also highlights how they utilize the principles of multimodality, as expanded upon by Lotherington & Jenson (2011), to guide the design of the user experience, curating the sensory input to shape the user’s journey within the virtual environment.

Kress (2003) also specifically argues for multimodal approaches to critical communication analyses that apply to user contexts. Consumers of media become producers of media, Kress contends, through a participatory process of design (composition), rhetoric (encoding/decoding), and active production (material) that combines rhetorical and aesthetic response. As an act of interpretation, materials that operate as modes convey meanings across cultures and contexts that surpass monolinearity and monomodality. For Kress, these modes are primarily built upon what he terms a satellite view of language that bridges words, images, and media for epistemological generation. Sheridan (2010) expounds on and explores these appeals to material realities, considering technologies like 3D printers as providing new opportunities for humans and machine to operate in conjoined networked ways to generate new objects. In this way, the discourse between artists’ choices and viewers’ symbolic language interpretative abilities takes us into a space from fundamental constructionist beliefs to progressive constructivist or compositionist perspectives that account for visual rhetoric not being owned by specialized trained groups of interpreters and analysts but as rhetoricity brandished by lay audiences in overlapping non-linear ways. Who and what controls the production of discourse controls what counts as text. Ethos can encourage or discourage interactivity by the audience but also falls into liminal states of transparency and hybridity in digital environments which “blend words and visuals, talk and text, and authors and audiences” (Hocks, 2003, p. 629).
How do audiences as users of digital media interact and participate in visual rhetoric? In line with Spinuzzi’s (2011) theories of runaway objects, consumer audiences of visual media have quickly become user/viewer/mediator/producer chimeras. With these multiple audience subjectivities, Foss’ characteristic is fundamentally pushed as Gries posits that “a thing’s rhetorical meaning is constituted by the consequences that emerge in its various material encounters, affects, and intra-actions” that also operates within media ecologies to actively collapse binaries between the digital and the physical (Gries, 2015, p. 29). Classical rhetorical notions of message delivery and critical aspects of circulation to and among audiences must be “re-theorized for the digital age” (Porter, 2009, p. 207). Once communicative artifacts move into a digital arena, they become less about connotation and denotation and enter a process of meaning production located in “shared cultural knowledge of conventions, vocabularies, and experiences” (Scott, 1994, p. 255). Gronbeck (2009), drawing from Manovich, focuses on arenas of multimodality which bring modularity, automation, variability, and transcoding to impact the cultural component of an audience reading the visual artifact. Delving into multimediation, wherein what we see is never actually solely the artifact because it is constantly de/re-contextualized, “most texts are multisensual and composed of several semiological systems...that work in consort” (Gronbeck, 2009, p. 30).

2.3.1 The Role of Media Interfaces in Multisensory VR

Media interfaces affect VR experiences. For artists, both content and form operate with functional and procedural components in VR as interfaces to appeal to users’ emotion, cognition, and imagination. Virtual media ecologies that utilize multisensory components can easily be derided as giving way to gimmick effects, but they actively collapse interface binaries between the digital and the physical (Galloway, 2012; Kim, 2005). The interface design of most immersive multisensory VR environments consists of live, virtual, and constructive simulation space constructions. Virtual simulations are typically built using gaming engines for asset generation and texturing. Zones are set up to trigger sense interactions at various levels of dispersion tied to
aspects like location and/or sequence of events that a user performs. For example, in the Çatalhöyük multisensory VR experience, they start the virtual fire and the sensors disperse the smell of wood burning. The physical space is composed of mounted motion sensors, light arrays, wooden platforms, physical objects (3D printed, manufactured, and constructed), haptic devices, and sensory zone trigger devices. The HMD, providing dual light-emitting diode (dLED) displays with a combined high resolution of pixels are used. These HMDs also incorporate eye-tracking and hand-tracking and/or triggering capabilities. A user's HMD is wired into overhead motion feeds to generate spatial/perceptual networking. Usually, minimal facilitation allows fluid physical motion for each participant (keeping cords untangled, clearing obstructions, etc.) (Cutting, 1997; Kaur, 1997). These are the myriad technical specifications. The process of actually designing the media interface is an act of conceptualization and composition.

Analyzing multisensory VR as a media interface opens up critical opportunities to interconnect technology and culture with social/historic positionings and material design (Lemke, 1989; Manovich, 2001; Kress, 2003; Galloway, 2012). Drawing from McLuhan, Galloway calls attention to modes of mediation discoverable through technology that encourage analysis to extend “techne as technique, art, habitus, ethos, or lived practice” for the communities that use them (2012, p. 16). The medium cannot be buried within participant narratives but must be afforded equal privilege of consideration in how data, like stories, are built. Through such computational processes being built in to simulations, persuasion is persistently composed for and hidden from the user through procedural and suasory effects that are rhetorically retained and revealed by using techniques, defined by Bogost, “for making arguments with computational systems and for unpacking computational arguments others have created” (2010, p. 2).

Expanding Barthes, Foss, and Hill’s concepts into multimodal contexts, Laurie Gries (2013) pushes the visual artifact’s symbolic action much further by positioning images as event making things. Within multimodal digital environments, a theoretical distinction can no longer be made
between an original image and a reproduction in terms of symbolic value to audiences and in shifting contexts. For Gries, this complicates traditional theories and applications of ethos, pathos, logos and kairos in regard to steady reinforcement of individual symbolic roles of images. Digital contexts highlight the alterability and viral nature of concepts like time, place, and rhetorical purpose wherein images are strategically activated and used as symbolic event and action condense (Ballif, 1998; Ehninger, 1972). Gries argues that “studying image as event” critically moves us away from visual rhetoric’s linguistic constraints; “[r]ather, images conceived as events can be studied as a dynamic network of distributed, unfolding, and unforeseeable becomings” (2013, p. 334-335). Away from the inductive and deductive applications of the rhetorical to the visual that Foss (1982) proposes. A plurality of strategies and symbolic characteristics should instead move with flexibility away from “representation of a prior, intended argument or ideology but in its present and future productions of multiple or differential modes of perception, viewing subjects, forms of affect, and attributions of sense and value” (Vivian, p. 491).

For a visual object to transform into a communicative artifact, both a communicative symbol as well as one that “can be studied as rhetoric,” Foss requires that it be endowed with particular human actions (p. 144). Presenting an important distinction, this action can occur, by Foss’ definition, in the process of creating the visual object or in its interpretation. The technologies and media users work through rhetorically inform decisions and operate as communicative artifacts as well (Arola & Wysocki, 2012; Lunsford, 2007). Rhetorically, Foss (2004) distinguishes function from purpose in that purpose is the desired or intended effect imbibed in the object by the creator of the artifact while the function is the actual rhetorical communicative action of the artifact. Yet form and emergent relational ecologies cannot be overlooked in favor of locating rhetorical function in isolation. Bal (2003) reminds us that an object’s “definition, grouping, cultural status and functioning” is created and cannot be “set apart” or “consist of images” only; the motivation towards visibility and visuality must also speak to and of “the social constituencies
interacting with them” (p. 8). In theory, the only reality of a virtual space is that it is ever-mediated. Hillis (1999) contends, “The nature of immersion is to make the users feel drenched in sensation” (p. 70), yet the mediation of immersion provides narrative content and behavioral realism, an artistically rendered fidelity of appearance that generates an additional immersive quality—cognitive and sense involvement (Lee et al., 2006). This primarily relies on the audience, even if the only audience is the creator.

When involved in rhetorical interpretation, Barthes (1974) views us as the text—“production without product,” both producers and consumers at once, posing that interacting with an image elicits “networks” that “are many and interact” in “a galaxy of signifiers,” each one with its own share of truth (p. 5). When virtual rhetoric is made to work for situated audiences and not in the abstractions often used in the process of production, viewers tend to see things unanticipated by the producers. This is where virtual rhetoric can play a role in helping to identify what likely understandings, or misunderstandings, an audience might bring to bear upon processes of production, wherein we prize analysis of the visual as equal to how we engage with the visual (Gronbeck, 2009).

2.3.2 Mediology and Multisensory VR

In Media Manifestos (1996), Regis Debray advances a critical mediology that historically and politically contextualizes media’s impacts. While both Debray and McLuhan (1994) critically analyze relationships between media and culture, Debray’s mediological approach departs from McLuhan’s perspectives of media. Debray avoids the technological determinism and binaries associated with McLuhan by emphasizing the mutual shaping between media and their cultural contexts. He focuses more directly on media’s concrete social functioning and embedded institutional power relations rather than McLuhan’s more abstract philosophies about media effects. Debray suggests that mediologists should defend “the right of the text... to produce something other than text” (p. 66). Debray also complicates McLuhan’s linear model of
communication by conceiving of transmission as active transformation rather than just the passing
along of discrete information. Additionally, Debray’s interdisciplinary integration of semiotics,
history, sociology, and other fields enables a more grounded, politically conscious analysis of media
as ideological formations, contrasting McLuhan’s more sweeping concepts that privilege speech,
writing, and print. Debray recognized the growing cultural significance of visual modes enabled by
new media.

Conceptualized by Régis Debray, mediological methods approach media as material
mediations that consider “the evolution of communication systems” and their “technologically
transmitted interventions” (p. 115). Within these spaces, the designer can be inserted. Mediology,
in particular, approaches modes of technological mediation in non-deterministic ways, wherein
*techne* is equivalent to technique but also to aesthetics, ethos, context, circulation, and lived practice
(Debray, 1996; Turnley, 2011). As originally conceptualized by Régis Debray, mediology
approaches media as both material interventions and semiotic communication systems (p. 115). In
this way, Debray’s framework does not foreclose on the artist’s agency or the medium’s
embeddedness and recursion. In viewing VR as both medium and interface, as informed by
mediology and technography, technologies are “socially active” and present critical opportunities
for researchers to consider and reconsider technical determinism (Kien, 2008, p. 1104).

Mediological methods, provide a critical cross-disciplinary non-deterministic perspective to these
debates and to investigating methods and decisions of multisensory VR artists. They acknowledge
the interconnectedness of system-user-material-designer and historic positionings that closely
connect technology and culture (Debray, 1996; Turnley, 2011).

As applications of mediology continue to progress, Melinda Turnley takes an applied look at
how mediology informs rhetorical ecologies, linking assumptions embedded across a range of
media with bodies and tools as cooperative/co-evolving rather than binary or reductive. This
process is akin to Bowman and McMahan’s idea that immersion should not be defined “as a single
construct, but rather as the combination of many components, any or all of which can benefit the application... Immersion is not all or nothing, as the terms immersive and nonimmersive suggest, but rather a multidimensional continuum” (p. 39). Or as Turnley posits, “Rather than positioning media as causal agents that have automatic influence, mediology assumes a co-constructive relationship between medium and milieu” (p.128). Mediology crucially links culture with technology through material and sense mediation, and, as it emphasizes situated practices and each dimension fits a consideration an artist approaches when designing an immersive environment, I find that this heuristic of examining digital media spaces can be extended to inform my analysis of the decisions and practices of multisensory VR artists in valuable ways.

Importantly, Debray’s framework does not foreclose on negotiations of agency, and also asserts the embeddedness and recursion of media. As a progression of this embeddedness and recursion, Melinda Turnley’s 2011 work focuses on how mediology can progressively inform rhetorical ecologies that link bodies and tools as cooperative/co-evolving. She also provides a critical mediology-based methods that employ the following “generative rather than prescriptive” framework of dimensions (see Figure 1 for Turnley’s expanded definition of each): Technological (“technical components or processes necessary in the functioning of a medium”); Economic (“systems for production and the channeling of resources which support the development, distribution, and maintenance of a medium”); Social (“metaphors, images, and narratives that circulate in relation to a medium”); Archival (“material and conceptual components for the reception, accumulation, distribution, and retrieval of information and discursive traces”); Aesthetic (“conventions and expectations for form, formatting, design, and content associated with a medium”); Subjective (“patterns and expectations related to subject formation, the nature of the self, and the positionality of users/audiences”); and Epistemological (“assumptions concerning the nature of knowledge, information, truth, intelligence, and literacy”) (p. 132).
Turnley (2011) interprets and applies Debray's mediological methods to find mediology's interdisciplinarity and emphasis on materiality and practice useful for composition studies. She distills and tailors Debray's ideas into a conceptual framework attuned to the field's interests and commitments. Her goal is developing tools for rhetorically engaging new media forms. Turnley finds Debray's interdisciplinary approach to analyzing relationships between culture, media, and the transmission of ideas to be productive for rhetoric and composition studies. She sees mediology as sharing key commitments with the field regarding situated rhetorical practices and critical analysis of discourse. She highlights Debray's focus on materiality and rejection of overly abstract notions of ideology. Mediology emphasizes studying how symbolic activities intersect with forms of social organization and media systems. This resonates with composition's attention to literacy practices in context. Turnley notes Debray's non-deterministic view of technology. He critiques instrumentalism and argues media function as “apparatus-support-procedure” where tools, techniques, codes, and networks are intertwined. This aligns with perspectives in computers and composition on the social embeddedness of technology.

She underscores mediology's focus on how transmission transforms messages, not just neutrally communicates them, complicating traditional communication models centered on information transmission. Turnley builds out Debray's view that multiple modes beyond just words mediate rhetoric and cultural transmission. This, again, reflects multisensory VR composition’s multimodal orientation. She utilizes ideas from critical theorists like Debray, Hayles, Haraway, Selber, and Selfe to inform media instances of agency, literacy, ideology, and power in relation to emerging media environments, also applicable to multisensory VR contexts. Aiming to expand on non-deterministic, context-conscious media perspectives, Turnley's seven dimensions condense key issues in rhetoric, literacy, and technology studies, offering “a heuristic that aids in the analysis and production of texts in various media” specifically for “contexts of new media writing” but applicable across many media domains (p. 131). As mediology also crucially links culture with
technology through material and sense mediation, I find Turnley's intervention on digital media methods using these dimensions can be extended to studies of multisensory VR artists in critical ways.

2.4 IMMERSIVE DESIGN AND DESIGN THINKING

Whether the purpose of a product is meant to impact policy, train a user, educate the public, or as entertainment, immersive design prototype testing must consider the impact of the artist’s decisions and common practices on the user’s experience. Scholarly works in the field of design studies are just beginning the exploration process of how to analyze and measure immersive sense experiences in VR, but not yet with an interest toward the actual construction of rhetorical sense dimensions of immersion. With methods grounded in traditional tenets of UX/UI such as predictability, aesthetic integrity, consistency, responsiveness, and interpretation among other aspects (Norman, 1986; Nielsen, 1994; Tufte, 1997), immersive design strategies typically evaluate user experience rather than artists’ approaches to diagnose problems and inform design procedures (Monk et al., 1993; Slater et. al, 2003; Slater, 2004).

Additionally, VR systems research that does accommodate design affordances into testing for both usability and interaction focuses more on interfaces in virtual environments rather than explicitly emphasizing design decisions that may cause discomfort for the user (Golding, 1998; Norman, Sutcliff & Deol Kaur, 2008; Norman & Nielsen, 2010). Generally, immersive design centers around principles of sensation (perception of stimuli), cognition (mental engagement), affect (emotional engagement), actions (degree of personal connection to the experience), and relations (networked aspects of experience) (Chertoff et al., 2010, p. 106-107). Each of these principles is a consideration artists must address and engage along with remediation related to material and narrative interaction (Bolter & Grusin, 1996).

In a recent empirical study I was part of that investigated visual artists’ creation processes in immersive VR, these immersive design principles were used to assess effective artistic execution
as dependent upon levels of presence, experience, interaction, and involvement (Rechowicz, et. al., 2018b). A high presence environment is defined as one that meets a user’s expectations by increasing the suspension of disbelief in VR. Quality of experience is defined as how well the tool’s affordances allow the user to become immersed in intended operations. Quality of interaction is defined as the user’s ability to work with tools and artifacts as well as the tools’ affordances and constraints. Quality of involvement is defined as the user’s engagement in processes while exploring the simulation. These are each and all primary areas of address for VR artists. These specific qualities also imbricate with dimensions of both mediology and virtual rhetoric and center the importance of artists’ decisions and methods on the immersive design of multisensory VR environments.

Scholarly works in the field of design studies are just beginning the exploration process of how to analyze and measure immersive sense experiences in VR, but not yet with an interest toward the actual construction of rhetorical sense dimensions of immersion. Whether the purpose of a product is meant to impact policy, train a user, educate the public, or as entertainment, design testing models must consider the impact of the artist’s decisions on the user’s experience, with methods grounded in the works of UX/UI pioneers Norman (1986), Nielsen (1994), and Tufte (1997). In comparing VR evaluation methods that use Nielsen’s heuristics, cooperative evaluations with users to diagnose problems (Monk et al., 1993) are beneficial to informing design procedures, but these do not comprehensively address methods of multisensory VR artists in the system composition process. Importantly, frameworks and heuristics of design studies place an important emphasis on a generative, participant-led format using both qualitative and qualitative means to produce results that can successfully inform viable simulations (Slater et. al, 2003; Slater, 2004).

Additionally, research performed by Norman, Sutcliff and Deol Kaur (2008) attempts to accommodate design affordances into testing for both usability and interaction within the 3D graphical UI of VR systems. Their methods also stress the importance of a mixed methods approach
when testing user interfaces in virtual environments, but do not go far enough in explicitly emphasizing design decisions. In cases specific to VR design, wherein users require HMDs, a review of methods structures indicate that researchers and artists must primarily account for factors of perceptual variances, motion sickness, and vertigo that may impact immersion as well as the user’s physical body (Gheerawo & Lee, 2009; Ulrich, 2011; Lanier, 2017). Bowman & McMahan point out an important distinction about immersion and presence constituting two very different concepts in virtual reality: “Immersion refers to the objective level of sensory fidelity a VR system provides. Presence refers to a user’s subjective psychological response to a VR system” (p. 38). From the scientific subfield of presence research in game design, Chertoff et al. (2010) propose a valuable virtual experience test to measure holistic virtual environment experiences based on five dimensions: sensation (perception of stimuli), cognition (mental engagement), affect (emotional engagement), actions (degree of personal connection to the experience), and relations (networked aspects of experience) (p. 106-107). With Chertoff et al.’s inclusion of multisensory engagement analysis in their tests, the resulting dimensions also incorporate critical considerations for the designer, such as flow, or naturalness of presence and interaction, for optimal involvement, (Csikszentmihalyi, 1990) and remediation related to material and narrative interaction (Bolter & Grusin, 1996).

### 2.4.1 Actor-Network Theory and Agency in VR

Applications of Actor-Network Theory (ANT) play a crucial role in illuminating the interplay of human and non-human actors in the creation and experience of multisensory Virtual Reality (VR) environments. ANT, as evolved by Bruno Latour (2005), Michel Callon (1986), and John Law (1999), proposes that social phenomena emerge from the interactions of both human and non-human entities within a network (Latour, 2005). It underscores the agency of non-human actors, highlighting their role in shaping outcomes alongside human actors. In the context of multisensory VR, ANT allows for a more expansive view of agency, one that encompasses not only the VR artists
and users but also the non-human actors such as software, hardware, coding languages, and sensory stimuli involved in creating and experiencing these digital environments. Latour contends that such technologies are, in fact, “highly socialized, extremely embodied, and localized” (qtd. in Lovink, p. 155). These non-human elements are not just tools or background aspects of the VR experience, but vital participants in the network that together generate the multisensory VR environment and impact its reception and interpretation (Callon, 1986).

The concept of translation in ANT is particularly useful in examining how agency unfolds in VR design. Translation describes the process by which various actors negotiate their relationships, redefine their roles, and align their interests to form a network (Callon, 1986). For example, a multisensory VR artist might adapt their creative vision based on the constraints and possibilities of the VR technology at hand, signifying a negotiation between the human artist and the non-human tech components. Similarly, a user’s experience in the VR environment may be shaped by their interactions with the sensory stimuli and interface design, underscoring the agency of these non-human actors. ANT also posits that this agency is not fixed but is continuously (re)negotiated and (re)distributed among the network's actors. In multisensory VR, the locus of rhetorical agency becomes distributed, presenting a challenge to and expansion on ANT. The principle of symmetry in ANT, which treats all actors equally regarding their potential to affect change, allows me to see the multisensory VR environment as a dynamic ecosystem. Within it, the artists, users, and technical elements are not merely interacting but actively co-constructing the VR experience (Law, 1999).

The multisensory dimension of VR further emphasizes the role of non-human actors, wherein, through various sensory stimuli, emotions, stimulate physical responses, and shape perceptions are evoked, thus exercising agency. It is here that the user’s agency becomes particularly interesting, mediated not only by their decisions and the design decisions, but also by their physiological and psychological responses to the sensory stimuli.
Katherine Hayles’ also contributes to the intertwining of humans with technology, offering a critical vantage to view how we might understand agency in multisensory VR design. As Hayles (1999) posits, humans and intelligent machines are co-evolving, interconnected entities, challenging the traditional humanist distinction between the human Self and technological Other, again emphasizing agency as distributed across a network of human and non-human actors. In multisensory VR, the boundary between the human and the technological becomes porous. As Hayles might suggest, the human user’s sensory perception is not simply subjected to but integrally entwined with the VR technology. The sensory stimuli created by VR technology could be seen as part of the user’s extended cognitive system, co-constructing the experience and thus bearing agency. Similarly, the VR artist’s creative process is deeply embedded within and mediated by the technology they employ, making it a key participant in the act of creation. Donna Haraway’s critique of objectivity problematizes assumptions of technological neutrality, underscoring designers’ obligations to consider how systems can empower or marginalize users based on their embedded perspectives (1988). Haraway also advocates for exploring “situated knowledges,” arguing knowledge production should foreground positionality (1988), further localizing mappings of socio-technical associations. Hayles and Haraway both provide complementary lenses that resonate for viewing multisensory VR compositions as intimate socio-technical networks. Herein agency, cognition, culture, and technology are inextricably interwoven, further framing agency distribution, affirming the agency of non-human actors, challenging human-machine boundaries, highlighting the ethical implications of praxis, and ultimately benefiting the complexities of exploring multisensory VR compositional processes and considerations.

2.4.2 Accessibility and Inclusion Issues in Multisensory VR Design

In addition, ANT’s approach to agency resonates with the inclusivity and accessibility concerns in VR design. By recognizing the active role of non-human actors, artists have to carefully consider how these elements might affect diverse users differently. Inclusive design requires a shift
in perspective from seeing technology as a neutral tool to recognizing it as an active participant that can either enable or hinder accessibility. The intermingling of human and machine, user and interface, emphasizes the need for VR technologies to respect and accommodate the diversity of users’ bodies and sensory perceptions. Inclusive and accessible design is integral to ethical and responsible multisensory VR. Technical communication, which sits at intersections of science, rhetorical theory and user design, bring multifaceted considerations to these emergent media environments. At its core, inclusion involves user-centered design that carefully considers diverse capabilities and perspectives (Redish & Barnum, 2011). For instance, Lisa Melonçon asserts that designers have an obligation to ensure accessibility features like closed captions and descriptive audio are available for those with sensory impairments (2013). Yet true inclusion goes far beyond interface design. Critical media access studies by Elizabeth Ellcessor (2016) show that technology adoption is socially and politically shaped, and designers should necessarily challenge biases and barriers that limit participation for marginalized groups.

Additionally, promoting greater media literacy is key to empowering diverse users to critically navigate digital spaces (Kellner & Share, 2007). Users who understand VR’s rhetorical possibilities can more meaningfully co-construct their experiences. As Bazerman (2004) notes, literacy is context-dependent, and inclusive design works to accommodate users’ diverse backgrounds with socially responsible and culturally relevant content. Designers may bring biases, resistance, norms of composition and assumptions that directly impact users who have difficulty with normative uses of interfaces and technical aspects of interaction (Carter, 2007). For artists, the overarching concern stems from an already-immersed production team “tak[ing] things for granted instead of seeing them clearly and describing them explicitly” (p. 57). As an extension, rhetorical genre theory reveals how emerging structural conventions may marginalize groups, requiring interrogation of norms (Spinuzzi, 2003).
In addition, critical interrogation of norms and assumptions is necessary, where may technologies contain an implicit “technological unconscious” that reproduces embedded biases if left unexamined (Slack & Miller, 1993). Inclusion requires conscious challenging of systemic inequalities perpetuated through design choices. Selfe & Selfe (2013) assert the “ideological interfaces” concept that reminds creators that true inclusion requires grappling with societal belief systems, not just technical features. A focus on accessibility across compositional phases encompasses interface design, critical media literacy, genre awareness, and challenging systemic bias. This spans functional, sensory, and cognitive affordances as well as content, interaction, literacy, user empowerment, and critical examinations of a designer’s own bias to create more equitable and ethical immersive spaces for diverse participation.

2.5 CONCLUSIONS

While the specific focus on artists’ perspectives in multisensory VR design may not be extensively covered, I have drawn upon interdisciplinary scholarship that encompass a variety of fields to approach VR simulation design, virtual rhetoric, sense immersion, interactive media interfaces and human-centered design processes to inform deeper understandings of the results produced from this study. By synthesizing and analyzing the available literature, existing knowledge can situate and expand on the unique aspects of artists’ engagements with dimensions of media and their considerations when composing in multisensory VR design. Examining VR artists’ creative approaches can extend contemporary understandings of multisensory virtuality and its rhetorical possibilities. Though existing research about multisensory VR design and artistic methods used in composing immersive environments is, well, virtually non-existent, I do find that informed multidisciplinary approaches that address processes of imagination and invention, both cultural and technological, in a dimensional way is vital to understanding artistic decisions.

Additionally, the close alignment of mediology and virtual rhetoric’s dimensions paired with immersive design motivations toward negotiating agency while achieving qualities of presence,
experience, interaction, and involvement, while not exhaustive, constitute factors that play into artists’ methods and decisions to address the compositional process of immersive sense-centric VR experiences. The virtual, being a reality unto itself (the hyperreal), contains “intentionality, purpose, accessibility, constitutive power, shared symbols and meanings” necessary to constitute a unique rhetorical vantage (Aczél 6). VR is a genre form composed of distinct dimensions that communicate rhetorically through considerations of what the media will allow, producing the desired effect upon an audience. In the case of VR, the audience is typically situated in rhetorical terms as is the user of the system, and the user-as-audience has expectations of this highly contextual engagement that must be met by the artist-as-rhetor (Cooper, et. al.; 2014). Perception in practical reality is inherently multisensory (Merleau-Ponty, 1945), therefore when VR incorporates multisensory elements, it is the artists that fashion ontologies through their systems use processes, tools and methods of representation across this spectrum from practical and material realities to virtual immersion. ANT provides a powerful framework for understanding agency in multisensory VR, moving beyond a human-centric view of agency to acknowledge the role of non-human actors in shaping VR experiences. Through the benefit of this lens, artists emerge to operate in a complex and dynamic network of human and non-human actors, continuously interacting and co-constructing meaning. Moving forward to applying these theories and methodologies in my research process, the next chapter details the theoretical approaches I incorporated in this study as well as the methods used for designing and deploying data collection from multisensory VR artists. I also cover the data coding and thematic analysis process utilized for this research study to build out thematic categories, assertions and answers to my research questions.
CHAPTER 3

METHODOLOGY

After presenting the purpose, questions, and definitions associated with this study in the first chapter, I then positioned this study’s aim in past scholarly concepts and perspectives in the second chapter. The goal of this chapter is to 1) outline the necessity and efficacy of theoretical frameworks I employed, 2) explain the application of methodological and analytical approaches I used, and 3) detail the methods and steps I implemented to collect data, perform analysis, produce results, and reach significant findings. The methodologies leveraged in this research are grounded in mediology principles, complemented by Actor-Network Theory (ANT) to illuminate the intricate relationships integral to the design process. This theoretical framework serves as a nuanced lens that aids in the interpretation and analysis of data gathered through interviews and surveys with a group of multisensory VR artists. Studying VR artists who compose multisensory environments extends mediology dimensions into new territories of investigation and also underscores the close-knit network relationships between artists, systems, and users, opening up new avenues for ANT applications.

Applying a mixed-methods approach provided an enriched iterative understanding of the artists. This approach combines both quantitative and qualitative research methods, allowing me to utilize the strengths of both methodologies. In the context of this study, mixed methods were employed through surveys and interviews. Surveys, with their structured format, helped capture a wide range of responses, offering a broad perspective on the issues and concerns that multisensory VR artists face in their work. Surveys also provided the opportunity to quantify specific aspects of their experiences, adding a layer of objectivity to the findings. Additionally, interviews provided an avenue for deeper qualitative insights to emerge. These allowed the artists to articulate their design practices and decisions in their own words, facilitating an understanding of the similarities of complex dimensions that underpin their work. Unlike surveys, which provide snapshots of artists’
experiences, interviews offered a space for narratives to unfold, revealing in-depth insights into their creative processes, their challenges, and their unique solutions. This qualitative aspect was especially useful in exploring the underrepresented perspectives of these artists, capturing the richness of their experiences in ways that numbers alone couldn’t convey.

Thematic analysis was then used to distill and interpret the data gathered from both surveys and interviews. This analytical method was particularly useful in identifying, analyzing, and reporting patterns or themes within the data. It also aided me in organizing the data in a way that yielded a meaningful extraction of insights. For this study, thematic analysis was utilized to uncover recurring ideas regarding the artists’ engagement with media dimensions and their embedded considerations or processes. It helped illuminate how artists negotiate the constraints and affordances presented in the multisensory VR compositional landscape, offering a detailed account through the data. This systematic approach to interpreting the data benefited my research findings, ultimately providing a significant understanding of multisensory VR artists’ practices and perspectives.

3.1 THEORETICAL APPROACH

Extending beyond game controllers that vibrate or headphones that play music, multisensory VR design relies on converging immersive technologies that both mediology and ANT best helped me investigate. Turnley’s mediological framework also paired well with rhetorical theories of narrative and multimodal design, bringing a needed depth of focus to bear on the artists’ decisions and processes in media contexts. Mediology’s closely aligned dimensions of engaging media across several applicable categories crafted a unique approach (outside of simulation studies) to more closely define and inform modes and qualities particular to immersive technology’s composition for this study’s data analysis and interpretation.

My research process addressed each of the thematic categories of mediology in order to provide a necessary dimensional methodological framework for investigating design methods. I
also centered a generative approach to collecting, analyzing, and categorizing data. In this way, thematic analysis, a rhetorical process of coding and categorization in research practices, informed my investigation of media practices as expressed by artists as well as analyzing artists’ processes and experiences for trends and patterns. Locating dimensional thematic markers and patterns that emerged allowed for critical understandings of this professional group’s specialized composition methods and practices.

### 3.1.1 Actor-Network Theory as a Broad Framework

The use of Actor-Network Theory (ANT), as an overarching framework, when paired with mediology for detailed analysis, offered a definitive approach to dissecting the complex dynamics of multisensory VR production. ANT, with its socio-cultural perspective on technology, grants a comprehensive understanding of how networks of actors, including non-human entities, collaborate to create meaning (Latour, 2005). It reframes technology not as a mere tool but as an actor with agency. For the purpose of this study, ANT illuminated how systems, artists, and users are interconnected and act upon each other within a network. However, despite its valuable insights, ANT can sometimes confine exploration to rigidly defined relationships, not extending beyond the immediate network. It also lacks a strong historical socio-cultural awareness, which I find to be a critical aspect in understanding the broader context within which VR artists operate (Law, 1992; Davis, 2020).

To address this, methodologies drawn from Hayles’ (1999; 2017) extend the use of ANT in this study in particular, offering a more nuanced and comprehensive exploration of multisensory VR design practices. With a definition on the agency of technology, I could best explore interactions between the human and non-human agents in the design process but also the ways in which they converged or were integrated in the creation of multisensory VR experiences. This approach particularly benefited analyzing how artists use various technologies in their design practices, not just as passive tools, but as active collaborators that influence and shape the final artistic output.
These concepts were also employed as a method for understanding how data and information are processed and represented within the design process and the resulting VR experiences in order to better investigate how artists collect, interpret, and utilize data, and how this information is embedded into the VR environments they create.

As an added layer of methodological inquiry that extends beyond conscious decision-making processes, by acknowledging the role of nonconscious cognitive processes, I could also explore how underlying, often unseen, processes might shape the design and consumption of multisensory VR through analysis of design practices and user experiences, probing for the presence and impact of nonconscious processes. These methodological approaches, drawn from ANT, allowed for a deeper dive into the ways multisensory VR artists engage with media dimensions in their design practices and how users ultimately experience these designs. They illuminated not just the overt, conscious decisions and actions but also the underlying, nonconscious processes that play a role in the creation and reception of multisensory VR experiences. Additionally, ANT asserts that technology is not just a tool. Rather, it offered me the ability to examine how networks are designed to a particular end. It is a broad framework, providing a socio-cultural view of materiality and agency that advantageously values rhetorical understandings of communication & composition to conceptually frame how networks make meaning, by, for and to whom. The main advantages of using ANT in this study lie in how it allowed me to examine social & technical relationships from mediology as a network in a constructivist way. It also permitted definitions of technology and material assemblies as agents, not tools and not purely functional.

As previously stated, there are limitations with using ANT as a close primary theoretical framework for examination in this study. As a framework for examining multisensory VR’s multiple assemblages, ANT does foreclose a bit on what is allowed outside of tight networked relationships, often focusing on too many factors that need reigning in. Additionally, it does not have precedent in
valuing overly prescriptive methods of data collection processes and analysis. More important to this study, ANT’s inexperienced application to audience experience is supplemented by including UX/user-centered methods. Its lack of necessary historical socio-cultural contextual awareness is addressed by concepts of embeddedness & recursion of media provided by mediology and cultural studies. While ANT, thus far, does not see past networks to allow for examination of the dissemination & transmission of media to the user, mediology opens it up more to the social and cultural impact of multisensory VR (as both shaped and shaping social networks) and provide the closer lens through which I categorized my data.

3.1.2 Mediology as a Lens for Multisensory VR Exploration

Mediology brings to this work a multidisciplinary perspective to media and applicable comprehensive dimensions that are strategically flexible and map quite well to immersive technology design processes and considerations. It is my assertion that these dimensions—more clearly defined by Turnley (2011) extending from Debray’s manifestos (1996)—allowed for a clear and close understanding of how artists who work in multisensory VR composition define, design, and engage media tools in their professional craft. With this dimensional framework, I was also able to further localize themes and independent variables on their knowledge, perception, and practices as relational to the media contexts in which they work.

Mediology also makes room for investigating persuasive dimensions of immersive sense transmissions through decisions artists make with media, material, narratives, and tools within the ecology of a VR compositional experience. Turnley’s dimensions, detailed in Figure 1, offer areas for examining an applied array of persuasive appeals artists employ in their sensory compositions in order to gauge the importance of how appeals operate for artists using media tools and tactics to trigger immersion for users.
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Elaboration</th>
<th>Issues to Consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological</td>
<td>Technical components or processes necessary in the functioning of a medium (e.g., papyrus, moveable type, vacuum tubes, fiber optic cable, GUT’s, etc.)</td>
<td>A medium’s technological development is neither linear nor inevitable. Certain technologies may support certain structures and practices, but technological forms do not wholly determine media’s uses. Technological proficiency is necessary for digital literacy but must also be articulated with critical, rhetorical literacies.</td>
</tr>
<tr>
<td>Social</td>
<td>Metaphors, images, and narratives that circulate in relation to a medium (e.g., print as the catalyst for Western democratic individualism, the World Wide Web as an inclusive global network, etc.) as well as patterns of individual and group association that develop vis-à-vis a medium</td>
<td>A medium’s relationship with its milieu is co-constructive. The political and social imaginaries of a particular period influence and are influenced by culturally dominant media. The social spaces that develop in and through media are not neutral and function in relation to cultural hierarchies of power and privilege.</td>
</tr>
<tr>
<td>Economic</td>
<td>Systems for production and the channeling of resources which support the development, distribution, and maintenance of a medium (e.g., American television was technically possible by the 1930s but did not spread until it was supported by the 1950s postwar economy; print and networked media posit different models of ownership, originality, and authorship)</td>
<td>A medium is involved in exchange fiscally and discursively as part of a functioning economy of exchange, supply, and demand. For a medium to “work,” it must have recognizable value, and value is contextual rather than intrinsic. Access to media resources are differently distributed in relation to cultural formations such as race, class, gender, education, and language; these different conditions of access impact whether or not people can effectively develop media literacies.</td>
</tr>
<tr>
<td>Archival</td>
<td>Material and conceptual components for the reception, accumulation, distribution, and retrieval of information and discursive traces (e.g., human memory, paper, tape, film, disks, etc.)</td>
<td>A medium supports and is supported by particular assumptions about memory, information structures, and access. The ways in which a medium frames the storage of and access to information have significant legal, political, institutional, and ethical consequences. The spatialization of text through digital networks and mobile technologies is shifting how information is structured and used.</td>
</tr>
<tr>
<td>Aesthetic</td>
<td>Conventions and expectations for form, formatting, design, and content associated with a medium (e.g., print is read from left to right, TV programs generally are 30-60 minutes long, blue underlining indicated a link in early web page designs, etc.)</td>
<td>A medium is most recognized by the normalized conventions which govern the construction and evaluation of its artifacts. Once aesthetic conventions are normalized, they can become seemingly invisible in their regulation of credibility, literacy, and expertise. Conventions can encourage standardization, but they do not automatically forestall innovation or creativity.</td>
</tr>
<tr>
<td>Subjective</td>
<td>Patterns and expectations related to subject formation, the nature of the self, and the positionality of users/audiences (e.g., print hierarchies posit stable, unified readers, non-linear hypertexts assume decentered, more fragmentary selves, computer interfaces often presume English speakers, etc.)</td>
<td>A medium offers allowable or expected ranges of action for users. Rather than being neutral or universal, such roles are embedded in cultural assumptions about difference. Users of media also participate in self-representation and identity construction; individual agency in these processes must be negotiated in relation to larger cultural formations.</td>
</tr>
<tr>
<td>Epistemological</td>
<td>Assumptions concerning the nature of knowledge, information, truth, intelligence, and literacy (e.g., traditional correspondence between fluency with the print medium, intellectual ability, and social affluence; digital media’s distribution of knowledge and support of collaborative knowledge construction)</td>
<td>A medium can support certain worldviews and validate particular ways of learning and knowing. When a medium is associated (positively or negatively) with certain abilities and opportunities, it can reinscribe hierarchies which privilege certain groups and exclude others.</td>
</tr>
</tbody>
</table>

Figure 1. “Dimensions of a Medium.” Reprinted from Computers and Composition, 28, Turnley, M. “Towards a Mediological Method: A Framework for Critically Engaging Dimensions of a Medium,” p. 132, with permission from Elsevier. See Appendix D: Figure Use Copyright Permissions.

These seven mediological dimensions primarily inform the theoretical framework used in developing my approaches to this dissertation's thematic heuristics and data interpretation.
Although mediological dimensions have not previously been applied to the production or evaluation of multisensory VR, it was impressively effective and highly adaptable for examining multisensory composition tactics as social, epistemological, cultural and rhetorical tools that craft persuasive immersion through simulation sense technologies. The seven dimensions also focused the scope of my investigation to consider the interrelated nature of multisensory VR as a technological, ecological, cultural, and networked convergence of systems. Turnley stresses "...in the functioning of a medium, these categories are not autonomous. All of the dimensions are mutable and interrelated, and any applications of the heuristic should consider relationships among multiple dimensions" (p. 132). Her framework, described as “a rubric that encapsulates some of the key issues related to media’s functionings as larger cultural, historical formations and situated sites of rhetorical transmission and transformation,” does provide elaborations on each dimension and issues to consider for each, but Turnley asserts they are meant to be viewed as “list of traits as broadly useful, it is not meant to be comprehensive or definitive" (pp.131-132).

Broad and multidisciplinary in application, mediology marries well with rhetorical theories of narrative and composition design, adding needed focus to dimensions related to the artists’ design processes. Artists fashion ontologies through their processes, tools and methods of representation on a spectrum from practical and material to virtual reality. Mediology situates how relationships make meaning with a socio-cultural view of technology and culture. Much like ANT, concepts of mediology value rhetorical understandings of communication & composition, agreeing that technology is not just a tool, yet it places greater emphasis on the ways, means, and relationships that emerge and how technology shapes/is shaped by cultural and social factors. Turnley follows Debray in calling these media convergences areas of “rhetorical and cultural shifts” (p. 126). In a practical way, employing mediology as the key informing framework also provides clear categories to keep a tightly defined scope on my data coding processes and was useful to
provide a frame of attention throughout my thematic analysis for developing insights and relational categories.

There is no precedent for applying mediology to VR much less a media assemblage such as multisensory VR, which may be perceived by some as risky. While I favorably view the fact that Turney’s interpretation of mediology’s dimensions bleed into each other and approach categorization as generative, not prescriptive, other scholars may see these factors as a limitation to application. I can state from its practical application in this study that these factors along with its ability not to foreclose on negotiations of agency benefitted my work. However, I do acknowledge that it posed a tricky thousand-mile view from the situatedness of multisensory VR composition and a limited approach to materiality. These limitations were supplemented with theories from ANT and distributed cognition. ANT also filled a gap in the limited attention mediology provides to inherent power structures and agency, specifically in the context of compositional processes.

3.1.3 Combining Approaches

I situate myself as a digital rhetorician, in scholarship and in practice. Crystal VanKooten (2016) asserts, “Digital rhetoricians examine, create, and theorize digital texts and the myriad practices surrounding them, a process that, in its complexity, necessitates developing new and hybrid methodologies.” I contend that the complex relationships and “myriad practices” evident in multisensory VR composition requires the benefit and application of hybrid methodologies. Networked relationships make meaning by way of the artists’ considerations, decisions, and tactics and how networks are designed to a particular end. In my research, I found it beneficial to couple Actor-Network Theory (ANT) with mediology, creating a comprehensive framework that facilitated both a macro and micro examination of the networks, relationships, and meaning-making mechanisms within the field of multisensory virtual reality (VR) design (Latour, 2005; Debray, 2000). The complimentary nature of ANT’s assemblages (systems) and mediology’s milieu
(interactions) bridged socio-cultural and technological perspectives, allowing me to delve into the intricate interactions among artists, technologies, and users within these networked relationships.

ANT offered me insights into the human and non-human actors involved in multisensory VR design, while mediology expanded my analysis to include social and cultural impacts of VR. Turnley’s dimensional framework further enhanced my understanding of the relationship between VR design features and their influences on the formation and dissemination of networks (2016). My research findings on accessibility and inclusion in VR design were particularly enlightened by ANT’s emphasis on network interaction and formation, while mediology offered critical perspectives on power structures, societal attitudes, and cultural norms that influenced design choices. Additionally, ANT aided in understanding the relationships among designers, engineers, and accessibility experts, while mediology complemented by investigating the role of metaphors, images, and narratives in shaping media perception and use (Latour, 2005; Debray, 2000; Higgins, 2012). Nonetheless, both ANT and mediology had limitations that I took into account. While ANT helped uncover immediate network relationships, it sometimes overlooked the broader context of design decisions (Latour, 2005). Mediology, on the other hand, lacked focus on specific actors and networks involved in design processes, and neglected the role of non-human actors (Debray, 2000). These gaps were partially filled by user-centered design methods, ensuring that the design decisions truly met the needs and preferences of end-users (Norman, 2013).

Combining ANT and mediology offered a comprehensive and dimensional methodological framework for exploring multisensory VR design practices. This amalgamation illuminated how artists operate within social networks, use media technologies, and shape diverse user experiences. Moreover, it enriched the investigation of the interactions between human and non-human actors, along with their impact on user perceptions and behaviors. Furthermore, incorporating rhetorical aspects enhanced the analysis of artists’ decision-making processes, ultimately influencing how users interact with and perceive these immersive environments (Higgins, 2012). As Turnley
recommends “situated praxis” or “researching practices in context” (p. 129) for applications of these heuristics, examining multisensory VR artists also allows for a “situated analysis rather than deterministic overgeneralizations about how media function” (p. 131).

Lastly, my blend of ANT and mediology with rhetorical invention offered a unique perspective outside of traditional simulation studies. This fusion facilitated a comprehensive analysis and categorization of my data, paving the way for building critical understandings of the situated knowledge and practices in multisensory VR design (Higgins, 2012). By using ANT to identify the specific actors and networks involved in the iterative design processes, and mediology to analyze the broader cultural and historical context in which these decisions are made by the artists, I gained a more comprehensive understanding of the factors that shape the design of inclusive and accessible multisensory VR environments. As a starting point, ANT brought a way to identify and define the specific actors and linked networks involved in the design process to begin to investigate the decisions and tactics of artists who work collaboratively to build the environments. While ANT provided a detailed understanding of the specific actors and agencies involved in the composition process, it could not fully capture the broader trends and themes that have shaped the development of multisensory VR environments over time much less the social, narrative, aesthetic, and archival symbolic components that artists employ in their design processes. Mediology added this needed dimensional element to locating specific assertions and themes in data analysis. This blending generated a necessary “dimensional network” methodological framework for investigating design methods as well as a generative approach to collecting, analyzing, and categorizing data toward building critical understandings of this professional group’s situated knowledges and practices in phases I detail later in this chapter.

3.2 METHODICAL APPROACHES

In order to operationalize mediological approaches under an umbrella of ANT in this study, I conducted data collection and analysis from surveys and interview sessions foregrounding these
theoretical lenses. A mixed methods approach that combined analysis of both qualitative and quantitative data was applied for interpretation to locate thematic clusters. In addition, thematic analysis, a rhetorical process of coding and categorizing based on finding patterns and trends, also informed my investigations of artists’ media practices, processes and experiences.

The artists, my object of study in this dissertation, are a highly contextualized group. In order to rigorously examine their shared understandings and their processes and methods, my methodical design and approach to inquiry remained focused on the artists’ lived experiences and perspectives on their craft. I viewed this study’s methodical design and approach, from the beginning, as epistemological—both knowledge-building and knowledge-making analysis of micro levels of practice to provide insight into macro levels of structures, professional practice, and scholarly contribution. My methods were framed around practitioner issues that link closely to sites of practice. In a secondary way, I was using texts as they relate to an activity system to explore how academic researchers and practitioners “can work together on common interests with a reciprocal relationship between research and practice” (Rude, 2009, p. 189).

Within a month after a Human Subjects research proposal was approved as “Exempt” by Old Dominion University’s Institutional Review Board as detailed in Appendix B, this study as designed was operationalized by conducting data collection and analysis from surveys and interviews. In a phase approach, surveys were first deployed, and then interviews were performed with participants. Finally, all data was collected, secured and reviewed, then analyzed and interpreted to locate thematic clusters, sub-themes, and categories to answer my research questions. Quantitative data were tabulated and reported for statistical pattern analysis and frequency in reporting. Qualitative data included interview transcripts and memo notes from recorded sessions of participants’ accounts about their professional experiences, methods, and artistic decisions. In this section, I explain my methods decisions and detail my data collection and generative processes of analysis.
3.2.1 Mixed Methods Rationale

I employed a mixed methods approach to this research study, finding it to be highly beneficial for investigating the decisions, methods, and tactics of multisensory VR artists using systematic scaffolded analysis techniques. Characterized by the use of both qualitative and quantitative research methods (Creswell, 2013), this approach allowed me to cultivate a pragmatic and iterative yet rich relationship with my data. My research instruments also provided paths for both qualitative and quantitative data collection and thematic analysis methods, guiding a comprehensive understanding of artists’ compositional processes and considerations as applicable to my original research questions.

Mixed methods research strategies have gained increasing recognition for the ability to provide comprehensive and nuanced insights into complex research questions. Its core strength lies in its capacity to offset the limitations inherent in using either qualitative or quantitative research methods in isolation. By integrating diverse data types, mixed methods research fosters a more complete understanding of the subject matter, enhancing the robustness of the findings (Tashakkori & Teddlie, 2003). In addition, it allows for the validation of results through triangulation, thus enhancing the reliability and credibility of the research.

However, adopting and applying a mixed methods approach is not without its challenges. Bryman (2006) contends that the integration of qualitative and quantitative data remains a key hurdle for many researchers. Often, the findings from the two methods are presented independently, curtailing the potential benefits that can build from a holistic view and review of the results. Johnson et al. (2007) underscore the complexity of mixed methods designs, namely the substantial investments in time, resources, and expertise. Additionally, the challenge of ensuring the quality and consistency across both qualitative and quantitative components of the research is also often complex and difficult for many researchers (O’Cathain, 2010).
Attempts to strike a balance between the two methods may lead to the dilution of one approach, thereby undermining the depth of data collection and analysis (Morse, 2003) and logistical difficulties arise from the need to coordinate different forms of data collection (Tashakkori & Teddlie, 2003). Moreover, some critics argue that the distinct epistemological foundations of each method can pose a threat to the validity of mixed methods research (Sale et al., 2002), yet when conducted carefully and deliberately, blending methods yields rich, multifaceted insights that would be difficult to obtain through purely qualitative or quantitative methodologies alone to arrive at repeatable and documentable processes (Seidman, 2019).

Creswell and Creswell (2017) emphasize that, through the thoughtful collection and integration of qualitative and quantitative data, one form of data can validate or corroborate the other, thus increasing the validity and reliability of the research findings. This triangulation was valuable to me in obtaining different but complementary data on the same topic. Using a mixed methods approach did allow for more depth and detail, but more importantly, enriched the results with different perspectives and unexpected insights. I also found that, for this particular study, utilizing the preliminary quantitative survey offered me more flexibility in augmenting the qualitative interviews to address different types of questions to expand on the survey’s focus areas. Likewise, quotes from my interviews frequently helped explain statistical patterns in my survey data. I found that this enhanced the data overall as the surveys gave me a wide view while the interviews let me delve deeper, and then I could circle around for comparing and contrasting between the two.

### 3.2.2 Thematic Analysis

I selected and implemented strategies of thematic analysis for this research study as this method aligned with my research questions and contextual objects of study. Thematic analysis is a widely used method within social science and humanities-focused qualitative research. This approach allowed me, throughout my data analysis process, to identify, analyze, and report
patterns or themes within my collected data. Thematic analysis also has several advantages for providing intricate and comprehensive interpretations and findings. Braun and Clarke (2006) underscore its adaptability, noting its ability to operate without being constricted to a particular theoretical framework, thus making it a versatile tool for research inquiries. This flexibility is echoed by Boyatzis (1998), who views thematic analysis as both systematic and adaptable for managing large volumes of qualitative data. I found this to be the case in my research. Similarly, Guest, MacQueen, and Namey (2012) point out the foundational role of thematic analysis as a stepping stone in extracting meaning from complex qualitative datasets, thereby lending credibility and rigor to the research.

While thematic analysis provides an accessible and flexible means to interpret qualitative data, it does come with caveats. Braun and Clarke (2006), for example, caution that the very versatility of thematic analysis necessitates careful decision-making during the analysis process. They point out the potential for inconsistency if decisions are not systematically and thoughtfully made. I found this to be particularly true in late stages of data analysis. Also, using thematic analysis requires frequently finding a balance between a tightly analytical and a flexible approach to interpreting complex data sets. Attride-Stirling (2001) and Tuckett (2005) allude to the process being labor-intensive and time-consuming, particularly when dealing with extensive data.

Importantly, thematic analysis also carries the weight of subjectivity and interpretive decisions in the coding process. There is a potential for researcher bias to color the identified themes, putting research at risk of insufficient rigor if the analysis is not conducted systematically due to this perception of subjective flexibility (Joffe, 2012). Saldaña’s (2011; 2015) perspectives on various thematic data coding and analysis methods provided valuable guiding insights that helped me overcome these impediments. He underscores 1) the iterative nature of coding to address rigor, 2) the need for reflexivity in interpretation, and 3) maintaining consistency to mitigate any biases.
Despite constraints, complexities and inherent challenges to thematic analysis, my integration and application of this approach into my mixed methods study produced comprehensive insights after coding and categorizing to locate markers and patterns. I identified key themes in the data to gain a deeper understanding of the multisensory VR artists’ processes and considerations that provided rich well-supported answers to my research questions. In a broader fashion, as the objectives of this study were geared toward, thematic analysis was successful as a highly interpretive yet systematic approach to identifying patterns, themes, and sub-themes that emerge from data. This was especially the case with content from interview transcripts contributing to deeper understandings (Braun & Clarke, 2006). Thematic analysis also provided me a means to accurately represent my participants’ perspectives through more iterative processes of evaluating important themes in the data. It allowed for the flexible integration of my methodological frameworks to more closely define the complex interconnected relationships in the highly situated media practices between artists, media, and users from the artists’ perspectives.

3.2.3 Study Design

I initiated the data collection process with the administration of surveys, the findings of which not only helped delineate baseline professional and technical composition priorities but also guided the follow-on interview phase. Through statistical pattern analysis and frequency reporting, I identified associations in the survey results that were particularly illuminating when evaluating interview transcripts. The survey served as a tool to gain broad insights into trends and phenomena, while the follow-up interviews offered a deeper understanding of the artists’ underlying experiences, opinions, and motivations. By coupling these data collection methods, I was able to capture the demographic characteristics of the artists and perform thematic analysis on their use of specific design techniques, technologies, and methods. The inclusion of both the survey and the interviews was crucial to my study design, as the results complemented each other and
provided a comprehensive picture of the artists’ processes and considerations that couldn’t have been achieved using a single method.

My multi-faceted approach, characterized by iterative stages of analysis, yielded robust insights through rigorous investigation. However, I was cognizant of the limitations of surveys in capturing the nuanced experiences of a specific professional knowledge group. Therefore, supplementing survey data with follow-up participant interviews enabled a deeper exploration of the artists’ perspectives and bolstered my findings with a diverse array of data sources. In terms of qualitative aspects, interview responses and memo notes from recorded sessions served to assess the participants’ lived professional experiences, methods, and artistic decisions. These transcripts and notes were then analyzed and interpreted to establish thematic category clusters.

In designing my interview questions format and also while performing the interviews, I consciously drew from research practices of strategic reflective listening (Royster & Kirsch, 2012) and uses of rhetorical silence (Ratcliffe, 2005). I also integrated interpretive phenomenological practices (Creswell, 2013), which place an emphasis on participants’ lived narrative perceptions and understandings as integral to leading thematic analysis processes. In addition, I incorporated tenets of situated knowledges into the design and execution of the study (Haraway, 1988). This perspective challenges biases and fixed categorizations by emphasizing knowledge production as a subject-centric process. As this perspective paired well with concepts of mediology, it also played a critical role in keeping this research study participant-led throughout every stage of research. Early in the research design process, I also considered appropriate sample sizes; the scope of what could be captured in this dissertation and the concept of saturation were deemed vital considerations (Mason, 2010; Charmaz, 2006). Saturation, according to Charmaz, refers to the point at which additional data collection no longer yields new or relevant insights. This concept is influenced by various factors, including 1) population specificity, homogeneity or heterogeneity, 2) selection criteria, 3) budget, 4) key stratifiers, 5) project timeline, and 6) researcher experience. A better
understanding of sample size and saturation guided me in defining and recruiting enough participants to achieve in-depth meaningful findings while not overwhelming this work's focus on answer my research questions.

To analyze the data using my mixed methods approach to collection, I designed this study's analytical processes around thematic coding to identify key themes and patterns. Using Turnley's dimensional framework, my goal was to attain a deeper understanding and findings to address my dissertation research questions, and this process was fundamentally rooted in five core steps of thematic analysis. The first stage is data familiarization, immersing myself in the data by reading and re-reading it multiple times, acquainting myself with the depth of its content. This also entailed making notes and annotations as I went along, interacting closely with the raw data and establishing a basis for the next steps. The next step was to begin the process of coding. For example, I identified segments of data that related to one of the dimensions of mediology or to one of the research questions and labeled them with codes representing key themes or patterns, for example, “aesthetic method,” “archival - tactile feedback,” “social influences,” and “technology choices.” After initial coding, I then began collating the codes, which entailed grouping similar codes together to create broader themes. In this process, for example, codes such as “positionality of user,” “embedded assumptions of agency,” and “co-construction practices” were grouped together under the overarching theme of “Subjective dimension – Persuasion toward subject formation/identity construction.” I then reviewed and refined these themes to ensure that they were robust and accurately represented the data. Finally, I used the themes identified to develop categorical insight assertions that directly replied to my research questions in both descriptive and explanatory ways. In essence, this systematic thematic coding process allowed me to identify,

5 This is to be understood as “in design” rather than “in practice.” Subsequent sections of this chapter address a more detailed implementation of these core steps in the process of data coding and analysis.
analyze, and interpret patterns within my data, providing rich, detailed insights and a deeper understanding of my research question.

3.3 SURVEY DESIGN & OPERALIZATION

The purpose of the quantitative assessment survey was to assess patterns among participants, isolate independent variables, and evaluate their responses in relation to the processes of and priorities involved in composing multisensory VR systems. To that end, surveys were performed with participants and then analyzed and interpreted to locate baseline professional and technical composition priorities. Results were then tabulated for statistical pattern analysis and frequency in reporting. In this section, I detail the survey design, execution, and analysis process.

3.3.1 Participant Selection/Screening

For this study, participants were specifically selected using the description of people who 1) situate themselves in the Creative/Applied Arts with expertise in interactive media and immersive technology, and/or integrated media, and 2) who identify as VR artists and/or exhibit a strong research or professional background in digital technology and sense integration. Additionally, I screened this selection description to include those who have worked professionally in the composing process of at least one completed multisensory VR environment, because I wanted the results to reflect the range of experience from novices to significant expertise in order to capture as wide an understanding as possible. Although both artistic designers and computer engineers generally perform aesthetic creation work in such environments or on such projects, I constrained this study to the investigation of artists because their background and training are more closely aligned to the foundations of aesthetic principles and sense design qualities that my questions and frameworks address. More importantly, artists’ approaches to these areas are different.

I chose this participant group to examine because, as I point out in previous chapters, most research scholarship focuses on systems and users while ignoring the perspectives of those who
artistically compose these systems for the user and stakeholders. By focusing this study on artists as a specific professional disciplinary group of subjects, I affirmed Ruha Benjamin’s (2019) call to examine the people shaping our digital environments, asserting that “technology is often spoken about as if it were a force separate from human influence.” This selection of subjects was also influenced by practices of genre tracing (Spinuzzi, 2003), which seeks to examine how people adapt and produce specific rhetorical conventions and culturally connected moments to emerge in compositions. Scholars such as Spinuzzi have traced genres in professional workplace environments to learn what kinds of genres are in collective use and how they function and transform to support those environments. These professional environments then can be expanded to examine larger and more dimensional relational networked ecologies of audience-rhetor-purpose.

3.3.2 Survey Design

After determining this study’s participant pool description, I began carefully crafting the research instruments. In designing the survey, foundational themes from my methodological frameworks and informing research provided a foundation for creating questions that broadly addressed 1) the artists’ decisions, methods, and tactics across development phases, and 2) their approaches to multisensory VR as an artistic medium that aims to create immersive, interactive, and engaging experiences by integrating various sensory modalities and fostering a sense of presence for users. The survey’s questions were based around their priorities and thoughts on the importance of various factors across different phases of immersive environment development. Each question was meant to address a specific aspect or phase of multisensory VR composition, as mapped out and explained in Table 1 below. I did not seek to capture any traditional demographic data in this survey such as gender, location, age, etc. as it was deemed non-essential to this initial exploration toward answering my research questions. While these were not factors of analysis nor prohibitive to participant criteria, training/education and years/amount of experience were crucial
to getting a better picture of their situated professional knowledges and for later filtering of subsequent response sets.

Table 1.


<table>
<thead>
<tr>
<th>Question #</th>
<th>Survey Question</th>
<th>Design Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1.</td>
<td>Which of the following best describes your highest level of education and/or training?</td>
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<tr>
<td></td>
<td>High School</td>
<td>Allows for acquiring a baseline of recording level(s) of professional training.</td>
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<td>Professional Certifications</td>
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<td></td>
<td>Trade School</td>
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<td>Associate's Degree</td>
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<td>Bachelor's Degree</td>
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<td></td>
<td>Master's Degree</td>
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<td></td>
<td>Doctorate/Terminal Degree</td>
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<td>Q2.</td>
<td>Approximately how many VR environments have you been a part of composing (on a team or otherwise)?</td>
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<td></td>
<td>None</td>
<td>Allows for acquiring a baseline of recording years of experience working in VR.</td>
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<td>2-5</td>
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<td>5-7</td>
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<td>7-9</td>
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<td></td>
<td>More than 10</td>
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<td>Q3.</td>
<td>When beginning a VR composition in the concept and development phase, please rate these factors from highest to lowest in priority for you (1 as highest, 7 as lowest):</td>
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<td></td>
<td>Budget</td>
<td>Assesses how the artists rate the importance and priority level of various key factors of multisensory VR design at concept &amp; development phase in the production process.</td>
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<td></td>
<td>Available tools</td>
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<td></td>
<td>Story/Narrative</td>
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<td></td>
<td>Aesthetic style</td>
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<td></td>
<td>Media requirements</td>
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<td></td>
<td>Audience</td>
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<td></td>
<td>Purpose</td>
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<tr>
<td>Q4.</td>
<td>When testing a VR composition in the prototype phase, please rate these factors from highest to lowest in priority for you (1 as highest, 6 as lowest).</td>
<td>Assesses how the artists rate the importance and priority level of various key factors of multisensory VR design at prototype phase in the production process.</td>
</tr>
<tr>
<td>Question #</td>
<td>Survey Question</td>
<td>Design Rationale</td>
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<td></td>
<td>Graphic fidelity</td>
<td>Allows for understanding the artists’ perceptions of technical components’ importance to composing a multisensory VR environment irrespective of process and development phases. Data from Q5-7 were closely compared against Q3-4 for how priorities and perceptions of specific components’ and aspects’ importance may change across development phases. Informed by Technological dimension.</td>
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<td></td>
<td>Audience engagement</td>
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<td>Sense fidelity</td>
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<td></td>
<td>Naturalness of controls</td>
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<td></td>
<td>Aesthetic quality</td>
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<td></td>
<td>User experience</td>
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<td>Q5.</td>
<td>How important are technical components to composing a multisensory VR environment?</td>
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<td></td>
<td>Extremely important</td>
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<td>Very important</td>
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<td>Moderately important</td>
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<td>Slightly important</td>
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<td></td>
<td>Not at all important</td>
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<tr>
<td>Q6.</td>
<td>How important are material components to composing a multisensory VR environment?</td>
<td>Allows for understanding the artists’ perceptions of material components’ importance to composing a multisensory VR environment irrespective of process and development phases. Informed by Technological and Archival dimensions.</td>
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<tr>
<td></td>
<td>Extremely important</td>
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<td>Very important</td>
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<td>Not at all important</td>
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<td>Q7.</td>
<td>How important are aesthetic properties to composing a multisensory VR environment?</td>
<td>Allows for understanding the artists’ perceptions of aesthetic properties’ importance to composing a multisensory VR environment irrespective of process and development phases. Informed by Aesthetic dimension.</td>
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<tr>
<td></td>
<td>Extremely important</td>
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<td></td>
<td>Very important</td>
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<td>Not at all important</td>
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<tr>
<td>Q8.</td>
<td>How important is it to consider user expectations and assumptions when composing a multisensory VR environment?</td>
<td>Assesses the artists’ perspectives in relation to users by addressing the artists’ perceptions of expectations and assumptions when composing a multisensory VR environment, irrespective of process and development phases. Informed by Subjective and Epistemological dimensions.</td>
</tr>
<tr>
<td></td>
<td>Extremely important</td>
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<td></td>
<td>Very important</td>
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<td></td>
<td>Not at all important</td>
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<tr>
<td>Question #</td>
<td>Survey Question</td>
<td>Design Rationale</td>
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<tr>
<td><strong>Q9.</strong></td>
<td>How important is it that the virtual environment seems consistent with real-world sense experiences?</td>
<td>Assesses the artists’ perceptions of sense consistency importance for the user when composing a multisensory VR environment, again irrespective of process and development phases. <em>Informed by Social and Archival dimensions.</em></td>
</tr>
<tr>
<td><strong>Q10.</strong></td>
<td>It is important to include aesthetic elements that trigger users’ emotions in a multisensory VR environment.</td>
<td>Provides a statement prompt for assessing artists’ levels of agreement; statement centers artists’ prioritization for inclusions of aesthetics as linked to emotion for the user in multisensory VR environments.</td>
</tr>
<tr>
<td><strong>Q11.</strong></td>
<td>It is important to consider persuasive design techniques when composing a multisensory VR environment.</td>
<td>Provides a statement prompt for assessing artists’ levels of agreement; statement centers artists’ prioritization of techno-rhetorical UX considerations in multisensory VR environments.</td>
</tr>
<tr>
<td><strong>Q12.</strong></td>
<td>It is important to design a vivid unfolding narrative for the user into a multisensory VR environment.</td>
<td>Provides a statement prompt for assessing artists’ levels of agreement; statement addresses artists’ prioritization for inclusions of fidelity and narrative elements for users in multisensory VR environments.</td>
</tr>
<tr>
<td><strong>Q13</strong></td>
<td>It is important to seek to achieve a sense of wonder for the user of a multisensory VR environment.</td>
<td>Provides a statement prompt for assessing artists’ levels of agreement; statement addresses artists’ prioritization of wonder for the user as a point of engagement and experience in multisensory VR environments.</td>
</tr>
</tbody>
</table>
Table 1. Continued


<table>
<thead>
<tr>
<th>Question #</th>
<th>Survey Question</th>
<th>Design Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q14</td>
<td>The technical/mechanical quality of sensory tools is important to the creation of a multisensory VR environment.</td>
<td>Provides a statement prompt for assessing artists' levels of agreement; statement addresses artists' prioritization of technological and economic dimensions in multisensory VR environments.</td>
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<tr>
<td>Q15</td>
<td>In terms of your composition process, how important is it that the sensory qualities you include in a VR environment promote user exploration?</td>
<td>Assesses levels of importance of considerations that encourage exploration to the artists' composition processes; Informed by the PEII model (see Appendix A); given that each of these four factors in the model were deemed critical by prior research for optimal user experience, they were included in Q15-19 as a potential extension or intersection of the mediological framework specifically for investigating multisensory VR.</td>
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<tr>
<td>Q16</td>
<td>In terms of your composition process, how important is it that the multisensory VR environment promotes a sense of presence (a feeling of “being there”) in the user?</td>
<td>Assesses levels of importance of considerations that encourage a sense of presence to the artists' composition processes.</td>
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<tr>
<td>Q17</td>
<td>In terms of your composition process, how important is it that the sensory aspects of the environment keep the user involved?</td>
<td>Assesses levels of importance of considerations for inclusion of sensory aspects that promote user involvement to the artists' composition processes.</td>
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<tr>
<td>Q18</td>
<td>In terms of your composition process, how important is it that your artistic designs convey a narrative for the user?</td>
<td>Assesses levels of importance about considerations on linking aesthetic design and narrative in the artists' composition processes.</td>
</tr>
</tbody>
</table>
Table 1. Continued

*Survey Instrument: Questions and Design Rationale.*

<table>
<thead>
<tr>
<th>Question #</th>
<th>Survey Question</th>
<th>Design Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In terms of your composition process, how important is it that you include items (material and/or virtual) that the user can interact with in the environment?</td>
<td>Assesses levels of importance of considerations that encourage interaction in the artists’ composition processes.</td>
</tr>
<tr>
<td>Q19</td>
<td>Would you like to be contacted for a follow-up interview for this study? Yes No</td>
<td>Allows participants the option of voluntarily providing their email address if they wished to be contacted for a follow-up interview, thus creating a pool of potential participants for the second phase of data collection processes.</td>
</tr>
</tbody>
</table>

I then built out the 20-question survey in Qualtrics, a statistical reporting software selected because I am most familiar with its interface for survey deployment and analysis as it is frequently used by researchers at Old Dominion University. The questions were formatted using radio selection buttons, a numbered ranking selection system, and Likert scale format to capture responses characterizing artists’ ranking of importance by marking an appropriate number on a 7-point scale, in accordance with the question content and descriptive labels. Open qualitative response fields were not included in the survey design to ensure the data collected for analysis was strictly quantitative for ease of management purposes.
3.3.3 Survey Deployment & Participant Recruitment

To begin the process of recruiting survey participants, I distributed the live Qualtrics survey using a targeted or purposive sampling, which involves intentionally selecting individuals or soliciting in professional groups who are experts or are knowledgeable in a particular area of interest. This sampling method is common in qualitative research where the goal is not to generalize to a larger population, but to develop a deeper understanding of a specific group or phenomenon (Creswell & Creswell, 2017). In this case study, the phenomena being explored were within the professional community of multisensory VR artists, therefore I chose to recruit purposefully from this specific group with respondents participating on a voluntary basis. Recruiting announcements and calls for survey participants (as shown in Appendix C) that included an active survey link were distributed on closed social media professional network groups for VR designers and professional listservs specific to the immersive arts industry.

My requests for participants were disseminated in mid-January 2021 and closed twelve weeks after initial circulation, after a second purposive sampling push across the same channels in early March 2021. The survey was then closed out when the number of respondents began to significantly slow. In total, 21 participants took part in the survey. Though those who responded to take part in this study were prompted with a verified informational consent “opt-in” release form to begin the survey, participants were not asked to share any identifying information, and the survey instrument was not set to record any identifying information in Qualtrics.6

3.3.4 Survey Data Collection

After the survey was closed to new responses, Qualtrics was also used to conduct data collection, filtering, analysis and visualization of the survey datasets as it is an institutional standard for accessible academic research. It is also adept and stable for securely collecting and

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6 This was also explained in the informed consent statement, available in Appendix E, before respondents opted to participate in and begin the survey.
recording data from survey responses and providing out visualizations as well as data filtering. Once the survey was closed to participants, data points were collected, filtered, and stored in Qualtrics under a password protected ODU-student account system in place. The raw data report from the survey is provided in Appendix F.

### 3.4 INTERVIEW DESIGN & OPERALIZATION

After survey data was collected and reviewed as an initial assessment of the survey responses, I moved on to the interview portion of my mixed methods approach. A review of the quantitative data allowed for a capture of understanding of multisensory VR artists' perspectives on their compositional decisions, methods and tactics but also provided an opportunity for refinement of my interview questions. For the purposes of this study, qualitative data were composed of interview transcripts and memo notes from recorded sessions of participants' accounts to assess their lived professional experiences, methods, and artistic decisions.

Each interview was designed to follow a semi-structured format. I asked pre-prepared questions but also left space for reflecting on and reframing questions, thus encouraging interview subjects to expand on certain topics, techniques, and definitions, or to elaborate on particular responses, descriptions or perspectives for both clarity and added exploration of their perspectives.

#### 3.4.1 Participant Selection/Screening

In an effort to promote consistency, the artists I interviewed were defined by the same criteria as the survey participant selection perimeters. While my methods of selection and screening in this study largely relied on self-reporting, the participants I interviewed each aligned with creative or applied arts fields, both traditional and digital, and all had varying expertise in interactive media and immersive technology, and/or integrated media, with a strong background in digital technology and sense integration. Each had worked professionally and/or in a research team capacity on at least two completed multisensory VR projects.
3.4.2 Interview Design

The interview format was composed of nine open questions. Each question was essentially designed to focus on allowing the artists to characterize their professional experience, methods, tactics and tools used in the production of multisensory VR design. The interview questions’ intent was to assess the participants’ interpretations and qualifying experiences 1) on methods they use in designing multisensory VR environments; 2) on shared understandings of multisensory factors they feel contribute to the process of immersion for the user; and 3) how they utilize particular tools and technologies to enact immersion in multisensory VR environments. Again, my moderated semi-structured interview format allowed me to ask pre-prepared questions but also encouraged interview subjects to expand on certain topics, techniques, and definitions, and to elaborate on their responses, descriptions or perspectives. The questions were designed as shown with particular design rationales provided here in Table 2 (see Appendix G for the full interview script).

Table 2.

<table>
<thead>
<tr>
<th>Question #</th>
<th>Interview Question</th>
<th>Design Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1.</td>
<td>How would you define or describe multisensory VR?</td>
<td>Provides a grounded understanding of the artist’s own definition descriptions, individually and then collectively in analysis, on what multisensory VR is, what composes it, what it entails, and what is necessitated by it that sets it apart from typical VR.</td>
</tr>
<tr>
<td>Q2.</td>
<td>Can you describe your experiences designing multisensory VR environments?</td>
<td>Allows artists each speak more to their design experiences, potentially touching on or reflecting on their own focus areas and previous professional background, experiences working embedded within teams, and of particular examples of projects they have worked on. The first two initial questions tapped into epistemological dimensions on the part of the artist - what do they know and how do they know it.</td>
</tr>
</tbody>
</table>
Table 2. Continued

*Interview Instrument: Questions and Design Rationale*

<table>
<thead>
<tr>
<th>Question #</th>
<th>Interview Question</th>
<th>Design Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3.</td>
<td>What technologies do you most frequently employ when composing a multisensory VR environment?</td>
<td>Addresses technological dimensions, asking the artists to reflect on the technologies they most frequently employ when composing a multisensory VR environment.</td>
</tr>
<tr>
<td>Q4.</td>
<td>In your experience, what methods or tactics do you find most beneficial to include to create a sense of immersion in a VR environment, sensory or otherwise?</td>
<td>Addresses on sensory methods and tactics towards immersion; to help me explore themes of value around what the artists individually prioritized as important methods and tactics in their composition processes; <em>informed by aesthetic and social media dimensions</em>.</td>
</tr>
<tr>
<td>Q5.</td>
<td>Are there any particular design decisions about sensory or aesthetic aspects that you find you primarily factor into the construction, testing, and user experience (UX) of multisensory VR compositions?</td>
<td>Prompts the artist to consider their perspectives on the relationship between the construction, testing, and user experience of multisensory VR compositions to further explore the design decisions that specifically involved sensory or aesthetic aspects as factors; <em>informed by aesthetic and social media dimensions</em>.</td>
</tr>
<tr>
<td>Q6.</td>
<td>How do you digitally and physically construct the environment to make suggestions for use or to enable the user?</td>
<td>Explores more of how, but also why, the artists digitally and physically construct environments to make suggestions for use or to enable the user; <em>crafted to build on conversation related to subjective and archival dimensions that may be involved</em>.</td>
</tr>
<tr>
<td>Q7.</td>
<td>With various design considerations in mind, how do you prioritize based on the needs of individual projects and the resources of your customers or users?</td>
<td>Addresses how the artist prioritized various design methods based on the needs of individual projects combined with considerations of the users, customers, and available resources. <em>This question was an extension from the survey responses received on artists’ priorities across development phases, but also informed factors of mediology’s economic dimension</em>.</td>
</tr>
<tr>
<td>Q8.</td>
<td>Can you talk a bit about an artistic decision or design method that was unsuccessful in a VR build, and how it was (or may have been) corrected in the design process?</td>
<td>Evaluates the role that failure plays in the composition process, providing a moment for the participant to reflect on failure as a critical factor of user experience, exploring aspects of human-led design that influences methods and decisions; <em>informed by HCI and design thinking</em>.</td>
</tr>
</tbody>
</table>
Table 2. Continued

*Interview Instrument: Questions and Design Rationale*

<table>
<thead>
<tr>
<th>Question #</th>
<th>Interview Question</th>
<th>Design Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q9</td>
<td>Are there any additional points about your methods or experience as an artist you find important to multisensory VR design that we didn't discuss?</td>
<td>Allows each artist an opportunity to reflect back on our conversations and bring up any additional points about their methods or experience as a multisensory VR artist they wished to speak to. <em>In my experience as a researcher, including this final question brings to the fore the factors or perspectives the participant finds most important and, therefore, is useful as a guide to thematic coding and categorization in later analysis stages.</em></td>
</tr>
</tbody>
</table>

3.4.3 Participant Recruitment

After this study’s survey instrument was closed, I contacted participants who volunteered for follow-up interviews via their preferred email addresses to gauge interest and schedule interviews. The first five artists to respond and then also confirm dates and times for interviews were selected. I purposefully kept the number of participants to a maximum of five for this portion of my research as this is a manageable sample set given the length of the interviews performed and the amount of transcript data I projected for collection, management, and analysis. Due to the highly situated professional constraints of the participant pool, saturation of the qualitative sample size was reached rather quickly (Charmaz, 2006).

These five artists were then provided consent forms, detailed in Appendix H, to sign and return. I also asked each artist about accessibility needs they could voluntarily disclose as well as their comfort with or preference for either phone or virtual/video interview sessions. Once those confirmation responses were received, I sent each artist a Zoom link to access the virtual interview on their selected date and time. It should be noted that correspondence was used strictly for scheduling interview times and for sending and receiving consent forms prior to interviews.
Though the interview subjects did share identifying information for correspondence purposes, their names are anonymized within the interview transcripts produced and analyzed, within the data collected, and in the text of this study; they are reflected herein as Participant 1, Participant 2, Participant 3, Participant 4, Participant 5, ordered based on the timeline of who was interviewed first to last. At the time of performing the interviews, I had little-to-no knowledge about their individual experiences, education levels, or their particular area(s) of focus in multisensory VR design.7

3.4.4 Deployment Process

Interviews for this study were conducted from mid-March to April of 2021. Each participant preferred they be conducted via video conference calls on Zoom, which were each recorded with the express permission of the participant. Zoom was used for video interviews, as it was each participants’ preference in terms of the application to which they had best online access. Consent forms signed by each interview participant were also received, reviewed, and stored on a password-protected server prior to each interview commencing.

One affordance of using Zoom was the additional accessibility measures it allowed to be taken during each interview session. I provided the questions, both scripted and open-ended, as they were asked both verbally and in the video conference software’s chat function. Across five interviews, the time duration ranged between 60-90 minutes long. In each session, I opened by thanking them for their time and valuable contribution to my study, then stated the following:

1. the purpose of my research,
2. what the results of the research could help to inform,
3. how the content resulting from the interview may be used in the future,

7 As I’ve pointed out prior, this study was in no way designed to factor in or examine traditional demographics as they were inconsequential to this work’s research questions, but I can disclose that the five participants I interviewed were diversely balanced across wide ranges of age, regional/ethnic categories, and gender (conforming and non-binary).
4. assurances of their anonymity in final reporting,

5. a reminder of the voluntary nature of their participation wherein they could withdrawal their participation at any time,

6. the expected duration of the interview and the format,

7. affirmation that they may ask me questions at any time as they find necessary, and

8. how accessibility and accommodation measures would be implementing during the interview session.

Thereafter, each of the interview sessions with the artists followed the question protocol as designed with open follow-on questions extending from several of their responses, as reflected in the transcripts detailed in full for all five session in Appendix I. As each session progressed to conclusion, I also took copious memo notes on pre-prepared digital document forms for each participant’s interview (see memo sample in Appendix J), recording points of interest, connecting concepts, and conversational topics that needed clarity or required additional questions.

3.4.5 Interview Data Collection

After each interview session concluded, I rendered and downloaded the recorded video session with appropriate labeling of “Participant#_date” and then saved each to a password secured ODU student Google server. As the interviews were each conducted virtually, geographic location of participants was not a prohibitive factor to data collection. The process began by transcribing directly from the recorded interviews using the application Otter.io. I then went through each video recorded session to proof and manually edit the resulting transcriptions for accuracy and matching capture. While efficient and typically accurate, Otter.ai is not open-source software and does not always provide a precise capture of speakers or words and phrases, I found this to be a necessary task of quality control in the data recording and collection process. In addition, I anonymized the individual participant names using my aforementioned convention (see section 3.4.3) within the interview transcripts produced, the memo notes generated, and within naming conventions of
storage folders created for each participant’s data to be stored on my password-secured ODU student server. Each folder contained the participant’s signed consent form, session video, interview transcript, and corresponding memo notes form from their interview session. Backup copies were then made of each of these data folders and saved on a secure external hard drive to avoid data loss.

3.5 DATA CODING & ANALYSIS

The survey was closed to responses. The interview sessions had been completed. Survey responses, memos notes, interview transcripts, and session videos had been organized and stored in digital folders. It was then time to visit the data with fresh eyes to begin the process of coding, analyzing, and interpreting the trove of data I had collected. Though unplanned, this also became a time for (re)conceptualizing the processes I was about to undertake, which felt like distancing myself and being singularly ensconced in it at once. I began at the outset of this study’s original conception with the intention of my analytical methods being systematic and empirically rigorous. Yet upon initial review of what I had gathered from participants, it became apparent that, instead, the work ahead of me called for a more complex but nuanced process of iterative discovery and contemplative connections (Saldaña, 2016). My primary goal throughout this process, as a researcher, was to remain immersed in the artists’ narratives of practice while also keeping my own professional biases as both a researcher and a practitioner in check throughout. Secondly, my goal was to construct both methodologies and methods around my objects of study and data sources rather than applying prescriptives or assumptions to them (Sullivan and Porter, 1997, p. 46).

Additionally, in performing this work, a main goal was to provide the artist-as-rhetor the opportunity to speak—to outline and describe how they utilize contextualized communicative tools while taking aspects of the media used, uses, and users into consideration. I returned to reflect on how I value my identity as a learner and an ethical researcher as applied to this study’s data
collected from the survey and interviews. I viewed the act of coding for instances, sets, and themes of analysis to be a task of rhetorical invention in categorization throughout the process of my investigation. Intentional openness allowed the participants’ lived experiences and communicated perspectives to guide the methods I undertook in advancing results, answers, arguments, and ultimately, a story from data. The process of coding and analysis evolved over three phases—from dipping toes into discovery and evaluations becoming initial tagged groups, then diving deeper toward an evolution of themes, and finally, extending theme categories more broadly back to the surface as informing concepts. I recount that process in this section.

3.5.1 Phase 1: Coding Tagged Groups

I began the initial process of data coding in Phase 1 by reviewing my data sources to ensure data accuracy and to confirm that they had all been consolidated in usable formats. Then, I performed a preliminary review and evaluation across the collected survey data, memoing in a Google document as I re-read and reviewed to inform initial data source tagging. This familiarization step was necessary to immerse myself in the data, where reading and re-reading led me to locate initial ideas and significant correlations from the participants. For example, after reviewing the survey report and making notes on the participants’ response sets, I utilized Qualtrics to filter for possible correlations between artists’ reported experience and training levels and their prioritization of multisensory VR compositional aspects. I also filtered for factors they considered important as well as for possible correlations between process stages and reported priorities of importance. This allowed me to capture an early idea of 1) how their training and experience levels impacted those considerations, and 2) how their priorities and considerations changed across various stages of multisensory VR development. I made notations on the survey results based on context, how they addressed my questions, and how the reporting spoke to key concepts related to methods, tactics, factors of composition, and importance for production.
Next, I revisited the interview transcripts. I copied each full transcript into a separate google document and then integrating my memo notes corresponding to each question I asked the participants during interviews into comments fields for review and later cross-checking. These transcripts were then imported into DeDoose where I began reviewing content in each one to set up for tagging response samples to aid later thematic analysis. After initial data review and familiarization with the content, taking notes and annotating as I went through, I began ideating the coding process again around context, how they addressed my questions, and how the reporting spoke to key concepts related to methods, tactics, factors of composition, and importance for production. I then compiled keywords from each interview by frequency of use and cross-compared each to identify key terms relevant to the artists’ design composition process.

At this stage, I also produced word cloud visualizations (available in Appendix K) to gather an idea of emergent and intersecting topics common to the interview subjects, giving me a broader view of areas that might apply to my theoretical approaches and discovery of any outlying topics or themes. Finally, I tagged sentences and paragraphs in transcript responses in DeDoose to get a sense of what issues are most at play, labeling parts of data with assignments for later organization. The goal in this step was to allow the data to guide the thematic analysis process as much as possible in capturing key themes and relationships before advancing into the next phase. This initial process of data preparation, data source tagging, and validation ensured that the dataset was thoroughly examined and accurately represented in a format ready for deeper analysis. The output from this phase provided a solid foundation for the subsequent steps of grouping the data into themes and categorizing those themes into concepts.

**3.5.2 Phase 2: Coded Groups Become Themes**

After familiarization, initial analysis, and coding, I took the transcripts’ codes and grouped them according to similarities and outliers found and referred to Turnley’s mediology framework as a topic model. At the beginning of Phase 2 in my analysis process, I built out from Phase 1’s
descriptive and explanatory assertions. This not only provided me a more nuanced and thorough understandings of the artists’ compositional processes but also shed light on specific tactics, considerations, and decisions employed by multisensory VR artists. The intention of this next phase was to, first, look back through and see which broad initial codes came up over and over again in excerpts to find trends and patterns, and then, to start creating relationships between the open base coding I performed in Phase 1 to fashion axial codes into related descriptor sets.

I began by reviewing my initial coded tags in DeDoose and organizing each tagged excerpt from the interview transcripts. Reviewing the initial tagging was important to the iterative process of revisiting the data and refining the tags, ensuring that they were representative of the data and no crucial information was lost or misrepresented. Next, I collated previous codes by grouping similar coded data sets together into thematic groups, generating deeper interpretive concepts and sub-themes from broader themes. The goal of reviewing, grouping, and refining was to ensure that the original themes as tagged accurately reflected the data to avoid explicit bias and were well supported by the data to avoid any inconsistencies or themes taken out of context in the transcripts early on in my analysis. For example, I was able to identify specific patterns in the coded tags to group into relational code categories of 1) segments that related to my original research questions, and 2) those that represented how the dimensions of mediology in the decisions and tactics as expressed by the artists being studied. I then identified and tagged specific assertions and segments about the practices, design choices, and tactics used by the artists as related to the dimensions. Some data sources had multiple thematic codes, which demonstrated a plurality of meaning (Charmaz, 2006; Saldaña, 2016) that validated initial tagging of the data sources by this review of the assigned tags and reaffirmed the non-fixed nature of each dimension being put to use.

At this point in the process of Phase 2 analysis, I started grouping the transcripts’ code categories into broad themes (parent topics), each with their own correlated sub-themes (relational child), based on Phase 1 applied coded tags for initial concepts I found present. First,
thematic groupings from each transcript were sorted using a color-coded visualization in DeDoose for themes to code participants' subjective interpretation of their experiences, methods and tools used, and design practices to locate correlations to each dimension of mediology. I also grouped quotes and excerpts where participants referenced definitions, use of the dimensions of mediological methods, or persuasive aspects that align with their approaches to media composition for later evaluation and correlation.8

After naming the general themes and specific sub-themes initially generated through Turnley's seven dimensions, I moved from a generative evaluation process to adapting an explanatory schema around my themes. In addition, I found it necessary in this process to map on "traces" or facets that were outside of the original dimensions' scopes but acted as potential extensions according to the contextualized data as grouped. This re-approach to each of the data sets from Phase I—grouping instances of data together and using pattern coding to label groups as detailed in Figure 2—allowed for a variety of possible themes to contribute to the rigor of the triangulation process while also ensuring that the participants' perspectives were accurately captured and contextualized (Creswell, 2013). Finally, the new coded data from the transcripts was cross-checked with the original data to ensure that the thematic codes accurately represented the data (Saldaña, 2016).

8 As a visual learner with typical vision, I found using color-coding to be particularly helpful to me in knowledge-making and organizing groupings of concepts and areas of artists' focus, yet I do acknowledge that this particular method as applied in Phase 2 would require modification for an analyst with vision limitations, executive functioning, or processing neurodiversity in order to replicate this study's results.
3.5.3 Phase 3: Themes Categorized into Concepts

Once a thematic structure began to emerge from Phase 2 analysis, I carefully reviewed the descriptor sets from the survey results in Qualtrics and interviews transcripts I had created in DeDoose, as well as the key themes, trends and patterns in the data I had identified. The express goal of this step was to ensure that the groupings of certain thematic pairings that emerged as a guide not only generated accurate relationships among thematic variables but could potentially provide a view toward complete assertions from the data to answer my research questions (Miles et al., 2014). At this point, the process of thematic analysis began to grow complex. I saw that the analyzed aggregate data collected, visualized, and grouped for emerging thematic patterns had grown quite robust and beyond what my original framework could have foreseen. Phase 3 became a process of not only relating themes to explanatory concepts but also a process of decision-making.
about what themes would not only address my research questions but were also possible to capture and most important to report out within the tight scope of this dissertation. It was clear that decisions had to be made in terms of scope that could and should be covered in a dissertation-length document to decide on focus areas and what could inform future research. In particular, there were what I call *beautiful outliers*—expansions on or challenges to a paradigm or framework that are unexpected but also applicable and, in fact, benefit the growth of theories and practice (Kuhn, 4th edition, 2012). These outliers challenged and ultimately enhanced my understanding by pushing the boundaries, both in theory and practice, and were a solid thematic trend amongst the artists interviewed referencing accessibility and co-constructive inclusion in relation to each dimension of Turnley’s framework.

In order to develop both descriptive and explanatory assertions from the themes I identified, I first turned my attention to reviewing for correlations or deviations between my survey response notes and thematic groupings from transcript excerpts. I cross-compared, contrasted, and triangulated the qualitative themes and sub-themes with the survey response data sets and notations. Then, as an additional measure towards developing explanatory assertions from my identified themes, I manually resorted my qualitative data to better triangulate my themes taking shape and identify any additional emerging or unanticipated themes. This step assisted me with formulating a clearer explanatory schema and enhance the validity of my results as a recommended step by Foss & Waters (2016, pp. 248-251), performed to challenge any assumptions evident in my first two phases of coding. To do this, I downloaded and compiled my categorized quotes as evidence from Dedoose into a Google document and printed this document out. I then manually cut out each quote sample line and/or paragraph. Next, I labeled envelopes for each dimension of mediology and set aside an additional unlabeled envelope. I went through re-reading each extracted transcript statement, evaluating by codes and placing them each in the labeled “dimension” envelope to which they most directly or closely corresponded. Outliers were placed in
the unlabeled envelope for re-evaluation later. This reframing (dismantling and reassembly) pushed me to re-address my original thematic assumptions and consider new relationships “beyond the obvious” (p. 255).

After the manual review process was complete, I re-sorted and labeled my evidence quote excerpts in the Google documents according to what material labeled envelopes they were in and further sorted these thematic hierarchies into sub-themes beneath each (a sample is available in Appendix L). Importantly, I performed thematic evaluation on excerpts in the blank envelope and found they fit under a new cross-cutting category of Access and Inclusion that were contextually and thematically relational to each of the other dimensional themes. Once this step was completed, I wanted to view the parts in relation to the whole—my two research questions. Many of the newly categorized labels reaffirmed my original thematic coding and sub-themes, yet newer relationships—not only between sub-themes but also the dimensions in correlation to each other from participants’ subjective interpretation of their experiences, methods and tools used, and design practices—progressed my decision-making about the concepts that would become my explanatory schema, detailed in Figure 3, and assertions to focus on in this dissertation’s interpretations and discussions.
The thematic exploratory schema that emerged demonstrated 1) the close relationships between the Technological and Economic dimensions; the Archival, Aesthetic, and Epistemological dimensions; and Subjective and Social dimensions in the artists’ responses, and 2) were tightly reworked through decision-making on my part to focus on the most frequent and commonly referenced concepts in the artists’ responses, then 3) brought into closer conversation as research insights to directly inform my two research questions.

3.6 CONCLUSIONS

To investigate the emergent conventions of new digital genres, this study’s mixed methods approach and processes of thematic analysis “focus on digital composition and rhetorical expression in digital spaces,” as Boyle (2016) suggests, as spaces of networked events by interpreting shared understandings of the designers and their processes or methods. The
integration of Turnley’s mediological dimensions framework and ANT to guide coding categories and themes allowed me to better understand and more closely define the complex relational interactions between artists, media, and users from the artists’ perspectives. It was critical to use these systematic approaches to assess designers’ perspectives on their practices and considerations of composing multisensory VR environments. My methods of data collection and analysis, once aggregated and interpreted, generated results that I detail in the next chapter as evidence for later discussions, conclusions and recommendations in this dissertation.
CHAPTER 4

RESULTS

Taking an opportunity for a brief review, this dissertation contributes to and expands on the existing body of knowledge about multisensory VR compositional processes by exploring immersive design. Importantly, it does this from artists’ perspectives on the design processes of multisensory digital technologies through theoretical dimensions of mediology and actor network theory. The first three chapters of this dissertation provided a comprehensive overview of 1) the research gaps and questions that this study addresses, 2) a detailed literature review of relevant scholarly works, and 3) a thorough explanation of the theoretical approach and study design, including the data collection process. Chapter 1 introduced the purpose of this study as well as its theoretical grounding, and outlined my major research questions, providing a relevant description of the research problem highlighted by the significant gaps in the literature on the topic and provided an overview of the study’s theoretical grounding and research design. Chapter 2 presented a review of scholarship on immersive technologies and explored more deeply the gaps in disciplinary research that this dissertation’s approach and conclusions seek to fill. By thematically presenting concepts and theories related to the research questions and object of study, I also emphasized the potential importance of rhetorical and media dimensions to understanding multisensory VR compositional practices.

Chapter 3 of this dissertation provided a detailed explanation of the theoretical framework and research design adopted for my study. First, I addressed the methodological assemblage by highlighting the unique utility of combining ANT with mediology’s thematic dimensions in analyzing artists’ methods, experiences, and processes. I then outlined my mixed methods research approach to design, data collection instruments, strategies for my interview and survey question composition processes, participant selection, data collection, assessment methods, and a description of the phased thematic analysis process.
The remaining chapters of this dissertation focus on the analysis, interpretation, and significance from the collected data in my study of multisensory VR artists. This chapter presents the results and analysis of the data collected, using statistical reporting from the survey results and presenting qualitative interview transcript excerpts and results from initial analysis. Then, Chapter 5 explores the themes that emerged from data analysis, providing key insights into my research questions and expansions on theoretical frameworks used. In conclusion, Chapter 6 and 7 discuss the implications and recommendations arising from this study’s findings, as well as directions for future research in the field.

4.1 SURVEY RESULTS & ANALYSIS

For the purposes of this section, I focus on the responses to the survey questionnaire that study participants completed. Reviewing this statistical data provided me the opportunity to examine variables for differences and analyze them for corollary relationships. Again, the questionnaire had a total of 19 questions, each created to address the decisions, methods, and priorities of multisensory VR artists during different phases of project development. Participants were asked to characterize their experiences by rating factors in terms of lowest to highest priority or importance, by marking an appropriate number on the 7-point scale, in accordance with the question content and descriptive labels. In this section, I cover the results organized by question topics.

**Artists’ Education and Experience.** Participants were asked to describe their highest level of education and/or training (Q1). The responses, shown in Figure 4, revealed that 44% of participants held a Master’s degree, 33% completed a Bachelor’s degree, 11% earned doctorate or terminal degrees, and 11% had professional certifications.
In regard to experience in composing VR environments, either individually or as part of a team (Q2), 57% of respondents had been involved in the creation of over 10 VR environments. As seen here in Figure 5, 14% reported having worked on 5-7 VR environments, another 14% on 2-5 environments, and the remaining 14% on only 1-2 environments.
This data suggests that within this professional community, a higher degree level of education is common. Notably, artists who held at least a Bachelor’s degree also reported having contributed to more than five VR environment compositions. This correlation between educational attainment and hands-on experience underscores the validity of the survey’s results regarding development priorities and decision-making. The insights provided by these experienced practitioners lend substantial reliability to the practical field knowledge reported in this study.

**Priorities in the Concept Development Phase.** Participants were then asked to rank various factors in terms of their priority during the initial concept and development stages of VR composition (Q3). More than half of them (55%) said that the budget, or how much money they can spend, is the most important thing they think about. Close behind that, 40% said that the main goal or reason for creating the project is their next biggest concern. Storytelling was also high on the list,
with 63% saying it’s a high priority. The style or look of the project and the tools they can use to make it were also important to 72% and 36% of people, respectively. Interestingly, considering the audience—or who will be experiencing the VR—was a lower priority for half of the participants. Even more, 70% said that any specific media requirements, like certain technical specifications, were their least important concern. What stood out was that the main goal of the VR project didn’t seem to matter much early on for many artists. In fact, 60% of people said it was one of their least important concerns at the beginning stages.

**Priorities in the Prototype Phase.** Participants were then prompted to rate what’s important to them when they’re at the stage of making a prototype, or a preliminary model of a multisensory VR project (Q4). Every participant (100%) said that getting their audience involved and engaged was the most important thing at this stage. More than half of the participants (63%) told us that how the user experiences and interacts with the VR was their next biggest concern. Naturalness of controls, or how intuitive and easy-to-use the controls feel, was a high priority for just over half of the people (51%). Having a high level of sensory realism or fidelity was also key for a significant majority, with 75% rating it a high to medium priority. Interestingly, during the prototype phase, the quality of the graphics wasn’t as important. Over half of the participants (63%) considered it a lower priority. The same proportion also felt that the aesthetic quality, or how visually pleasing their VR project is, was their least important concern at this stage.

**Importance of Components.** In the next survey questions, when asked to rate the importance of technical components to composing a multisensory VR environment (Q5; see Figure 6), a wide majority (86%) reported that the technical parts - the software and hardware they use - are very to extremely important. I then asked about the importance of the physical materials they might use (Q6; see Figure 6). While fewer participants (29%) thought these were extremely important, a good number (72%) still said they were very to extremely important. Interestingly, 14% didn’t think these material components were important at all. I then asked about the
importance of aesthetics - or how the VR environment looks and feels (Q7). While less than a third (29%) said they were extremely important, a larger group (71%) still thought aesthetics were moderately to very important. While not every artist thinks aesthetics are crucial, most of them believe they still play a significant role.

Q5 - How important are technical components to composing a multisensory VR environment? Q6 - How important are material components to composing a multisensory VR environment?

![Data visualizations of results from Survey Q5 and Q6.](image)

**Figure 6.** Data visualizations of results from Survey Q5 and Q6.

**Considering User Expectations, Assumptions, and Consistency.** I then asked artists how important it is to think about what users expect and assume when they’re creating a multisensory VR environment (Q8). The majority (71%) said it is very to extremely important. Yet about a quarter of them (28%) felt that these expectations and assumptions are only slightly to moderately important. Next, I asked the artists about the importance of making the VR environment feel like the real world (Q9). Less than half (43%) thought it was extremely important to match the senses to real-world experiences. However, the majority of artists (56%) reported that ensuring this kind of sensory consistency in the VR environment is only slightly to moderately important.

**Decisions About What to Include and Consider.** In questions 10-14 of the survey, participants were provided statements to which they were prompted to respond with their level of
agreement with each statement. As previously noted in Chapter 3, these statements center around the artists’ decision making for the importance of inclusions and considerations in multisensory VR environments. First, I asked how much they agreed with the idea that it’s important to use aesthetic elements to trigger users’ emotions in the environment composition (Q10; see Figure 7). The majority (60%) strongly agreed that these elements are crucial, while the rest (40%) somewhat agreed. Interestingly, none of them were neutral or disagreed. Next, I asked participants to rate their agreement with the statement, “It’s important to consider persuasive design techniques when creating a multisensory VR environment” (Q11; see Figure 7). Their opinions were more varied on this point. While a majority (60%) somewhat agreed, only 20% strongly agreed that these techniques are important. The remaining 20% didn’t feel strongly either way, neither agreeing nor disagreeing on the importance of such considerations.

<table>
<thead>
<tr>
<th>Q10</th>
<th>Q11</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important to include aesthetic elements that trigger users’ emotions in a multisensory VR environment.</td>
<td>It is important to consider persuasive design techniques when composing a multisensory VR environment.</td>
</tr>
</tbody>
</table>

![Figure 7. Response data visualizations for Survey Q10 and Q11.](image)

9 It is important here to note that I did not provide any context or qualifying examples of persuasive techniques in this survey statement. In future studies extending from this work, qualifiers would be included.
The Role of Narrative, Wonder, and Technical Quality. I also asked artists about the importance of creating a vivid, unfolding story in the VR environment (Q12). Most of them (80%) either strongly or somewhat agreed that it’s important to make decisions around the narrative design. However, a fifth of them (20%) somewhat disagreed. Nobody sat on the fence or strongly disagreed with this. Next, I asked about the statement, “It’s important to create a sense of wonder for the user in a multisensory VR environment” (Q13). The responses were mixed: while most (60%) only somewhat agreed, a fifth (20%) strongly agreed. The remaining 20% didn’t feel strongly either way, neither agreeing nor disagreeing. Finally, I asked artists to rate their agreement with the statement, “The quality of the technical and sensory tools is important when creating a multisensory VR environment” (Q14). Most (80%) strongly or somewhat agreed, while 20% felt neutral about the role of these tools in the creative process.

Key Considerations in the Composition Process. I asked artists about various considerations they make during the composition process and how these relate to the PEII model (see Appendix A). When asked about the importance of including sensory qualities in a VR environment to encourage user exploration (Q15), a vast majority (80%) of artists reported that this consideration is very to extremely important, while the remaining 20% saw it as moderately important. Then, I asked about the importance of the VR environment fostering a sense of presence or the feeling of “being there” for the user (Q16). Most artists (60%) reported this was extremely important, with 20% considering it very important and the remaining 20% seeing it as moderately important.

I also asked artists how critical it is for the sensory elements of the environment to keep the user engaged (Q17). Most (60%) felt that this is very important, but only 40% deemed it of extreme importance. Next, I prompted participants to rate the significance of artistic designs that convey a narrative for the user (Q18; see Figure 8). A majority (60%) found this extremely important. However, while 20% considered it very important, surprisingly, another 20% found it not
important at all. Finally, when responding about the importance of including items, whether material or virtual, that the user can interact with in the environment (Q19; see Figure 8), a majority (60%) found this extremely important, while the rest (40%) considered it very to moderately important.

<table>
<thead>
<tr>
<th>Q18 - In terms of your composition process, how important is it that your artistic designs convey a narrative for the user?</th>
<th>Q19 - In terms of your composition process, how important is it that you include items (material and/or virtual) that the user can interact with in the environment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Data visualization image]</td>
<td>[Data visualization image]</td>
</tr>
</tbody>
</table>

Figure 8. Data visualizations for results from Survey Q18 and Q19.

4.1.1 Analysis of Survey Results

Upon deeper analysis, the responses to the survey instrument revealed several critical aspects of the participants’ perspectives on their decisions and priorities about media dimensions during different phases of development. My analysis of these responses also offered interesting insights into their embedded considerations throughout the multisensory VR environment composition process. As led by the survey data results, the following thematic insights were drawn:

1. **Experience and Proficiency:** The majority of the surveyed artists have significant experience in composing VR environments, indicating high digital literacy and proficiency with the technology. Most artists involved in the survey have substantial experience with VR
environment composition, indicating strong technological proficiency and digital literacy. This background allows them to understand the practical aspects of creating multisensory VR experiences.

2. **Prioritization of Practical Aspects**: During initial stages of VR composition, practical considerations such as budget, project purpose, aesthetic style, and tool availability are prioritized over user-centric aspects like audience needs and media requirements. This suggests that in the early stages of creation, logistical aspects drive decision-making.

3. **User Engagement Becomes Key in Later Stages**: In the prototype phase, there is an evident shift in priorities with user engagement and experience gaining more importance. This signifies the value artists place on creating an engaging and immersive experience in VR environments. As projects progress to the prototype phase, user engagement and experience become key priorities. This shift underscores the critical role of the audience in the successful creation of VR environments.

4. **Technical Components and Sensory Tools Are Paramount**: When asked about the importance of various components to the VR environment, technical components are seen as the most crucial, suggesting artists highly value understanding the tools they’re using. They also view the quality of sensory tools as crucial, suggesting a recognition of the role these tools play in effective VR composition.

5. **Discrepancy in User Experience vs. Real-world Consistency**: There is a discrepancy in the importance placed on user expectations and assumptions versus consistency with real-world sense experiences. Artists appear to prioritize user experience over exact realism. This could imply a higher priority given to crafting an engaging user experience over replicating realism.

6. **Mixed Opinions on Persuasive Design Techniques**: Artists expressed mixed feelings about the role of persuasive design techniques, possibly pointing to a need for clearer understanding
or differing opinions on its role in VR design. There seems to be less agreement among artists about the importance of persuasive design techniques that could indicate a need for more education or understanding in this area.

7. **Significance of Sensory Qualities and User Interaction:** Artists view the inclusion of sensory qualities as very important for promoting user exploration, reflecting the importance of sensory integration in VR design. Artists also prioritize including interactive elements and naturalness of controls, emphasizing the importance of user interaction. This demonstrates that sensory integration and user interactivity are key principles in VR design.

8. **Importance of Narrative:** A significant majority of artists see a vivid unfolding narrative as a crucial component of multisensory VR environments. This implies that storytelling plays a significant role in their creation process. Closely tied to narrative, while creating a sense of wonder is important to many artists, the degree of agreement is less than for narrative aspects. This suggests that generating “wonder” for users is valued but might not be seen as essential or functional in every VR creation.

9. **Division Over Aesthetic Narratives and User Involvement:** There appears to be a division among artists on the importance of aesthetic narratives and user involvement, indicating these areas might need further exploration and discussion. There were artists who were neutral or disagreed with the importance of these aspects. This highlights that while trends can be identified, the approach to creating multisensory VR environments can vary significantly between artists, demonstrating a diversity of perspectives in the field.

Broadly, my survey analysis suggested that artists involved in VR environment composition prioritize technical knowledge, user engagement, sensory integration, and interactivity. However, there may be less agreement or understanding in areas like persuasive design techniques and the importance of aesthetic narratives. More applicable qualifying definitions, education or discussion
could be beneficial for artists in these areas. My analysis also demonstrated a consensus towards
the significance of narrative and high-quality tools in multisensory VR creation, with a strong
emphasis on user engagement and sensory integration. However, there was a wider range of
opinions on the importance of creating a sense of wonder, employing persuasive techniques, and
the role of aesthetic narratives. This may reflect different creative philosophies, goals, or styles
within the field or with particular project requirements. From analysis of these results, I also
found it important to consider how concepts of technical proficiencies and digital literacies in this
specific professional community of practice align with rhetorical literacies. Interpreting these
differences as potential reflections of varying creative philosophies or approaches within the VR
design field, this consideration called for more direct inclusion in my subsequent interview
instrument design.

4.1.2 Survey Conclusions

Survey responses revealed the fascinating dynamics in the approaches of artists towards
multisensory VR composition across different stages of the development cycle. In the inception
stages—the concept and development phase—artists prioritized tools, media requirements, budget
considerations, and project purpose. Technological elements and processes unique to multisensory
VR eclipsed rhetorical facets such as narrative, aesthetic style, and audience, thus shedding light on
artists’ digital literacy and proficiency. The paramount importance of understanding the
affordances and constraints of tools and media underscore the significance of these early-stage
priorities.

As artists transitioned to the prototype and testing phase, their focus shifted from
technological considerations to more audience-oriented ones. Audience engagement and user

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10 The survey design did not provide any descriptive qualifying information or specific context of a particular
multisensory VR environment or type for users. Further research would be needed to better understand and
address the reasons for this wide range in responses to these topics.
experience ascended to the highest priority, indicating a shift towards rhetorical aspects of the media used. Elements like naturalness of controls and graphic fidelity, which straddle the intersections between technology and human-computer interaction (HCI), became critical during system testing and subsequent technical revisions. At this juncture, the user assumes the role of the expert guiding further iterations, effectively shifting the mantle of digital literacy to the end-user. This aligns with current scholarship emphasizing iterative user experience testing with varied user types, who may not share the same digital proficiency as the professional community.

Interestingly, the importance assigned to technical components was fluid, changing based on the development phase of the multisensory VR environment. This fluidity is indicative of the complex and iterative interplay between technology, user expectations, and project development stages.

When probed on the role of persuasive design techniques in multisensory VR composition, a majority of participants (60%) considered these only somewhat important. Despite this seeming ambivalence, subsequent artist interviews confirmed a profound understanding of how media composition’s technological dimensions co-construct rhetorical literacies for users. Overwhelmingly, artists responding to the survey recognized the critical role of technical or mechanical quality in sensory tools for successful multisensory VR creation. This implies the tools’ affordances as well as their procedural and functional processes are vital components of the production process. The effective arrangement of sensory components also directly contributes to the much-valued sense of presence within the VR environment. This sense of presence, a crucial facet of immersive VR experiences, also begins with the technology and digital literacy of the artists and developers employing these tools. The survey data also hint at possible limitations in artists’ understanding of persuasive design’s role in multisensory VR creation or, alternatively, a different viewpoint on its importance.
The qualitative data from artist interviews I detail in the next section further elucidated perspectives on persuasive design decisions and methodologies. This rich experiential data complemented the survey responses, offering more detailed insights into the distinct dimensions of multisensory VR creation. By synthesizing these diverse sources of information, a more nuanced understanding of the survey results was achieved, setting the stage for more robust assertions to respond to this dissertation’s research questions.

4.2 INTERVIEW RESULTS

Shifting the focus from quantitative to qualitative, this section reflects my mixed methods approach, bridging numerical insights with the contextual value that comes from direct narratives. The goal of the interviews I performed was to record and analyze the methods, tools, and design decisions of artists engaged in multisensory VR design—an area that has often been eclipsed by a focus on VR systems and their users. By gathering firsthand accounts from the artists themselves, I’ve sought to uncover recurring themes within their professional experiences and shed light on the unique construction processes, decisions, and procedures intrinsic to multisensory VR design composition. In this section, I present the results and Phase II qualitative analysis of these interviews. I have distilled categories of meaning and initial themes from the wealth of content gathered, providing a structured, yet nuanced exploration of artists’ experiences.

Revisiting my primary research questions—which probe into how multisensory VR artists engage with the dimensions of the media in their design practices and decisions—the information extracted from these interviews also provided a direct window into the considerations and processes that underscore multisensory VR construction. The results and analysis of the qualitative data, as initially coded and categorized, stem from a careful examination of interview transcripts and memo notes. This data was generously shared by the five multisensory VR artists who volunteered their time and expertise for this study. These artists occupy complex and unique professional roles that necessitate equally complex approaches to understanding their work. To
further enhance the rigor and depth of this study, these interviews serve as a crucial evidential pillar—both complementing and conversing with the survey results reported in the previous section. Through this blending of quantitative and qualitative insights, a fuller and more nuanced understanding of multisensory VR compositional artistry emerged.

4.2.1 Understanding the Participants

The interview participants each had different levels of expertise and areas of focus in multisensory VR art, as Table 3 demonstrates. Their responses reflected their own situated perspectives in their professional practice throughout the interview conversations, and, within the scope of this study, the five participants interviewed each expressed specific focus areas where they felt most literate and proficient.\textsuperscript{11} For Participant 1, taking traditional 3D materials into a multisensory space to play with scale is their proficiency, while Participant 2’s area of artistic literacy was mimicking tasks and environments with fine aesthetic detail and balanced fidelity. Participant 3 felt most comfortable designing towards emotional experiential affordances, and Participant 4 focused on user/object engagement and experience. Participant 5 primarily engages in creative media works that center embodiment, proprioception, and sense-of-self in the virtual space.

<table>
<thead>
<tr>
<th>Participant #</th>
<th>Level of Expertise</th>
<th>Area(s) of Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>0-1 yr.</td>
<td>Traditional sculptural aesthetics; Space &amp; place</td>
</tr>
<tr>
<td>Participant 2</td>
<td>10+ yrs.</td>
<td>Digital aesthetic parity; 3D imaging</td>
</tr>
</tbody>
</table>

\textsuperscript{11} The participants were not asked explicitly about their specific areas of focus; rather, they were evident and expressed by the participants throughout interview conversations.
Table 3. Continued

*Participant Levels of Expertise and Focus Areas*

<table>
<thead>
<tr>
<th>Participant #</th>
<th>Level of Expertise</th>
<th>Area(s) of Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 3</td>
<td>5+ yrs.</td>
<td>Emotional-experiential; Narrative development</td>
</tr>
<tr>
<td>Participant 4</td>
<td>5+ yrs.</td>
<td>UX: User-sense parity &amp; user-object engagement</td>
</tr>
<tr>
<td>Participant 5</td>
<td>3-5 yrs.</td>
<td>Media Arts; Proprioception; Body representation</td>
</tr>
</tbody>
</table>

In conducting the qualitative analysis of my interview transcripts, I incorporated a thematic analysis technique (Braun & Clarke, 2006) called “keyword-in-context” (KWIC) or “keyness” analysis (Scott, 1997) in Phase 1. This technique brought to light the frequency and context of participants’ word usages, providing a detailed initial look into underlying themes within the data for Phase 2 and 3 analysis. This approach was important because it allowed me to highlight and codify the shared concepts that emerged from the qualitative data, providing a way to track the most frequently mentioned ideas or concepts (Joffe, 2012). Additionally, by identifying common keywords for each participant, as detailed in Table 4, I was able to uncover patterns or trends in the participant responses that may not have been immediately obvious.

This process also brings a degree of quantification into the qualitative data by ascertaining the frequency of keyword usage, thus bringing a level of objectivity to my findings (Creswell, 2013). Also, these keywords helped me to initially clarify the participants’ context, attitudes, beliefs, and behaviors related to multisensory VR design. Although keyword analysis was only one part of my comprehensive analysis process, this approach added to supporting evidence for my interpretation, enhancing the credibility and reliability of my research conclusions (Creswell & Poth, 2016). The context in which these words were used, the way they interconnected, and the broader narratives
in which they were embedded, were all crucial elements that I considered in Phase 2 and 3 in-depth thematic analysis.

Table 4.

Participants’ most used terms in interviews.

<table>
<thead>
<tr>
<th>Participant #</th>
<th>Most Used Terms during interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>object, space, virtual, people, create, artists, vr, question, experience, feel, printed, user, lighting, explore, process, piece, important, study</td>
</tr>
<tr>
<td>Participant 2</td>
<td>sound, environment, technology, important, vr, experience, questions, user, interactions, design, create, visuals, engage, multisensory, build, vr experiences, artists, understand, real, participation</td>
</tr>
<tr>
<td>Participant 3</td>
<td>creating, vr, headset, virtual, world, experience, people, real, inform, feel, space, brain, prompts, design, virtual reality, multisensory, add, technologies, sound, trauma</td>
</tr>
<tr>
<td>Participant 4</td>
<td>vr, design, environment, question, user, experience, multisensory, immersion, objects, sensory, methods, artists, real, people, research, arranging, sensory experiences</td>
</tr>
<tr>
<td>Participant 5</td>
<td>vr, people, headset, experience, question, body, designing, vr experiences, trackers, space, representation, virtual environment, environment, terms, sense, avatar, explore, immersion, multisensory</td>
</tr>
</tbody>
</table>

4.2.2 Interview Results & Analysis

**Defining Multisensory VR.** Each interview participant, when asked how they would define multisensory VR, provided unique responses, but commonalities were found through deeper investigation. The artists emphasized the importance of creating an immersive environment that fully engages the user and simulates real-world experiences, particularly the ways in which multisensory VR aims to provide stimulating experiences by engaging a combination of senses beyond just the visual and auditory. The definitions and descriptions the artists provided also centered on crafting a compelling sense of presence through multisensory VR composition to enhance the user’s perception of “being there” in the virtual environment. In addition, they each
stressed the importance of interaction within the virtual environments they compose, highlighting the unique natural and real-world interactions and experiences that multisensory VR can provide. This uniqueness is mostly due to the integration of various sensory modalities, such as visual, auditory, tactile, and proprioceptive inputs, that create a more comprehensive and engaging experience.

As the excerpts in Table 5 demonstrate, when speaking about more technical aspects of the definition and description of multisensory VR, each interview participant homed in on the necessity of multisensory VR having at minimum six degrees of freedom (6DoF) as both a technical requirement and distinguishing characteristic. This necessity separates it from standard VR, enabling users to move and interact within the virtual space with greater freedom. Additionally, the artists also discussed the integration of various sensory modalities, such as visual, auditory, tactile, and proprioceptive inputs, as an integral to fashioning a more fully engaging and convincing user experience. As an extension of these technical necessities, three of the artists specifically mentioned the use of additional accessories and peripherals, like vibration packs, haptic devices and scent makers, to enhance the multisensory aspect of the VR composition. One artist highlighted the significance of spatial sound as critical to creating an immersive multisensory experience, even when other sensory modalities could be limited.

### Table 5.

*Interview Q1: Excerpts that highlight definitions of multisensory VR*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immersive interaction, stimulating experiences, and presence</td>
<td><strong>Participant 2:</strong> &quot;...extended reality has to engage more than a couple of senses. So you have to not just have the visuals, but auditory, tactile, a combination of as part of the experience or the interaction... the sensory perception, to me, it also involves a memory of the, like presence... the perception from the user of having a higher level of presence.&quot;</td>
</tr>
</tbody>
</table>
Table 5. Continued

*Interview Q1: Excerpts that highlight definitions of multisensory VR*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactivity, sensory modalities, and six degrees of freedom</td>
<td><strong>Participant 3:</strong> “So there’s different types of VR, there’s three degrees of freedom VR, which is a lot less of your senses being utilized. And then there are six degrees of freedom VR, which is full scale, full room scale, VR, which incorporates a lot of just with the headset, and the controllers can activate many sense sensors.”</td>
</tr>
<tr>
<td>Technology integration of various sensory modalities</td>
<td><strong>Participant 5:</strong> ”...when we hear the term VR, I think it’s used in a lot of different contexts. And it covers sort of a wide range of technologies and experiences. I would say that multi sensory VR, for me, would entail an experience that, from a technical standpoint, has six degrees of freedom. So not only rotation, but also positional information. And that’s being fed back into the user through the headset.”</td>
</tr>
</tbody>
</table>

**Design Experiences.** When prompted with the question “Can you describe your experiences designing multisensory VR environments?”, each artist reflected on their own focus areas and previous professional background, experiences working embedded within teams, and of particular examples of projects they have worked on. Common to each of their responses was an emphasis on collaborative experiences. The artists often work within teams, combining their creative ideas and aesthetic skills with the technical expertise of other team members to bring a multisensory VR composition to life. Each artist, again, touched on the aim to create successful immersive experiences that evoke a sense of presence for the user, blurring the lines between virtual and physical realities.

They also spoke of their priority to ensure that the VR experiences were both accessible and safe for users through conscious decisions during the building process and during use. They did this, for example, by minimizing simulation sickness during testing phases and providing users with information about the experience before entering the virtual space once the environment is deployed for use. Each artist pointed to particular instances of designing natural and intuitive
interactions for users within multisensory VR environments, a crucial step in replicating real-world actions and gestures. These narratives involved descriptions of their experiences with incorporating multiple senses into the experiences, essential to crafting a successful composition, but also how checking and balancing levels of visual and sensory realism within the VR environment is an important aspect of the design process.

Interestingly, as Table 6 shows with excerpts from this question, in these interview response sets, concepts of embodiment and body representation emerged as four of the participants spoke about exploring the relationship between users’ physical bodies and their virtual representations. This topic also extended to discussions about the tension between the embodied and disembodied experiences. While a few of those interviewed touched on limitations wherein they, as artists, must consider the constraints of the technology, their own technical knowledges, physical space, and needs of the users throughout the phases of designing a given experiences, all of the artists emphasized a drive toward experimentation and exploration. This demonstrates that they approach multisensory VR design as an opportunity to push boundaries and explore new creative possibilities, free from the constraints of traditional media, to create new ways for users to engage with the virtual world.

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration, Accessibility, and Safety</td>
<td><strong>Participant 1:</strong> “For me, it was a very collaborative process as an artist who does not have a deep technical background or understanding of programming language and nuance. A large part of it was working with a team in order to execute and generate these virtual spaces... So part of the things we were creating, we wanted to make sure that we could minimize anyone’s negative experience and mitigate that from happening in the beginning.”</td>
</tr>
</tbody>
</table>
Table 6. Continued

*Interview Q2. Excerpts of artists in describing experience with multisensory VR*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactivity, Intuitive</td>
<td><strong>Participant 2:</strong> “So after you’ve encountered your limitations, then you need to figure out how can you address the friction point between what a person would do in reality for that action to occur? And how can you map it in the virtual environment, in such a way that it does not create does not feel intuitive, in the sense that this is what a person would do right on it to perform that activity.”</td>
</tr>
<tr>
<td>Interaction, and Limitations</td>
<td></td>
</tr>
<tr>
<td>Multi-sensory Integration, Embodiment, and</td>
<td><strong>Participant 5:</strong> “In designing that, I just really wanted the reality and the virtual reality to actually align in a way that made sense to their senses. So, you know, that for me became the question around which I centered my first experiences designing for environments was, you know, what, what happens if you start representing the rest of the body, right, we have the viewpoint, the visual viewpoint. What happens when you represent the rest of the body?”</td>
</tr>
<tr>
<td>Experimentation</td>
<td></td>
</tr>
</tbody>
</table>

**Technologies Used.** The artists were then asked to reflect on the technologies they most frequently employ when composing a multisensory VR environment. Primarily, all of the interview participants centered their responses around the theme of creating immersive environments that engage multiple senses in combination to fashion a narrative toward enhancing presence and engagement. They also re-emphasized the importance of 6DoF for creating a sense of presence and agency for the user in their responses to this question. Yet they each spoke of exploring various haptic technologies to provide tactile feedback as a particular challenge to creating a more engaging experience for users.

Calibration and tracking, both critical facets of testing for accurate tracking of user movements and interactions were also mentioned as crucial but also challenging in the design phases of a multisensory VR composition for creating believable and seamless user experiences. In terms of software, many of the artists use 3D scanning and modeling tools to create and manipulate virtual objects to include in compositions. They then employ Blender, and Unity or Unreal gaming
engines to bring these elements and objects together with interaction points in the final environment. For the technical components and hardware, they often employ headsets, controllers, sense triggers and devices, and various tracking systems to pair with the software aspects. Table 7 displays the technical tools the participants most frequently mentioned as used for multisensory VR production.

<table>
<thead>
<tr>
<th>Game Engines</th>
<th>Visual-to-virtual object rendering</th>
<th>Objects &amp; Surfaces</th>
<th>VR tools - physical</th>
<th>VR tools - software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unity 3D, Unreal, Medium, Direct X, OpenGL, Maya</td>
<td>3d scanner, laser mapping scanner</td>
<td>Hand tracking devices, XPS 16 video, GoPro, scent packs, fans, wireless headset</td>
<td>Adobe Premiere, Blender, Google blocks</td>
<td></td>
</tr>
</tbody>
</table>

As the artists spoke about the technologies they most frequently employ when composing a multisensory VR environment, they continued to return to topics of embodiment and methods for achieving presence. They again wove in the importance of collaboration and creative experimentation into their tactics with hardware and software. As detailed in examples in Table 8, the artists’ pointed out technical abilities and tactics, allowing users to feel as if they are truly part of the virtual world but also providing agency, for creating experiences that evoke a sense of embodiment and presence. In terms of technological prowess, a couple of the artists expressed how they highly valued the different skill sets and expertise of their team collaborators. Because of technical knowledge the artists may lack, they all prioritized an openness to exploring new and emerging technologies, such as biofeedback and brain-computer interfaces, to push the boundaries of what multisensory VR media can do and what they can accomplish technically.
Table 8.

*Interview Q3. Examples of Participant Quotes highlighting key findings in discussing technologies artists most frequently employ for multisensory VR composition.*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-sensory processes, components</td>
<td><strong>Participant 2:</strong> “So at the bare minimum, whenever we’re doing VR environments, VR experiences you have to have a way of tracking at least two components of the user. One is their position in the space and where they’re looking at in the space. And then the other one is one of their hands interacting in the environment. So you have to track where that position of that hand is doing work, and then the full body motion and head motion. So those are called, you know, degrees of freedom tracking. You gotta have the six degrees of freedom tracking or multiple components of the user, once you have those, right, then you start adding that sense of presence.”</td>
</tr>
<tr>
<td>Collaboration</td>
<td><strong>Participant 1:</strong> “For me, it was a very collaborative process as an artist who does not have a deep technical background or understanding of programming language and nuance. A large part of it was working with a team in order to execute and generate these virtual spaces. That would be not only accessible to the general public, but also safe, which was very important.”</td>
</tr>
<tr>
<td>Experimentation and limitations of technologies</td>
<td><strong>Participant 5:</strong> “And so for me, it’s really important to have a headset, but also the space around the headset to move. And then the experiences that I’m most interested in, in creating, because they are so interested in this question of our embodied sense of experience, that I think wireless headset technology is really important, because that tether if you’re using a tethered headset, it’s this one extra sort of constant reminder, that’s it’s literally pulling you back into the sort of physical environment that you’re in.”</td>
</tr>
</tbody>
</table>

**Sensory Methods and Tactics.** Next, the interview participants were asked “In your experience, what methods or tactics do you find most beneficial to include to create a sense of immersion in a VR environment, sensory or otherwise?” Each artist had particular value sets around what they individually prioritized as important methods and tactics, likely connected to experience levels, that they brought to the composition process. Analysis of the interview transcripts provided some common key tactics and methods that they found to be critical priorities. Excerpts of these commonalities can be found in Table 9. Drawing from tenets of user experience
design and interaction arts, it was clear each artist found being highly attuned to A) balancing stimulation and user experience, and B) optimal user participation and interaction levels. Both play a vital role in the methods and tactics they apply to any project that requires fashioning a sense of immersion. They each stressed that it is crucial to find the right balance between multisensory stimulation and user comfort, making the overall experience accessible and enjoyable without overstimulating the user. Three participants pointed to collaboration and clear communication between the creative and engineering teams as helping to prioritize and maintain this balance.

To make a multisensory VR experience more compelling, the artists’ responses suggest that users should be active agentive participants rather than just spectators. Depending on the goals of a given experience, the artists each gave examples of situations and compositions in which including various levels of and opportunities for participation enhanced the sense of presence and engagement. In addition, they suggested that moments of wonder in interaction and engagement were best achieved through convincing storytelling. In this case, this is achieved through combining aesthetic senses with narrative tactics to set a mood, creating a sense of presence, and enhancing the presence aspect of a given experience. Most artists conveyed that most of their decisions relied on maintaining a balance between scenario consistency and multisensory validation consistency with the visual environment to avoid conflicting sensations. In this way, ensuring consistency across all sensory inputs can create a more convincing experience; the more senses are engaged and validated within a given narrative, the more real the experience feels.

However, even the smallest inconsistency can disrupt the immersion, and many of those disruptions have to consider the user’s body/sense awareness. For instance, as a couple of the participants pointed out, providing a representation of the user’s body within the virtual environment can strengthen the sense of presence and immersion. This involves accurately reflecting the user’s movements and interactions within the virtual world—a process heavily reliant on technology. Also, utilizing 360-degree spatialized sound aids in creating an immersive
environment, considering, as one participant pointed out, our sense of hearing is inherently more spatial than our sense of vision. As an example of positional feedback and agency, methods can also be included that give users the ability to move their body within the virtual environment, and then have that movement mirrored by their virtual body to deepen their sense of presence and immersion. This includes allowing users to interact with objects through a narrative while also having naturalness of controls over their actions within the environment.

Table 9.

*Interview Q4: Excerpts from participants highlighting methods or tactics beneficial to creating a sense of immersion.*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balancing user experience with creative &amp; technical elements</td>
<td><strong>Participant 1:</strong> &quot;Creating awe and inspirational moments. Also, the user experience was really important to us...they could also control a virtual swarm or storm of objects that was moving around through a predetermined rhythm...there was lots of different give and take between the engineering side and the creative side.&quot;</td>
</tr>
<tr>
<td>User participation &amp; interactivity</td>
<td><strong>Participant 2:</strong> &quot;So the ability for the user to participate, not just be a spectator, but the participant is very important...Include some level of participation...And then, you know, technology is the last thing. Think of, right? Although a lot of people start with the technology, but in my experience, that's the wrong direction to start from...&quot;</td>
</tr>
<tr>
<td>Immersion &amp; User sense awareness</td>
<td><strong>Participant 4:</strong> &quot;Sound Design is important...humans are very much connected to sound. And if they're hearing, you know, the real world, and it doesn't pair with the virtual world that you're wanting them to experience, it lessens the virtual experience.”</td>
</tr>
</tbody>
</table>

**Construction, Testing, and User Experience.** When prompted to talk about design decisions focused around sensory or aesthetic aspects that primarily factor into the construction, testing, and user experience (UX) of multisensory VR compositions, the artists’ perspectives pointed to strong considerations of design decisions within the parameters of a given project’s
affordances and constraints. Participant 2 emphasized the need for quick prototyping and testing with users who have limited experience in virtual reality, aiding the identification of any problems with early-stage modes of interaction and adapting the experience based on user feedback. However, Participant 5 placed more importance on understanding whether the VR experience is meant to be an open-ended exploration or serve a utilitarian purpose. They explained that this influences design decisions made, levels of user testing performed, and how much ambiguity would be allowable in the multisensory experience.

In terms of compositional considerations, each artist also alluded to prioritizing the process over the final product (see Table 10 for codes and quote samples), finding the most decision-making value in keeping a tight focus on the team’s process iterations and users’ interaction testing rather than only prizing a polished finished product. Each artist spoke to the value of rapid iteration and user feedback for testing and building out sensory or aesthetic aspects. They also emphasized the importance of leveraging synesthesia to overcome technical limitations and designing with trauma-informed practices and accessibility in mind from the very early stages of a project’s conception and throughout construction. Participants 2 and 3 emphasized the importance of being mindful of potential triggers and traumas when designing multisensory VR experiences, as well as considering the needs of differently abled and neurodivergent users. Most pointed to using synesthetic experience design\(^\text{12}\), where one sense triggers a memory of another sensation. This compensates for technical or economic constraints in rendering certain sensory or aesthetic aspects of the virtual environment.

\(^{12}\) As a broad definition, synesthetic design involves methods for creating experiences that stimulate multiple senses simultaneously in a way that they interact or blend, mirroring the neurological phenomenon of synesthesia where stimulation of one sense involuntarily triggers another sense (Haverkamp, 2012).
<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>UX accessibility &amp; inclusivity</td>
<td>Participant 1: “We wanted everybody who is entering the virtual space essentially got a one-on-one handler, for the whole time that they were in the space, just in case they had any questions in case they at any point needed assistance. You know, we had it set up that if you had certain disabilities, you would still be able to access the virtual space.”</td>
</tr>
<tr>
<td>Collaboration &amp; consideration of UX</td>
<td>Participant 4: “And each layer you can add, I believe it creates more and more convincing for you, but the smallest inconsistency could cause everything to trickle down because your brain can figure out that it’s not real.”</td>
</tr>
<tr>
<td>User feedback &amp; literacy levels</td>
<td>Participant 2: “...but the learning curve should be low enough that they can adapt quickly. Right. So that’s a good sounding board, you bring people that are not that familiar, or don’t spend all their days with these technologies. Yeah, to kind of give you some feedback, because then you’ll find that what you thought might have been useful, was informed by your...knowledge.”</td>
</tr>
</tbody>
</table>

When the interview participants were asked “How do you digitally and physically construct the environment to make suggestions for use or to enable the user?”, all five participants spoke to the challenges of blending virtual spaces with physical spaces when creating immersive environments for users. Interestingly, each artist also discussed the need for providing guidance to users, either through direct instructions or subtle suggestions in the virtual environment. While three of the artists touched on the importance of ensuring that digital user interfaces are intuitive, avoiding elements that may break immersion, like those that are not part of the story world or not matching with the visuals or actions. All of the artists mentioned how incorporating real-world elements into the virtual space ultimately make it more intuitive and easier for users to interact with. This point of real-world interaction’s inclusion in the designed space also brought up discussions of constraints on deployment and distribution of the final multisensory VR product.
Almost all of the artists interviewed returned to the topic of accessibility, ensuring that they make suggestions for and include design elements that enable all users. They expressed that they focus their digital and physical compositional processes on virtual experiences that are as accessible as possible to a wide range of users, regardless of their familiarity with VR or their physical abilities. As an extension, all of the artists also emphasize the importance of utilizing inclusive design practices, both in terms of onboarding/off-boarding into and out of the experience and how they make suggestions for users to engage with/within the virtual environment. As presented in excerpts in Table 11, a couple of the artists mentioned that they draw from techniques of UX research (HCI/psychology specifically) when designing virtual spaces to allow them to more closely understand user behavior and to inform the creation of virtual spaces that elicit specific desired emotions or actions, depending on the goals of the experience.

Table 11.

*Interview Q6: Examples of Participant Quotes highlighting key findings when discussing how they digitally and physically construct the environment to make suggestions for use or to enable the user*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance for accessibility &amp; inclusivity</td>
<td><strong>Participant 1:</strong> &quot;...there was suggestions, whether they were implied or direct, at many points along the way, whether there was signage, letting people know how to interact with something...so as to direct the flow of how people are going to experience the physical space.”</td>
</tr>
<tr>
<td>Interface design, real-world elements challenges</td>
<td><strong>Participant 4:</strong> &quot;I am a little bit the advocate of the user environment. But of course, I’m aware of the other needs. So I understand the business limitations and the technical things that are available to us. And I try to not get ourselves into something that is very hard to complete. But ultimately, I am kind of keeping the sight of the user.”</td>
</tr>
<tr>
<td>User feedback &amp; limited VR literacy/experience</td>
<td><strong>Participant 5:</strong> &quot;So then you can do really, and this is where it becomes playful, right? Because once people figure that out, and this is the thing we did, we didn’t give people instructions about what was happening. We didn’t tell them what was going on, people just kind of figured it out. And once people figured it out, it becomes a very sort of playful experience, right?”</td>
</tr>
</tbody>
</table>
Prioritizing Design Methods. Extending from the survey responses received, I asked each interview participant how they prioritize various design methods based on the needs of individual projects combined with considerations of the users, customers, and available resources. Most of the artists’ responses foregrounded 1) remaining open to exploration and experimentation, 2) the importance of exploring creative approaches and ideas, 3) trying different techniques, and 4) iterating on their creations throughout the composition phases of the multisensory VR experience. They spoke primarily of approaching all phases, from brainstorming to final testing, using tactics of open communication with clients as well as close team collaboration wherein each member brings their own unique perspective and expertise to carefully coordinate project priorities and tasks needed. When speaking about individual projects’ needs, the artists interviewed highlighted processes such as the value of creating prototypes and iterating on their designs to fine-tune experiences and address any issues. In addition, on this topic, each artist discussed the importance of deciding the level of detail and realism needed for a given project, factoring in consideration of both customer expectations and the goals or purpose of the experience based on communication with customers.

During this part of the interviews, each artist also began to discuss interactions with customers and users in a more in-depth manner. Particularly when discussing customer goals for multisensory VR projects, three of the artists interviewed prioritized setting expectations and managing limitations or constraints as early as possible. The artists conveyed that communicating with clients about the limitations of the technology and the feasibility of their requests helped them strive for a balance between meeting expectations and delivering a quality experience. Also, they prized adaptability and flexibility (as displayed in excerpts in Table 12), with customer expectations and given budget constraints. The artists recognized the need to balance customer expectations with technical limitations and resources, and they communicated that they stay open to often adapting their creative design approaches accordingly.
As a couple of those interviewed pointed out both the team and the client ultimately center the user experience in decisions both big and small. Yet when prioritizing various design methods based on the needs of individual projects, the artists conveyed the unique importance that playfulness and creativity play for them throughout the process—it is at the root of their ability to adapt and remain flexible during prototyping and testing iterations in team collaborations. It feeds their ability to explore and experiment for different user engagement and experience possibilities.

The artists I interviewed place a lot of emphasis on making immersive experiences that evoke feelings in users. They do this through designs that can be either hyper realistic or even more simplified, and believe this invites users to be curious and inventive inside the multisensory VR world. As a result, users can engage with the environment in their own unique and creative ways. This mirrors the inventive approaches used by the artists when designing the experience.

Table 12.

*Interview Q7. Examples of Participant Quotes highlighting key findings on how the artists prioritize various design methods based on the needs of individual projects combined with considerations of the users, customers, and available resources.*

<table>
<thead>
<tr>
<th>Initial Code (s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>User experience &amp; client engagement</td>
<td><strong>Participant 3:</strong> “Also, a lot of clients are people commissioning, that immediately, ...especially if they haven’t done any VR work before, they automatically think that the virtual world has to be very realistic looking. And they don’t fully understand that some of the things that they’re asking for, can be accomplished with primitive shapes and, and basic, suggestive elements in the world.”</td>
</tr>
<tr>
<td>Adaptability &amp; flexibility</td>
<td><strong>Participant 2:</strong> “You know, let them know of their certain physical phenomena that are you’re not going to be able to replicate, because a lot of this is in real time. It’s not that you cannot. I mean, Hollywood does it all the time. Yeah, but they have hundreds of servers, hundreds of people, and, you know, multimillion-dollar budgets to end up with that result.”</td>
</tr>
</tbody>
</table>
Table 12. Continued

*Interview Q7. Examples of Participant Quotes highlighting key findings on how the artists prioritize various design methods based on the needs of individual projects combined with considerations of the users, customers, and available resources.*

<table>
<thead>
<tr>
<th>Initial Code (s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playfulness &amp; creativity</td>
<td><strong>Participant 5:</strong> “I think, again, those are the experiences I’m really interested in creating where it’s not necessarily about, it’s not necessarily goal-oriented. It’s more of like I said earlier, like a sandbox, sort of open experience where people can kind of make what they want out of it, and kind of just have the experience as opposed to having sort of these sort of utilitarian or, or goal-oriented task.”</td>
</tr>
</tbody>
</table>

**Failure of Methods and Decisions Made.** The next question for the artists interviewed for this study was fashioned to evaluate methods and decisions made when failure comes into the composition process. I asked each participant, “Can you talk a bit about an artistic decision or design method that was unsuccessful in a VR build, and how it was (or may have been) corrected in the design process?”

The artists discussed various challenges they encountered while composing specific multisensory VR projects. They addressed these challenges in various ways and in detail, yet there were common threads in their responses: 1) limitations in computing power and rendering capabilities, 2) difficulties in communication with clients, 3) problems with user interactions, 4) clashes with real-world environments, and 5) tracking issues. Participant 1 spoke about issues with scaling down the level of aesthetic detail and reimagining their compositions to overcome computing power and rendering constraints. Participant 2 discussed projects that required better prioritizing of artistic decisions based on clarity and setting realistic expectations with clients to avoid frustration and misunderstandings in the final stages of prototyping. Participants 3, 4, and 5
described decisions or methods that were unsuccessful because of perceived "failure" for the user of the environment.

Reflections provided by these participants point to how they corrected these “failures” through artistic decisions or design methods. For example, they: 1) reduced visual distractions and ensured that interactive components were not overly stimulating for users, 2) adjusted the VR and physical environment to accommodate different user heights and needs of different bodies while also considering user comfort, and 3) improved body tracking through the use of external sensors for different bodies and more user-friendly onboarding interface experiences.

Though the scenarios and examples shared by each participant varied widely, initial thematic analysis revealed common approaches to balancing technical constraints and artistic vision. The artists experienced limitations in computing power, rendering capabilities, and time constraints, which affected their ability to achieve their desired level of detail or complexity in the projects they were referencing. Their examples, excerpts for which are provided in Table 1, affirmed the need to balance VR immersion with real-world considerations. Striking the right balance between immersion in the virtual world and maintaining awareness of the real-world environment was expressed as an ongoing challenge, especially when it comes to sensory design and coordinating different sense triggers with user interactions. In addition, the artists also stressed the importance of clear communication and setting expectations for overcoming (or avoiding) failures by ensuring that all team members, including clients, have a good understanding of the multisensory VR development process, its limitations, and the scope of the project is crucial to avoid frustration and ensure a successful outcome.

The artists were also particularly focused on user experience challenges and examples that limited accessibility. They pointed out how designing inclusive and accessible interactions is a significant challenge in multisensory VR composition. They consider how factors such as overstimulation, environmental distractions, and users’ varying levels of familiarity and literacy
with VR can impact the effectiveness of an experience. Overcoming physical constraints such as integrating body tracking into VR experiences can be complex. As the artists explained, issues can arise related to, for example, different user heights, interference from furniture, or even wired headsets with backpacks and clunky trackers, necessitating methods and creative decision-making that provide both comfort and accessibility for a more diverse range of users. Yet the artists interviewed also recognize that setbacks and failures are part of the creative process in composing a multisensory VR environment (or working with any new medium). Each conveyed adaptability and learning from failures as key to adjusting their designs based on feedback and use these experiences of challenges and perceived failure to improve their future work.

Table 13.

*Interview Q8. Examples of Participant Quotes highlighting key findings of artistic decision or design method that failed and/or were corrected in the design process.*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balancing technical constraints &amp; artistic vision</td>
<td><strong>Participant 1:</strong> &quot;You know, I felt so, so utterly fortunate and privileged to, you know, essentially have people who are working for me, and because I would have a whimsical idea. And they were always willing, but sometimes what I thought would be very simple and straightforward. Oftentimes, what I thought was a simple idea turned into just something that wouldn’t be feasible within the parameters that we had.&quot;</td>
</tr>
<tr>
<td>Communication &amp; Setting Expectations</td>
<td><strong>Participant 2:</strong> “So I say that it is okay to make sure at any point of the project, that the client understands that it is important to address these misconceptions.”</td>
</tr>
<tr>
<td>User experience challenges - Adaptability &amp; Access</td>
<td><strong>Participant 5:</strong> “And so that made me think a lot about, you know, well, should we give agency to the user to choose their representation, but then as soon as you do that, it opens up a whole host of technical problems of how do you allow that to happen?”</td>
</tr>
</tbody>
</table>
Artists’ Reflections. Finally, I closed out each interview with a question that allowed the artists to reflect on our conversation, asking “Are there any additional points about your methods or experience as an artist you find important to multisensory VR design that we didn’t discuss?” This gave each artist the opportunity to discuss any points they felt important that were not asked prior, did not come up in the semi-structured conversation, or perhaps that they would like to emphasize further.

As detailed in Table 14, a few of the artists emphasized the importance of collaboration between themselves and engineers, developers, and subject matter experts to create multisensory VR experiences. This demonstrated the multi/transdisciplinary nature of multisensory VR calling for such a focus on teamwork throughout each process. Artists have creative approaches but may lack the technical knowledges to execute them. By collaborating with engineers and other technical experts, they effectively bridge this gap and compose inventive VR experiences by pooling diverse skill sets and expertise. Collaboration, according to the artists, ultimately leads to more innovative and sensory immersive experiences for the end-users.

Participants also mentioned the need for designers to be more aware of their own sensory experiences and to explore and analyze these experiences to inform the design process. They pay close and careful attention to the sensory input they encounter in their daily lives. This assists them with developing an acute awareness of analyzed sensory experiences to create more authentic and compelling immersive multisensory VR experiences for users.

As an extension, all of the artists interviewed re-emphasized the importance of inclusive design methods. They foreground a focus on designing experiences that are accessible to users with different abilities and take into account various limitations to inform their decisions. This approach to composition, according to the artists, ensures the experience can be accessed and enjoyed by as many people as possible, regardless of their abilities or limitations. Considering factors such as
color blindness, hearing impairments, or mobility constraints during the design process, the artists strive to develop VR experiences that cater to a wider range of users.

As a couple of the participants pointed out, as evidenced by excerpt in Table 1, this approach not only benefits those with specific needs but also has the potential to enhance the experience for all users by promoting clarity, simplicity, and more effective communication of information. This includes factors such as accessibility, where creators should consider how different types of users can interact with the virtual world or how users are represented within virtual environments and how this can significantly impact their experience. Participants took the opportunity to reiterate example tactics such as a focus on avatar embodiment, guiding safe transitions in and out of the experience, and implementing trauma-informed care practices.

Three of the artists also took this closing opportunity to point out the valuable benefits, for their craft, of learning from users with different bodily or neurodiverse experiences (individuals with diverse embodiments) to inform their designs toward more inclusive multisensory VR experiences. In addition, the artists each communicated thoughtful ethical considerations that designers and artists should consider before and during the creation of multisensory experiences. Given the rapid advancement of VR technology, a couple of the artists noted that this approach of “learning through bodies” involves challenging normative assumptions about body types and abilities, and advances opportunities for more responsible creative applications that arise from engaging with and designing for a more diverse range of user experiences.
Table 14. 

*Interview Q9: Participant Quotes highlighting key findings of artists’ final thoughts.*

<table>
<thead>
<tr>
<th>Initial Code(s)</th>
<th>Participant Quote Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration</td>
<td><strong>Participant 1:</strong> “I think it's very important for people who are creative to not be held back by a lack of technical knowledge... I think it should be a collaborative sport, for sure.”</td>
</tr>
<tr>
<td>Inclusive Design &amp; Design Thinking</td>
<td><strong>Participant 2:</strong> “...once you start thinking with some of these considerations, and what may be considered limitations, it kind of opens your creativity... So instead of kind of keep on going more inside and inside your box, and it kind of helps you break out.”</td>
</tr>
<tr>
<td>Sensory Experience Awareness</td>
<td><strong>Participant 4:</strong> “[Y]ou should kind of be more aware of your sensory experiences in general, and try to kind of be more aware and to deconstruct them a little bit and see what types of sensory information you manage to record in your daily life.”</td>
</tr>
<tr>
<td>Accessible Embodiment Ethics</td>
<td><strong>Participant 5:</strong> “They [rapid advancements in VR technology] open up a whole host of ethical questions as well. And I think that that’s always something that is always I tried to keep in the back of my mind...I think we often design these experiences already with a sort of able-bodied presumption... I think experiences that don't necessarily take that as the base to work from could be really interesting, could open up new areas of exploration, that wouldn’t be possible if we didn't make those assumptions.”</td>
</tr>
</tbody>
</table>

4.3 CONCLUSIONS

This chapter provided an in-depth analysis of both the surveys and interviews conducted with multisensory VR artists, reporting valuable results about their compositional methods, decisions, and tactics. By way of performing exploratory statistical analysis and initial qualitative thematic coded tagging analysis, my key findings revolve around the most frequently recurrent themes:

- collaboration,
- inclusive and accessible design practices,
- creative aesthetic and sensory processes,
- user experience considerations.
Each of these topics emerged as crucial aspects in the artists’ creative embedded considerations and process. In the development of immersive and engaging multisensory VR experiences, these themes emerged across all phases of the composition process—from conception to final product—worked through in a collaborative and iterative fashion.

It is clear that collaboration and experimentation between artists and engineers is vital in overcoming technical barriers and fostering creative expression in the composition and testing process. Additionally, the results and analysis I’ve reported here emphasize the importance the artists place on accessibility and inclusive design, which not only expands the user base but also encourages, for the artists, creative thinking beyond conventional boundaries.

In terms of methods the artists use, additional important takeaways from my results include the following:

1. balancing artistic expression and user experience while considering the practical limitations of technology and budget constraints;
2. the significance of blending digital and physical elements to create immersive sensory experiences;
3. the use of subtle cues to guide users through the environment;
4. the importance of iterative design involving user testing and feedback;
5. the need for a well-designed interface to ensure ease of interaction.
6. consideration of different user embodiments and experiences as crucial for accessibility and expanding the range of audiences to virtual worlds.

These analyses grounded and guided my critical insights and conclusions about how multisensory VR artists approach the challenges and affordances of creating engaging and intuitive spaces for users. In the next chapter, I describe in detail the thematic insights emerging from these findings. By delving deeper into interpretive analysis of these findings, I continued to uncover unique aspects of composing in multisensory VR that then allowed me to explore how insights the
artists shared in common can potentially inform future research, artistic media practices, and the
development of new directions for understanding multisensory VR technologies and composition
processes.
CHAPTER 5
EMERGENT THEMES & INSIGHTS

Moving from a process of discovery with initial coded tagging yielding results, I derived relational themes and insights from a second cycle of interpretive coding of datasets to build out overarching thematic categories and corresponding sub-themes. These additional steps (Phase 2 and 3)—connecting initial results of the surveys, interviews, and memo notes—benefitted from theoretical foundations of mediology and ANT as guiding lenses. I returned to view my initial analysis through a tighter framework of the dimensions of mediology—technological, economic, aesthetic, archival, social, subjective, and epistemological. I categorized the data sets for associative thematic patterns and relationships to identify insightful themes applicable to the ways artists who design multisensory VR compositions engage dimensions of media in their design practices and decisions. Emerging from the artists’ interviews, closer investigation located patterns and commonalities, yielding themes across the response sets in Phase II analysis for filtering out key thematic insights. These thematic categories began to foreground 1) aspects of the technologies and methods artists use to design multisensory VR environments, 2) design decisions artists factor into the construction, testing, and user experience (UX) of multisensory VR compositions, and 3) how the artist digitally and physically constructs the environment to make suggestions for use/that enable the user.

In connecting the results of the interviews and surveys with this study’s methodological theories, the following thematic categories in Table 15 emerged as dimensional focal points of multisensory VR artists’ decisions, methods, and tactics:
Table 15.

**Thematic Categories and Subcategories**

<table>
<thead>
<tr>
<th>Dimensional Theme</th>
<th>Relational Sub-Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological and economic affordances</td>
<td>Attention to diverse needs and hierarchy structures</td>
</tr>
<tr>
<td>and constraints</td>
<td>Accessible interactions in design and composition</td>
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<tr>
<td></td>
<td>Overcoming privileging of access</td>
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<tr>
<td></td>
<td>Equity, access, and inclusion as supply/demand issues</td>
</tr>
<tr>
<td>Archival &amp; aesthetic narrative factors</td>
<td>Multimodal considerations through phases of development</td>
</tr>
<tr>
<td>as epistemological</td>
<td>Co-construction through composition phases</td>
</tr>
<tr>
<td></td>
<td>Invention in composition and form through sensory methods</td>
</tr>
<tr>
<td></td>
<td>Agency through accessible narrative reception and framing</td>
</tr>
<tr>
<td>Social &amp; subjective agencies</td>
<td>Artists and/as user positionality</td>
</tr>
<tr>
<td></td>
<td>Interface design towards subject formation, identity</td>
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<tr>
<td></td>
<td>construction and agency</td>
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<td></td>
<td>Persuasion and expectation in relation to agency</td>
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<tr>
<td>Accessibility and inclusive practices</td>
<td>Embracing inclusivity by balancing affordances and constraints in design</td>
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<tr>
<td></td>
<td>Conditions of access when producing (for) bodies</td>
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<td></td>
<td>Interactive storytelling that fosters literacy through accessible narratives</td>
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<tr>
<td></td>
<td>Participatory design and welcoming world-building</td>
</tr>
</tbody>
</table>

Each of these four thematic categories is composed of informing sub-themes, for which I provide key insights below. Individually, they are not intended to be definitive nor deterministic, but rather, blend well and flow holistically together to better understand and inform clearer answers to my research questions. In the sections that follow in this chapter, I will detail the connections brought to light by viewing these thematic categories through a dimensional lens to bring into closer focus artists’ experiences and perspectives of multisensory VR media.

5.1 **THEME 1: TECHNOLOGICAL & ECONOMIC AFFORDANCES & CONSTRAINTS**

As initially suggested in the survey data analyzed, the artists interviewed tied technological affordances and constraints closely to economic conditions, issues that presented as boundaries to what is both creatively possible and to accessible inclusive practices for the users. Turnley defines the technological dimension as the material components and processes necessary for a medium to function. However, she complicates purely technical views by arguing that a medium’s tools and
techniques develop in complex, socially situated ways rather than autonomously determining its uses (p. 133). The economic dimension, in this case, is composed of the systems that support a medium’s development, distribution, and maintenance, involving production, profits, resources, and the overall political economy. Turnley notes how a medium must have recognizable value, wherein value is defined as contextual rather than intrinsic. This framing positions the economic as inextricable from a medium’s discursive functioning within broader systems of material exchange and sociocultural value.

The survey data and interviews transcripts revealed that the creation of virtual environment experience building is a highly iterative process that requires a balance between artistic vision, technological limitations, and balancing client and user needs. The artists pointed out that they navigate an ever-changing landscape of technological advances (in VR and otherwise) that pushes at the need to constantly acquire new skills and knowledge to remain relevant in the field. There was also a consistent refrain about the need to address issues of inclusivity and accessibility in the design process, which requires close collaboration with clients to understand their goals and priorities. Yet the process of creation also hinges tightly on a willingness to experiment, fail, and learn from mistakes in order to produce a product that meets the needs of all stakeholders involved. In this case, the user is also positioned as a stakeholder.

One key aspect in this thematic category that emerged across the sub-themes I derived from the texts examined clarifies the artists’ focus on the user and their needs. This included a veritable range of considerations according to each artist, but several frequent commonalities were located: 1) addressing diverse needs in the design process, 2) testing experiences with users who have limited experience or literacies with VR, and 3) continually checking in with clients to ensure that the design aligns with their goals and expectations.

Additionally, there was common recognition that equitably accessible virtual exchanges require addressing potential limitations and constraints up front in the design process. In this way,
the artists again prioritize inclusivity by balancing goals and interactions with potential limitations of technologies. As supported by sample excerpts included with each sub-theme herein, the artists’ efforts towards the user demonstrate a commitment to creating meaningful and engaging experiences that consider the diverse needs of users.

5.1.1 Attention to Diverse Needs & Hierarchy Structures

The artists in this study design multisensory VR experiences with attention to diverse needs and a deep understanding of the user’s experience throughout composition processes. This focus on the user requires a) interdisciplinary collaboration, b) careful consideration of the user’s embodiment and experience, and c) designing for graceful failure to ensure a seamless and immersive experience. In addition to the evidential quotes provided in Table 16, Participant 2 emphasized the value of engaging users with limited experience in virtual reality, as they can provide valuable feedback and a different perspective. Participant 3 pointed out the importance of considering the embodiment of the user from the beginning of the design process, which is often undervalued by engineers and computer scientists on production teams. Across the span of interviews, each artist underscored the importance of designing with accessibility in mind, so that users with varying levels of VR experience and expertise can engage with the experience.
Attention to diverse needs was seen as an affordance of multisensory VR media. Yet a common constraint mentioned was the need for multidisciplinary collaboration and communication between technical and artistic teams. This communication ensures that the user’s experience is prioritized in the design process. Most of the artists acknowledged their own constraints of lacking certain technical literacies to execute the engineering and programming development required for multisensory VR design. However, they each positioned themselves as user advocates to overcome hierarchies in technical knowledge that can present as challenges for them as well within production teaming.

Most of the artists also emphasized the importance of designing for graceful failure, where the system can handle and recover from errors without significantly disrupting the user’s experience. The artists expressed their advocacy by ensuring the user’s successful calibration to the virtual reality environment and careful consideration of how users may interact with and adapt to sensory elements incorporated. They also anticipated the potential impact of technological failures

<table>
<thead>
<tr>
<th>Sub-theme 1</th>
<th>Participant Quote Samples</th>
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</thead>
<tbody>
<tr>
<td>Attention to Diverse Needs &amp; Hierarchy Structures</td>
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</table>

"...it’s also a matter of how the team works. [I] define myself as a user experience designer, I am a little bit the advocate of the user environment. But of course, I’m aware of the other needs. So I understand the business limitations and the technical things that are available to us. And I try to not get ourselves into something that is very hard to complete. But ultimately, I am kind of keeping the sight of the user. And then my colleagues each have their own, you know, point that they’re coming from.” (Participant 4; p. 6). 

"It’s a disservice to the potential of creative endeavors that can be executed in VR if you have to first acquire all of this engineering and technical know-how in order to be expressive. And I don’t know exactly how you resolve that. But I think it should be a collaborative sport, for sure.” (Participant 1; p. 11).
on the user’s experience, thus breaking the sense of presence and immersion that the user is striving to achieve.

5.1.2 Accessible Interactions in Design & Composition

The artists interviewed assert that accessible interaction in multi-sensory VR design is key, as detailed in Table 17. This requires adopting structured practices in designing interactions and then iteratively testing to ultimately craft multisensory VR experiences that consider the diverse needs and experiences of users as much as possible. They do so with the use of structured practices to address 1) the different interactions users may have in the virtual environment, 2) how closely it matches to their practical reality, and 3) how easily understood interactions are for the user in the design. For example, such practices and methods mentioned include 1) the use of integrating technology to capture finger and hand motions, 2) the importance of tracking and animating the user’s body accurately, and 3) compositional considerations about how various visual and sensory elements operate together to allow users to become immersed and interact within the virtual environment in more engaging and effective ways.

<table>
<thead>
<tr>
<th>Sub-theme 2</th>
<th>Participant Quote Samples</th>
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</thead>
<tbody>
<tr>
<td>Accessible Interactions in Design &amp; Composition</td>
<td>“Then, you know, technology is the last thing [you think of, right? Although a lot of people start with the technology, but in my experience, that's the wrong way, the wrong direction to start from, because it’s easier for you to work with the limitations of the technology to achieve the purpose, then, you know, start from the technology, building stuff that technology handles, then you’re able to fulfill that purpose that you didn’t think of, to begin with.” (Participant 2; p. 7).</td>
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<td>“But, you know, get it as close to how a person experienced reality. So you can map some of these interactions in a way that it’s easier to understand, easier to make that connection, that leap of faith of, Okay, I get it, I can, I can do this. And then work.” (Participant 2; p. 3)</td>
</tr>
</tbody>
</table>
Such practices that address and consider diverse user needs frequently run into issues of privileged access. Advanced hardware and software for multisensory VR composition to stage interactions—for example, accurately track and animate the user's body to provide a sense-of-self that leads to a greater sense of presence in the environment—can be cost-prohibitive, according to the artists. They each emphasized that technological limitations frequently yield more creative approaches when they center the user and the goals of the composition, but they can also impact accessibility for the user once the final product is completed.

5.1.3 Overcoming Privileging of Access

How the artists each considered and addressed technological hierarchies and limitations centered around two factors: 1) the user's access to and within multisensory VR, and 2) the artists' own access to technical components and economic means to overcome compositional limitations. Privileged access can constrain use of advanced hardware and software that can provide the necessary feedback for user experience (for example, wireless headsets, effective locomotion, enhanced hand or eye trackers, 6DoF, advanced 3D auto-generation software). When discussing the technological hierarchies and limitations they encounter in multisensory VR design, the artists alluded to themes of adaptability, flexibility, and most importantly, creative problem-solving. These factors, as reflected in the quotes in Table 18, in the design process worked to align and optimize what was available for integration into the design process and around the technical knowledge of the team.
### Table 18.

**Overcoming Privileging of Access**

<table>
<thead>
<tr>
<th>Sub-theme 3</th>
<th>Participant Quote Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overcoming Privileging of Access</td>
<td>“Artists that are creative, or artistic, are able to utilize...tools to create the experiences even without the need to know all the lower level knowledge. So it’s kind of like how computers were at the beginning, like the technology existed, but you really had to be a mathematician, to be able to operate these things you had to understand in a binary and all of how these things work. And eventually, the interfaces and the front end, where the user interaction change in such a way that now we all use computers, we don’t care how it works under the hood, right. And we as creatives can use it to do nice, creative things with it.” (Participant 2; p. 6).</td>
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<td>“It’s really important to consider when designing experiences, we often design these experiences already with a sort of able bodied presumption that I think...don’t necessarily take that as the base to work from, but this could open up new areas of exploration, that wouldn’t be possible if we didn’t make those assumptions.” (Participant 5; p. 13).</td>
</tr>
<tr>
<td></td>
<td>“So there was lots of different give and take between the engineering side and the creative side. And what was so positive and wonderful about the experience for all parties was, I got to put on an engineer’s hat every once in a while, and they got to put on the creative hat every once in a while. So it forced us all to have plasticity in the way in which we were approaching the project, which was great.” (Participant 1; p.s 4-5).</td>
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</tbody>
</table>

The artists each had processes that enabled them to create accessible and engaging experiences. They overcame requirements for advanced technical skills or privileged access to hardware and software by experimenting with the devices a particular environment called for. They also used rapid decision-making and testing within their teams to adjust levels of calibration of hand and body tracking to align with tasks or goals. This results in optimal realism of how a body interacts in a given place and space for the users. For example, a major factor in this calibration is dependent on whether the user will use a controller or just their hands gesturally without controllers to interact with elements and complete tasks. This changes the technological input
applied. In this scenario, a few of the artists would put themself in the place of the user to conceptualize what is needed next to train the system for appropriate realism of interaction.

5.1.4 Equity, Access, and Inclusion as Supply/Demand Issues

As evidenced by survey response sets and artist interviews, the importance of balancing the creative goals of the project with the economic realities of production is crucial. There is a clear distinction between the costs associated with creating a basic virtual environment and those that come with creating a more complex, detailed, and realistic one. The economic exchange of supply and demand plays a vital role in artists’ decision-making processes when aligning multisensory VR environment goals with technological constraints. Motion trackers, VR headsets, and audio functionalities have recently become more affordable and standardized. Yet the artists pointed out that integrating haptic devices, higher fidelity environments, temperature/air pulse, and scent components remains costly.

The artists each emphasized how critically important it is to balance creative conceptualization of a project’s purpose and budget constraints with the availability of advanced hardware and software. While highly realistic virtual environments and objects are prized by clients and exciting for the artists, that level of fidelity—highly refined, detailed, and semi-realistic virtual worlds or objects—can come at higher costs for clients and customers. The artists work with clients to manage expectations, address any misconceptions early on, and ensure that costs remain manageable while still achieving the desired experience. One tactic three of the artists mentioned using is conceptualizing low-fidelity prototypes with intended interactions early in the process to help clients understand what they are getting into before spending a lot of money. This is critical to preventing any misalignment in the project’s goals and expectations. Additionally, this strategy aligns costs with equitable expectations and access to resources, giving clients and team members a solid starting point while keeping the costs under consideration.
Table 19.

**Equity, Access, and Inclusion as Supply/Demand Issues**

<table>
<thead>
<tr>
<th>Sub-theme 4</th>
<th>Participant Quote Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity, Access, and Inclusion as Supply/Demand Issues</td>
<td>“...the thing about working in this area is that it’s just so rapidly evolving, and it’s happening so quickly that I think when we’re designing for it, it can be really challenging to keep up with the changes in technology. But it’s important to because [it is really] a technology offering new affordances and sort of new avenues that can be explored by artists and designers to create experiences that are different” (Participant 5; p. 13).</td>
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<td></td>
<td>“There was a lot more limitations with trying to plate it from its original location to [a] satellite site, we couldn’t control the lighting quite as much. So even though we set up some 3d projectors, it was more lackluster than I would have liked things to have been, it literally wasn’t cast in the best light possible.” (Participant 1; p. 9).</td>
</tr>
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</table>

Transactional professional communication about early decisions and careful calibration in the design process, for the artists, means embracing constraints on media access as part of the artistic process. Cost of and lack of access to certain technologies can also frequently impact user accessibility to and within multisensory VR experiences, as demonstrated by the excerpts in Table 19. A willingness to adapt and learn from failure was echoed as a crucial factor in making multisensory VR compositions. Additionally, as Participant 1 pointed out (see Table 19), these compositions are frequently locked in place to specific physical locations, which adds an additional layer to issues of equitable access. The physical location-specific nature of many multisensory VR compositions presents a significant barrier to equitable access. This effectively limits the audience to those who can physically access their locations, leaving out those who are unable due to various reasons such as geographical distance, physical disabilities, or other factors such as socio-economic status that might prevent travel.

Turnley contends that while proficiency with technology is vital for digital literacy access, it must be articulated with ethical and rhetorical skills in composition to avoid deterministic
assumptions. She also frames how access to media resources is unequally distributed along race, class, and other axes, impacting who can gain media literacies, asserting that digital networks are reshaping traditional economic notions of exchange, capital, and ownership (pp. 133-134). For artists, this is a critical concern as it directly affects the reach and inclusivity of their work. The potential audience becomes limited, which could lessen the demand for their compositions. By being conscious of these accessibility challenges, artists creatively strategize on ways to broaden their audience reach, such as considering portable or remote-accessible VR experiences. Additionally, their consideration of accessibility and inclusivity is not just about expanding the potential audience, but also equal opportunities to experience, learn from, and engage with emerging technology. This demonstrates ethical considerations as well that advance multisensory VR compositions not creating further digital divide. By addressing these issues, artists contribute to a more inclusive culture in the VR industry.

5.2 THEME 2: ARCHIVAL & AESTHETIC NARRATIVE FACTORS AS EPISTEMOLOGICAL

Aesthetic dimensions are the conventions and expectations associated with a medium’s form, formatting, design, and content—the stylistic conventions and assumptions that influence how a medium’s artifacts get produced and evaluated. Certain normalized conventions can become invisible regulators of credibility, literacy, and expertise. However, Turnley argues conventions need not foreclose innovation or creativity. Instead, they can provide resources for invention, remixing and redesign (pp. 135-136). As closely related, the archival dimension captures the material and conceptual components that enable a medium to receive, accumulate, distribute, and retrieve information. A medium’s archival affordances shape cultural notions about memory, information structures, and access. Turnley’s framework also highlights how digitization impacts archival practices through structures and networked information flows (p. 134). The epistemological dimension, as she asserts, is composed of the ideologies and paradigms for sense-making enabled by a medium’s approaches to information and literacy. These are the assumptions
about knowledge, truth, intelligence, and literacy shaped by a medium. As is the case with multisensory VR, different media posit models for interpreting reality based on their information structures (p. 137).

As evidenced by my thematic analysis, there is a close connection, for the artists, between the cognitive affordances of multisensory VR to engage memory with narrative conventions through aesthetic framing of graphic elements and senses in the interface and elements applied. Design methods and sensory tactics used by the artists have constraints as well. Artists employ decision-making about distributing knowledge and creating new knowledges through design while also addressing user literacy, fluency, and accessibility with the media. Additionally, as the artists is part of development teams themselves, siloed knowledge hierarchies are frequently constraints to co-constructions of knowledge production that are valued between the artists and their team members. From information framing and reception of aesthetic methods included, whether they be sensory, material, or digital, artists are also keenly attuned to preventing knowledge gaps between their compositional decisions and the user’s understanding throughout development phases.

The artists consistently expressed that sensory, material, and digital compositional elements were influenced by and were fashioned to influence particular narratives. These narratives are seen as central drivers towards a projects’ goals. More specifical to the sensory affordances the artists technologically designed, visuals (e.g. light, shading, textures, objects, etc.) are addressed using powerful software for fidelity detailing and rendering. Sensory simulation (e.g. sound, haptics and physical surfaces, body tracking for movement, etc.) also must be stitched into the environment via software engineering for editing. This ensures that all aesthetic content works as seamlessly as possible in the multisensory VR compositional spaces to convey narrative drivers, thus persuading the user toward specific interactive tasks or knowledge-building engagements.

Along the design path from invention, experimentation, and testing to a final product, the artists interviewed were quick to point out that multisensory VR builds are collaborative efforts,
involving computer scientists, developers, researchers and artists on production teams. Marrying the technologies involved is certainly a team effort in terms of variable input and output devices that must come together to fashion a world that can be sensed as intended for the user. The artists’ responses frequently reflected this collaborative “we” or an instructional tone of “you” but also, in conversation, centered their own individual contributions, perspectives, and tactics throughout their aesthetic and narrative compositional processes.

In this section, I highlight key insights on how archival and aesthetic dimensions impact narrative factors the artists epistemological means of knowledge-building. These include 1) multimodal considerations the artists employ through different phases of development, 2) the co-construction practices that come into play between the artists and their teams and the users, 3) how artists harness invention through their sensory methods used in compositions, and 4) how concepts of agency are approached and developed through accessible narrative reception and framing.

5.2.1 Multimodal Considerations Through Phases of Development

Intentionality, questioning, and testing is at the heart of what the artists frequently expressed when addressing considerations across a range of multimodal needs, communication tactics, and requirements in designing out multisensory VR experiences. Participant 1, for example, discussed how the external sensors, physical elements, sense triggers, as well as adequate degrees of freedom and calibration come together for the user. These allow the multisensory experience to be positioned to best propel the system’s functional and narrative goals from the practical world to virtual world. This careful multimodal joining is a central critical factor most of the artists emphasized in terms of the importance of “suggestions” or “intention of interaction” (available as sub-theme and quote samples in Table 20) in aesthetic design to guide users in virtual spaces. Such rhetorical suggestions help users stay on task and feel present to focus on the experiences in the environment.
### Table 20.

**Multimodal Considerations Through Phases of Development**

<table>
<thead>
<tr>
<th>Sub-theme 1</th>
<th>Participant Quote Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimodal Considerations Through Phases of Development</td>
<td>“So you bounce it between people that are not directly involved in the development of this, just to get feedback. How is it that interactivity or that participation experience that you kind of envision, how is it going? Right?” (Participant 2)</td>
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<td></td>
<td>“...taking into consideration the intention at interaction, and how can they be addressed within the limitations of the technology and the space because if you don’t, if you don’t use that, then your experience kind of falls short.” (Participant 2; p. 3)</td>
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<td></td>
<td>“There was suggestions, whether they were implied or direct, at many points along the way, whether there was signage, letting people know how to interact with something, using pipe and drape, so as to direct the flow of how people are going to experience the physical space, setting up a projection of the virtual space that people were inhabiting with the headset behind them, so that other people in the space could see what they were seeing, you know, strategically putting, you know, couches in certain locations, so you could have the right angle on things.” (Participant 1; p. 7)</td>
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</tbody>
</table>

The artists also provided examples of design challenges they faced. For example, when multimodal design methods failed, users broke from immersion, were confused without a full sense of embodiment, or failed to notice engageable narrative elements, thus rendering the elements useless. Each of these examples made the experience less immersive for the user. The role of artists, as Participant 2 highlights, throughout the creative process of designing multisensory VR experiences, should focus on 1) the needs of the users and 2) the desired experience before technical modalities are considered. The artists stay mindful of the different ways in which users might interact with multimodal components in fine combinations. In addressing the needs of the user, they stressed the importance of crafting and tailoring experiences to different needs and preferences by always testing modalities at various touchpoints throughout phases of development.
5.2.2 Co-construction Through Composition Phases

The artists in this study affirm that knowledge-making and knowledge framing in virtual spaces involve a complex interplay between materiality, embodiment, and experience. They emphasized the importance of creative experimentation and adaptation in the face of emerging media technologies and capabilities. Each artist, in their own way, also stressed the importance of gaining experience and applying experimentation and adaptation in their creative process a collaborative effort. As excerpts in Table 21 demonstrate, they acknowledged their own strengths and limitations in their development teams in terms of their individual literacy levels and expertise or fluency with technical media. Artists framed their ability to work within and learn from their teams, but also to co-produced knowledge-making and knowledge framing in a similar fashion through collaboration with the users. Importantly, artists also extend these considerations of co-construction with the user when they spoke of creating inclusive virtual experiences. They factor in users’ needs and limitations to co-inform the artists’—and the team’s, by extension—decisions and methods applied during development and testing phases.
Table 21.

Co-construction Through Composition Phases

<table>
<thead>
<tr>
<th>Sub-theme</th>
<th>Participant Quote Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-construction Through Composition Phases</td>
<td>“So there was lots of different give and take between the engineering side and the creative side. And what was so positive and wonderful about the experience for all parties was, I got to put on an engineer’s hat every once in a while, and they got to put on the creative hat every once in a while. So it forced us all to have plasticity in the way in which we were approaching the project, which was great.” (Participant 1; p.s 4-5).</td>
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<td></td>
<td>“You’re the first user of the piece, yes.” (Participant 2)</td>
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<td></td>
<td>“I feel like part of me is really adverse, like I, part of me really doesn’t want to give any instructions, I feel like part of me wants to just create an experience where people are, it’s a sandbox people kind of free to do whatever they would like, in the first experience that I made. You know, we gave people verbal instructions. So we there’s a sort of onboarding stage where you know, you’re putting the trackers on people, you’re putting the headset on a person, and this is an area actually, that doesn’t get discussed a lot when it comes to VR experiences is the, the before you’re in the experience only after you’re inexperienced.” (Participant 5; p. 9)</td>
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</table>

Each of the artists also touched on examples demonstrating how multisensory VR can provoke visceral reactions, impacting how users understand the relationship between knowledge, emotional memory, and embodiment. Knowing which aspects or elements will elicit a positive or negative experience or response requires working co-constructively throughout phases and again, relying on multi-touchpoint user testing to adjust and recalibrate. The user, in this way, is integral to co-construction throughout the build process. As Participant 2 affirms, the artist becomes “the first user of the piece” (see Table 21); in many ways, this is a pathway to co-construction. There is an exchange of networked experience within a team that 1) emerges in iterations of testing, then 2) extends to (staying attuned to) the user, and finally 3) ensuring the success of the final interactive environment. Such co-construction assists with overcoming digital literacy constraints and more
closely bridges gaps in inclusive accessible knowledge-making, because it is informed by users rather than untested assumptions on the part of the artists or their team.

5.2.3 Invention in Composition & Form Through Sensory Methods

Advancements in technology provide artists the ability to expand and push the boundaries of a media’s possibilities beyond space, place, color, light, sight, touch, texture, smell, and sound. The artists I interviewed conveyed the various ways in which they consider sensory composition and form to create successful multisensory VR experiences. It is a distinct process of sensory invention toward persuading the users. The artists each highlighted the importance of inventiveness and innovation in content and design. VR aesthetics combined with human sense memory offer a level of creative freedom for the artists that they don’t find possible with traditional media. Multisensory virtual media allows them to create alternate realities without being confined by physical laws such as scale, gravity, and physics. As demonstrated by Participant 3 (see excerpt in Table 22), artists also placed high importance on carrying over the playful or powerful possibilities of aesthetics and sensory elements from traditional media, such as lighting, shadows, and temperature. In these cases, the compositional decisions the artists make have a direct and significant impact on the user’s sense of presence and immersion in a fully formed material and virtual experience.
Table 22.

*Invention in Composition & Form Through Sensory Methods*

<table>
<thead>
<tr>
<th>Sub-theme</th>
<th>Participant Quote Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Invention in Composition &amp; Form Through Sensory Methods</em></td>
<td>“So basically, throughout the years, you have adapted your behavior to fit that technology, not the other way around.” (Participant 2; p. 9)</td>
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<td></td>
<td>“And during the experience, they were using a scent creator. And the whole premise of it is that you are the seed that you just planted, you start under ground. So you can smell soil, you’re smelling soil, and you’re looking around in the VR and you’re seeing that there’s like big worms in the ground next to you. And then you feel a vibration under your feet and in your chest. And you start to lift out of the ground. And you can look at your arms and your arms are actually sprouted leaves that are having and then you’re watching yourself grow and you’re getting farther off the ground. But when you look down, you see that you are rooted in the ground and you’re becoming a tree and it’s a very, you know, sped up experience but not so sped up that you feel nauseous.” (Participant 3; p. 5-6)</td>
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<tr>
<td></td>
<td>“[S]cenario consistency … like a piece of information becomes more real, when it’s validating or validated through multiple senses. So if you can see something in 3d, it’s convincing. But if you can also hear it, it’s more.” (Participant 4; p. 4).</td>
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</tbody>
</table>

Additionally, most of the artists noted that the creative process in multisensory VR can be quite different from traditional media. They assert that it is freeing for most of them, requiring a different approach to traditional media’s fine balancing act between aesthetic considerations, invention, compositional intent and design constraints. In order to overcome constraints, they indicated the importance of prioritizing user engagement and experience testing throughout the design process. They also frequently assert their own creative explorations or imaginative visions with the technology to see what works and what doesn’t. Whether through tracking, procedural generation, or allowing users to explore the space to get a sense of scale and their own body within the environment, for example, the artists stay attune to how framing and reception of aesthetic sensory tactics can potentially detract from or enhance the overall experience. As a tactic outside of VR, several of the artists also routinely stayed hyper-aware of their own sensory experiences in
practical reality and used these sense memories to inform their work, harnessed by the artists as later source material for invention within the multisensory VR media’s possibilities.

5.2.4 Agency Through Accessible Narrative Reception & Framing

It became clear in the second phase of analysis that the artists prioritize methods that provide the user a sense of agency to further enhance accessibility and intuitive interaction when composing multisensory VR experiences. They frequently push against technology to allow for enhanced agency, particularly with procedural affordances to enhance narrative representation. Whether within the multisensory VR experience or during the onboarding/offboarding process, artists provide suggestive aesthetic narrative framing or clear instructions to users to act as accessible guidance. In this way, artists engage cognitive affordances of memory in their VR compositions, as the quotes in Table 23 demonstrate, particularly in terms of combining senses with narratives to agentive effect.
<table>
<thead>
<tr>
<th>Sub-theme</th>
<th>Participant Quote Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency Through Accessible Narrative Reception &amp; Framing</td>
<td>“...well, should we give agency to the user to choose their representation, but then as soon as you do that, it opens up a whole host of technical problems of how do you allow that to happen? How do you enable people to do that, without creating a sort of barrier into entry into the actual work itself, right?” (Participant 5; p. 9).</td>
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<tr>
<td></td>
<td>“So that when they came around this imaginary corner, they would feel the particles touch, you know, blowing on their skin. And they, and then I performed some dialogue, encouraging them to reach out and see if they could, you know, grasp that virtual book. And so and so yeah, in designing that I just really wanted the reality and the virtual reality to actually align in a way that made sense to their senses.” (Participant 3; p. 2)</td>
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<td>“Another one is having some sense of agency within the space. So whether that’s just like picking up objects or, you know, and that this ties into the movement, right positional information, moving through a space that gives you a sense of agency within that space, which I think, again, deepens that sense of presence or immersion within the virtual environment.” (Participant 5; p. 6)</td>
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<td>“We can create a lot of interesting sensory inputs that can guide their experience and tell a story...[they’re looking] through a loop, they’re inside a building, and they look through a little peephole, maybe you want to have a very light breeze, you know, going, going through a little cardboard cutout hole, when they go to look at just to give them the sense of like, ‘Oh, I really am inside a building right now.’” (Participant 3; p. 7)</td>
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</table>

The artists use sensory cues and design choices to construct a narrative with content and form, prioritizing the importance of user agency and accessibility in the design of their compositions. They combine the use of olfactory cues, engaging users with material objects, scent creators, reflections of oneself through time in VR, cartoonish unrealistic visual aesthetics, or pressurized air triggers, for example. Such combinations create a deeper sense of agency, engagement and playfulness for the user, triggering curiosity and a sense of freedom to explore a different world as they wish. The artists’ perspectives affirm that the design of virtual spaces is intentionally meant to negotiate and prioritize agency for the user. These spaces are designed to
create certain moods or emotions based on how narratives are expressed and how the user is allowed to progress. The agential flexibility of virtual environments can be carefully balanced to suit the needs of the experience goals and the user, frequently crafted by the artist on a spectrum between giving the user zero information versus giving the user the proper framing and reception so as to provide the impression of control over the experience.

Aesthetic elements of new media impact interpretation and usability. Turnley contends analysis should not only consider how conventions shape meaning but also interrogate what perspectives are embedded in or excluded from prevailing aesthetic norms. She argues that becoming literate in a medium involves an orientation towards its particular informational architectures. Turnley also focuses attention on how a medium’s archival dimension intersects with issues of power, institutions, and ethics in analysis of architectural elements that organize a medium’s circulation. In addition, when media become associated with certain intellectual abilities, they can reinscribe problematic social hierarchies in their composition. By examining how digital networks fashioned in composition by the artists are facilitating collaborative knowledge construction, multisensory VR’s epistemological affordances privilege certain worldviews the artists work to overcome.

5.3 THEME 3: SOCIAL & SUBJECTIVE AGENCIES

Mutually shaping relationships between media and user communities, the social dimension comprises the metaphors, images, and narratives that circulate about a medium as well as the patterns of association and social practices that develop through it (Turnley, 2011, pp. 133-134). A medium’s cultural roles are co-constructed with its social milieu, and its function in social spaces have the potential to disrupt or reinforce hierarchies. This outward-facing dimensional view closely relies on the internal-looking perspective of the subjective dimension. Turnley defines the subjective dimension as the user identities and selfhood ideologies interfacing with and mediated through a medium (pp. 136-137). These are the patterns and expectations artists include that
impact user identity, selfhood, and positionality as enabled by media choices, offering allowable ranges of action that also embed socio-cultural assumptions.

The artists responses suggest there are various social dimensions and factors contributing to subject identity formation in immersive multisensory VR settings. They placed a significant emphasis on the roles that interface design, user interaction, and sociocultural contexts play in their compositional decision making and methods. This includes how subject formation for the user closely involves the attunement of the artists’ attention to agentive interface design. Several factors they mentioned point to persuasive and aesthetic expectation, assumptions, and motivations they implement to lead the user toward certain goals as having particular affordances and constraints for this category. The remediation tactics they apply to their compositional framing involved not only a social inclusive focus on interaction and associations, being highly attuned to the user’s positionality, but also their own positionality as artists/creatives within a community of practice.

In this section, I will cover thematic insights on the ways social and subjective agencies are embedded in the artists’ considerations and processes. These include 1) how artists position themselves in relation to how they position the users of their compositions, 2) their interface design decisions that promote subject formation, identity construction and agency, and 3) how they harness persuasion and expectation to enhance agency.

5.3.1 Artists and/as User Positionality

The subjectivity and social contexts of both artists and users are critical factors that fashion an interplay in multisensory VR environments. Throughout my conversations with the artists, they displayed an understanding and acknowledgment of aspects such as 1) fostering empathy, 2) considering exploration, and 3) striving for connection with users during their development phases. To create virtual experiences that resonate with users on a deeper level, the artists step into the user’s shoes. As the excerpts in Table 24 demonstrate, this method plays a critical role in shaping the build’s final successful UX. The artists interviewed were each acutely aware of their
positionality to the user as multifaceted—they create virtual worlds that directly influence users’ perceptions, emotions, and behaviors. Their responses and reflections demonstrated that their own subjectivity plays a significant role in the design of VR environments. Likewise, their personal experiences, perspectives, cultural backgrounds, and professional focus areas shape their creative choices, which in turn impact the user’s experience. Symbols, narratives, or aesthetic elements from their own experiences that they choose to incorporate may resonate differently with users from diverse backgrounds or with different abilities. The artists also showed a deep awareness of their own experiential values and project goals they prioritized when designing multisensory VR experiences as causing limitations or, the inverse, being too lofty or ambitious and not translating well for the user.

### Table 24.

*Artists and/as User Positionality*

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<thead>
<tr>
<th>Sub-theme</th>
<th>Participant Quote Samples</th>
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<tbody>
<tr>
<td>Artists and/as User Positionality</td>
<td>“...virtual architects should also be, you know, thinking about human psychology when they’re creating for humans or making suggestions for users.” (Participant 3; p. 11).</td>
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<td>“It’s funny because, you know, you think, like I could describe it to you like this verbally [or] write it down or whatever. ...But [it’s] a different experience when [you] actually, you know, have the headset on. And you’d think that it’d be kind of unsettling... I was so immersed within an environment that I didn't notice at first...but I didn’t have a representation of a body.” (Participant 5; p. 4).</td>
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<td>“And the other part that you can do is you can basically try a little bit of experience acting. So if I was in the environment, you know, how do I see myself doing this things? You know, what kind of information would I consider that wouldn’t be available in the space and then from there, you can start using some of these software tools. And you very quickly work on those experience engagements, not necessarily on the look and feel, right, or even the correct spatial auditory or you just want to very quickly mock up something to test, if that mode of interaction that you can have. first act it out. How effective would it be? Right?” (Participant 2; p.s 8-9)</td>
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To better address their users, the artists also valued drawing from research in human psychology, design thinking, and trauma-informed practices, as a few examples provided, to tap into greater user empathy when composing. Acknowledging that a composition can’t be their own self-indulgent self-expression, they are “creator” but also look to the user to inform what can and should be created or included. As a key decision, the artists balance the wider contexts of a project’s goals with the users’ insights to drive their design motivations or choices and the intended agential impact on the user. The artists were keenly aware that, for the users, perception and engagement, interpretation, action and reaction are dependent on successful design choices and technical execution. Users may find some aspects of the environment familiar or relatable, while others might challenge their assumptions or provoke new insights, making the relationship between the artists and their users in multisensory VR dynamic and reciprocal. This ongoing exchange allowed the artists in this study to refine and adapt their designs to better cater to the diverse needs of users and create more meaningful, inclusive, and impactful experiences.

5.3.2 Interface Design towards subject formation, identity construction & agency

The artists were keenly aware of the vital role they play in shaping the user’s subject formation, identity construction, and agency through interface design choices in multisensory VR composition. Interface design in these compositions directly influences user subject formation by defining how users interact with and perceive the virtual world. Artists shape the user’s sense of identity and agency by carefully crafting the elements of the interface, such as avatars, interaction methods, and sensory feedback, to craft a sense of immersion and presence for the user. The quotes in Table 25 are a few examples of the ways the artists communicated that their methods and choices specifically made when designing interfaces. At times, these choices in development resulted in key affordances or immersion-breaking constraints for users. For example, providing users with accurate avatars or movement representations of themselves enabled them to 1) feel more empowered to explore and 2) have a sense of agency over constructing their identities or
choosing narrative outcomes within the virtual environment, free from certain constraints of the physical world. Yet limiting the range of options and representations available, according to a few of the artists interviewed, negatively affected users’ identity construction processes, ultimately breaking the immersion or narrative assumptions the artists had intended. Again, most of the artists see this as a locus of experimentation to find out what works between decisions, execution, goals, and experience.

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<th>Sub-theme</th>
<th>Participant Quote Samples</th>
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<tr>
<td>Interface Design towards subject formation, identity construction &amp; agency</td>
<td>“Why do I feel less present in certain platforms and more present than [in] others? And I kept like inquiring with myself about that because there were specifically like ones that I was just like, wow, something feels more flat about this experience, even though it’s social.” (Participant 3; p. 4).</td>
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<td>“But as an art project, I feel like a lot of it is just guided by my own sensibilities, aesthetic sensibilities, and also guided by often sort of underlying conceptual framework that I’m or a question that I’m just kind of exploring through the work. So if people do the experience, and have wildly different sort of experiences, I take that as a good thing, right? Whereas I wouldn’t necessarily take that as a good thing if I was building a tool, for example, you know. So I think that that, you know, that’s an important sort of question to consider when creating a work right like is this Work, something, you know, is there a sort of a utilitarian purpose to this? Or is it more of an open ended question? And are we okay with having some ambiguity in terms of the user experience?” (Participant 5; p. 8)</td>
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<td>“You’re the cause and effect.” (Participant 2; p. 3)</td>
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In a similar way, most of the artists explicitly referenced agency in multisensory VR, implying that it is shaped by the ways in which the artists design user interactions within the environments. By creating intuitive, accessible, and engaging interfaces, the artists conveyed their desire to foster a sense of agency in users, allowing them to actively shape certain experiences.
(though not all) within the virtual world. For the artists, staying attuned to opportunities to introduce agency boosts the user's social understanding of expectations and interactions through affordances the artists prioritize in their design choices. In this way, the artists exhibit agency as well. Whether through compositional inclusions of sense triggers, narrative elements, visual themes, and/or sound aesthetics in a VR environment, the artists' decisions about how/when to provide users more agency in a space or how/when to guide and influence the user's choices ultimately resonates with users on a deeper level. This push-and-pull at agency is a priority for the artists with which to experiment. Through this nuanced push-and-pull, the user also engages in more empathy, exploration, self-expression and understanding, leading to deeper subject formation and identity construction.

5.3.3 Persuasion, Expectation and Agency

Although the use of persuasive tactics was minimalized in the survey results, interviews performed with the artists gave me an opportunity to explore this particular facet further. It is apparent, from the many examples the artists provided during interviews, that they do employ various compositional and technical methods and tactics specifically to persuade users in multisensory VR environments. As a few of the excerpts in Table 26 reflect, whether “convincing,” “suggesting,” “guiding,” “informing,” “instructing,” “forcing,” or “achieving desired results,” the artists’ language was steeped in methods that are meant to persuade. There is an interplay here between user expectation and agency closely tied to persuasive elements the artists necessarily—and with intent—include. In this particular context of multisensory VR environments, persuasion refers to the deliberate use of different sensory inputs and design decisions to steer the user towards a particular outcome or behavior, such as learning or engagement.

The inclusion of persuasive appeals plays a significant role in setting the stage for and compelling user expectations. For the artists, when designing a composition, persuasive elements enable them to guide the user by combining sensory stimuli and design decisions (taking into
account a balance between the amount of input and stimuli). The various ways they choose to persuade users—for example, utilizing sensory cues, sound triggers, or visual design elements—are meant to guide or motivate users to particular ends. Each artist drew from expert awareness and understanding of user motivations, conveying how they use color, motion, vibration, shadows, smells, sound, or haptic feedback to direct users’ attention or create both functional and emotional responses. Thereby, they guide user actions and decisions within the virtual world.

Table 26.

Persuasion Expectation & Agency

<table>
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<tr>
<th>Sub-theme</th>
<th>Participant Quote Samples</th>
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<tbody>
<tr>
<td>Persuasion Expectation &amp; Agency</td>
<td>“So you need to include some level of participation, even in VR experiences that you kind of directing them to the outcome you want them to get to.” (Participant 2; p. 7).</td>
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<td>“That sort of engages them with the environment to begin with. And then after that initial sort of push, you know, it’s a gentle push down this hill, and hopefully, the experience takes on a life of its own right, hopefully, the experience itself unfolds and that the, the setup is engaging enough that it that that you get pulled into it, regardless of you know, without any instructions without any sort of over sort of goals or or endpoint, if you will.” (Participant 5; p. 10)</td>
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<td>“But they were being visually told there’s something slightly slightly dangerous right here. And it wasn’t like tall fire, it was very short. But it was like, you know, they know what fire is in the real world, they know it’s slightly something you need to be careful around. So Oh, they’re gonna be careful around this segment of the experience. Exactly. So those are things outside of the experience that I was, you know, mixing realities to inform the experience. Also, inside the experience, you’re informing the user of how they’re going to be using the space.” (Participant 3; p. 10)</td>
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<td>“Well, I would say that the most important thing to consider is scenario consistency. And then I would say that the piece of information becomes more real, when it’s validating or validated through multiple senses. So if you can see something in 3d, it’s convincing. But if you can also hear it, it’s more. And if you can touch it, then you have a bit of haptic feedback, even more so. And each layer you can add, I believe it creates more and more convincing for you, but the smallest inconsistency could cause everything to trickle down because your brain can figure out that it’s not real.” (Participant 4; p. 4)</td>
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In addition, the artists each expressed how they anticipate users’ needs and create experiences that align with those expectations, such as 1) designing environments with socially familiar elements, 2) creating intuitive interaction points, or 3) incorporating references that resonate with users. As touched on previously, artists balanced creative invention with meeting user expectations to ensure believable and engaging experiences as well as safe experiences that are not overwhelming. Utilizing motion devices, such as those Participants 2 and 4 employed in pilot training, enables users to feel authentic sensations. Providing a believable virtual body representation and corresponding accurate body movements, for example, was a common first step toward compelling user agency. Participant 3 also described a design strategy to guide the user’s attention to specific elements within the VR environment by using visual cues like a pulsing glow to direct the user’s gaze towards certain objects or areas, thereby increasing the chances of the user engaging with those elements. Such strategies create participatory narrative experiences (rather than ones where users are simply observing). Artists intentionally add elements that encourage the user to engage with or avoid aspects of the environment, thus promoting deeper user involvement.\(^\text{13}\) In this way, what the artists suggested in the cases they conveyed is that users are also persuaded towards the perception of agency when it is actually the artist’s decisions that are affording or constraining in a display of agential give-and-take. Many of the persuasive tactics the artists mentioned, often for rather practical reasons, are meant to simplify or clarify the UX goals. The artists are aware they influence the range and types of agency they afford to users. It is their goal to enable users to feel authentic sensations and provide a higher sense of presence in order to fashion a believable experience that evokes both trust and presence on the part of the user.

\(^{13}\) Participant 5 expressed they had become more experimental with persuasion and agency, recently allowing experiences they work on to unfold naturally, without overemphasis on goals or endpoints. This approach lets the experience unfold on its own, with the user given free agency without any sort of goals or endpoint.
Rhetorical throughout, the social dimension encompasses not just technical capabilities for connection and persuasion but also issues of power and inclusion in how virtual spaces are structured and composed for a user. Turnley contends analysis of a medium should account for how value and authority get constructed in particular scenes of practice, such as those multisensory VR artists inhabit. Between the social and the subjective, these findings affirm her assertion that user agency must be understood as emerging through fluid positionalities across various contexts, wherein subjective roles are constructed in relation to cultural formations.

5.4 THEME 4: ACCESSIBILITY & INCLUSIVE PRACTICES

In approaching initial data collection and coding from the interviews I performed, I frequently cross-checked my research questions, notes, and assumptions from survey results with the emergent themes and the dimensional framework used. Accessibility and inclusive practices were unexpected thematic categories as they were outside of the explicit seven-point dimensional framework of mediology. This thematic set represents a new dimensional area for the framework. While Turnley addresses access and issues of inclusion in relation to examining media, findings demonstrate it as a distinct category for addition. Though my questions were not framed to address these factors explicitly, practices and considerations of access and inclusion were referenced time and again by the artists interviewed, either on their own terms or in conjunction with the previous three thematic categories I discussed above. They each demonstrated in their responses that these factors are central to their decisions, methods and tactics.

As integral touchstone facets of the artists’ approaches to composition throughout every phase of development, and as each of the thematic categories integrate these sub-theme facets, it was perhaps the most foundational discovery of this study to find that the artists viewed multisensory VR’s potential as media that can potentially do the most to advance inclusive technological design decisions and accessible VR practices. They not only see their motivation as building immersive sensory environments for general audiences but specifically (and deeply)
consider a range of user needs, neurodiversities, and disabilities. Whether conceptualizing a build, composing an environment, or applying integrated technologies, I detail in this section the artists' thematic references about design practices they use to 1) balance technological and economic limitations toward greater accessibility and more inclusive production practices, 2) address the needs of diverse bodies, 3) advance meaning-making and literacy for the user through accessible narratives methods, and 4) incorporate participatory design techniques that ensure more welcoming world-building.

5.4.1 Embracing Inclusivity: Balancing Affordances and Constraints in Design

Each artist interviewed expressed that, by considering both affordances and constraints in their design and production practices, they strive to create virtual environments that are more inclusive and accessible to a wider range of users. They assert, as demonstrated in the quotes in Table 27, that such considerations enhance the overall user experience and also contribute to their own abilities to develop more effective and innovative multisensory VR products for all users. Participants 2 and 3 specifically highlighted the importance of considering the UX from a perspective of inclusive design practices to balance and inform their artistic and conceptual decisions throughout development phases. Most of the artists pointed out specific challenges and opportunities presented by incorporating inclusive design thinking methods, centered around consideration of users’ physical and emotional comfort as well as their diverse accessibility needs. In examples, they emphasized the importance of creating experiences that are least likely to make users feel nauseous, or mapping implied interactions and instructions in ways that are clear and easier to understand rather than relying only on intuitive narrative assumptions or aesthetic connections alone to convey directions. In addition, the artists also stressed that they pay close attention to users’ sensory experiences in virtual spaces in order to better understand the role of aesthetic sensibilities and cues incorporated into a build’s frameworks (whether utilitarian or open-ended) to guide the design decisions around the expectations of the users’ needs.
The artists affirmed that their challenge main is to figure out how to 1) balance aesthetic choices and project goals with inclusive design principles, 2) ensure that the end result is engaging, meaningful, and accessible, and 3) consider a range of physical, cognitive, or technological constraints. To address these constraints, the artists reaffirmed their ability to remain flexible, adaptable and creative also helps them accommodate users with different abilities, rather than simply forcing users to adapt an environment of generic tactics and presumptions.

In production, depending on whether the end users of the environment—as defined by stakeholders—will be a specific audience or open-to-all, the artists also adopt research practices to investigate different user abilities, backgrounds, and preferences during development. They primarily prioritized accomplishing the end goals of a specific project but also the safety, a sense of joy or wonder, and comfort for the user. A few application and design methods they mentioned

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<th>Sub-theme</th>
<th>Participant Quote Samples</th>
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<tr>
<td>Inclusive Production Practices: Affordances &amp; Constraints</td>
<td>“You know, we had it set up [so] that if you had certain disabilities, you would still be able to access the virtual space. Obviously, this would have been problematic for anybody who was visually or hearing impaired. We did not take it that far. But yeah, that was critical to the whole exploration.” (Participant 1; p. 6).</td>
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<td>“I would say nowadays is to make inclusive design part of your design thinking and design considerations, not because it’s going to be used by a person that’s hearing impaired or visually impaired. But because considering these things, allow you to see other possibilities to make it simplified, and have a more clear message or clear experience for the user.” (Participant 2; p. 13)</td>
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<td>“You know, people, there are certain people that just get motion sickness very, very easily. But it was interesting, in the beginning of my experiences with VR, and demoing, how many people in the general population would get nauseous, but I started to quickly understand why a large chunk of people were getting nauseous, and it wasn’t them. It was the experiences that people were creating.” (Participant 3; p. 9)</td>
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using to overcome limitations include options for different sensory inputs, customizable avatar embodiments, adjustable user interfaces, alternative input methods, designing intuitive interfaces, and offering adjustable difficulty levels.

5.4.2 Navigating Accessibility: Addressing Bodily Needs in Production

As stated previously, each artist participating in this study demonstrated a strong commitment to inclusive design practices, specifically that cater to diverse physical bodies and abilities. Yet, while they framed their focus on equity and inclusion as an affordance for them conceptually, they also pointed out the limitations of technologies and budgets they frequently face to successfully accommodate accessibility and diversity. The artists continually learn from users with diverse abilities. Most of the artists emphasized the importance of addressing bodily accessibility with their teams early in the design process to create environments that can adapt to users’ diverse needs. They especially underscored how critical it is for them to remain aware of different bodily experiences, as the quotes in Table 2 highlight. Focusing on accessibility, as a couple of the artists pointed out, also offers them an opportunity to push their creative invention and break free from the constraints of designing for normative body types, implying that multisensory VR in particular allows for the exploration of new areas that would otherwise remain uncharted if designers only consider able-bodied users.

14 Each artist recognized the value of considering the unique constraints and affordances of the media they employ, as well as the physical and virtual spaces in which the experiences they work to compose take place (frequently locked to one specific location at a time). I have emphasized this in previous sections of this chapter, however, this section focuses the topic specifically on users’ bodily needs.
In more specific ways, the inclusive design practices some of the artists mentioned applying were focused on color contrasts, lighting adjustments, enhanced body tracking, adaptable task-oriented tool use, and guided onboarding/offboarding transitions. A couple of the artists mentioned incorporating more experimental multimodal interactions and testing multiple means of interaction, such as visual, auditory, and haptic feedback, to cater to users with different sensory preferences and abilities. To inform design decisions, most of the artists involve individuals with diverse abilities and backgrounds in the design and testing process to ensure they receive feedback and perspectives from a diverse range of users they aim to accommodate. Alternative input methods were also brought up by a couple of the artists as tactics they had implemented - eye-tracking, voice commands, or adaptive controllers - to accommodate users with varying physical abilities.
Other tactics the artists mentioned as critical to addressing more accessible bodily needs include: 1) designing clear and intuitive navigation systems or offering adjustable difficulty levels and pacing options; 2) allowing users to tailor the experience to their personal preferences and abilities; and 3) ensuring that they've provided careful guided on/off-boarding and tutorials to assist users with different levels of familiarity with VR technology and sensory interactions. The artists affirmed that they strategically focus on basic bodily accessibility as an ongoing aspect of project iteration, with each stressing the importance of continuously iterating, testing, and refining the VR environment based on user feedback and what can be done to navigate considerations and address these needs in production.

5.4.3 Interactive Storytelling: Fostering Knowledge Literacy through Accessible Narratives

As I previously pointed out in this chapter, themes in the artists’ responses suggest that incorporating narrative elements and embodiment in multisensory VR experiences enhance knowledge-making and acquisition. These incorporations also enhance accessibility and inclusive interactive design applications. The artists harness a blend of storytelling and aesthetics to guide users between practical and virtual reality through sensory-based associations and interactivities. According to most of those interviewed, the careful integration of such components significantly enhanced participation, immersion, and engagement. The examples the artists conveyed (samples shown in Table 29) suggest that they, as creative practitioners, found great satisfaction in incorporating narrative elements into their compositions but deeply considered users’ literacy levels with VR to make narrative elements as accessible as possible.

In both interviews and surveys, the artists affirmed narratives as fundamental to VR social communication, as storytelling is deeply embedded in daily lives and shapes ways of knowing and interacting in practical reality. For example, Participants 2 and 5 both emphasized the importance of incorporating different levels of participation in their designs and suggested that narrative construction is closely tied to 1) users’ embodied selves, 2) perception of place, and 3) learning the
world through sensory experiences, all of which can then be benchmarked as areas of greater focus when designing multisensory VR environments. Critical to all three of these narrative construction considerations when composing is addressing different bodies, diverse abilities, and alternate ways of learning. A few of the artists also touched on the importance of considering the user’s experience and knowledge levels when designing an experience, re-emphasizing the need for collaboration between artists and engineers to ensure that technical decisions do not hinder accessibility needs. This point, again, highlights the hierarchical nature of knowledge-making and knowledge framing, where certain types of knowledge, such as technical expertise on a team, may be privileged over others that can introduce and advise on more accessible narrative practices.
Table 29.

Interactive Storytelling: Fostering Knowledge Literacy through Accessible Narratives

<table>
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<th>Sub-theme</th>
<th>Participant Quote Examples</th>
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<tr>
<td>Interactive Storytelling: Fostering Knowledge Literacy through Accessible Narratives</td>
<td>&quot;I think it’s important for a creative person, if you’re going to be putting people who do not have experience in the virtual realm, into this environment, I think it’s very important that they have a guide, whether it’s a digital guide, or an actual person standing by I just think it’s, I think it’s very important because it’s very easy to bump into things or fall down. And, it’s disorienting, for sure.&quot; (Participant 1; p. 7).</td>
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<td>&quot;,..you know, the most successful ones are the ones that you engage people that have limited experience in virtual reality. Right, because those are the ones that don’t have the prior AP priori knowledge, right? They haven’t been used to, you know, these that, it doesn’t mean that they’re going to be able to do it right away. Right, but the learning curve should be low enough that they can adapt quickly. Right. So that’s a good sounding board, you bring people that that are not that familiar, or don’t spend all their days with this technologies. Yeah, to kind of give you some feedback, because then you’ll find that what you thought might have been useful, was informed by your prior knowledge.&quot; (Participant 2; p. 9).</td>
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<td>&quot;Our brains are really powerful at creating meaning and accepting things. Absolutely. And protecting, protecting us.&quot; (Participant 3; p. 10)</td>
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<td>&quot;For me, it was a very collaborative process as an artist who does not have a deep technical background or understanding of programming language and nuance. A large part of it was working with a team in order to execute and generate these virtual spaces. That would be not only accessible to the general public, but also safe, which was very important. There, I know there’s certain whether it’s stimulation sickness or, or other instances, where, because it’s fairly young technology, some people have unpleasant experiences. So part of the things we were creating, we wanted to make sure that we could minimize anyone’s negative experience and mitigate that from happening in the beginning. So we even had a questionnaire, before we would let anybody enter the virtual space, it was very important for us to make sure that they knew the kind of conditions they were getting into.&quot; (Participant 1; p. 2).</td>
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Additionally, a common tactic the artists mentioned applying was utilizing sense framing to heighten embodied and material experiences in a given VR narrative. To link a user’s body to the immersive experience through aesthetics rather than written or spoken narratives, artists simulate, mimic or augment everyday lives in order to provide a more complete picture of a given experience.
Each artist suggested this part of the composition process requires not just creative invention but empathy. Crafting empathic narrative experiences allows users to step into the shoes of other beings and to experience things that are impossible in the physical world - being a tree and experiencing the sensation of growing (Participant 3) or connecting with past civilizations (Participant 2). This approach, according to the artists, goes beyond traditional narrative qualities to encompass a full range of sensory factors, creating immersive worlds filled with associative metaphors, mood, tone, motivation, progress, resonance, and resolution. This also involves continuously testing scenario consistency, specifically when narratives are reinforced by combining senses triggers in tandem for a greater distribution of knowledge through a story’s design. Such compositional decisions require careful consideration of the user’s sensory and cognitive capabilities balanced with the artist’s own technical and artistic expertise. The artists are aware that the technological VR environment can expand cognitive capabilities beyond biological limitations, but they consciously compose associations and interactivity from the outset of the design process with accessibility in mind rather than only for normative users with advanced aptitude and knowledge of VR.

5.4.4 Participatory Design: Crafting Welcoming Immersive Worlds

As an extension on the previous three sub-themes, a common refrain among the artists interviewed was the importance of creating multisensory VR experiences that are equitable, accessible, safe and welcoming for users. While some pointed out the non-neutral constraints of VR technology, they all highlighted considerations and ways of overcoming limitations to create more accessible and welcoming worlds. For example, as evidenced by the quotes in Table 30, while Participant 4 touched on how VR can create experiences that are not possible in practical reality, thus challenging users’ expectations and understanding of the world, Participant 3 emphasizes the importance of welcoming users back to reality after a VR experience, acknowledging the need to shift body perspective and offering tools to help users reorient themselves. This reflects their use of
trauma-informed practices—a consideration for users’ well-being to counter the non-neutral aspect of VR, which tend to have physical and emotional impacts on users. Participant 1 also frequently centered safety when creating physical-to-VR spaces, particularly for those who may be susceptible to negative experiences like sensory overload or simulation sickness.

Table 30.

<table>
<thead>
<tr>
<th>Sub-theme</th>
<th>Participant Quote Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participatory Design and Welcoming World-building</td>
<td>“I begin by approaching any piece with the idea of these trauma-informed practices and concepts of accessibility, and also of, you know, making it accessible to people who may be different, differently abled, or neurodivergent.” (Participant 3)</td>
</tr>
<tr>
<td></td>
<td>“I think the most important tactics were, again, it was very much focused on people having a safe, enjoyable experience. So entering the space, testing things out, at times, working with my collaborators to kind of dial it back a little bit, because the instinct from the programmers perspective was to kind of push it as far as we possibly can. And though some of those iterations were fun, they were also I found them to be a little bit of a multisensory overstimulation.” (Participant 1; p. 4)</td>
</tr>
<tr>
<td></td>
<td>“So after you, you kind of create all this series of knowledge that they need to or, you know, whatever the outcome of the experience needs to be - the experience of trying or or looking at somebody going through it, all the different questions and things that from an inexperienced user come up and how to press this, then and only then, then you start thinking about, okay, now I'm going to start to create a model this and the pyramid model of that.” (Participant 2; p.s 10)</td>
</tr>
<tr>
<td></td>
<td>“I let them know that I was going to be taking the headset off. And welcome them back. I always try to when I demo anything in virtual reality, I invite them in. And then I welcome them back out. Because I feel like our brains need a marker to like, note that they are doing a recalibration into different experiences. So yeah, I would welcome them back. And when they would see the book, like they knew they had the book in their hand because they could feel it. But then it was something they brought, it felt like they brought it back from this magical world into reality. So there’s definitely that crossing over.” (Participant 3; p. 3)</td>
</tr>
</tbody>
</table>
In a move to use the technology to foster social connections and interactions, Participant 5 conceptualized ways that the offboarding stage of VR experiences could be made more communal and social, creating a space for users to share their experiences and connect with others during and after an experience. All of the artists emphasized the need for intentional design choices to guide users safely through virtual environments, including accommodating diverse physical abilities and creating clear accessible pathways. In discussing these design choices, they reiterated the need for collaboration and co-creation across different communities of practice—including engineers and, most importantly, users’ feedback—to achieve more welcoming compositions. The artist’s role, as they see it, is not only to create immersive authentic sensory environments by pushing the limits of VR technology but also to guide users in conscious ways through the experience by 1) providing clear communication, 2) creating careful rhetorical gestures, and 3) incorporating clear cues that culminate in experiences that are accessible to everyone, regardless of their physical and cognitive abilities, social-emotional needs, or technical literacy expertise.

5.5 CONCLUSIONS

The artists surveyed and interviewed for this study were incredibly insightful and open to sharing their knowledge and expertise, particularly in the interviews, with responses full of detailed examples, practical technical know-how, and considerations indicative of their theoretical and philosophical thoughts in the discussions we had. The results and analysis of the thematic categories and insights I have presented in this chapter, though they necessitated exclusion of many topics due to the richness of the datasets and coded categories that emerged, directly addressed this dissertation’s primary research questions (see Table 31). These themes and sub-themes also emphasized the discovery of accessibility and inclusion as the artists’ touchstone consideration

15 This example also harkens back to VR’s socio-historical links to cinema, as Participant 5 explained this conceptualization as meeting in a theater lobby, after watching a film with friends, to chat and discuss thoughts about their shared experience.
throughout the many dimensional decisions and design processes in developing multisensory VR environments.

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Sub-themes that address the question</th>
</tr>
</thead>
</table>
| In what ways do artists who design multisensory VR compositions engage dimensions of media in their design practices and decisions? | - Invention in Composition & Form Through Sensory Methods  
- Accessible Interactions in Design & Composition  
- Agency Through Accessible Narrative Reception & Framing  
- Interface Design towards subject formation, identity construction & agency  
- Inclusive Production Practices: Affordances & Constraints  
- Interactive Storytelling: Fostering Knowledge Literacy through Accessible Narratives  
- Participatory Design and Welcoming World-building |
| From the perspective of artists, what are the considerations and processes embedded within multisensory VR design? | - Multimodal Considerations Through Phases of Development  
- Artists and/as User Positionality  
- Overcoming Privileging of Access  
- Co-construction Through Composition Phases  
- Equity, Access, and Inclusion as Supply/Demand Issues  
- Attention to Diverse Needs & Hierarchy Structures  
- Persuasion Expectation & Agency  
- Conditions of Access when Producing (for) Bodies |

My mixed methods approach, using a survey and interviews with multisensory VR artists, yielded valuable insights into the compositional methods, decisions, and tactics utilized in the design of multi-sensory VR experiences. Both technological and economic affordances and constraints play a crucial role in shaping the design of these experiences. Artists work within the limitations of available hardware and software, which influence their creative choices and the quality of the final product. These findings suggest that artists often adapt to these constraints by developing creative solutions that leverage available resources and maximize the impact of the experience. Archival and aesthetic narrative factors also emerged as epistemological drivers that
guide the artist’s creative decisions. Artists create multi-sensory VR experiences with specific objectives in mind, such as communicating a message or eliciting an emotional response from the user. My thematic analysis revealed that artists draw on a range of sources to construct a narrative that resonates with the user. The use of multi-sensory elements, such as sound, touch, and smell, enhances the immersive experience and helps to create a sense of presence within the narrative and to ensure that the narrative unfolds in an intuitive and engaging manner.

Throughout, I have also highlighted, in both broader and more focused ways, the artists’ cornerstone of accessibility and inclusive practices in multi-sensory VR design. They recognized and communicated the need to create experiences that are accessible to diverse audiences, and they employ a range of techniques to enhance immersive experiences for all users, but are acutely aware of the importance of creating experiences that are welcoming and inclusive. By synthesizing these findings, I was able to draw meaningful connections and provide a detailed understanding of the compositional methods, decisions, and tactics utilized by multisensory VR artists.

By rigorously sourcing themes through this second phase of thematic categorizing, I continued to uncover the unique aspects of composing in multisensory VR. I aim to advance this study’s discoveries by incorporating these key findings, as they directly relate to my research questions, to larger theoretical conversations and provide foundational learnings for further exploration. In the next chapter, I complete the tasks of turning output into outcomes, and explore the implications of these findings, relating them directly to this study’s research questions and identifying critical scholarly discussions emergent from these questions and themes. I then connect key significant assertions to how they can inform future research, artistic practice, and the development of approaches or practical applications across fields of study in the final chapter.
CHAPTER 6
DISCUSSION OF THEMATIC CATEGORIES

In the previous two chapters, I provided the results and key findings of the survey and interview data as initially analyzed, followed by descriptions of the emergent themes and categorized insights from thematic analysis performed for this study. My research questions were answered by these findings and insights, composing a more immersive picture of the artists’ personal perspectives and professional practices. Through an iterative process using comparative thematic analysis on the datasets, data groupings became categories, examined and derived to allow themes to emerge. From these thematic categories, I connect several key discoveries in this chapter to respond to this study’s inquiries and to broader scholarly conversations across fields of study and professional application.

In my analysis of the ways artists engage dimensions of multisensory VR as well as their considerations and processes, I initially investigated their survey responses for the following:

1. how and what artists prioritize throughout different phases of development;
2. their thoughts on the importance of different components and properties to composing multidisciplinary VR environments;
3. their expectations and assumptions toward user needs;
4. their decision-making considerations about aesthetic factors;
5. their decision-making considerations about design techniques and sensory tools;
6. how they prioritize varying considerations in their composition process.

My analysis of participant interview transcripts allowed me to more deeply explore for thematic results that yielded the following:

1. the artists’ diverse experiences and how they define and describe multisensory VR;
2. the technologies they use as well as their sensory methods and tactics;
3. their design decisions focused around sensory or aesthetic aspects that primarily factor into the construction, testing, and UX of multisensory VR compositions;

4. how they digitally and physically construct the environment to make suggestions for use or to enable the user;

5. how they prioritize various design methods based on the needs of individual projects combined with considerations of the users, customers, and available resources;

6. how they approach failure of methods and decisions made.

Then, I returned to view my initial analysis through a framework of the dimensions of mediology—technological, economic, aesthetic, archival, social, subjective, and epistemological. I coded the data sets for associative thematic patterns and relationships to derive insightful themes applicable to the ways artists who design multisensory VR compositions engage dimensions of media in their design practices and decisions. I argue that they:

1. engage practices of invention in composition & form through sensory methods;

2. prioritize accessible interactions in design & composition;

3. center user agency through accessible narrative reception & framing;

4. approach interface design towards subject formation;

5. identity construction & agency; use inclusive production practices to address affordances & constraints of the media;

6. harness interactive storytelling to fostering knowledge literacy through accessible narratives;

7. advance participatory design methods and welcoming world-building tactics.

Furthermore, themes also emerged that respond directly to my second research question. My findings reveal that, from the artists’ perspectives, the considerations and processes embedded in multisensory VR design are:
1. multimodal considerations through phases of development;
2. a heightened awareness of user positionality as well as their own as designers of experiences;
3. considerations in their processes that attempt to overcoming privileging of access;
4. processes that center practices of co-construction through all composition phases;
5. considerations of equity, access, and inclusion as related to supply/demand issues;
6. close attention to diverse needs & hierarchy structures;
7. the role persuasion plays in expectation & agency;
8. and conditions of user access when producing virtual bodies while producing experiences for physical bodies.

The results and thematic categories extracted from participant responses to surveys and interviews provided a deeper understanding of multisensory VR’s procedural and functional processes, tools, narrative drivers, user experience and design conventions of form and content from the artists’ perspective. These understandings illuminate comprehensive assertions that can now speak in and across scholarly fields. By utilizing Turnley’s interpretation of mediological dimensions as a basis, my research questions were answered by locating central themes of these dimensions that each center accessibility and inclusion with a particular focus on the user’s experience.

A great deal of information was obtained from the survey and interviews performed, and the data was rich in unanticipated ways. For the purposes of discussion and implications within the scope of this exploratory study’s findings, I decided to focus the remainder of this dissertation on thematic insights that center the artists’ decisions, methods and tactics in relation to accessibility and inclusive design practices. The decision to focus on accessibility and inclusive design practices reflects my intent to explore significant themes that have wide-reaching implications across all of the other dimensions. In turn, examining artists’ decisions, methods, and tactics in these areas is
critical as it contributes to a more inclusive and accessible understanding of multisensory VR
design. This approach also acknowledges the increasingly diverse range of VR users and the need
for designs that are accessible to a wide variety of people. The information obtained from the
surveys and interviews provided a rich foundation for examining these important aspects, making
them an unexpected but ethical choice for the main focus of my discussion and implications.

In this chapter, I move from the specific insights’ variables and axioms to connect and
situated these synthesized themes into broader theoretical conversations, expanding on the
conceptual propositions uncovered and further advancing scholarship on the practices of
multisensory VR artists. Here, the thematic categories and insights are synthesized to fashion
bridges to wider theoretical concepts and as extensions of application, situated in and affirmed by
past research and concepts. There are a variety of technological hardware, applications, and tactical
decisions that procedurally and functionally influence the design composition of multisensory VR
environments. I use the term “technology” loosely, as Turnley posits, to mean any tool and view
multisensory VR as a networked set of communication tools:

Technology is a crucial component of how media function both culturally and rhetorically. Deterministic narratives often reduce media to their technical components...I seek to
complicate these reductive framings by situating work with media in relation to not only
technological aspects but also the other six dimensions of the framework (p. 133).

By examining and connecting across dimensional lenses, decisions on the part of the artists and the
development team as a whole are at least partially determined by technologies’ relation to the
economic aspects and resources of a given project.

I argue that multisensory VR is a highly networked social space (Hayles, 1999) wherein the
artists’ focus on the user paired with an impetus toward inclusion and access is a co-constructive
process that begins in the earliest stages of conceptualization and design iterations. This impetus
remains at the forefront throughout production to address both technical and economic constraints
(Turnley, 2011, pp. 133-134). Turnley importantly highlights that “[t]echnological components do
not unilaterally determine either the form or content of a medium” (p. 133). Both the technological
and economic dimensions of this media, as understood within a mediological framework, greatly impact and are influenced by social dimensions.

While technical and economic factors are primary to the ultimate function of an immersive product, socio-cultural contextual and historical factors (Shield, 2003) also inform how a medium is composed (Arola, 2010; Clark, 2008; Kress & Leeuwen, 2001; Wysocki 2005), how it is used (Swarts, 2007; Chertoff & Schatz, 2015), and how it evolves (Rice, 2008; Ball, 2004). In addition, artists negotiate the rhetorical affordance and constraints of aesthetic and archival dimensions by foreground inclusive design practices and accessible experiences for the users of multisensory VR environments. Their goals as composers emphasize user agency, identity construction, co-constructive practices, and paths to literacy and knowledge formation. These goals are aligned closely with Turnley’s interpretation of the subjective and epistemological dimensions (pp. 136-137). My findings assert that embedded motivations towards and constraints on accessibility and inclusion in many different forms cross-cut each of these dimensions.

As artists employ compositional elements in immersive environments, they affirm their keen awareness that “a medium’s technological development is neither linear nor inevitable,” as Turnley asserts. The nonlinear nature of the ideation-to-development process is evident in the decisions and practices of the artists. Documenting their decisions and practices also illuminated how this specific media network of relations is composed, how hierarchies and privileges of access in VR design and immersive environments influence the media’s use as well as the artists’ structures, decisions, and practices, and speak to the rhetorical affordances and constraints of addressing proficiencies and literacies.

**6.1 ENGAGING DIMENSIONS OF MEDIA IN DESIGN PRACTICES AND DECISIONS**

Artists who endeavor to create multisensory VR compositions engage dimensions of media in their design practices and decisions by employing interface design and sensory methods to advance invention in their compositional forms towards subject formation, identity construction,
and user agency. These practices and artistic decisions increase presence, interactivity, participation, and engagement for the user (Rechowicz, et.al., 2018b). The artists also harness interactive storytelling (Aylett & Louchart, 2003; Gee, 2007; Vallance & Towndrow, 2022) to advance knowledge literacy and are careful to ensure that the sensory and aesthetic narratives they create a) meet the goals of the project, and b) are accessible and clear for the user. In addition, the artists engage social and subjective dimensions of media by striving for participatory design practices to produce more welcoming world-building. They value and foreground inclusive production practices (Sheppard, 2009). While technological and economic factors can be constraints to these decisions and practices, the artists in this study confirm that attention to accessible interactions in design and composition methods offer affordances to their own creative processes to overcome constraints and also provide the users greater agency through accessible narrative reception and framing. This section situates and details these assertions further.

6.1.1 Interface Design, Sensory Methods and Inventions in Composition & Form Towards Subject Formation, Identity Construction, & User Agency

The impact of media design and virtual communication on the creative process of artists working in multisensory VR is a growing area of interest. Researchers have increasingly been examining how VR aesthetics (Ulrich, 2011; Sutcliffe & Deol Kaur, 2008) combined with human sense memory (Rechowicz, et.al., 2018a) offers a level of creative freedom not possible in traditional mediums, enabling artists to create alternate realities without being confined by physical laws such as scale, gravity, and physics (Murray, 1997; Manovich, 2001). As artists experiment with inventive and innovative content and design, they are also engaging with larger conversations in media design and virtual communication about shaping user subject formation, identity construction, and agency.

At the intersection of rhetoric and composition, multisensory VR experiences can be understood as a form of persuasive communication. Artists use sensory composition and digital
form to create immersive environments that engage users and influence their perceptions, emotions, and actions. Drawing on the works of scholars such as Aczél (2016) and Laurel (1991), we can consider how artists’ design choices and interface decisions function as rhetorical strategies in the immersive VR environment. Located in “the reception and interpretation of the persuasive intention and outlay” for the user/participant (Aczél, p. 8), artists navigate the push-and-pull of user agency. As a strategy aligned with ANT’s focus on similar agentive flows (Hayles, 1999), we can further understand how these strategies contribute to deeper subject formation and identity construction within the virtual space. Having always been adapted along with technology, processes, production, and circulation, Aczél champions deeper analysis into “ways virtual spaces are created in order to persuade and immerse users” (p. 3) wherein the “interface is not a thing, an interface is always an effect...[i]t is always a process or a translation” (Galloway, 2012, p. 33).

According to studies from Lotherington & Jenson (2011) and Slater et. al., (2003), user engagement and experience testing are critical components of the design process in technical communication and user experience. As artists balance aesthetic considerations and design with technical constraints, they strive to create intuitive and accessible interfaces that provide users with agency. This process is closely related to the tenets of user-centered design, as outlined by Norman (1988). By prioritizing user engagement and experience testing, artists identify and address potential immersion-breaking constraints, ultimately enhancing the overall VR experience. The importance of providing users with agency and the potential impact of limited representation on users’ identity construction processes is a key issue in the fields of virtual communication and user experience. Scholars such as Turkle (1995) and Nakamura (2002) have examined the ways in which virtual environments can shape user identities and agency, highlighting the important role of artists in designing these spaces. Through the careful crafting of elements such as avatars, interaction methods, and sensory feedback, artists affirm the work of both Slater (2004) and
Rechowicz, et. al., (2018b) by fostering a sense of immersion and presence, thus enabling users to have a sense of actively shaping their experiences within the virtual world.

Actor- Network Theory (ANT) and mediology are valuable frameworks for understanding the connections between artists, technology, and users in the interface design networked relationship. ANT emphasizes the role of both human and non-human actors in the creation and maintenance of networks (Latour, 2005). In this particular context of multisensory VR, artists, users, and technological components can be understood as actors that interact and influence one another, shaping the overall experience. By examining these networks, we can gain insights into the complex interplay between creative practices, technological affordances, and user experiences.

Mediology, based on the framework proposed by Turnley (2011), focuses on the transmission and transformation of cultural meanings through various media forms. In the case of multisensory VR, this approach allows scholars to explore how artistic choices and sensory methods contribute to the formation of cultural meanings and user subjectivities.

By considering the ways in which artists utilize various sensory tactics to engage users, we can better understand how these choices shape user subject formation (Hillis, 1999), and identity construction (Halberstam & Livingston, 1995; Grimshaw, 2014). As an extension, examining the role of empathy and ethics in VR design (Schroeder, 2008) also shapes valuable insights into the responsibilities of artists as they shape user experiences.

6.1.2 Tapping into Interactive Storytelling to Knowledge Literacy through Accessible Narratives

Artists assert that stories drive users to understand and engage. In media design and virtual communication scholarship, the role of interactive storytelling is understood as crucial for enhancing user participation, immersion, and engagement (Vallance & Towndrow, 2022; Aylett & Louchart, 2003). This is particularly so in multisensory VR environments. Interactive storytelling in multisensory VR experiences fosters knowledge literacy through accessible narratives. This
practice highlights the complex relationships between artists, technology, and users in shaping immersive and participatory environments (Deuze, 2006). Ryan’s (2001) exploration of narrative as virtual reality and Wolf’s (2012) examination of imaginary world-building both emphasize how narratives serve as a fundamental aspect of VR social communication, shaping ways of knowing and interacting in virtual spaces. The creative methods and decisions made by artists from incorporating narrative elements directly impacts user experience and contributes to the success of these virtual spaces.

These methods and decisions have rhetorical intent. Artists harness narrative construction and composition, as defined by Gee (2007) and Burbules (2004), to persuade and engage users’ sense of virtual embodiment, their perception of place and space, and ways and means of learning through sensory experiences. The narrative structures and techniques employed in multisensory VR experiences are persuasive and evocative, drawing users into immersive virtual environments. The acts and instances of immersive participation unfold within “networked settings” and functional components are “part of the pleasure of discovery” that is inherent to imagination and wonder (Burbules, p. 170). Interest, involvement, imagination, and interaction fashion connectivity, allowing participants to experience and contemplate (p. 166-67). Sense framing and embodied experiences contribute to the persuasive and evocative qualities of VR narratives, resonating with users on a deeper level.

In addition, technical communication and user experience are both intertwined in the design of multisensory VR experiences that cater to different bodies, abilities, and ways of learning (Sheppard, 2009; Selfe, et. al., 2004). Understanding users’ experience and knowledge level when designing narratives requires close collaboration between artists and engineers. This ensures that technical knowledge and application do not constrain or overtake narrative invention and artistic expression. Ultimately, this collaborative approach enables the development of more accessible and inclusive VR experiences, aligning with the tenets of user-centered design (Norman, 1988). The
complex relationships between artists, technologies, and users when composing interactive storytelling in multisensory VR compositions also considers the role of human and non-human actors in the creation, flow, and maintenance of these closely related networks. Artists, users, and technological components can be understood as actors that interact and influence one another, shaping the overall narrative experience (Hayles, 1999). As an expansion to ANT, these networks reveal the intricate interplay between creative practices, technological affordances, and user experiences.

By considering the ways in which artists utilize various narrative techniques to engage users, we can better understand how these choices shape user subject formation and identity construction. In conversation with scholarship on narrative theory (Frasca, 2003; Dahlstrom 2014; Padilla et al. 2017), digital storytelling (Bal, 2009; Ryan, 2007), and extended cognition (Clark & Chalmers, 1998) contextualizes this thematic category, drawing upon the works of scholars such as Bruner (1986) and Lakoff and Johnson (1980), who consider how the cognitive and embodied aspects of narrative contribute to the construction and reception of meaning. Such scholarship can extend to multisensory VR composition and experiences. Turnley (2011) also clarifies the transmission and transformation of cultural meanings through narrative forms. In the case of interactive storytelling in multisensory VR, the lens of mediological dimensions highlights how artistic choices and narrative elements contribute to the formation of cultural meanings and user subjectivities.

6.1.3 Using Inclusive Production Practices with Awareness of Certain Affordances & Constraints & Accessible Interactions in Design & Composition to Provide Agency through Accessible Narrative Reception & Framing

Multisensory VR artists employ inclusive production practices and accessible interactions in design and composition. One way they do so is by providing agency through accessible narrative reception and framing. This thematic category carries considerable relevance for the fields of media
design and virtual communication as the artists view the implementation of structured practices for designing and iteratively testing interactions for multisensory VR experiences as vital in addressing diverse user needs and experiences. Their methods are consistent with the concept of user-centered design (Norman, 1988), which emphasizes understanding and accommodating the user’s needs, preferences, and constraints. However, artists affirm that technological limitations and access for both their teams and users can frequently contribute to the creation of more inclusive and accessible virtual spaces (Brewster, 2002; Gaver et al., 1999).

Drawing from digital rhetoric, analyzing how artists employ narrative reception and framing to engage users’ cognitive affordances of memory offers new views on the process of crafting a sense of agency in multisensory VR experiences (Bolter & Grusin, 1999; Murray, 1997). The utilization of sensory cues, design choices, and inclusive production practices showcases the artists’ awareness of the persuasive and engaging qualities of their compositions (Gee, 2007), ensuring that technological constraints do not impede the desired user experience (Laurel, 1993; Sengers et al., 2005).

Inclusive design practices and design thinking methods, such as considering users’ diverse abilities, backgrounds, and preferences, contribute to the development of more effective and innovative products (Horton & Quesenbergy, 2014; Story et al., 1998). With both technical communication and UX practices in mind, the artists prioritize users’ physical and emotional comfort as well as their accessibility requirements (Redish & Barnum, 2011; Wharton, et al., 1994). Additionally, the application of artists’ research practices to explore user needs and preferences during development and the incorporation of various design methods to overcome limitations further highlights the importance of user-centered design in generating inclusive and accessible multisensory virtual environments (Hassenzahl, 2003; Nielsen, 1993).

Situating this thematic category within the broader scholarly conversations spanning media design and virtual rhetoric also allows us to better comprehend the complex interplay between
artistic choices, technological restrictions, and user experiences in the design of inclusive and accessible multisensory VR compositions. Relating these conversations to scholarship on user-centered design, inclusive design, and accessibility, as well as the role of empathy and collaboration in the design process, is a valuable extension into the challenges and opportunities encountered by artists in the creation of virtual environments that cater to diverse user needs and experiences (Bødker, 2006; Dourish, 2001).

Moreover, it is crucial to consider how these design practices and decisions align with the dimensions of media as defined by Turnley (2011). The various ways in which artists engage with these dimensions to create multisensory VR compositions that are inclusive, and accessible also provide a sense of agency for users through accessible narrative reception and framing. In media design, the integration of technology and creative expression is a central aspect. Artists must navigate technological constraints while also considering the economic realities of hardware and software access. This balance is essential in crafting immersive and inclusive VR experiences that can reach a wider audience (Buxton, 2007; Manovich, 2001).

By staying informed of nascent developments in VR technology and collaborating with engineers, artists develop work-around solutions that bridge the gap between technical expertise and artistic composition methods (Frasca, 2003; Laurel, 1991). The archival dimension, which involves recall and disseminating information, plays a significant role as artists must consider how their narratives will tap into cultural and personal memory and be experienced by users in various contexts (Kostelnick & Hassett, 2003; Aarseth, 2004; Chun, 2008). This entails understanding the implications of different platforms, distribution channels, and sensory techniques and how they will impact the accessibility and longevity of their compositions (Kline, Dyer-Witherford, de Peuter, 2003; Manovich, 1999).

The aesthetic, epistemological, social, and subjective dimensions of media are closely linked in multisensory VR experience design. Artists stay keenly attuned to the aesthetic sensibilities and
cues incorporated into their works, as well as the ways in which these elements contribute to the overall user experience (Gee, 2007; Jenkins, 2004).

They also consider the epistemological implications of their design choices, such as how their compositions facilitate learning, exploration, and meaning-making (Hollan, et al., 2000; Squire, 2008). Moreover, the social dimension of the media encompasses interactions between users and their virtual environments, as well as the broader cultural and societal contexts in which these experiences are situated (Bourdieu, 1984; Giddens, 1984). Artists therefore are mindful of the potential social implications of their design decisions, such as how their works may promote or challenge certain values, norms, and power structures (Hawk, 2004; Hayles, 1999).

Finally, the subjective dimension (Turnley 2011) of the media activates the personal and emotional aspects of user experiences, which the artists affirm are shaped by both the design of the virtual environment and the individual’s unique background, preferences, and abilities (Turkle, 1995; Varela et al., 1991). By considering these dimensions of media in tandem, artists strive to develop more inclusive, accessible, and engaging multisensory VR compositions that resonate with diverse users on multiple levels.

6.1.4 Striving for Participatory Design and Welcoming World-building

The artists assert their commitment to creating multisensory VR experiences that prioritize inclusivity, accessibility, and user well-being and focus their decisions, methods, and tactics towards creating multisensory VR experiences that are as equitable and welcoming for users as possible. This drive relates to and affirms participatory design, a concept embraced by scholars such as Spinuzzi (2005) and Sanders and Stappers (2008), and advocates for involving end-users in the design process to ensure their needs and preferences are met. Extending this concept to the composition of multisensory VR, by creating environments that accommodate diverse physical abilities and providing clear pathways, the artists demonstrate their commitment to inclusivity, reflecting the work of Gaver et al. (1999) and Gheerawo and Lee (2009) who stress the importance
of user-centered design practices. The artists develop innovative and effective design practices that address the complex challenges of creating immersive, engaging, and accessible virtual environments for as diverse a range of users as possible.

The notion of welcoming world-building in this thematic category aligns with Murray’s (1997) concept of ‘immersion’ in virtual environments, where users feel enveloped by and present within the virtual world. Likewise, in M&S, there is a paradigm shift towards virtual immersive experiences that address wider inclusion and accessibility (Rose & Meyer, 2002; Padilla et al., 2014; Deuro et al., 2017). Providing clear communication and careful rhetorical gestures, as advocated by the artists, also echoes Bogost’s (2010) concept of procedural rhetoric, which emphasizes the role of processes and rules in shaping experiences and meaning within interactive systems. By situating this study’s insights within these broader discourses, the artists demonstrate their awareness of the diverse dimensions of media, as well as their dedication to creating meaningful and engaging virtual experiences.

As the artists navigate multisensory VR composition throughout the development phases, their work also intersects with the field of modeling and simulation, which offers valuable insights and tools for the creation of realistic, immersive virtual environments (Sadowski & Stanney, 2002; Rizzo et al., 2011). By drawing from the expertise of professionals in these areas, artists better understand the complexities of human perception, cognition, and behavior in simulated environments, leading to more engaging and effective VR experiences (Witmer & Singer, 1998; Slater, 2009). Furthermore, the artists’ emphasis on iterative design and testing of interactions connects with the simulation-based approaches advocated by scholars such as Slater and Wilbur (1997) and Sadowski and Stanney (2002), who stress the importance of iterative user testing to optimize system design and improve the overall user experience.

The artists’ considerations of trauma-informed practices that expressly focus on users’ well-being are validated by existing scholarship on the ethical design of virtual environments (Madary &
Metzinger, 2016). Their emphasis on safety, particularly in relation to sensory overload and simulation sickness (Kennedy, et al., 1993; Golding, 1998), builds upon the work of Kennedy et al. (2000) and Sharples et al. (2008), who investigate the potential adverse effects of VR on users. As a close cross-over, in the context of ANT (Latour, 2004) and mediology (Debray, 1996), this approach by the artists recognizes the ethical role between human actors, technology, and social processes. They acknowledge the non-neutral aspects of VR and strive to overcome limitations, aligning with the work of scholars such as Akrich (1992), who explored the “script” inscribed in technologies, and how these scripts can be negotiated and reconfigured by closely empathizing with users. The artists’ focus on fostering social connections and interactions in their VR compositions resonates also with the work of Turkle (2011) and her exploration of the role of technology in shaping human relationships, and Biocca et al. (2003), who investigated the potential of VR to support social presence, and adds to the ongoing conversation about the significance of shared experiences in virtual spaces (Hunicke et al., 2004; Jenkins, 2006; Schroeder, 2010).

Lastly, the artists’ advocacy for collaboration and co-creation across different communities of practice, including engineers and users’ feedback, speaks to the broader discourse on approaches to design (Brown & Duguid, 2000; Carayannis & Campbell, 2009). This focus on collaboration echoes the work of Spinuzzi (2011), who emphasizes the importance of networks and collaborative work in addressing complex problems. Yet their advocacy and range of considerations also highlight the crucial role of transdisciplinarity in addressing the diverse challenges associated with creating participatory accessible virtual environments. Transdisciplinarity, as defined by Nicolescu (2002), refers to a research approach that transcends disciplinary boundaries to develop innovative solutions to complex problems through the integration of multiple perspectives, theories, and methodologies.

The artists in this study demonstrated their active engagement with diverse fields and working within unique multimodal teams to solve design problems and achieve production goals.
This approach allows them to draw upon a wealth of knowledge and expertise from various disciplines, fostering collaboration and co-creation across different communities of practice (Jenkins, 2006; Nicolescu, 2002). As a theoretical extension, transdisciplinary approaches also encourage the artists to consider the complex interplay of technological, economic, archival, aesthetic, epistemological, social, and subjective dimensions in their design practices and decisions, as defined by mediology (Debray, 1996; Turnley, 2011). By embracing transdisciplinarity as applied to the dimensions of the media they work with, the artists are more well equipped to address the multi-faceted challenges of creating accessible, inclusive, and welcoming virtual environments.

Transdisciplinarity is an approach to research and problem-solving that involves collaboration and integration across multiple disciplines (Pierre Lévy, 2011). This approach is hallmarked by five critical facets, reflected in the practices and perspectives of the artists surveyed and interviewed for this study: collaboration, integration, practical relevance, contextualization, and flexibility. Transdisciplinarity typically centers collaboration between researchers, practitioners (be they engineers, subject matter experts, artists, etc.), and other stakeholders from different and often far-reaching disciplines, who work together to address complex problems and questions that cannot be addressed by a single discipline (Barabási, 2016; Benyus, 1997). The integration of different perspectives, methods, and approaches from multiple disciplines across all phases of research, development, and project execution, creates a more participatory basis for addressing critical issues of access and inclusion, and more holistic understandings of a given problem, issue, or creative endeavor.

6.2 EMBEDDED CONSIDERATIONS AND PROCESSES OF MULTISENSORY VR COMPOSITION

In multisensory VR design, artists must navigate the intricate socio-technical landscape to create accessible and engaging experiences. By understanding the interplay between technological hierarchies, limitations, and economic realities, artists seek to create compositions that are both
technologically innovative and socially inclusive. Yet it is a complex relationship of considerations between media, technology, and socio-cultural factors that the artists operate within.

From the perspective of the artists, the considerations and processes embedded within multisensory VR designs they compose are varied and multifaceted depending on the purpose/goals of the project. Yet there are consistent considerations and processes that emerged in this study. As they work through each iterative phase of development (not a linear process, but a cyclical one of production, testing, and returning back to modify), the artists focus many of their multimodal considerations towards achieving persuasive goals that provide the user with guided expectations balanced with agency. The artists also consider how access is privileged. This applies to 1) access to equitable technical knowledge, 2) constraints on budget and technical components, and 3) extends to equity and inclusive processes for the user.

Additionally, the artists deeply consider the positionality of the user to inform their processes in composing multisensory VR environments. As an extension, they also consider their own positionality in relation to the user—as designers of the experience, as guides, as composers of the engagements the users encounter. At many points in development, they step into the role of the user to inform decisions and changes. They also expressly prioritize UX in the conceptualization phase of production. In this way, multisensory VR compositions become a co-constructed endeavor between the team, the systems, and the users. As an extension of establishing foundational co-constructive practices, the artists are also keenly aware of and help to establish processes for diverse user needs. This means they are also cognizant of the media's normative uses and hierarchy structures and attempt to reconceptualize the conditions they (re) produce when composing virtual bodies for real bodies in immersive space. The following sections detail and further situates my assertions.
6.2.1 Multimodal Considerations Through Phases of Development towards Persuasion

Expectations & Agency

As artists reflect on intentionality, questioning, and testing during the design process, they embody the principles of user-centered and participatory design by exploring and pushing the boundaries of multisensory VR design. Multisensory VR design is a multimodal practice and these principles harnessed by the artists prioritize users’ needs and expectations, creating accessible and inclusive experiences that align with the broader rhetorical theories of multimodality (Sanders & Stappers, 2008; Jenkins, 2006; Bitzer, 1968; Foss, 2009). By considering multimodal communication, artists consciously craft persuasive elements and interactions in virtual environments, creating experiences that resonate with users on multiple sensory levels across dimensions of mediology. Within these considerations, artists acknowledge the complex dynamic between technological, social, and subjective dimensions in building out virtual compositions by addressing the challenges associated with effectively meeting users’ expectations (Turnley, 2011; Debray, 1996). Moreover, they draw from principles of modeling & simulation when bringing compositional parts together to design authentic sensory environments that enhance users’ agency and facilitate seamless interactions (Sadowski & Stanney, 2002). By blending these considerations, artists create more engaging and believable virtual environments.

This thematic category based on the artists’ multimodal considerations also underscores the importance of utilizing UX communication to foster user agency and immersion (Redish, 2010; Norman, 2013). Artists recognize the need for clear communication, intuitive interfaces, and feedback mechanisms. These three factors better enable users to effectively navigate and interact with and within extended reality spaces. As an extension, by focusing on multimodal methods through each phase of project development, the artists also more deeply embed the importance of designing accessible dynamic experiences for diverse user groups.
With the addition of external sensors, physical haptic material elements, and other sense technologies, this approach extends principles of user-centered design and participatory design. In terms of persuasive methods towards expectations and agency, the artists carefully balance creative invention with meeting user expectations (Aczél, 2016; Massumi, 2002) to ensure not only believable and engaging experiences but also safe ones that are not overwhelming. For example, utilizing motion devices combined with visual and sound elements yield a design strategy to guide the user’s attention to specific narrative elements or paths within the VR environment by using visual cues like a pulsing glow, which increases the chances of the user engaging with those elements. This approach promotes user involvement while balancing their own sense of agency (Hayles, 1999).

The artists’ considerations to fostering user agency is evident in their awareness of the range and types of agency they afford to users. It is a subtle push and pull. Their goal is to provide authentic sensations and a high sense of presence, crafting believable experiences that evoke both trust and presence on the part of the user. Many of the persuasive tactics the artists mentioned are also meant to simplify or clarify the user experience (UX) goals. Providing a believable virtual body representation and corresponding accurate body movements, for example, is a common first step toward compelling user agency (Slater et al., 2009). Attention to multimodal methods also highlights the artists’ understanding of user motivations, particularly in how they use color, motion, vibration, shadows, smells, sound, or haptic feedback to direct users’ attention or create emotional responses, thereby guiding their actions and decisions within the virtual world (Bolter & Grusin, 1999; Bowman & McMahan, 2007). Such persuasive appeals play a critical role in setting the stage for and compelling user expectations by including these design choices in their compositions (Ulmer, 2003; Roundtree, 2013).
6.2.2 Overcoming Privileging of Access, by considering Equity, Access, and Inclusion as Supply/Demand Issues

The artists in this study expressed their considerations of overcoming privileging of access across the various mediological dimensions. This is a concern that transcends various scholarly fields and practical applications, as the artists factor in project goals, team capabilities, user needs and their own perspectives. Media design scholars, such as Manovich (2001), emphasize the importance of understanding the socio-cultural implications of new media technologies. This idea extends to multisensory VR design, where technological hierarchies and limitations impact users’ access to immersive experiences.

Artists in this study expressed frustration countered by adaptability, flexibility, and creative problem-solving in working with available resources to ensure a broader audience can access these experiences. In this sense, the artists’ approach aligns with Latour’s (2005) assertions which highlight the dynamic relationships between human and non-human actors in shaping socio-technical systems. By acknowledging and addressing the technological hierarchies, limitations, and economic realities inherent to multisensory VR composition, artists demonstrate a desire to overcome privileging of access, advancing efforts to promote equity, access, and inclusion in the practice of multisensory VR design.

Virtual communication scholars, such as Rheingold (2000), emphasize the need to create immersive and engaging virtual environments that facilitate meaningful interactions. In multisensory VR design, overcoming privileging of access is essential to ensure that users can engage with the designed environment fully. The artists in this study focused on addressing these limitations by calibrating interactions and employing creative problem-solving techniques. This approach is consistent with Bolter and Grusin’s (1999) concept of remediation, which suggests that new media technologies often borrow and reconfigure elements from earlier media forms to create new experiences. In this case, artists leverage their knowledge of various technologies and
strategies to take steps towards democratizing multisensory VR environments. By this same token, scholars of rhetoric, such as Brummett (2003), Selfe (2009) and Brooke (2009) emphasize the importance of multimodal communication and the need to address access and inclusivity in digital environments.

As a move to counter hierarchies, the artists’ considerations of access and inclusivity aligns with the principles of universal design (Connell et al., 1997), which advocate for designing products and environments that are usable by all people to the greatest extent possible. By considering not only the needs and preferences of different users but also access to media experiences, the artists negotiate many dimensions of the media ecology to create immersive environments that are accessible to everyone, and consistently consider diverse physical and cognitive abilities, social-emotional needs, and technical expertise.

One way artists do this is by working with clients to manage expectations, address misconceptions, and ensure that costs remain manageable while still achieving the desired experience. This approach resonates with the user-centered design principles (Norman, 2013) and participatory design methodologies (Sanders & Stappers, 2008), which advocate for involving users and stakeholders in the design process to ensure that their needs and preferences are met. Across a closely aligned field, technical communication scholars, such as Spinuzzi (2005) and Redish (2010) also speak to these goals by emphasizing the importance of balancing creative goals with economic realities. In a similar way, modeling & simulation scholars, such as Sadowski and Stanney (2002), speak to this importance of understanding and addressing complex factors that impact the user experience in virtual environments, such as technological limitations that may constrain users’ access and develop strategies to overcome them. By employing creative problem-solving techniques and iterative design processes, the artists address accessibility with approaches that align with the principles of agile development (Beck et al., 2001) and user-centered design (Norman, 2013), which emphasize multiple testing iterations and continuous improvement in
response to addressing the most meaningful but also, frequently, the most basic of user needs (Hassenzahl, 2010).

Equity, access, and inclusion in VR are essential considerations not only for multisensory VR artists but also for developers and stakeholders as well. Staying continuously attuned to creating virtual experiences that are accessible to diverse user groups, including those with different physical, cognitive, and sensory abilities is echoed by the field of user experience, where researchers such as Gulliksen et al. (2003) stress the importance of user-centered design while inclusive design advocates Holmes and Nguyen (2020) go beyond simply making virtual experiences accessible to users with disabilities, to adapt inclusive design practices frequently instantiated for neurodivergent or disabled users to also meet the needs of all users.

As aligned with the artists’ multifaceted considerations, D’Aubin (2007) highlights the importance of considering factors such as language, cultural context, and socioeconomic status when designing VR experiences. By addressing these aspects, the artists express the desire for virtual environments to continue to evolve to become truly inclusive. This involves promoting a sense of belonging and encouraging more deliberate decision-making towards meaningful engagement. In order to get there in actionable ways, research in the field of media design by Dove et al. (2017) echoes the sentiments of the artists by suggesting that better collaboration with different communities of practice, including users, engineers, and clients can lead to more equitable VR compositions and may address technological hierarchies, limitations, and economic realities to solve supply and demand issues. In addition, integrating participatory design methods (Sanders & Stappers, 2008) in the creation of multisensory VR environments can empower users to contribute their perspectives and insights, thus advancing work on more inclusive and equitable virtual productions and products by teams. Ultimately, by considering these principles in their compositional processes to drive their decisions and tactics, artists create environments that are engaging, but more importantly, are accessible and inclusive for a diverse range of users and
encourage a sense of belonging and participation in the rapidly evolving landscape of virtual experiences.

6.2.3 Artists and/as User Positionality, capitalizing on Co-construction through Composition Phases

When considering positionality, multisensory VR artists acknowledge that there is a dynamic reciprocal relationship between artists and users wherein they stay attune to the user but also are self-aware of themselves as both a creator and a user. Understanding their positionality and engaging in active practices of co-construction, artists tap into empathy to inform inclusive and interactive VR experiences. They are aware that they play a vital role in shaping users’ perceptions and experiences in virtual environments. The artists’ acknowledgment of their own subjectivities and the potential impact of their creative choices on users echoes ongoing scholarly discussions about user-centered design principles (Gulliksen et al., 2003), and, as an extension, recent work in inclusive design by Holmes & Nguyen (2020) who echo the importance artists place on addressing diverse user needs with empathy and taking opportunities to examine positionality in order to create more inclusive and accessible virtual experiences.

Additionally, when examining virtual communication, the artists’ reflecting on their own knowledges and research of human psychology, design thinking, and trauma-informed practices speaks to their broader effort to understand and shape users’ perceptions and experiences within multisensory VR environments. This focus on users’ experiences and co-construction of knowledge in relation to the artist’s own also draws on principles of UX design that emphasize ways of surpassing more generic or homogenous user requirements by shaping research and testing to better understand audience preferences and limitations throughout the design process (Garrett, 2010; Kaptelinin & Nardi, 2018).

The concept of artists stepping into the user’s shoes and considering their own positionality as both creators and users of VR environments relates to rhetorical theories put forth about
understanding of the audience’s expectations and the impact of the artists’ choices on users’ experiences. This particularly parallels the relationship between the author and reader in the context of written communication (Ede & Lunsford, 1984; Shipka, 2011). In a very similar way, artists stay aware of how their creative decisions, informed by their own experiences and subjectivities, may resonate differently with users from diverse backgrounds or with diverse abilities and experiences, similar to how writers are acutely aware of their audience when composing texts (Shipka, 2011).

Technical communication scholarship has also explored the role of technology in shaping user experiences and the need for community practices to inform design (Blythe et al., 2014; Redish, 2010). The artists’ focus on creative problem-solving and collaboration within their teams and closely with their users aligns with these ongoing discussions. As Blythe et al. (2014) argue, technical communication practices and methods evolve and adapt to the changing landscape of a particular technology in tandem with considerations of the user, a concept that fits well with the artists’ approach to positionality and team communication as co-constructive practices when composing an environment.

Importantly, the concept of co-construction in multisensory VR design extends ANT’s emphasis on relational agency of both human and non-human actors in knowledge making and dissemination of knowledge (Latour, 2005; Hayles, 1999). Artists engage in co-construction processes with users and within their own teams, artists carefully consider the various roles at play in shaping a multisensory VR production, as well as their own experiences and understanding within it. When artists draw from their own cultural and learning backgrounds and experiences, while also remaining conscious of those of users and others on their teams, they tap into the interplay between broader considerations of subjective and social dimensions. They are informed by contextualizing outside of technological concerns with broader ways that media forms—past
and present—shape our understanding of both our practical and virtual realities (Debray, 2000; Turnley, 2011, Hayles, 1999).

The field of modeling & simulation also sheds light on co-construction processes in VR design, asserting the importance of iterative communal development and user feedback in creating compelling virtual environments (Susi, Backlund & Johannesson, 2007; Gabbard, et al., 1999). By engaging users and team members who may have different capabilities and experiences than their own in the design process, artists refine their compositions based on more diverse insights to meet needs and expectations. In addition, the concept of co-construction as related to multisensory VR design extends the broader field of UX design, which emphasizes the importance of understanding and addressing users’ diverse needs, literacies, and limitations as being the primary focus throughout the entire design process (Garrett, 2010; Kaptelinin & Nardi, 2018). When artists consider their own positionality as artists and towards their compositional decisions for users, they enhance their ability to reach their audiences more effectively by staying aware of their own subjectivities and engaging in co-construction processes to overcome diminished viewpoints or practices.

6.2.4 Attention to Diverse Needs & Hierarchy Structures, especially Conditions of Access when Producing (for) Bodies

Artists in this study also stressed the consideration of diverse user needs as an important step toward dismantling hierarchical structures that may hinder inclusive design practices. This thematic category demonstrates that they recognize that the experiences they fashion should primarily be constructed with accessibility in mind for users with varying abilities, backgrounds, and experiences. This is of particular importance to considerations of physical bodies and their virtual representations. This category can be situated within the broader discourse on inclusive design practices that challenge universal design principles. Scholars such as Mace et al. (1991) and
Hamraie (2017) advocate for designing products, environments, and experiences that are usable by the widest range of users possible, regardless of age, ability, or status (Connell et al., 1997).

As I previously pointed out, inclusive design practices aim to involve diverse user groups in design processes (Spinuzzi, 2005; Sanders & Stappers, 2008). Multisensory VR artists specifically apply these principles and practices to careful consideration of diverse bodily abilities and experiences. In practice, artists' transdisciplinary collaboration in the multisensory VR design process as collaborative efforts between artists and technical experts. Breaking down hierarchies and assumptions is especially vital for successfully creating immersive experience solutions that cater to diverse bodies (Garland-Thomson, 2011; Alper, 2017). In this way, this thematic category also echoes the call for greater collaboration in media design composition practice (Wysocki & Johnson-Eilola, 1999; Hayles, 2005). A major factor in achieving greater collaboration, according to the artists, is by dismantling hierarchies between technical and artistic expertise. By working towards cross-team knowledge building and understanding of functional priorities and technical capabilities, such as an awareness of users' embodied experiences and sensory mechanics and tracking of user bodies, multisensory VR artists prioritize how they advocate for user needs and physical access to immersive experiences.

Artists' considerations of producing for bodies is also situated solidly within scholarly discussions on the connection between embodiment and experience in virtual environments (Manning, 2013; Hayles, 2017). Acknowledging diverse bodily experiences is crucial for multisensory VR artists as they design virtual worlds that are intended to engage users on multiple sensory levels. By considering different bodily experiences and learning from users with diverse abilities or ways of knowing, artists are better able to craft virtual compositions that adapt to and accommodate users' unique needs when interacting within sense-immersive experiences. User-centered design, as an extension, also emphasizes the importance of understanding users' physical needs and limitations with considerations of designing trust into experiences and on collaborative
teams that requires anticipating potential errors and disruptions (Shneiderman, 2000; Norman, 2013).

Typically, when prioritizing user needs, artists design for graceful failure while maintaining users’ sense of presence and trust in the virtual environment. Yet when concepts of equity, access, and inclusion in the design and use of emerging technologies are factored in, particularly to VR (Gonzales & Zantjer, 2015; D’Ignazio & Klein, 2020), the attention to diverse needs and hierarchy structures by artists in this study echoes calls for more equitable access to technology and the importance of considering marginalized populations in the design process. In this vein, multisensory VR artists further contribute to the development of more inclusive and accessible digital experiences by focusing on the unique affordances and constraints of the medium, specifically when combined with the ongoing discussion on the role of empathy in design (Fulton Suri, 2003; Battarbee et al., 2014). By stepping into the user’s shoes and understanding their diverse needs (and frequently convincing their team members and stakeholders to do the same), multisensory VR artists are better equipped to navigate and address the complexities of their users’ experiences and work in practical ways towards more designing sensory environments for diverse bodies.

6.3 CONCLUSIONS

In conclusion, this study’s assertions connect to broader concepts and practices, benefiting and contributing to a deeper understanding of the considerations and processes embedded within multisensory VR design from the perspective of artists who design them. My work here expands on scholarship about the importance of multisensory perception, interdisciplinary collaboration, and attention to diverse needs and hierarchy structures. By situating these assertions within larger scholarly conversations, the key insights I’ve covered in this chapter underscore the significance of these themes for the development of more accessible, meaningful, and immersive virtual experiences.
I started this research from two questions about 1) how artists engage the dimensions of mediology in their design practices and decisions while creating multisensory VR compositions and about 2) what considerations and processes are embedded within multisensory VR design from the artists’ perspectives. Survey results and interview transcripts were analyzed using foundational frameworks of mediology and actor-network theory. After thematic analysis, the data sets yielded insightful learning categories that answer this study’s research questions and gain relational value by further being situated within past and present scholarly conversations.

In response to my first research questions, the first thematic category demonstrates that artists employ interface design and sensory methods to advance invention in composition and form towards subject formation, identity construction, & user agency. From there, artists design virtual environments that engage users on multiple sensory levels, facilitating a sense of presence and immersion. This theme also contributes to the ongoing discourse on the role of embodiment and multisensory perception in shaping virtual experiences (Murray, 1997; Slater & Wilbur, 1997).

By acknowledge the affordances and constraints of multisensory VR media, artists create more engaging and immersive virtual environments that resonate with users on a deeper cognitive, functional, and sensory levels. In addition, the second category stresses the role of interactive storytelling as critical for enhancing user participation, immersion, and engagement in multisensory VR environments. The artists prize incorporating narrative elements to persuade engagement and to positively impact user experience, thus contributing to the success of multisensory virtual spaces.

A third thematic category which answers this question centers how the artists include inclusive production practices and accessible interactions in their design and compositions to provide greater agency for users through accessible technical and aesthetic reception and framing. The final category addresses how artists engage the dimensions of mediology in their design practices and decisions to create multisensory VR experiences that are equitable, accessible, and
welcoming for users. Their emphasis on participatory design and welcoming world-building compliments and extends larger scholarly conversations across the fields of media design, virtual communication, rhetoric, composition, Actor-Network Theory (ANT), mediology, technical communication, user experience, and modeling & simulation.

In answering this dissertation’s second question of considerations and processes from the artists’ perspectives that are embedded within multisensory VR design, four categories of understanding in particular emerged. Artists embed multimodal considerations throughout their phases of development, with the first being situated specifically towards persuasion and expectations to enhance user agency. The artists must balance creative invention with meeting user expectations to ensure not only believable and engaging experiences but also safe ones that are not overwhelming. Secondly, in ways tied closely to economic dimensions and theoretical concepts of value, the artists in this study utilize creative multimodal decisions and methods to overcome multisensory VR’s oft privileged access. By considering equity, access, and inclusion as supply and demand issues they attempt to address, artists approach multisensory VR design to foster greater inclusivity in the rapidly evolving landscape of virtual experiences.

A third category reveals that artists deeply consider the user’s positionality but also their own positionality as artists/creators as well as how they are situated within teams to capitalize on co-construction through each compositional phase. By actively engaging with the diverse expertise of team members and collaborators, they prioritize open communication between technical and artistic teams. Multisensory VR artists can then better navigate the complexities of the design process and create virtual environments that cater to a wide range of user needs. This theme aligns with the call for greater collaboration in the fields of media studies, rhetoric, and composition (Wysocki & Johnson-Eilola, 1999; Bal, 2003; Hayles, 2005). My insights advance and build on these arguments to advocate for a more integrated co-constructive approach to the development of
immersive virtual experiences in order to dissolve hierarchies of technical knowledge and user-centered understanding.

As an extension, the final thematic category that answers my second research question centers the artists’ attention to diverse needs in the context of hierarchy structures, particularly the conditions of access when producing digital bodies and meeting needs of physical bodies. This category underscores the importance of designing multisensory VR experiences with an intentional focus on diverse user needs and dismantling hierarchy structures that may hinder inclusive bodily design practices. By engaging with inclusive design principles and prioritizing the needs and experiences of users with different abilities and backgrounds, multisensory VR artists feel they contribute to the development of more accessible, meaningful, and immersive virtual experiences. This engagement situates my study within broader discussions on inclusive design practices, universal design principles, and equity, access, and inclusion in the design and use of emerging technologies, including VR (Mace et al., 1991; Hamraie, 2017; Gonzales & Zantjer, 2015; D’Ignazio & Klein, 2020). Intertwining this theme within conversations of scholars and practitioners enhances a better understanding of the complex interplay of physical and embodied factors that shape the multisensory VR design process. This understanding can, in turn, help artists create more inclusive, accessible, and impactful virtual experiences.

Each of these assertions I’ve derived bring to light important aspects of multisensory VR design composition that carry significance across various fields. By situating these assertions within larger scholarly conversations, the research results and insights presented in previous chapters gain deeper relational significance. The unique affordances and constraints that artists confront with multisensory VR media, the critical role played by co-constructive collaboration processes, and the importance of designing virtual experiences that cater to diverse user needs all center inclusion and accessibility.
In the next and final chapter of this dissertation, I outline the significance of this study's findings and the implications for practitioners as well as scholars in the fields of media design, virtual communication, rhetoric, composition, technical communication, ANT, mediology, modeling & simulation, and user experience. Additionally, I cover limitations recognized within this study's approaches and make recommendations that draw on my thematic insights to inform future research to extend this work's initial process of discovery. In closing, I also reflect on my own experiences and positionality as a researcher examining this particular community of practice.
CHAPTER 7
CONCLUSIONS

This research endeavored to fill a critical gap in the academic exploration of Virtual Reality (VR), pivoting the focus from VR users and technologies to the artists who compose these multisensory environments. Existing scholarship has largely overlooked these artists, inadvertently casting a blind spot over a significant and growing sector of the immersive XR field. This study originated from the intention to address this discrepancy, delving into the thought processes, considerations, and approaches that these artists employ in their designs. The purpose of this study was to discover the ways in which multisensory VR artists engage dimensions of media and the considerations embedded in their design practices. Given the gap in research on multisensory VR from the perspective of the artists who assist in its production, I began my research process for this dissertation. I became interested in their decisions, methods and tactics - where their affordances and constraints resided according to their professional knowledges. Turnley’s (2011) model of mediology was a starting point for formulating a method of thematic analysis to discover these ways. As multisensory VR technologies continues to evolve, the insights gained from this study can serve as a foundation for future research and practice across the fields of media design, virtual communication, rhetoric, design composition, technical communication, mediology, modeling & simulation, and user experience research, ultimately contributing to the advancement of more inclusive and equitable virtual worlds.

Two core questions anchored this investigation: 1) How do artists engage dimensions of media in their design practices and decisions while creating multisensory VR compositions? and 2) What considerations and processes are embedded within multisensory VR design from the artists’ perspectives? The methodologies employed to answer these questions were grounded in a framework of mediology dimensions, complemented by Actor-Network theory to elucidate the distinct networked relationships inherent in the design process. This blended theoretical
framework provided a nuanced lens through which to analyze and interpret the data collected via surveys and interviews conducted with groups of multisensory VR artists. My research findings demonstrate that dimensions of mediology are inherent to multisensory VR compositional considerations and processes. Additionally, my study of the artists who compose multisensory VR environments expands on dimensions of mediology to include accessibility and inclusion. This study also affirms the networked close relationships between artists, systems, and users as a new avenue for ANT investigations and applications.

My findings from survey data collected from artists provided a baseline understanding of priorities and considerations throughout phases of development that the artists move through during multisensory VR production. When I moved to the interview stage of this study, the focus became centered more on the ways in which artists position their design practices and decisions. More importantly, analysis revealed that their professional communication practices and techniques prized distinct dimensional themes that emphasized inclusive design decisions and methods that center accessibility for users. To discover the ways artists engage these dimensions of media—which Turnley posits are infused with “ethics, ideology, materiality, or power” (2011, p.133)—I analyzed responses to survey questions and interview transcripts with the artists. I first noted keywords and trends, then identified conceptual links from codes to themes and reference patterns located, and formulated claims to reach assertions and insightful categories from data results.

In delving deeper into the artists’ perspectives, the study revealed a broad spectrum of considerations and processes embedded within their designs. The results of my mixed methods approach and thematic analysis provided compelling insights into how artists engage with media dimensions in their VR compositions. They creatively employ interface design, sensory methods, and invention in composition and form to facilitate subject formation, identity construction, and user agency. This exploration further revealed that artists harness interactive storytelling to
advance knowledge literacy through accessible narratives. Inclusive production practices, cognizant of affordances and constraints, are adopted to fashion perceived agency through accessible narrative reception and framing. The artists’ approaches are found to be highly multimodal, iterating through different phases of development with an aim towards establishing persuasive expectations and nurturing user agency. This nonlinear cyclical process involves a continuous refinement of their compositions, underpinned by ongoing testing and modification.

Significantly, artists demonstrated an acute awareness of the privilege associated with access. Their designs consistently account for equity, access, and inclusion, recognizing these as supply-demand issues intrinsic to their work. They actively strive to overcome any disparities and constraints, ensuring an equitable VR experience for all users. Their practices also reflect a deep understanding of diverse needs and hierarchy structures, with specific consideration given to conditions of access when producing virtual bodies for real bodies in immersive spaces.

The artists’ positionality, both in relation to the user and their role in the composition process, emerged as a pivotal factor in their design considerations. Throughout the development process, the artists often adopt the user’s perspective to inform their decisions and modifications. They see themselves as designers, guides, and composers of the engagements that users encounter, thus making the multisensory VR composition a co-constructed endeavor involving the artist’s persistent relation to and learning from the team, the systems, and the users.

This research begins to fill the gap in our understanding of the complex and multifaceted process of multisensory VR composition from the artists’ perspective. It offers a fresh lens through which we can view and appreciate the depth of thought, creativity, and strategic consideration that goes into crafting these immersive experiences. Furthermore, this work holds the potential to inform and reshape conventional scholarship on VR design and user experience, illuminating new directions for research and theorizing both construction and UX in this dynamic field. The findings provide valuable insights that could prove instrumental in establishing best practices in
multisensory VR design, ultimately enhancing the immersive experience for users and fostering innovation in the field.

This dissertation synthesizes implications for technical communication, digital/virtual rhetoric, and modeling and simulation engineering, as well as future directions. The results of this study can inform practitioners about the dimensions and methods involved in creating multisensory VR systems, and their impacts on new media and technical communication pedagogy, design composition, and UX testing practices. Mediology and ANT (Actor-Network Theory) offered a unique blending of perspectives necessary to situate multisensory VR artists’ decisions, methods, and tactics within these larger conversations. Mediology benefited exploring the dynamic interplay between technological media and sociocultural practices, while ANT better defined the complex network of human and non-human actors that contribute to the co-creation and evolution of multisensory VR experiences.

In this final chapter, I first address the significance and implications of my conclusions, then cover future practical applications of this dissertation’s findings. Next, I pay particular attention to study limitations, and finally make recommendations for future work extending from this research. Returning to this study’s initial research questions, contribution to the fields of technical communication and digital rhetoric will center around repositioning artists’ perspectives and methods in the network of properties, affordances, and constraints of immersive environment construction (multisensory VR composition building). I also highlight here this work’s applied expansion on methodological frameworks of virtual rhetoric and mediology, as an effective approach to understanding designers’ considerations and processes. As an opportunity for culmination, this final chapter includes self-reflection on the challenges of the research as well as unexpected aspects that emerged from the analysis.
7.1 SIGNIFICANCE & IMPLICATIONS TO FIELDS

This study's primary significance is evidenced by its contribution in identifying professional situated knowledges and recording distinct multimodal composition-building experiences, decisions and procedures of multisensory VR designers. Capturing and thematizing the viewpoints and practices of artists who create virtual worlds through sense engagements illuminate the importance of persuasive technical design to the construction of immersion. The thematic categories derived from this study are situated within the larger scholarly conversations in fields such as media design, virtual communication, rhetoric, composition, technical communication, ANT, mediology, modeling & simulation, and user experience. My findings contributing to these conversations provide a clearer understanding of the complexities involved in creating multisensory VR experiences. Yet they also clarify and advance a focus on centering diverse user needs and preferences in critical ways, revealing how artists actively engage with broader theoretical and methodological concerns pertinent to multiple fields. Moreover, the use of a dimensional lens was incredibly adept at illuminating multisensory VR media's facets of 1) procedural and functional processes, 2) tools, 3) narrative drivers, and 4) conventional designed form and content used as 5) compositional elements toward user immersive in these environments.

The findings of this research project contribute significantly to larger scholarly conversations across several fields:

1. As both rhetoric and simulation are tools and sets of theories about communication, this work is of particular significance to those who study sense rhetorics or sense simulation.

2. Conclusions from analyses herein also demonstrate how these thematic categories can operate as heuristic models to be applied across different fields studying multisensory VR.

3. It presents a link between mediology and technical communication, using persuasive techniques as tools among artists, users, and systems.
4. Furthermore, it also highlights how this work expands on the methodological framework of mediology, thus offering a comprehensive understanding of designers’ considerations and processes within the media contexts in which they work.

5. My conclusions broadly expand scholarship specifically on a) the multisensory nature of VR experiences, b) the need for collaboration and communication between technical and artistic teams, and c) the prioritization of inclusive design practices that cater to diverse user needs.

Four significant ways the fields of digital rhetoric and technical communication can benefit from this research include 1) advancing understandings of rhetorical dimensions of immersive design in multisensory VR; 2) impacting new media and technical communication pedagogy as well as design composition and UX testing practices in the field of modeling and simulation; 3) expanding dimensions of mediology and actor network theory into new areas of analysis; and 4) crafting heuristics of design toward immersion in multisensory VR as applied rhetorical communication tools for practitioners.

First, by advancing evidence-based understandings of the rhetorical dimensions of immersive design in multisensory VR, this study presents empirical data and insights on how artists make rhetorical choices in the design of immersive VR experiences. It helps to demonstrate how these choices influence user experience and overall effectiveness of the VR system. This deepens our understanding of the intersection of rhetoric and design in the context of emerging VR technology, adding to a growing body of knowledge that can inform future design and communication strategies in the field.

Secondly, this work has practical implications for pedagogy and practice in new media and technical communication pedagogy, as well as design composition and UX testing practices in the field of modeling and simulation. For educators, the analysis of artists’ practices and decisions can be used to inform curricula in new media and technical communication, focusing on real-world case
studies and applications. For practitioners, insights from this study can be incorporated into design and testing workflows in modeling and simulation and UX, providing a foundation for more user-centric, accessible, and inclusive design practices.

Third, this research broadens the scope of mediology and ANT, extending these theoretical frameworks to encompass the unique challenges and opportunities presented by VR. By examining the role of artists and their interactions with technology, users, and sociocultural contexts, this study opens new avenues for thematic analysis, contributing to future developments across fields of study and offering fresh perspectives for future research.

Finally, the findings of this study highlight the importance of accessibility and inclusive design in creating immersive VR experiences that more effectively address diverse user needs and preferences throughout all phases of development. I argue, with these insights, that understanding and prioritizing user accessibility and agency can enhance the persuasive power of VR environments. This can provide practitioners with valuable heuristics—guiding principles and tools—to apply in their own work, helping them to create more effective, engaging, and inclusive immersive multisensory VR experiences that are more welcoming in their approaches to participatory design.

Each of these implications contribute to a greater understanding of the potential impacts of this research on various fields, and more obvious extensions to conversation around multisensory VR, from a purely technical perspective to a more comprehensive view that incorporates them into theoretical considerations of rhetoric, design, accessibility, and user experience.

7.2 APPLICATIONS AND RECOMMENDATIONS

The significance of this work, when positioned within larger scholarly conversations, underscores and expands on the importance of inclusive design practices, media communication, transdisciplinary collaboration, and user-centered design approaches in the development of multisensory VR experiences. So what can be done with this work that couldn’t be done before? It
serves as a call to action for practitioners and scholars in fields including media design, technical and virtual communication, rhetoric, and user experience to use this study's findings to further investigate not only multisensory VR compositions as media but as dynamic networked relationships that center knowledges, co-construction, persuasion, and agency. By centering the artist's vantage point to engage with these themes, first, both scholars and practitioners can develop theories and applications towards more equitable, accessible, and inclusive virtual experiences for all users. Secondly, as a primary result of this study, I see a clear pathway for artists' perspectives to be included in surveys of the field of multisensory VR and included in VR scholarship that previously has almost exclusively examined systems and users.

Third, as an application of this research, it is clear that defining and outlining artists’ considerations and practices can inform future multisensory VR artists of ways to create more accessible, meaningful, and immersive experiences for users with diverse needs, abilities, and backgrounds. A fourth result of this study I recommend is a needed overturning of conceptual approaches and scholarly perspectives that mainly situate investigations of multisensory VR through technological dimensions. I see this study as a crucial initial step in broadening our investigations as scholars to consider the creator’s positionality and impact of their decisions at the intersection of multiple relational networked dimensions, best reflected in examining their media practices.

The findings of this research do provide valuable insights into the intricate, multidimensional process of designing multisensory VR environments. These insights are critical not just for VR artists and designers seeking to improve their design process but also for educators and policymakers striving to foster more equitable and inclusive access to VR technologies. There are practical recommendations emerging from this dissertation. Artists designing VR experiences have a myriad of embedded considerations and processes that can broaden the appeal and accessibility of these environments. The artists’ methods and tactics to overcome technical,
economic, digital literacy, and embedded constraints of the media could be most effective in practice. Key among these is designing features for diverse abilities, such as adjustable text and color contrast, audio descriptions, and multiple control options. Also, ensuring compatibility with a variety of hardware enhances accessibility to different users, while clearly communicated instructions help users navigate the virtual environment effectively. Moreover, user testing with more diverse group can allows for the identification and rectification of potential barriers to access before public release.

Additionally, I argue that my findings emphasizing the user’s positionality and diverse needs within the design process reflect and serve to expand existing theories of user-centered design. They also enhance theories of inclusive design by underscoring equitable access and representation in VR environments, while also stressing the potential of interdisciplinary collaboration in the design process. Based on this research, I recommend a reframed approach to multisensory VR environment design as an iterative, cyclical process of ideation, testing, and modification that is more participatory. This assertion challenges conventional understanding by showcasing multisensory VR design not just as technological innovation but also as a process of rhetorical invention driven by empathy, inclusivity, and deeper understanding of diverse user needs. As more detailed yet critical extensions, the assertions in this work invite further exploration of and expansion on 1) the role of empathy in design, 2) the impact of user positionality, and 3) the potential for more inclusive and equitable design practices. They also raise intriguing insights for evaluating the relationship between real bodies and virtual bodies, offering a fresh perspective on embodiment in VR environments.

With the recent domestication of VR, I contend that expectations are high for its potential to disrupt social hierarchies and promote social inclusion. However, like any technology, VR can also reinforce normative dominant social categories, promoting a homogenous identity that masks and reinforces social inequalities. As evidenced by this research, I recommend VR artists incorporate
digital literacy practices grounded in vital understandings about how more equitable literacy and communication tactics can be established in digital spaces, particularly when virtual spaces intersect with social-material interactions. This begins with training and pedagogy.

For training, my findings can be used to further investigate ways to improve the design of multisensory VR environments, such as involving users in the design process, considering diverse needs, and designing for graceful failure. For pedagogy, the artists’ principles can be incorporated into best practices guides and design curricula to train future XR artists and better inform technical fields such as VR design, HCI, digital media studies, and inclusive design. They offer valuable insights for professionals and scholars in these fields, guiding the design of more inclusive and engaging VR experiences and inspiring new research questions, methodologies, and collaborations.

As a recommendation towards enhancing co-construction practices, this study’s findings highlight the value of interdisciplinary collaboration, suggesting organizations promote team structures that facilitate knowledge sharing across domains. Communities of practice can serve as valuable platforms for VR developers and users to connect, collaborate, and learn from one another. Encouraging connections through online forums, meet-ups, and similar spaces can foster an environment of idea-sharing and problem-solving. Providing multisensory VR-specific resources and tools can support community members’ creativity and skill development in ways that challenge knowledge hierarchies. Mentorship programs and knowledge-sharing events can similarly further promote collective learning. Ultimately, supporting and promoting multisensory VR projects that align with the community’s values would help enhance the quality and accessibility of multisensory media design and experiences while advancing the VR field as a whole.

In addition to these recommendations, multisensory VR developers and artists should use mediological dimensions as a heuristic throughout each stage of composition as case studies or applicable to testing. I contend that this strategy could further enhance the democratizing potential of XR for accessible interactions. The introduction of technology can disrupt social dynamics within
a community in unexpected ways, hence understanding these complexities becomes vital. Addressing technological infrastructure and economic constraint issues that limit access in communities is crucial and should extend beyond the dominant user groups. Efforts to bridge the digital divide cannot conflate or equate a lack of access with a lack of knowledge. Instead, by working closely with diverse communities of users, development teams could potentially develop solutions that address this divide. For example, in advancing understandings of the rhetorical dimensions of multisensory VR, digital literacy 1) plays a role in how users perceive and interpret the immersive experiences, and 2) incorporated in pedagogy and practice, is vital to new media and technical communication education. It is a key competency that these heuristics aim to foster in artists to the ultimate benefit also of users’ fluency and competency.

7.3 LIMITATIONS

Despite the significant insights, practical applications, and implications drawn from this study, there were limitations encountered in the research process which deserve both notation and consideration. Firstly, the volume of responses received for the survey fell short of the desired range. This issue directly influences the generalizability of the results, potentially posing a deficit to the diverse perspectives a larger pool of respondents may have provided. While this study offers unique insights into multisensory VR design processes and considerations, a greater number of responses sourced from a larger call for artist participants would perhaps have enhanced the robustness of my findings and promote a more comprehensive understanding of the topics I discussed herein.

Secondly, I acknowledge that my survey instrument did not capture the contact information of those that volunteered to be interviewed after taking the survey, therefore soliciting a secondary pool of volunteers for interviews after the survey was subsequently closed to responses also posed an unforeseen challenge. In this case study, calls for additional survey and interview participants, although ultimately beneficial to results, would have affected timelines for data analysis and
reporting as set in my research plan. Although this 1) did not limit the diversification of insights and, to my knowledge of the participants, 2) did not result in an underrepresentation of certain perspectives, a slightly broader range of participants with different backgrounds, expertise, and experiences in future research would certainly paint a more complete picture of the complexities involved in multisensory VR design composition practices, thus extending verification of my findings further.

As an extension, the voluntary nature of my participant recruitment methods may have introduced self-selection bias as it is possible that only those who engage in professional groups on social media and are particularly passionate or opinionated about their work chose to participate, potentially skewing the findings and limiting their applicability to the experiences and processes of a wider population of multisensory VR artists. Moving forward, these limitations could be addressed in future research. A larger pool of participants could be sought to attract at least 20-30 survey responses and a minimum of five more follow-on interviews pulled at random from those who completed the survey.

Traditional demographics were not captured or reported out in this study, and as such, the representation of diversity among the multisensory VR artists who contributed to this work (or potential lack thereof) poses another potential limitation. I acknowledge that a sample group that is not diverse across many demographic factors may inadvertently run the risk of over-indexed participants that echo dominant cultural perspectives in the findings. Indeed, cultural nuances can significantly impact the way an artist approaches their compositional considerations and processes. Additionally, while I prize the unfolding non-leading nature and process of discovery exhibited in this dissertation’s multi-layered and rich results, I view not approaching concepts and practices of inclusion and accessibility more explicitly in both my survey and interview questions as a limitations that, as the next section suggests, can and should be remedied in future research designs.
Another possible area of improvement relates to the analytical methods I employed. The mixed methods approach used in this study revealed various areas of overlap and gaps among the thematic dimensions derived from the responses. Turnley, in fact, makes note of this potentiality as they are all “mutable and interrelated, and any application of this heuristic should consider relationships among multiple dimensions” (2011, p. 132). As an opportunity for advanced learning, there is the potential for refinement to my analytical phases in future studies. Alternative analytical methods, such as grounded theory approaches, assertions toward model-building, or the application of situated knowledges heuristic categorization, could also offer a highly nuanced understanding of participant responses and enrich analysis in new ways.

In a similar way, the interpretive nature of qualitative data combined with thematic analysis also introduces questions of potential bias and validation, as different researchers might interpret the same data in varying ways. The perception of inherent subjectivity could limit the generalizability and objectivity of the findings. However, I employed rigorous coding and analytical processes, as well as reflexivity throughout to counter my own perspectives and biases throughout to maintain a level of trustworthiness and validity in the findings. While it is true that complete objectivity might be unattainable in qualitative research, the detailed contextual understanding it provides brings unique and valuable insights that are essential in exploring complex phenomena like artists’ practices in multisensory VR design.

A final consideration is the rapidly evolving field of multisensory VR design. The constant emergence of new technologies, media applications, and techniques could mean that the findings of this study become quickly outdated, limiting their long-term relevance. The future research I outline in the next section can remedy this by continuing to perform timely research in this closely networked relational arena of multisensory VR development between systems, artists, teams, and

16 Limitations of specific methodologies and methods employed are also detailed to a greater degree in Chapter 3 of this dissertation.
users build upon this work. While I do not view the limitations of this study as diminishing the importance of its findings, they do serve as guideposts for future research, pointing towards possible directions for refinement and expansion. I assert that it is the complex and evolving nature of virtual reality specifically across the individual and collective dimensions of mediology, illuminated in this dissertation, that necessitates a persistent commitment to refining research approaches in order to continually seek to broaden our understanding of this dynamic media genre.

7.4 SUGGESTIONS FOR FUTURE RESEARCH

The discoveries in the data I collected and analyzed were as broad as my research questions allowed. This can be considered by some as a limitation of the research, but I see it, rather, as an excellent starting point to propel additional scholarly works based on this dissertation. In basing the lens of this research on the seven mediological dimensions, I chose to eventually narrow the scope of this dissertation’s final reporting to center accessibility and inclusion because they were the “loudest thematic voice” in this work’s discovery. Issues towards and steps to ensure accessibility and inclusion were critical factors the artists remained firm on including in their discussions with me—cross-cutting throughout almost each response—which leads me to ascertain that it is at the heart of their motivations in composition and for the end user.

Only a fraction of the data collected and analyzed was presented here for in-depth discussions. Using the data from this study as a foundation, I foresee many future works produced based on deeper exploration of any one dimension or thematic category uncovered in this research process. A few select topics that deserve more extensive scholarly attention and research inquiry include but are not limited to:

- the artists’ approaches to technical design and sensory aesthetics
- economic affordances and constraints of multisensory VR
- historical and socio-cultural factors that influence multisensory VR composition
- artists’ perspectives on senses and embodiment in VR
• economic conditions and contextual value exchange for accessible composition
• social co-construction and positionally in multisensory VR
• digital literacy, bodily needs, or cognitive diversity as addressed by multisensory VR
• design decisions towards inclusive and welcoming multisensory experiences

For this dissertation, the recommendations and findings I outline demonstrate the potential of multisensory VR to create more accessible, meaningful, and immersive experiences for users with diverse needs, abilities, and backgrounds. They serve as both a practical guide for artists and developers, and a theoretical contribution to several intersecting future scholarly conversations.

In professional practice, as multisensory VR continues to evolve and imbricate itself into the advancing VR landscape, I see vast potential for these insights to inform more equitable and inclusive design practices, and advance on-going explorations of the many aspects my findings uncovered. First, as addressed in section 7.3 Limitations, I argue it is important for future work to approach a wider pool of artist participants and address my central questions using alternative methodologies. While this study provides initial insights into how artists’ professional backgrounds, positionalities, and personal identities shape their design choices, methods, and tactics, I also believe more research is needed to understand the full extent of this influence. This could also include factors such as cultural background or socioeconomic status in shaping an artist’s approach to multisensory VR design and how they grapple with or exhibit these influences in their work.

Second, findings derived from the artists’ perspectives should be augmented to center the user’s experience. By investigating how the user engages with dimensions of multisensory VR media and their embedded considerations towards immersive compositions, several facets of this work—social and subjective identity, persuasive appeals of aesthetics and narrative structures, affordances and constraints on their agency, and technological and economic aspects—could advance relational assertions towards physical and virtual literacy and accessibility. This would 1)
extend scholarship on multisensory VR users beyond their experiences with presence, experience, interaction, and involvement, 2) advance ANT in this space by informing closer insight into the relations apparent between the systems and components, the users/audience, and the artist-as-rhetor in this networked ecology, and 3) directly influence extended and updated understandings of mediology’s conception of milieu.

Third, I suggest that ethnographic methods also be performed wherein embedded research is conducted within a team of multisensory VR engineers and artists over a period of time to cross-check and expand out the thematic categories produced from this research. This would also allow for closer application of “the ability of digital composition to function as methodology, as a site for various local processes and methods of inquiry” (VanKooten, 2016). Importantly, being embedded within an immersive design team in a lab setting for observation across phases of development would further enrich and triangulate my data. It would not only provide the opportunity to cross-verify the thematic categories from this research but also offer direct experiential understanding of local processes and digital composition methods, thereby adding another layer to this inquiry into multisensory VR artists’ design practices.

Fourth, I also recommend these findings be used to develop more effective strategies for promoting digital literacy in VR users. As evidenced by my data analysis, the need for digital literacy to shape future VR design and content creation practices is particularly relevant to how to design VR experiences in ways that promote critical engagement and understandings that contribute to advancing accessible digital literacy. Multisensory VR has the potential to revolutionize education, particularly in digital spaces. Yet, to fully realize this potential, we must address technological infrastructure and economic constraint issues that limit access in communities. Future research could explore innovative evidence-based solutions to these barriers, such as community-based digital literacy programs or subsidized XR technology initiatives.
Fifth, each dimension addressed in my study offers, individually, a fertile ground for subsequent research that could further expand the understanding of the artists’ creative practices and their societal implications to build out needed scholarly conversations and professional practices. Most importantly, as this work contends, a new dimension of “Accessibility and Inclusion” should be added to mediology’s frameworks. As advances and appetites for immersive virtual experiences grows, there is a pressing demand for continual research and conversation about not only effective best practices but also valuable and necessary accessibility and inclusive practices for designing multisensory VR experiences. As viable extensions, additional research into the role of empathy in multisensory VR composition and across development phases offers an intriguing prospect for exploration, probing how addressing users’ agency, literacy, access and diverse needs may lead to more engaging and impactful virtual experiences for audiences. This could advance exploration into multisensory VR’s potential as a tool for social change, education, and empowerment, especially for marginalized and underserved populations.

I foresee that such research could aid in understanding the unique capabilities of multisensory VR media and creating inclusive design practices that challenge existing power structures and foster a more inclusive and accessible digital landscape. There are affordances and constraints to multisensory VR’s potential as an inclusive medium as this dissertation asserts. Future studies could build on these findings by exploring 1) new techniques and technologies for inclusive design and 2) how artists approach the challenge of designing for a diverse user base, focusing on accessibility and inclusivity. This might involve research teams investigating the impact of different experimental design methodologies, tactics, and interdisciplinary collaborations on the accessibility and efficacy of multisensory VR experiences, potentially delineating best practices and strategies for more accessible and inclusive design outcomes.

Sixth, in more specific ways, future studies should explore the impact of purposefully engaging a diverse range of users in the VR composition process. The importance of the user’s
experience in shaping the maker's decisions is a critical area of exploration. As revealed in my findings, artists engaging in multisensory VR design navigate a balance between their artistic vision and the user's accessibility needs. Future research could delve into these decision-making processes, comparing different approaches and directly measuring their impact on user engagement and experience in lab tests with observational approaches. The question of how a designer's own positionality impacts VR compositional decisions opens another fruitful avenue for exploration. For example, comparing VR experiences designed with and without input from users of different ages, abilities, and cultural backgrounds could provide empirical evidence supporting this study's argument for the impact of user involvement on the success of the final production. In a similar fashion, the relationship between real bodies and virtual bodies in VR environments opens up a fascinating avenue for future research, particularly for expanding on theories of embodiment and extended cognition. This dissertation located artists' considerations about the ways that users' perception of their virtual bodies can significantly impact their engagement with the VR environment. Future research could explore this relationship in more detail, shedding light on how the design of virtual bodies can be navigated responsibly. Understanding the ethical considerations involved in designing virtual bodies is also an opportunity to extend the dynamics and structures of collaboration among VR design teams to address wider questions about co-construction with users.

As Lunsford (2007) notes, composition in light of technological movement has to be reevaluated as "epistemic, performative, multivocal, multimodal, and multimediated" (p. 171). Historically linked, as one medium has preceded, informed, and conditioned the next in terms of our use and manipulation of vision and the visual, our theories, methods, and applications must operate in a critically facile and attentive way to keep up with the trajectory of technology enlivening our communicative artifacts for study. The risk of not keeping up, not observing from the thresholds, is losing our way via canonization. The work of this dissertation is a critical first step towards understanding multisensory VR design from the perspective of artists, and I am
excited to expand upon the considerations, processes, and challenges revealed in my findings, which open up multiple directions for further exploration and research. I assert it will not only advance scholarly knowledge but may also pave the way for a more inclusive, equitable, and accessible future of immersive experiences by influencing practical training and applications to compositional considerations in multisensory VR.

**7.5 REFLECTIONS**

In the beginning stages of conceptualizing a project, a researcher must consider the benefits and detractions investigating a digital culture may bring to the research question(s) (Creswell, 2013). Such considerations reveal what is valued rhetorically for the researcher as an agent of investigation and knowledge building, by requiring us to ask *who will this knowledge serve and how will it serve them?* Hayles also brings to bare the important yet subversive nature of reflexivity when embarking on such a task “because it confuses and entangles the boundaries we impose on the world in order to make sense of that world” wherein a theory, a technology, a philosophy, a rhetorical canon “is produced by the reflexivity that it also produces (an observation that is, of course, also reflexive)” (p. 8-9). When I began looking into the processes, techniques and methods that artists use to build multisensory VR environments, it was a genuine curiosity that drove me. What would my art and design students be interested in knowing more about? More selfishly, what did *I* want to know more about? In my first moment stepping into the initial build of the Çatalhöyük Virtual Archeology Project, I knew it was a rhetorical space of activity through and through but needed to know how and what could help me find out.

Throughout my professional career as an artist and designer (passionate and comfortable in that world of creative problem-solving), multisensory VR had been a blind spot—it was not an extension of my work that I had had opportunity to dig into in an applied hands-on way. Yes, I had gotten close through research opportunities, but the idea of creating a composition - not flat ink on paper or a click-thru web portal—that truly “came alive” and played compositions for the users’
senses, enough so that they would interact with your creation as if it existed in practical space and time and provided wonder for the user through a multitude of aesthetic elements at the designer’s disposal. This became an area where I was driven to know more—the nuances, the tools, the considerations and methods. It was not simply taking a painting or sculptural form into new media, so what was it?

I could not have been more fortunate to have had opportunity and provided valuable time and insight by those I interviewed and surveyed for this study. What I found was even more surprising in that the artists truly centered the inclusive needs of their users in such a wide variety of thoughtful ways, both practical and innovative. To me, as an instructor of art, design, and art theory/criticism, it is also integral to note that the processes, tactics, and decisions they undertake in creating multisensory VR builds—from the conception phases through the final product—are fascinating extensions of traditional artistic and design processes. This realization, in many ways, emphasizes the point that this nascent media is a new playground for older artistic compositional considerations that center expression, aesthetics, and, most critically, the audience/the viewer.

In quite a striking and overarching way, this research as well as the works and practices of multisensory VR development teams that it builds upon, would not be possible without starting from a space of transdisciplinarity. As a researcher, my own views and experiences on research processes have long been (and remain even more so) beyond multidisciplinarity or interdisciplinarity, to extend into this starting point of the problem to be solved and then bringing in a multitude of perspectives to remain flexible and open to untangling solutions that require a variety of new viewpoints. Transdisciplinarity is an intervention, promoting solutions independent of disciplines by way of overcoming biases. It is not a translation of disciplines. Importantly to me as a “pracademic,” transdisciplinarity emphasizes the practical relevance of research and problem-solving, and focuses on generating solutions, often in spite of disciplinary training, that can be applied in the real world. It also offers practitioners an opportunity to learn and produce outside of
their comfort literacies, assumptions, and tightly defined understandings. The work of this dissertation has done that for me.

Even with this study’s tight focus on one group in the often complex community of multisensory VR development teams, I assert that a) transdisciplinary approaches are often needed and should be more frequently adopted, and b) the application of a flexible and adaptable framework like mediology compliments not only varied dimensions of multisensory VR media but also requires transdisciplinary research methods. Taking into account the social, cultural, and historical contexts in which a multisensory VR system evolves, the importance of flexibility and adaptability becomes beneficial for artists, but also engineers, stakeholders, and users because it offers a more comprehensive and holistic approach to research and problem-solving than traditional disciplinary approaches. More complex problems and issues, by integrating different perspectives and approaches from multiple disciplines in intra-action (Barad, 2003).

Even in spaces of intersections, we can be biased to our own languages and ways of knowing and applying knowledge. How do we move outside of intersections that have hence become new boundaries to the thresholds? As the artists in this study asserted, fostering collaboration and co-construction among creators and scholars from differing technical and professional backgrounds allows for new directions and innovations to take shape—in multisensory VR composition and in research. Beyond breaking down boundaries of situated knowledges among communities of practice, methods and approaches to addressing complex problems can be more easily conceived when disciplinary assumptions are removed from a given creative task.

In my own space of reflexivity, I contemplated my core values as a researcher and scholar over and again during this project. I value what I brought to the work: creative problem-solving between disciplines that seeks to embrace failure-in-process; critical strategies for locating knowledge intersections and then thinking over them again as if watching relationships emerge like
specimens converging in a petri dish; and forming understandings specific to problems for the evolutionary production of research solutions. My own disciplinary identity (Rude, 2009) is rooted in being an Explorer (rather than an Exploiter) of networks and intersections across many disciplines, of participatory collaboration and design thinking, of centering inclusivity, ethics and aesthetics that further reconfigure what counts as composition, ever moving away from words and letters to semiotic relationships and meaning resonances that will continue to bring a “reading it crooked and telling it slant” (Glenn, 1995, p. 292) perspective to media and technologies. I value continuing to want the work I generated from this study to be problem-solving.
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## APPENDIX A

### PEII MODEL

<table>
<thead>
<tr>
<th>Themes</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quality of Presence:</strong> This cluster captures the quality of presence provided by the tool. A high presence environment that meets user’s expectations increases the suspension of disbelief with the necessary number of auditory stimuli;</td>
<td>Sense of Being There (SBT), Correspondence with vision (CWV), Adequacy of Depth Cues (ADC), Past Experience Modeling (PEM), Amount of Involvement (AOI)</td>
</tr>
<tr>
<td><strong>Quality of Experience:</strong> This cluster contains variables that capture the tool’s ability to convey the user’s intent. Users who feel that the tool is able to capture and convey their story tend to want to include it in their portfolio and share it with the public;</td>
<td>Ability to see all steps (AVS), Sense of Constructing a Story (SCS), Lack of Tactile Feedback (LTF), Incorporation in Portfolio (IIP), Ability to Record Narrative (ARN), Consistency with Real World (CRW)</td>
</tr>
<tr>
<td><strong>Quality of Interaction:</strong> This cluster indicates how users rate the quality of interactions with the tool. Users that feel hindered by the quality of displays and controls tend to feel that their ability to access creation tools was complex;</td>
<td>Concentration on Task (COT), Quality of Controls (QOC), Quality of Display (QOD), Use of More than one Color (UMC), Level of Access Complexity (LAC)</td>
</tr>
<tr>
<td><strong>Quality of Involvement:</strong> This cluster captures the user’s involvement while developing their model. Users that can feel engaged visually, auditorily and control their movement tend to find that the model they build with the tool is able to convey their vision;</td>
<td>Delay Using Software (DUS), Level of Auditory Involvement (LAI), Movement Control Mechanism (MCM), Helpfulness of Audio Cues (HAC)</td>
</tr>
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APPENDIX B

IRB EXEMPT DOCUMENT

OFFICE OF THE VICE PRESIDENT FOR RESEARCH

DATE: December 8, 2020

TO: Terra Ball
FROM: Old Dominion University Arts & Letters Human Subjects Review Committee

PROJECT TITLE: [1690604-1] Exploring Multisensory Virtual Reality Design Practices and the Media Art of Immersion

REFERENCE #: New Project

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE: 

REVIEW CATEGORY: Exemption category # 2

Thank you for your submission of New Project materials for this project. The Old Dominion University Arts & Letters Human Subjects Review Committee has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact Randy Gainey at 757-683-4794 or rgainey@odu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Old Dominion University Arts & Letters Human Subjects Review Committee's records.
APPENDIX C
CALL FOR SURVEY PARTICIPANTS

Participant Recruitment Message

Hi All,

I am currently conducting dissertation research in my doctoral program at Old Dominion University. If you are an artist working in multisensory virtual reality (VR), please take a few minutes of your time to complete this survey regarding your practices, methods, and experiences designing multisensory VR environments. All responses are anonymous. You will have the opportunity at the end of the survey to provide your email address if you are interested in a follow-up interview. The survey should take about 10-12 minutes to complete. I appreciate your time and help with this research.

Best,
D’An Knowles Ball
Ph.D. Candidate
Old Dominion University
Norfolk, VA, USA
## APPENDIX D

### FIGURE USE COPYRIGHT PERMISSIONS

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**Rights Owner**

Haven Science & Technology Journals

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### REQUEST DETAILS

**Distribution**

Worldwide

**Translation**

Original language of publication

**Cope for the Disabled?**

No

**Minor Editing Privilege?**

No

**Intentional Promotional Use?**

No

**Currency**

USD

### NEW WORK DETAILS

**Title**

MULTISENSORY VIRTUAL REALITY ARTISTS AND MEDIA: CONVERGENCE TOWARDS A PARADIGM: A FRAMEWORK; MOD EXO-S FOR UNDERSTANDING PROFESSIONAL COMMUNICATION IN ARTS...

**Institution Name**

Old Dominion University

**Expected Presentation Date**

2023-10-23

**Instructor Name**

Tori G. Ball

**Order Reference Number**

N/A

**The Requesting Person/Organization to Appear on the License**

Tori D’Ami-Ball

### ADDITIONAL DETAILS

**Editor of Portion(s)**

Tori G. Ball

**Volume / Edition**

20

**Pages or Page Ranges of Portion**

2-125-144

### REQUESTED CONTENT DETAILS

**Title, Description or Numeric Reference of the Portion(s)**


**Author of Portion(s)**

Tori G. Ball

**Publication Date of Portion**

2011-08-01

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1. Definitions. For purposes of these General Terms, the following definitions apply:

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- "Rightsholder" are the owners of copyright rights in the Works for which a User obtains licenses via the Marketplace platform, which are displayed on specific Order Confirmations.
- "Terms" means the terms and conditions set forth in these General Terms and any additional Order Confirmation Terms collectively.
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APPENDIX E

INFORMED CONSENT STATEMENT - SURVEY

Informed Consent Statement

Exploring Multisensory Virtual Reality Design and the Media Art of Immersion

You are invited to participate in a research study titled “Exploring Multisensory Virtual Reality Design and the Media Art of Immersion” (IRB Exempt #169064-1). This study is being conducted by D’An Knowles Ball, a Ph.D. Candidate in the Department of English at Old Dominion University (Norfolk, VA). The purpose of this study is to explore the practices, methods, and experiences of artists who design multisensory virtual reality (VR) environments. Further, this investigation focuses on the considerations, processes, and strategies artists employ when approaching the media used to compose multisensory VR. By completing the online survey that follows, you are agreeing to take part in this study. It will take you approximately 10-12 minutes to complete.

The results of this investigation will help the researcher inform academic communities of the ways artists approach composition toward immersion when designing these specific media environments. In addition, the study will inform the professional development needs of emergent industry practitioners. This research will also contribute to a larger body of knowledge regarding technical communication methods for composing persuasive immersion.

There are no specific risks identified with this research. The researcher will take all necessary steps to ensure that personally identifiable information is kept confidential and anonymous. Data will only be processed and analyzed by the researcher and will be deleted and destroyed within 18 months of data collection. The results of this survey may be used in reports, presentations, and publications; however, participants will remain anonymous, and the research will use no identifying information in any reporting situations. Participation in this study is voluntary, and refusal to participate or withdraw from participation at any time during the study will involve no penalties.

If you have any questions about this project, you can contact D’An Knowles Ball, Department of Communication & Theatre Arts, BAL 3000 5115 Hampton Blvd., Old Dominion University, Norfolk, 23529, 757-343-7032, dknowles@odu.edu. If at any time you feel pressured to participate, or if you have any questions about your rights or this informed consent statement, please call Dr. Tancy Vandecar-Burdin, ODU’s current IRB chair, at 757-683-3602, or the Old Dominion University Office of Research, at 757-683-3460.
Q1 - Which of the following best describes your highest level of education and/or training?

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Q2 - Approximately how many VR environments have you been a part of composing (on a team or otherwise)?

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Q3 - When beginning a VR composition in the concept and development phase, please rate these factors from highest to lowest in priority for you (1 as highest, 7 as lowest):
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Q4 - When testing a VR composition in the prototype phase, please rate these factors from highest to lowest in priority for you (1 as highest, 6 as lowest).
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Q5 - How important are technical components to composing a multisensory VR environment?

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Q6 - How important are material components to composing a multisensory VR environment?

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</table>

Showing rows 1 - 6 of 6
Q7 - How important are aesthetic properties to composing a multisensory VR environment?

<table>
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<td>How important are aesthetic properties to composing a multisensory VR environment?</td>
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<td>0.64</td>
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<tr>
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Q8 - How important is it to consider user expectations and assumptions when composing a multisensory VR environment?

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<tr>
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<td>Slightly important</td>
<td>14.29% 1</td>
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<td>5</td>
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<td>0.00% 0</td>
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<tr>
<td>6</td>
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Q9 - How important is it that the virtual environment seems consistent with real-world sense experiences?

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<tr>
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Q10 - It is important to include aesthetics elements that trigger users' emotions in a multisensory VR environment.

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<td>0.49</td>
<td>0.24</td>
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<tr>
<td>1</td>
<td>Strongly agree</td>
<td>60.00%</td>
<td>3</td>
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<tr>
<td>2</td>
<td>Somewhat agree</td>
<td>40.00%</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Neither agree nor disagree</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Somewhat disagree</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Strongly disagree</td>
<td>0.00%</td>
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<tr>
<th>Count</th>
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Q11 - It is important to consider persuasive design techniques when composing a multisensory VR environment.

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<th>Std Deviation</th>
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<tr>
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<td>1.00</td>
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<td>2.00</td>
<td>0.63</td>
<td>0.40</td>
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<td>20.00% 1</td>
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<tr>
<td>2</td>
<td>Somewhat agree</td>
<td>60.00% 3</td>
</tr>
<tr>
<td>3</td>
<td>Neither agree nor disagree</td>
<td>20.00% 1</td>
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Q12 - It is important to design a vivid unfolding narrative for the user into a multisensory VR environment.

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<td>2.00</td>
<td>1.10</td>
<td>1.20</td>
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<table>
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<th>Choice Count</th>
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<tr>
<td>2</td>
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<td>40.00%</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Neither agree nor disagree</td>
<td>0.00%</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Somewhat disagree</td>
<td>20.00%</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Strongly disagree</td>
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Q13 - It is important to seek to achieve a sense of wonder for the user of a multisensory VR environment.

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<th>Field</th>
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<th>Variance</th>
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<tr>
<td>1</td>
<td>It is important to seek to achieve a sense of wonder for the user of a multisensory VR environment.</td>
<td>2.00</td>
<td>5.00</td>
<td>2.80</td>
<td>1.17</td>
<td>1.36</td>
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<td>2</td>
<td>Somewhat agree</td>
<td>60.00% 3</td>
</tr>
<tr>
<td>3</td>
<td>Neither agree nor disagree</td>
<td>20.00% 1</td>
</tr>
<tr>
<td>4</td>
<td>Somewhat disagree</td>
<td>0.00% 0</td>
</tr>
<tr>
<td>5</td>
<td>Strongly disagree</td>
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Q14 - The technical/mechanical quality of sensory tools is important to the creation of a multisensory VR environment.

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<td>0.75</td>
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<tr>
<td>2</td>
<td>Somewhat agree</td>
<td>40.00%</td>
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<tr>
<td>3</td>
<td>Neither agree nor disagree</td>
<td>20.00%</td>
</tr>
<tr>
<td>4</td>
<td>Somewhat disagree</td>
<td>0.00%</td>
</tr>
<tr>
<td>5</td>
<td>Strongly disagree</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Q15 - In terms of your composition process, how important is it that the sensory qualities you include in a VR environment promote user exploration?

<table>
<thead>
<tr>
<th>#</th>
<th>Field</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>Variance</th>
<th>Count</th>
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<tbody>
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<td>In terms of your composition process, how important is it that the sensory qualities you include in a VR environment promote user exploration?</td>
<td>1.00</td>
<td>3.00</td>
<td>1.80</td>
<td>0.75</td>
<td>0.56</td>
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<td>Very important</td>
<td>40.00%</td>
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<tr>
<td>3</td>
<td>Moderately important</td>
<td>20.00%</td>
</tr>
<tr>
<td>4</td>
<td>Slightly important</td>
<td>0.00%</td>
</tr>
<tr>
<td>5</td>
<td>Not at all important</td>
<td>0.00%</td>
</tr>
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</table>
Q16 - In terms of your composition process, how important is it that the multisensory VR environment promotes a sense of presence (a feeling of “being there”) in the user?

<table>
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<tr>
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<th>Field</th>
<th>Minimum</th>
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<th>Std Deviation</th>
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<td>1.60</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>of “being there”) in the user?</td>
<td></td>
<td></td>
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<tr>
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<td>3</td>
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<tr>
<td></td>
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<tr>
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<td>Slightly</td>
<td>0.00%</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Not at all</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>important</td>
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</tr>
</tbody>
</table>
Q17 - In terms of your composition process, how important is it that the sensory aspects of the environment keep the user involved?
Q18 - In terms of your composition process, how important is it that your artistic designs convey a narrative for the user?

<table>
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<th>Field</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>Variance</th>
<th>Count</th>
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<tbody>
<tr>
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<td>In terms of your composition process, how important is it that your</td>
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<td>5.00</td>
<td>2.00</td>
<td>1.55</td>
<td>2.40</td>
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<tr>
<td></td>
<td>artistic designs convey a narrative for the user?</td>
<td></td>
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<tr>
<td>4</td>
<td>Slightly important</td>
<td>0.00% 0</td>
</tr>
<tr>
<td>5</td>
<td>Not at all important</td>
<td>20.00% 1</td>
</tr>
</tbody>
</table>

Showing rows 1 - 6 of 6
Q19 - In terms of your composition process, how important is it that you include items (material and/or virtual) that the user can interact with in the environment?

<table>
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<tr>
<th>#</th>
<th>Field</th>
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<th>Maximum</th>
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<th>Std Deviation</th>
<th>Variance</th>
<th>Count</th>
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<td>In terms of your composition process, how important is it that you</td>
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<td>3.00</td>
<td>1.60</td>
<td>0.80</td>
<td>0.64</td>
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<tr>
<td></td>
<td>include items (material and/or virtual) that the user can interact</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with in the environment?</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Very important</td>
<td>20.00%</td>
</tr>
<tr>
<td>3</td>
<td>Moderately important</td>
<td>20.00%</td>
</tr>
<tr>
<td>4</td>
<td>Slightly important</td>
<td>0.00%</td>
</tr>
<tr>
<td>5</td>
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Showing rows 1 - 6 of 6
Q24 - Would you like to be contacted for a follow-up interview for this study?

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<th>Field</th>
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<th>Maximum</th>
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<th>Std Deviation</th>
<th>Variance</th>
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<td>0.40</td>
<td>0.16</td>
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</thead>
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<td>Yes</td>
<td>80.00%</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>20.00%</td>
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</table>
APPENDIX G

INTERVIEW INSTRUMENT

Multisensory VR Artist Interview - Interview Script

Thank you for taking the time to be here today and for returning the signed consent form, which I've placed on a secure external hard drive.

The purpose of this interview is to collect qualitative data for a research study to explore the practices, methods, and experiences of artists who design multisensory virtual reality (VR) environments. This study focuses on the considerations, processes, and strategies (esthetic, technical, and/or practical) that artists employ when approaching the media used to compose multisensory VR. The results of this investigation will help inform academic communities of the ways artists approach composition toward immersion when designing these specific media environments. In addition, the study will inform the professional development needs of emerging industry practitioners. This research will also contribute to a larger body of knowledge regarding technical communication methods for composing persuasive immersion from the artists' perspectives.

The results of this study may be used in reports, presentations, and publications; but your identity will remain anonymous and the research will not identify you by name in any reporting situations. You will have an opportunity to review the draft of the final report for accuracy of representation. Your participation in this study is voluntary, and you may withdraw from participation at any time during the study with no penalty.

This interview is being recorded. And will take approximately 45-60 minutes. The format will be standardized and open ended, so feel free to ask clarifying questions or add additional information to your responses or comments as you feel you need to, and I will place the interview questions in the chat for accessibility. If you need to return to the question again or would like to follow up with additional thoughts after this interview has concluded. Do you have any questions or accessibility needs before we get started?

Research Instrument Part II: Interview Questions

1. How would you define or describe multisensory VR?
2. Can you describe your experiences designing multisensory VR environments?
3. What technologies do you most frequently employ when composing a multisensory VR environment?
4. In your experience, what methods or tactics do you find most beneficial to include to create a sense of immersion in a VR environment, sensorily or otherwise?
5. Are there any particular design decisions about sensory or aesthetic aspects that you find you primarily factor into the construction, testing, and user experience (UX) of multisensory VR compositions?
6. How do you digitally and physically construct the environment to make suggestions for use or to enable the user?
7. With various design considerations in mind, how do you prioritize based on the needs of individual projects and the resources of your customers or users?.
8. Can you talk a bit about an artistic decision or design method that was unsuccessful in a VR build, and how it was (or may have been) corrected in the design process?
9. Are there any additional points about your methods or experience as an artist you find important to multisensory VR design that we didn't discuss?

That concludes the interview today. Again, feel free to follow up with additional thoughts about these questions if you have any, just email them over to me. And you can get in touch with me if you have any questions or concerns. I appreciate your time today and thank you for taking part in this research study!
APPENDIX H

ADULT CONSENT FORM - INTERVIEWS

Adult Consent Form

Exploring Multisensory Virtual Reality Design Practices and
the Media Art of Immersion

D’An Knowles Ball - Ph.D. Student, English Department – Old Dominion University
Phone: 757-343-7032; Email: tknowles@odu.edu

Thank you for your willingness to participate in the “Exploring Multisensory Virtual Reality Design Practices and the Media Arts of Immersion” research study being conducted by D’An Knowles Ball. The purpose of this research is to explore the practices, methods, and experiences of artists who design multisensory virtual reality (VR) environments. Further, this investigation focuses on the considerations, processes, and strategies artists employ when approaching the media used to compose multisensory VR. The interview is expected to take between 45 to 60 minutes; however this will depend on the complexity of individual experiences and responses. The interview will be recorded for later transcription and analysis. If you have any questions regarding this study at any time, you may contact the researcher by phone at 757-343-7032 or via email at tknowles@odu.edu.

Risks to Participation. There are no specific risks identified with this research. The researcher will take all necessary steps to ensure that personally identifiable information is kept confidential and anonymous. Data will only be processed and analyzed by the researcher and will be deleted and destroyed within three years of data collection. The results of this study may be used in reports, presentations, and publications; however, participants will remain anonymous and the research will not identify them in any reporting situations.

Confidentiality and Data Usage. This study will be done with full confidentiality. This means, participants will be interviewed separately from each other in a private setting and no information will be shared by the interviewer from one participant to the other. Audio/video recordings will be stored on an encrypted external hard drive and not shared among student and/or faculty researchers. Audio transcripts will be void of any identifiable information such as proper names, places, or information that can identify the interviewee. Once the recordings are fully transcribed, all files and identifiable information will be deleted. If the participant wishes to end the interview or withdraw from the study at any time, all data related to the interview will be terminated. Once transcribed, the data will be kept for future analysis by the researcher for research purposes; however confidentiality will be maintained during the entirety of this project. In all instances where data is disclosed, including presenting of study results, it will be presented in a manner that does not reveal the subject’s identity.

Subject’s Initials _______
Once again, you may contact D'An Knowles Ball at 757-343-7032 or via email at tknowles@odu.edu for answers to questions about this study, research subjects’ rights, or in case of a research-related injury.

You are free to refuse to participate in this research project or to withdraw your consent and discontinue participation in the project at any time without penalty. Your participation will not affect your relationship with the institution(s) involved in this research project. If you have any questions about this project, you can contact D'An Knowles Ball, BAL 3000 5115 Hampton Blvd., Old Dominion University, Norfolk, 23529. tknowles@odu.edu If at any time you feel pressured to participate, or if you have any questions about your rights or this informed consent statement, please call Dr. Tancy Vandecar-Burdin, Old Dominion University IRB chair, at 757-683-3802, or the Old Dominion University Office of Research, at 757-683-3460.

My signature indicates that I am at least 18 years of age, I have read and understand this consent form, received a copy of this form, and all my questions have been answered. I agree to participate in the project as described.

_________________________________________  __________________________
Signature of Subject                               Date Signed

I give permission for this interview to be recorded and saved for future analysis.

_________________________________________  __________________________
Signature of Subject                               Date Signed
Redactions have been included to anonymize the participants' personal information.
Interview: Participant 1

Sat, 4/3 7:41AM • 49:45

SUMMARY KEYWORDS
object, space, virtual, people, create, artists, vr, question, experience, feel, printed, user, lighting, explore, process, absolutely, piece, important, study, swarm

00:05
Okay,

00:05
so thank you very much for taking the time to be here today. I really appreciate it. Yeah, and for returning the signed consent form, I got that. So I've placed it on the secure external hard drive with the rest of the data information for the study. Just to reiterate a little bit of what's in the consent form about the research study. The purpose of this interview is to collect qualitative data for a research study to explore the practices, methods and experiences of artists who design multi sensory evolved virtual reality environments. What the study focuses on mainly is the considerations and processes and strategies whether aesthetic or technical, were very practical things that the artists employ when approaching the media that's used to compose these multi sensory environments. The results of the study will help me inform academic communities about the way that artists approach compositions towards immersion when designing these actual media environments. Also, the study will inform professional development, hopefully, for emergent industry practitioners and other artists who are coming along. And hopefully, it can contribute to a larger body of knowledge regarding technical communication methods for composing persuasive immersion, from the artists perspectives in particular. So the results of the study may be used for reports or presentations or publications. But your identity will always remain anonymous. And the research will not identify you by name in any of these reporting situations. And you'll also have an opportunity to review a draft of the final report for accuracy of representation as well. And your potential participation in the study is voluntary, just to reiterate, and you may withdraw from participation at any time during the study with no penalty at all whatsoever.

- 1 -

Transcribed by https://otter.ai
So the interview is being recorded. And it’ll take approximately around probably 45 to 60 minutes of your time. The format will be standardized and open-ended. So feel free to ask questions, or add additional information to your responses or comments as you feel are needed. And I’ll also place the interview questions in the chat for accessibility reasons. So if you need to return to the question again, or if you would like to follow up with additional thoughts. After the interview is completed, you know, you can always reach out if you have the questions there. Before we get started, do you have any questions? Or do you have any accessibility needs before we get started?

Nope.

Okay. In that case, we’ll dive right in. And the first question will be, how would you define or describe multi sensory VR?

I would say in immersive environment, stimulating experiences, multi sensory experiences, or a simulacrum of the multi sensory experience that you would have in everyday life.

Very nice.

The second question or kind of the baseline, can you describe your experiences with designing multi sensory VR environment?

Yeah, let’s see. For me, it was a very collaborative process as an artist who does not have a deep technical background or understanding of programming language and nuance. A large part of it was working with a team in order to execute and generate these virtual spaces. That would be not only accessible to the general public, but also safe, which was very important. There, I know there’s certain whether it’s stimulation sickness or, or other instances, where, because it’s fairly young technology, some people have unpleasant experience. So part of the things we were creating, we wanted to make sure that we could minimize anyone’s negative experience and mitigate that from happening in the beginning. So we even had a questionnaire, before we would let anybody enter the virtual space, it was very important for us to make sure that they knew the kind of conditions they were getting into. Gonna just look at your question one more time. Yeah, as far as from a purely creative, artistic standpoint, I found the whole process of being able to create, in essence, an alternate reality, completely liberating, not having to deal with the confines of scale, gravity, physics, is really a very expansive exercise for a visual artist.

Interesting as a kind of a riff on that, did you? Did you find that it was it was less constrained in terms of media that you normally work with?
Very much so very much. So as someone who focuses on a handful of different media, being able to let go of the medium of choice, and not have to be concerned about the physicality of how things actually hold together, was very freeing as a sculptor, so much of what you push up against is your choice of materials, and not just the structural methods of how you put things together, but why you've chosen to put them together in that way. And in the virtual space, that is, it's a non issue. So that was really kind of fun.

Yeah. It really sounds like it allows you to explore in whole new ways. What technologies Did you employ when composing and multisensory VR? And you can use a specific project if you'd like a specific project example. Or it could be collaboratively as a team, you know, what kind of technologies came together?

this one particular artists residency that I did, we focused on. We began with scanning objects with a 3d scanner, laser mapping the surfaces of objects, we then translated that information into m. format that would allow us to take that data and print 3d print those objects. And before we 3d printed the objects, we would also manipulate the data of the scanned objects to create new objects, which would then that would happen in a virtual space program we were using called medium, which then was picked up by a collaborators of mine, one of whom turned this 3d object into an app. animation. And another, I can't refer to the program he used Exactly. But it involved creating a skin on the object and also creating an armature within it so that it could move in a realistic fashion. And another collaborator used. I'm trying, I'm drawing a blank, about the name of the game engine that he used in order to generate this monumental scale version of this one object. So what we did essentially, was we generated components from a laser 3d laser scanner, we created an object in a virtual space. And then we took that soul object as a jumping off point for exploration. So the the different results and manipulations of this one object, whether it was printing it in 3d, or animating it in a virtual landscape, or generating a 500 meter tall digital version of it that you could then virtually immerse yourself in. It wasn't so much about this sole object and its importance as much as it was about the portability of this object from one format to another. And it was kind of a, a beacon, or a landmark that people who were experiencing the entire showcase of all these different pieces, there was a commonality, a common thread through the whole thing.

Okay, so it kind of took the user from a physical object in a physical space into a virtual object manifested in a different way in a virtual space?

Absolutely. And we had an in between version as well, where there was a, a large kind of maybe 10 foot across version of the object, and we 3d printed the core. And then you could look with a iPad, and in an augmented reality program, you could see the finished version of this super large scale objects. So we had AR VR and also, we're using projection as well to create a surface on one of these models as well as 3d action.
Okay, okay. Fantastic. In your experience, what methods or tactics did you find most beneficial to use and to create a sense of immersion in the VR environment, or in the AR environment, I guess I should say, the XR environment that you were exploring?

I think the most important tactics were, again, it was very much focused on people having a safe, enjoyable experience. So entering the space, testing things out, at times, working with my collaborators to kind of dial it back a little bit, because the instinct from the programmers perspective was to kind of push it as far as we possibly can. And though some of those iterations were fun, they were also I found them to be a little bit multi sensory overstimulation. And I have enough experience in VR that if I was feeling that I felt like people who if it was their first time, it would be too much. So really, what we were focused on was going into the space working specifically to create all and inspirational moments. Also, the user experience was really important to us. So in this one piece, the user had the ability to travel around to different locations along this 500 meter sculpture. And they can also that was one of the things they could control that, aside from moving around and having different vantage points, they could teleport to these different locations. And they could also control a virtual swarm or storm of objects that was moving around through a pre determined rhythm. And so there was a cycle of this swarm, and you could speed up or slow down the way these things are moving around you.

Interesting, I think that that definitely speaks to a lot of artistic principles that perhaps, you know, engineers may not necessarily be attuned to, as far as the nuances, you know, what the viewer will actually experience when it’s within a space, you know, the scale and the rhythm within the piece itself?

Absolutely, there were also other instances where there were the creative ideas that absolutely came from the engineers, the engineering side of it, that were also fascinating, you know, like the idea to, to print out a portion of the code for this 3d printed object, because it’s so comical how much data is involved in printing this object, it wasn’t particularly complex, it wasn’t that simple. And we did a, you know, we’ve printed out the file, and we had to make the font this big, so we could fit it, and it was still supporting this piece of paper. And we, we then projected that as well. And we used now, it’s very mixed media sort of piece. And there was all kinds of things going on, we ran the file for the 3d print through a MIDI generator, and we actually created a soundscape that was kind of slowly in the background, that was just an audio version of what the file could sound like. So there was lots of different give and take between the, the, the engineering side and the creative side. And what was so positive and wonderful about the experience for all parties was, I get to put on an engineer’s hat every once in a while, and they got to put on the creative hat every once in a while. So it forced us all to have plasticity in the way in which we were approaching the project, which was great.

Very interesting.
I think, absolutely. Especially, I think, in terms of, you know, having something like the code, which a lot of people consider an in between step, you know, towards getting the object into the computer there and become a part of the experience, you know, the code is kind of the process, you know, and it becomes kind of a inclusionary piece. That was, I don't think it was, by any means a very successful sculpture. But I spent a whole lot of time on it. And there was just a lot of thought that went into it. And it was very weird. But the do I think it was as glorious as the virtual space recreated? Absolutely not. But it was really. It was very interesting. And it was, it was a great exploration.

Absolutely.

Up next,

Are there any particular design decisions or aesthetic decisions that you find for you primarily factor into the construction or the testing, or you mentioned earlier about the users experience? With this multi sensory VR composition?

this is from your perspective, you know, as an artist going into this work,

yeah, I didn't feel like I, I had to have any particular considerations compared to what I deal with every day working in the real world. I mean, it felt aside from trying to create kind of safe, positive experiences for people. Yeah, they're there didn't I think if I had been more on The technical end of it, there probably would have been some of that. But from from my part of it, I didn't feel that those parameters were particularly limiting in any way.

Okay.

So it was a really sort of open exploration kind of feel like you were saying earlier, related more to open exploration as you went along. Did you did you have kind of a pathway in mind? Or do you feel it kind of evolved as the process as you went through the iterations?

It very much so, because I wasn't hard designing anything. It really wasn't even conceived of as, as art necessarily, it wasn't thought of as a finished product, you know, the process and the interaction between all of the people who are working on it, that was really the exploration for us. So it was as much like an academic, interdisciplinary exercise as much as it was hard designing. So even though there were some objects that were made with a glowforge, laser burning device, that the end result was very much a two dimensional piece of art that you can hang on the wall, even that didn't feel
particularly finished, because there was, there wasn't that much focus on that. I'm kind of hard to pin down moment of completion, in the artistic process. We didn't really, I didn't really allocate a lot of space in order to do that, because it was more about getting as much out that was of quality as possible, rather than having perfect conclusive sort of things.

22:29
That's really, that's really fascinating in terms of product versus process, being, you know, a tactic and a goal.

22:39
Oh, yeah, very much. So as a, an artist whose livelihood comes from making finished things. It's very nice to not have to be concerned about that, you know, because the finishing of things is its own whole art in itself, you know?

22:57
Absolutely. For the next question, how do you incorporate you brought up of a few times, you know, your, your feelings towards producing this aesthetic experience for the user? How do you incorporate considerations of the end user in your artistic process for in Project decisions as they evolved?

23:25
A lot of this, a lot of the user considerations we put into play were about not just creating the space virtually, that people were going to engage with, but also the physical space where they were going to put the helmet on their head. We had a large projection piece that we made with this animation. And rather than have it be on a single wall, we had two projectors going into a corner, so as to produce more of an immersive environment. We wanted every everybody who is entering the virtual space essentially got a one on one handler, for the whole time that they were in the space, just in case they had any questions in case they at any point needed assistance. You know, we had it set up that if you had certain disabilities, you would still be able to access the virtual space. Obviously, this would have been problematic for anybody who was visually or hearing impaired. We did not take it that far. But yeah, that was it was it was critical to the whole exploration, lighting, we essentially reworked the entire lighting of the space and took the lighting down so that the virtual spaces we created, the lighting was very subtle. And we didn't want people to take the helmet off and be immersed in fluorescent lighting. And so much of our, our kind of innate aesthetic experience in the world is lighting based that it was, it really helped set the tone of the entire showcase to be able to dial back the lighting a lot, was very helpful.

25:46
A fascinating point, I think about the you know, going from a virtual world into, you know, back into the real space and having a kind of a transitionary space there. How do you put this one in the chat? I just thought of this one.

26:07
How do you

26:10
digitally or physically constructing environment to kind of make these suggestions for use, or to enable the user you mentioned that they had a one on one person with them? But do you feel that the space kind of had an intentionality of these kind of suggestions for how to use how to use or how to explore the different components of the experience?

26:41
Absolutely, um, um, we there was suggestions, whether they were implied or direct, at many points along the way, whether there was signage, letting people know how to interact with something, using pipe and drape, so as to direct the flow of how people are going to experience the physical space, setting up a projection of the virtual space that people were inhabiting with the headset behind them, so that other people in the space could see what they were seeing, you know, strategically putting, you know, couches in certain locations, so you could have the right angle on things. There was so much that went into, like, I think a lot of installation art tackled this question. And you start in any given installation, there's, there's a spectrum, usually between giving the user or the participant zero information about where they are versus completely controlling the experience. And I think, at least, it for where VR is right now. I think it's important for a creative person, if you're going to be putting people who do not have experience in the virtual realm, into this environment, I think it's very important that they have a guide, whether it's a digital guide, or an actual person standing by I just think it's, I think it's very important because it's very easy to bump into things or fall down. And, and it's disorienting, for sure.

28:55
Very much. So. As far as From what you describe about the intentionality of the physical space being designed, Was that similar to or opposite from the way the user would explore in the virtual environment?

29:18
That's a very good question. Um, yes, I would say, for this instance, the physical space was designed almost so the participant, the user, when they would enter the physical space, it would be no question as to this is a design space, it just felt naturally like that. You know, like when you enter a clean hotel room, you don't think, Wow, this room is very clean, as it should be. And I think that's, that's it It's important to kind of set the tone. And it puts people at ease a little bit, you know, again, with the lighting was very important to do that. And we had this large, somewhat kind of corporate space that we were working with. And we were able to portion off sections and change the lighting in such a way that it, it felt more like a creative space or an interdisciplinary space, not just the lab in the first floor of with no windows. And so that sort of like passive planning was, I think, similar, but very different consideration than create creating the space in the virtual realm, which a lot of the details of that was really left up to one of my collaborators who, through his knowledge of I'm so close to remembering the name of this game engine that he drew that he created this thing. Um, so again, blender.

31:22
It wasn't blender, I want to say Genesis, but that's my writing. good name. Yeah, definitely. But yeah, his ability to create, like different light sources, was watching this. So my idea was to create this monumental version of the sculpture that we could walk around and explore. And seeing the iterations of this thing go from being like blank with no shadows to then there's a virtual sun to then
there's multiple virtual suns, different light sources, it just became so realistic, so quickly. And, and
that was, that was like, an interesting thing, because that was his creative contribution was really
making that virtual space.

32:18
Interesting. That's very cool. So with these kind of, not only artistic considerations in mind,
but you know, very design early considerations in mind. How do you think you prioritized
based on the projects and the, you know, the project and the resources? How did you
prioritize based on the customer or the user? what you wanted to emphasize whether it was
budgetary, aesthetics, audience engagement? Did you determine that in the beginning, or did
it change during the process? Or was it kind of user engagement, experience, you know, the
whole time?

33:19
Well, I think it was somewhere in between. It started off like many artistic endeavors, it was
completely self indulgent, and enabled me to be able to have the freedom to explore these
technologies through the knowledge and expertise of a team of people who really understood them
in great depth. And that was our starting off point. And then as we were creating and manifesting
different iterations of 3d objects, they just felt very underwhelming, because so much of the sculpture
I've made in my career has a lot of passion and troubleshooting kind of built into the objects
themselves, that these extruded plastic objects coming out of a printer just didn't really have that
same sort of gravity and energy to also the it's just white or transparent plastic. So they're
kind of are these like ghostly dead objects. So when we decided, Well, I was informed that there was a whole
army of 3d projectors available at my disposal. That was Is the catalyst for us to start adding color
and texture to the surfaces of these things. And as we started with the concept of 3d projecting on
them, then we realized shortly thereafter, that we were going to have to control the lighting of the
entire space because otherwise, the projections just weren't going to be as good as they could be.
simultaneously with sorting through these physical objects, the we started flirting with this idea of
creating the these virtual spaces. There's one particular virtual space, a lot of the animation was one
graphic designer, on staff at [Blank], who I absolutely gave him this still basic 3d object, and I just
asked him to have at it and breathe some life into it. And he what he produced was, you know, it was
just incredible. And so it was a, we wanted, we very much wanted the users and the participants to
be engaged, but also to be informed about this exploration that we were all having amongst
ourselves. So we very much it felt very much like an academic exercise. We actually ported some of
this work out into the public A few months after the fact. And it was just very well received, you know,
because virtual reality is still very, it's very new to people.

36:47
Definitely, how was the experience taking it from one space to another, did you consider
taking the context shift, or the spatial shift is changing the content?

37:02
a little bit, we were definitely there was there was some, there was a lot more limitations with trying
to plate it from its original location to satellite site, we couldn't control the lighting quite as much. So
even though we set up some 3d projectors, it was more lackluster than I would have liked things to
have been, it literally wasn't cast in the best light possible. And what was very different was we didn't
have a large wall to project what someone in the headset was seeing. So that other people waiting in line to put the headset on, they didn’t know what they were getting into. And that was very different, like an element of surprise. Because I think we had it on a computer screen. But it’s, you know, it’s night and day when you see, you know, something on a very small screen, and then you get inside of it, so to speak.

38:12
That’s fascinating. You know, the space can you know, the constraints of the space can kind of change the experience for the user and for the user with an audience.

38:25
Absolutely. All these questions you’re asking me, it keeps making me think of this installation artist who works with light. His name is James Turrell. And I don’t know if you’re familiar with his work, but it’s all very much. They are. They’re real environments, but they almost feel like virtual environments, because the way he uses light, it’s very disorienting. And sometimes you’re not sure where boundaries are. And these spaces are typically enormous. And they’re very site specific. And it would be interesting to know if he is exploring things digitally.

39:14
Oh, no, that is an interesting question. Because I again, you know, I think it is very interesting to see how these initial ideas, these original media forms for artists can translate and sometimes cannot translate into different spaces. Which kind of brings me to my next question. I guess that’s a decent a decent segue. Can you talk a little bit about a decision or something in the the artistic methods that were tried, that were unsuccessful in the VR build, and maybe how it was corrected or could have been corrected in the build process. Whether it was the status For sensory or technical

40:02
have to have to think back. Oh, yeah, there was also, um, one thing we couldn’t do, which I would have liked to do was this, this large object that we were that you could explore this monument, we had a swarm of very small versions of this thing that were kind of buzzing around you. And that swarm because of the capacity computing capacity had to be composed of two dimensional version of this object. And ideally, for me, it would have been more like, you know, dragonflies, or like butterflies, or like, rather than this kind of controlled, swarming and blooming thing, I would have much rather it had been more, more chaos to it. And in the virtual space, if you could have paused it, and then zoomed in and looked at this object and seeing all of the detail and three dimensionality and complexity of the thing that you were standing on, you could have had this like, micro macro moment. But I think due to not just computing power, but also time constraints and rendering capabilities, we couldn’t really get things to that level of detail. That's always been something for me, as an artist that I found amazing is, the deeper you look, the deeper you observe, the more there is for you to observe. And I think the virtual space is it begs for us to simulate these sorts of things. But ironically, this one instance, what we did was since we went the other way, you know, we built this, we took this one object, and made it into a monument, which was also very cool, because I have never produced, you know, a 500 meter monument. But I was able to make one in virtual space. And it was better than a real life monument, because you can teleport to different arms, and it was in outer space.
Absolutely. And, you know, it definitely, in that particular case, you know, the, from what you mentioned, you know, the interaction with that monument, you know, within it, and around it, within such a large scale space. They have kind of a, I guess, the dichotomy with the smaller with the smaller ones was probably a little prevalent, but I don't know, it seems, it seems like an interesting kind of thing in the design process, you know, where you are in this world, and kind of find that you don't really have any constraints, and all of a sudden, it's a, you know, a microchip, you know, holding things.

Exactly, or, you know, like the, you know, the inability for the engineer to have, you know, another 300 hours to resolve that issue for you. You know, I felt so, so utterly fortunate and privileged to, you know, essentially have people who are working for me, and because I would have a whimsical idea. And they were always willing, but sometimes what I thought would be very simple and straightforward. Often times. What I thought was a simple idea turned into just something that wouldn't be feasible within the The parameters that we had. So you know that it was okay, it's part of rolling with the punches, you know, like, as an artist working in the physical world, I come against that all the time. But I usually I, I hit that obstacle in my head long before I hit it with the physical work that I'm doing. Right. Whereas so much of the generating this virtual space, so much of it was all just up here. A lot of it didn't feel real until it was complete. You know, I found that was a very frustrating aspect of working with the 3d printed objects for me was I felt like I was putting all this work in and I had nothing to show for it. And then all of a sudden, we would print this thing. It would be like, oh, okay, there it is. But it took, you know, a month before we had anything printed.

Hmm. That is fascinating. Yeah, it's a very loose invisible labor. You get very visible labor.

Yeah, exactly. Exactly. And I think for different disciplines, different career paths, you know, there's varying degrees of that, but as most visual artists, we're not maybe used to instant gratification, but we're used to some level of progress, depending of course, right, exactly.

As I mentioned, that's, that's a fascinating thing I hadn't considered before it was an interesting consideration there. And the last one, are there any additional points about your experiences, or the the different methods that you may have discovered in the process of creating this multi sensory experience that we didn't get a chance to discuss?

Um, I don't think so. I mean, the most salient part of it for me, as I've stated, again, and again, is this collaborative effort. And as someone who's dedicated a lot of time to working in a craft, I think, so much of the artistic endeavors nowadays, in our very specialized culture, I think it's very important for people who are creative to not be held back by a lack of technical knowledge. And I think it does a disservice to the potential of creative endeavors that can be executed in VR, if you have to first acquire all of this engineering and technical know how in order to be expressive. And I don't
know exactly how you resolve that. But I think it's, it should be a collaborative sport, for sure. And I just, I hope there are other I wouldn't say Luddite but more material based artists who have the opportunity to work with engineers in order to implement and execute ideas, given the opportunity, I would do it again, in a heartbeat.

48:34
Fantastic. That's wonderful. Hopefully, we can, I would definitely enjoy seeing more, that's for sure. All of you, if you think of anything, you know, based on these questions we've talked about if something just comes to mind, if you have shower thoughts or you know, 3am thoughts? Definitely, you know, feel free to reach out at any time, or if you have any questions at all. Just email them over to me. Or we can chat again if you'd like. But you can get in touch with me anytime you want. If you have any questions and concerns also, again, I really appreciate your time. Thank you so much for taking part in a research study.

49:25

49:33
Thank you very much.

49:34
So have a great week. All right. Take care and good. See you Bye. Bye bye.
Interview: Participant 2

Sat, 4/3 7:53AM • 1:12:45

SUMMARY KEYWORDS
sound, environment, technology, important, vr, experience, questions, user, interactions, design, create, visuals,engage, multi sensory, build, vr experiences, artists, understand, real, participation

SPEAKERS
Researcher

Researcher 00:10
Start recording.

00:12
Okay,

00:14
so thank you for taking the time to be here today, I really appreciate it. And also for returning the signed consent form, I've placed that on the secure external hard drive. Again, the purpose of the interview is to collect qualitative data for a research study to explore the practices and methods and experiences of artists who design multi sensory, virtual reality environments. The study focuses on the considerations the processes and the strategies, whether they're aesthetic or technical are very practical things that artists employ when they're approaching the media used to compose multi sensory VR. So the results of the investigation will help me inform academic communities on the ways that artists approach compositions towards immersion, when they're designing these specific environments. And also, the study will inform professional development needs of industry practitioners. And also, the hope is that it will contribute to a larger body of knowledge regarding technical communication methods for composing persuasive immersion, for from the perspective of artists. So the as was in the consent form, the results of the study may be used in reports, presentations and publications. But your identity will remain anonymous, and the research will not identify you by name in any of the reporting situations. You'll also have an opportunity to review a draft of the final report for accuracy of representation. Your participation in the study is completely voluntary, and you can withdraw from participation at any time during the study. With no penalty. I am recording the interview. And it'll take approximately 45 to 60 minutes, the format is going to be standardized and open ended. So feel free to ask any kind of clarifying questions or to add additional information to your responses or comments as you feel you need to. I'm also going to place the questions into the chat for accessibility. So if you need to return to the questions again, or if you would like to follow up with additional thoughts after the interview is over. You can always message me
afterwards or send follow up emails. So do you have any questions or accessibility needs? Before we get started?

02:48
I think I got everything set up and ready. So

02:53
okay.

02:55
Well, I'll put the first question in the chat. How would you define or describe multisensory virtual reality?

03:22
So to me multisensory is, regardless of whether it's VR or AR, or when they're not cool, extended reality has to engage more than a couple of senses. So you have to not just have the visuals, but auditory, tactile, maybe no combination off as part of the experience or the interaction with now I don't know how you can. Cold is but the ability on a multi sensory VR environment, you have to be able to interact in it as close as is possible to match the real world interactions. Right? You have to have that combination. That to me, it's it's a multi sensory. So if you cannot, for me, a desktop based VR, even if it has sound and visuals, I would not consider it multi sensory because for Perception is also meant that the sensory perception to me is it also involves a memory of the, like presence. Right? So a level of precedence needs to be involved or multisensory. So, yeah, so precedence, the perception from the user of up having a higher level of presence, virtual environment. It's, it's the, one of the multisensor.

05:57
Wonderful. And the next question relates very closely. Can you describe your experiences designing multi sensory VR environments? And you can you go, you know, use a specific example where you can describe, broadly?

06:15
Yeah, no, that's fine. So when designing this type of experiences, you have to take into consideration the limitations of participant as a human right. And also the limitation of the, the physical area in which that experience is going to take place. So, you know, that's, that's kind of like first considerations, and based on that, then you are going to start figuring out how are you going to address those limitations in your VR environment? So one of the most and I'm talking about whether it's headset or, you know, a cave like environment, where you have surrounding screens? Not not necessarily desktop based VR. So after you've encountered your limitations, then you need to figure out how can you address the the friction point between what a person would do in reality for that action to occur? And how can you map it in the virtual environment, in such a way that it does not create does not feel intuitive, in the sense that this is what a person would do right on it to perform that activity. So to some extent, you know, sometimes in some environments, you want the user to have this ability to grab things and pull them closer to them. Right? So that option of grabbing and pulling closer to you it's a very natural way of interaction. Right? And, or if you're going to do some sort of walking, you know, there's some implementations you can do for somebody to have that kind
of experience if it's important for them to experience that as they go through the environment. But trying to match even if it's not one to one, but the taking into consideration the intention at interaction, and how can they be addressed within the limitations of the technology and the space because if you don't, if you don't use that, then your your experience kind of falls short. You can have you know a very graphically beautiful You know, the soundscape is but if the user cannot easily interact in the environment and then natural way. And natural kind of importations. Because, it's really unnatural. But, you know, get it as close to how a person experienced reality. So you can map some of these interactions in a way that it's easier to understand, easier to make that connection, that leap of faith of, Okay, I get it, I can, I can do this. And then work. So that's kind of the the most, I would say, the most important component, after bad come, you know, the fidelity of the environment. How realistic in the sense of visually realistic, all the different different physics that happen when you look at the environment, versus a less realistic, right. And the rest of the combined senses that would happen with that experience. So if you drop something, you want to hear something when you hit something, because that's what happens in reality, right?

11:26
You're the cause and effect.

11:28
Awesome effect, the visual part is good. But if you detach that from the reality of sound, at least if you're an Earth, you know, that's important. But if you are, let's say, outside in space, and you're going to develop an experience that is in space, you know, you need to be very careful not to include sound when you're outside the space station, for example, or doing an extra vehicular activities. Because it space sound does not propagate. You only hear yourself breathing. And you talking, well, whatever happens outside, you don't hear. But when you're inside the station, you will hear. So, yeah, so in those situations, you want to help the user get familiar with this disconnections, because they're going to be in that type of environment. So it's, like very nuanced, transitioning, right? decision with the sense element that sounds like, yeah, and you have to kind of try to think about the, the experience of that environment, if it happened in reality. And then, based on the limitations of your technologies, how can you address those interactions within the limitations that you have? Right, so that, then it becomes that way, to me that way? You are addressing that level of precedence?

13:29
The next question relates is a good segue. Um, what technologies the most frequently use when you're composing multi sensory VR xR environments, and you can talk about a specific project that you've worked on with particular technologies, or the ones that you most frequently find yourself using for multiple projects?

13:54
Yeah. So at the bare minimum, whenever we're doing VR environments, VR experiences you have to have a way of tracking at least two components of the user. One is their position in the space and where they're looking at in the space. And then the other one is one of their hands interacting in the environment. So you have to track where that position of that hand is doing work, and then the full body motion and head motion. So those are called, you know, degrees of freedom tracking. You gotta have the six degrees of freedom tracking or multiple components of the user, once you have
those, right, then you start adding that sense of presence. In that experience, then, you know, you continue adding sounds sound like weather is by headphones or by sound in the space. And for head mounted displays, it's typically better to have a headset, headphones. Because you can simulate spatial sound inside those headset, those headphones. It's less convenient. If you have like a surround sound system, producing the sounds. Although you could, but you had to be very careful to map their location in the space. So that the spatial, you know, sound matches what you're seeing inside. So you have to have some sort of calibration originally, before you engage in an external sound system, right? calibration for sound and calibration for body.

Yes, calories down calibrations for body the interactions between those two. And then your interactions with the actual buttons that exist typically on your on your hand tracking, whether it's, you're going to use some sort of controller that has buttons. Or you're going to use your actual gestures and your hands with fingers, finger gestures, hand gestures, to be that that sort of input for the interactions to happen. So I'm going to grab something am I going to do the grab, you know, kind of motion with my hands. So I have to have a way for me to read that. Right. So if you're doing tracking, you know, six degrees of freedom cracking, depending on the technology you use, you can capture the finger motions or hand motions. So you can train, use that technology to train the grasp motion to train, you know, the put away motion, train a lot of these different interactions. So that then when the user is there, they can do some natural interactions, that they'll use the real world for that. If you don't have that, and you just have rough tracking of the hand without the fingers, and then you're going to map buttons, something you're holding in your finger, then you have to position those buttons in such a way that that can mimic some of this finger interaction.

So if I press two or three buttons with my fingers, it's kind of like the grabbing motion. I just do one finger it's it's a different type of interaction in my environment. So how you integrate this technology's kind of it's it's crucial for for creating a very high presence, it's most multi sensory experience, then, you know, there's other technologies, and they have kind of evolved through time that have to do with haptics to the ability to feel, right. And depending on the multi sensory environment you've tried to create. You can do that by having this external objects that provide that feedback. You can do it with what's called passive haptics, where you have dummy objects, real objects in the space that have roughly the shape of the virtual objects. And they're tracked. So when you're going to interact with something, even though you're kind of inside this virtual world, since we have calibrated everything, and we know where everything is, if I go and reach out to grab something, actually grabbing a physical object, right, kind of close that loop of that multi sensory experience, like, Oh, I see an object. If I do this, I should be able to grab it. And then while I laugh, I feel it. Oh, yeah. I grabbed it. So now I can move it to a different location, right. So passive haptics. It's another type of technologies that you can use. There are some new old technologies have limitations, so you have to kind of figure out, if the type of experience you're building is compatible with those limitations of the technologies, then you can even go further and start doing some other tactile kind of experiences, and use technologies that will provide heat that will provide, you know, air motion, that would provide smells, right, so that you can start adding those into the experience, if that is crucial for the experience. Right. So in some projects that I've worked on, we wanted to simulate being inside this, this house unit, form an ancient civilization, with a lot of the knowledge of how what type of society was,
environment, we had to add, not just the passive habits, but smells as well. Because this where they this spaces didn't have any ventilation, there was no windows, they had an area where they would burn wood. So you know, it would produce a lot of smoke, that would not easily dissipate. So visually, you also have to create some sort of a smoke filled room, but the smell, right, so you have this particular smell off. Like when you're barbecuing, you smell charcoal, you know, very strong. Now, you know, and then you had, if you were interacting with the objects, you needed to provide those feedbacks at the right location. So if I was going to put a fire wood back in the fire pit, to increase the amount of heat, we'll have to have some sort of heat generator that would trigger you, and every time I place it, so yeah, I feel the heat, I can feel an increase of heat. So that multi sensory stimulation, you know, your brain is able to bridge that gap. And so your behavior matches that off the multi sensory experience in that environment. And that was for that specific project. But in other projects, it's not such an important thing. Right, depending on what you're trying to do with that multi sensory experience, if I want you to feel how having no gravity affects your motion, then it's, you'd have to have smells there. Right? No, or even sounds. But yeah, you have to have some sort of way for you to, to propel yourself about how am I going to do that other types of technologies that that you can use, and this go back to some other projects that I worked before that I was Oh, do you involve devices called motion, motion basis. And these devices are primarily used for pilot training. And so these big platforms can move up and down, they move in all 60 degrees of freedom they can roll to give you that sense of presence in the simulator. So you can actually feel some of the sensations you would actually feel if you were in the real device, trying to you know fly and you know, gravity and all the effects that he has, if you have a sudden dissent versus right. That fidelity, and that sense of presence can be increased by adding a lot of this additional technologies on top of it. And you get almost a one to one experience. And I say almost because simulations remember Gonna be the real thing, but, but it gets you very close very, very close to that. So there's even some some information that you can retrieve by engaging the multiple senses. So, you know, as, like in certain professions, they tell you, you have to feel you have to get yourself to a point where you feel when it's right,

25:33
right, right.

25:34
I mean, they can tell you, oh, you have to make these for 55 minutes, roughly, and then it will get fine. But then if you just take time into consideration, you may not end up with the right mix. Right? And then people will tell you look, this is how it should feel. And then you feel it. And then you feel yours is like, oh, okay, so I need to do a little bit more, maybe I did it too slow, maybe too fast. So those kinds of feedbacks, the haptic technology can help you with and give you a better experience in your environment. There's other technologies that I haven't used, but I know of, that have to deal with locomotion. Again, human locomotion, right? So you're actually walking, you're actually doing the activities. And they can be addressed in many different ways. But if the activity that you're trying to train requires for you to have that realistic feedback, of locomotion, that you would use this kind of devices that were there.

26:55
Were from a very, I guess, from the very basics, like you said about sound and visuals. What kind of technologies do you typically used for, like creating sound or for creating visuals with software? So I guess, because you mentioned the headphones, but I guess software wise,

27:17
yes, the software wise, like unity3d, it's a good software to use that kind of address, both the visuals, and the sound. So they already have spatial sound simulation, okay. And another software that does that is unreal, the Unreal Engine can do spatial sound, and the visuals. And then you can get into the nitty gritty, right, this is like how much fidelity you want. So just like light, you know, bounces and creates the shadings and reflections and all these other things in the physical surfaces of the environment. Sound will do similar things in bounces gets absorbed in gets amplified, and acid hits different sources in the environment. So both of this software platforms allow you to do a physical simulation of the sound. So if you're in a space that it's big, and he has parallel surfaces, you'll start to hear reverberation. You start to hear echoes right. Or if it's small, and it starts to feel muffled, the sound changes characteristics. If it's a sound that's passing by you, you get that Doppler effect, where it sounds very high pitch when it's coming to you, but then the pitch lowers as it moves away from you. And that's related to the speed of the sound of the object generating the sound. So this particular software platforms do a very good job of integrating all that. Now, if you didn't have those, then you want it to do it on your own piecemeal approach. You would use some sort of sound simulation software and DirectX OpenGL or DirectX x for the visuals. And then you would build this, you know, connect them in your custom made program and that will get you that combination of both. You know, this you probably don't need to do nowadays. That was the the default way of doing this things. When you were up by 70, the default way of how you did things in there, I would say maybe 12 years ago.

And you know, up to 12 years ago, you had to really have this very, the skill of knowing how to low level access to hardware and hardware components, in order to build VR, nowadays is software is moving more towards more high level. So people that are creative, or artistic, are able to utilize this tools to create the experiences even without the need to know all the lower level knowledge. So it's kind of like how computers were at the beginning, like the technology existed, but you really had to be a mathematician, to be able to operate these things you had to understand in a binary and all of how these things work. And eventually, the the interfaces and the front end, where the user interaction change in such a way that now we all use computers, we don't care how it works under the hood, right. And we as creatives can use it to do nice, creative things with it.

So the in virtual reality, you're seeing that movement going more and more tours artistic. And the reason I think is because there is there is something about the creative process, that it's hard to capture when you are concerned about the little details from the beginning. Right, right. I like the creative process is a process that goes from, you know, very unfocused layers, Larry, you know, not sure what is going to come out of it. And then you start, you know, molding, Mali, Mali, until then you get to that right focus and right thing, and bam, you have all the details, everything. But you cannot do that, from the end, wrestle backwards. analyser tools allow you to do that, you know, you cannot come up with incredible VR experiences. Right. So as they move this tools, you know, the experiences in VR have become more and more engaging, more and more joyful to participate in. Because now the artists are using these tools to create those experiences. And it gives you the freedom of that creative process. using those tools. They're not at the level of any other computer tools for making art. But they're editing slowly and slowly. They're they're approaching that I would
say maybe another 10 years, and you will have a true software tool that is, you know, artists can use from beginning to end to create a VR environment and experience. Right now you still need some help. Yeah. And the technical people. Eventually, we'll get to a point where you get there. So let's see. Definitely,

34:33
I think I think there is that sense of collaboration right now, you know, that happens between artists and engineers. You know, where the gap is, as you said, you know, the gap is getting a little closer and closer because of the advancements in technology.

Oh, yeah. And that's one kind of it relates very closely to what you've previously talked about earlier. Are there any methods or tactics that you find most beneficial, like maybe talk to, to include in in a multi sensory VR environment to really push that sense of immersion?

35:16
So the ability for the user to participate, not just be an aspect, spectator, but the participant is very important. In a VR environment where you're only a spectator, it's not as compelling as a VR experience where you are a participant. So you need to include some level of participation, even in VR experiences that you kind of directing them to the outcome you want them to get to. Because if you don't do that, that sets a precedence, you have all the technology is kind of giving them the illusion of a sense of presence, but then they're not a participant. So it kind of gets gets confused and lost gives, like, conflicting sensations and expectations. And so it becomes really boring real quick. And, you know, you can't, you can't engage by experience. So, that's, that's a tactic. Typically, when you are using VR, VR, and creating VR experiences, include some level of participation, that you can have different resolutions of participation, you can make it very basic, very simple. Or you can make it as complex as you want to know it's appropriate for that experience. But a level of participation is important. And I think that also not our tactic is what are you trying to get out of this VR? environment? purpose, VR environment? And then you start building from that? So if you don't, you know, no, you know, what, why am I doing this? What's the purpose of it? And, you know, how can I ensure that the purpose is met, and that I can account for a level of participation, then that's, that's how you start in the design of the experience. Then, you know, technology is the last thing. Think of, right? Although a lot of people start with the technology, but in my experience, that's the wrong way, the wrong direction to start from, because it's easier for you to work with the limitations of the technology to achieve the purpose, then, you know, start from the technology, building stuff that technology handles, then you're able to fulfill that purpose that you didn't think of, to begin with. So yeah, it's it. It's easier to edit. You know, Wes, was you have this, this idea? And you first you don't start programming, you start. Okay, let's see what why am I doing this? What is the user going to take from this? And what is important for them to perform or to do? What is the most important method of participation for that in this VR experience? And then from that, then I can start looking at Okay,

39:51
so if I want them to move things around, yes, it's a game of I don't know. I need you to Understand how to connect multiple components. So then I need to give you an ability for you to grab and move things around. And then I look at the technologies available. Okay, so how can I integrate this technology to give them that ability to move things from here to here? How do I direct their attention?
How do I do all of this, but those are now you're coming down from the main, you know, undefined, but you have a concept. And you start making it into something concrete.

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So, to me, that's, that's the most beneficial method to take. Because I've seen engineers develop stuff, but it's not as engaging. It's functional. Yeah, it is not as engaged. And

41:10
but if you have the art the artist involved in it. And because of the way of thinking, you know, they have this, this concept called design thinking. Right? So an engineer engineering, they want to introduce people to design thinking, right? So you have to really think as a designer, as a, as a, an artist, creative process, right? You know, in detail technical portion is important to build stuff. But it's not important to come up with the concept and the experience. I mean, people do it all the time, people that build houses, or build buildings. At the end, you have to have somebody that knows how to nail and, you know, glue things together and caught them and make sure they're straight and right. But it didn't start with that. Right? You wanted an experience? How do I want to feel when I'm in this space? How do I want to, you know, be able to interact with the components of this space? And that's, that's your design thinking, you're kind of figuring out from the needs, and kind of playing with possibilities until you hone in. And then you say, Okay, now let's build it. Now I need to, Okay, I'm gonna need this many Java scripts, there's many things as many that in order to account for all this, the interactions and connections that need to happen. Yeah, that's kind of like the end of the line rather than the

43:04
beginning. Right. Yeah. That's a that's a very fascinating point,

43:10
I think.

43:11
And you mentioned kind of these design decisions towards user experience, in particular, on how would you say, you know, what the sensory and aesthetic aspects in mind? What are ways that you construct the environments to make suggestions for how they'll be used or to enable the user? No, no, you've kind of alluded to it. So if you wanted to go, like very specific, or if there are tactics that you kind of typically use, around user experience, and this kind of push towards, you know, using an environment in a certain way, or maybe using it in an unexpected way.

43:57
Yeah. So I mean, one thing that, that I like to do, and this is just because I like science fiction, right? I tried to take notes on what I've seen or read in science fiction, right? how somebody interacts with a piece of technology or right. And the other part that that you can do is you can basically try a little bit of experience acting. So if I was in the environment, you know, how do I see myself doing this things? You know, what kind of information would I consider that wouldn't be available in the space and then from There, you can start using some of these software tools. And you very quickly work on those experience. engagements, not necessarily on the look and feel, right, or even the correct
spatial auditory or you just want to very quickly mock up something to test, if that mode of interaction that you can have. first act it out. How effective would it be? Right?

45:43
You kind of become the first user of the piece in a way,

45:47
well, you're the first user, but you also have to bounce it, you know, with other people. So, so you work on it, and then you ask somebody else to come and say, you know, the way you're going to try to do here, once you're inside is this is activity. You try and tell me, what do you think? Right? And then somebody else? What do you think?

So you bounce it between people that are not directly involved in the development of this, just to get a feedback off? How is it that interactivity or that that participation experience that you kind of envision, how is it going? Right? And, you know, the most successful ones are the ones that you engage people that have limited experience in virtual reality. Right, because those are the ones that don't have the prior AP prior knowledge, right? They haven't been used to, you know, these that, it doesn't mean that they're going to be able to do it right away. Right, but the learning curve should be low enough that they can adapt quickly. Right. So that's a good sounding board, you bring people that that are not that familiar, or don't spend all their days with this technologies. Yeah, to kind of give you some feedback, because then you'll find that what you thought might have been useful, was informed by your bright prior knowledge. And you're getting used to doing things a certain way. So basically, throughout the years, you have adapted your behavior to fit that technology, not the other way around. So and then you can come up with alternate solutions to that issue. And sometimes you, you know, you realize that you're what you were thinking about those that that mock up of how the experience was going to go. was not that good to begin with. So then you do another pass and another pass. And it's important to do that at a high level, before you get down to the nitty gritty, because the nitty gritty takes a lot of time. Right. And you don't want to spend all the time. I can say, oh, it didn't work. Exactly. Yeah. Yeah.

49:01
Speaking of the nitty gritty, I think this one probably the, again, a very good segue with these various design considerations that you brought up in a very practical way. How do you consider prioritizing based on needs of individual projects? When it comes to customers, and users, sometimes customers and users can be the same, but sometimes there's, you know, they're very different entities. So how do you how do you prioritize the artistic considerations that you're putting into the work based on those kind of practical needs?

49:41
So at the very beginning, we made sure to make sure that the user your client understands that this is the first Stage, which is basically the design stage. So before we even build, start building the final version of it, you need to go through a design stage that is very iterative. And you're going to need access to them during that period. And you can, you know, you can say if we say anything above four iterations, you know, probably not worth it. But you've had to go at least four iterations with them. And this iterations have to address the key questions or the key outcomes that the client is looking forward. Right. So whether is, you know, somebody that wants a, a VR environment to help future pilot mechanics, manned aircraft mechanics, to be able to properly service an engine, right?
We need to have this conversation with the client to understand what is important, because what, what you usually find is that the subject matter expert, because they've been in the weeds for so long. They cannot put themselves in the shoes of a beginner, right? You may pretend you're putting yourself in the shoes of a beginner, but you have a lot of bias knowledge that a beginner would not have. And you make this assumption that these are unconscious assumptions, just because the fact that you've been there for so long. So because we are the newbies never been in that situation, it's important to go over the process with them, you know, this is what I want them to learn in this environment. And we want to go to the real environment to see how they do it, you know, sometimes taking video of the actual procedure, and you can do a you don't have to go down, like human factors people do, which is a task analysis, but but you can see the different steps and what they were doing, and then you're going to think about how did I know that I had to use that? So that you come back with questions? How do they know? Is this something that they learn already? Or do we need to make a reference about learning about these first before they do it?

53:06
So orders of learning, that are going to be incorporated?

53:10
Okay? Orders of learning. And so you go through that process? And then you try to, to do, you know, see if you can do it yourself? Even if it's a mental exercise, you know, Okay, so first I will do the bad man. And then you perish, I missed, you know, all these other things, why did I miss them. So after you, you kind of create all this series of knowledge that they need to or, you know, whatever the outcome of the experience needs to be - the experience of trying or or looking at somebody going through it, all the different questions and things that from an inexperienced user come up and how to press this, then and only then, then you start thinking about, okay, now I'm going to start to create a model this and the pyramid model of that, then you need to make sure you let the client understand that some physical behaviors may not be able to be implemented. Right. So some people may, you know, in their environment, there's a lot of liquids or fluids and they spray and the pool and they this and they do that. It's like, it's really important to have a physical simulation of the fluids here or is it more important for them to get the idea that if I see a leaky pipe what I do. Even if the leaky pipe, you know, the accumulation of the water is not physically accurate and this and that. Right, so what are the important key points to observe? vironment? So then you can implement them. And I would implement them from lower fidelity and slowly build up if necessary. I wouldn't start with the super highest fidelity.

55:31
Right.

55:32
But sometimes less is more. Right, it distracts us.

55:38
Right? Right. And that draft days, yeah.

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So that's how, from experience had like prioritize this thing. So at least you have to cover the key points, all the steps necessary, because you have asked them to explain them to you, you have asked to participate in one real thing, you record everything you observe, you, you know, make your notes, you ask them to answer some of these questions. You know, let them know of their certain physical phenomena that are you're not going to be able to replicate, because a lot of this is in real time. It's not that you cannot. I mean, hollywood does it all the time. Yeah, but they have hundreds of servers, hundreds of people, and, you know, multimillion dollar budgets to end up with that result. And it's, it's a one shot from one vantage point, you're not interacting with it. You're just a spectator, not a participant. So there's a difference. Right? So it's very important for them to understand that as you're going through it. So that, you know, we set the expectations, they understand that, yes, they're gonna have a virtual environment for training. No, it's not going to be Hollywood. It may look better than what they thought, sure, is better that they added the end. They say, Oh, I didn't expect this. Then say, Oh, yeah, we're gonna do Hollywood that they look into. This doesn't look like?

57:38
Absolutely, I think it kind of speaks to the next question. Little bit, again, is a good segue. A little bit about, can we discuss a little bit about the design decisions or methods or artistic processes that something that was unsuccessful? In a multi sensory VR build? And how it was corrected? If it was? Or how it could have been? Yeah.

58:07
I do have one. So you can have, I think this has to do a lot with when you're working with any group, you know, you've got to have somebody that has a very good understanding of what it takes to build VR, or to be able to do VR because I've, I've seen in some circumstances where the people get I would say the word frustrated that the person that understands what it takes to build this things, is asking questions that they may not think are relevant. Right. And what happens is, if you remove that person from there, then you get stuck on the details from the beginning, and it ends up not having anything to work with at the end. So that happened in a project. We spent a lot of money and there were fixated that the handwashing didn't look right. Is that okay? So, what are you trying to address here? that they need to remember to wash their hands? Yes. Okay. So let's create this interaction and this thing for them to understand the need to wash their hands. Yeah, it doesn't look like real hand washing. Now, if if from the very beginning, it was said that that was a deal breaker, hand washing from the avatar doesn't look realistic enough, then we probably would have gone a different route and do 360 video and have cameras on people like you are the character. But it's like those old interactive movies or interactive video games that were actually videotaped. Each each branch had a different video that was playing. And then you get, you can get what you want there and the fidelity. But because of, you know, the decision, let's not worry, let's not be clear about this, because I get frustrated, because they're asking all the right questions that are going to impact the development of this, right and time and effort and cost. If you don't, if you don't, at the very beginning, make them understand, to the point where you say, you know what, you tried to do it, I'm not gonna Good luck with that. If you stay in it, and then you suffer through, because all of these things like now you end up spending way more time and not getting where you need to get. And then you having to take, you know, emergency shortcuts stay the same, because you've already spent all this time and energy. So I say that it is okay. To to make sure at any point of the project, that the client understands that it is important to address these misconceptions.
I do think that that goes back to what you mentioned earlier about the creative processes and design thinking.

It does. And if you don't have that to begin with. And then you have people that can help you with that in the early stages, then you end up saying, yes, we're going to do all of this. But the reality is like, yeah, people really want to do all of this to people, that's impossible. No matter how good the people are only so many hours in the day, you know, they need to sleep they need to. So it's Yes, it that that is a recipe for, for for not a great experience and really a failed project because he never, you know, achieved what he was supposed to achieve. So, yeah, it's it's those are important things to put up front. And even if, you know, they think they know better is like it. You should be firm and no, no, this this can't work this way.

All right.

Having no understanding a little bit or helping them understand a little bit of how the technologies work. And the there's a difference between web based and something that runs as a program in the computer. Very different. You cannot just grab a program like I don't know. Let's pick up Maya. And then I want to run it on a web browser. Right? When there's no web browser version of Maya, I can't run my own web browser. Oh, but we need it. To do this, yes. And at the beginning, have clarified that he was going to be performed this way. But we needed to install this on every computer. Oh, but I cannot get all those computers. Right. So issues that you talked about it? You know, we went over a couple of meetings about this to make sure.

Yeah, exactly. Yeah.

It can get interesting.

Yeah, it sounds like, very interesting.

Now, see,

Are there any additional points from what we've discussed about your different methods and design processes and experiences? That you'd note?

Yes. Yeah, you know, as, and, again, this just comes from being involved and engaged in a few projects that take into consideration this notion of inclusive design. And it makes you really, I'm gonna say at least, more aware. But as you use it more and more, you can start making smarter
decisions design decisions. Because that the specific process of inclusive design, it's really nice, when you are doing multi sensory via an array, any, I would say nowadays is make inclusive design part of your design thinking and design considerations, not because it's going to be used by a person that's hearing impaired or visually impaired. But because considering this things, allow you to see other possibilities at make simplified, and have a more clear message or clear experience for the user. Right?

Once you start thinking with some of this considerations, and what may be considered limitations, it kind of opens your creativity, it's hard to kind of they go post lasts in one direction, but it actually increases your creative design thinking.

1:08:00
So the needs of the user kind of open up creativity or the needs of different kinds of users.

1:08:07
Yeah, I mean, I think that even if your user is not, doesn't have any let's call it impairment. If you start looking at everything that you do, from the lenses of inclusive design, right, so you start asking these questions. Right, it's not that okay, I can see colors. Yeah, but what if I'm colorblind? which colors I cannot see? My my color palette changes, what about contrast?

And what it means what ends up happening is, you know, if I chose if I use a color palette I was using before thanks, may not be as clearly visible or, you know, as clearly the right ad, but once I'm using this, like, oh, everything's so clear. So I gained something that I didn't think about before. And so you're considering different things like sounds and lighting, and, you know, all of these things that at the end make the simulation much better. Right, not just for the people that don't have those, you know, constraints or you know, different perception, you know, abilities. But then you can also expand your user base. So, that has been something that It asks, I've evolved throughout this and being engaged in this that, but it's now and most of the stuff that I do is like it used to be called the KISS principle. Keep it simple. But, you know, in inclusive design, that's a major component of it it's not just the simplicity of a lot. I mean, I would say, anytime you're trying to do something that works in a simple fashion is the hardest thing to do. So, but it forces you to think it forces your creative, creativeness, you know, creativeness to step out of the box. And that helps you in the long run. So instead of kind of keep on going more inside and inside your box, and it kind of helps you break out. And oh, okay, so I'll go this way. Right. So that's, that's something that now, you know, I tried to engage more and more as an important component when doing this type of designs.

1:11:35
Wonderful.

1:11:41
Fantastic. Well,

1:11:42
that will conclude the interview today. And again, feel free to follow up with any additional thoughts that you have, you know, if you get those 3am, or those shower thoughts that just popped into your head about these questions at any time, you know, just email them over to me. You can also get in touch with me if you have any questions or questions or concerns
about an interview. But I really appreciate your time today. And thank you so much for taking part in this research study.

1:12:13

[Redacted]

1:12:29

[Redacted]

1:12:35

Thank you Have a good day.

1:12:36

I appreciate it. You too.

1:12:38

Bye.
Thank you so much for taking the time today and for returning the sign consent form as well. I've placed that on a secure external hard drive. Just to go over again what was in the consent form. The purpose of the interview is to collect qualitative data for a research study to explore the practices, methods and experiences of artists to design and multi sensory virtual reality environments. focuses on the considerations processes and strategies, both aesthetic technical or very practical that artists employ when they're approaching the media use to compose multi sensory VR. So the results of the investigation will hopefully help me inform academic communities about the ways that artists approach these complex compositions towards immersion when designing these specific media environments, and also sorry, cat. The study will also hopefully inform the professional development needs of emerging industry practitioners. And it'll also contribute to a larger body of knowledge regarding technical communication methods for composing persuasive immersion, from the artists perspective in particular. So the results of the study may be used in reports or presentations and publications. But your identity will remain anonymous and the research will not identify you by name. In any of the reporting situations, you will have an opportunity to review a draft of the final report for accuracy of representation. Your participation in the study is completely voluntary, and you can withdraw from participating at any time. With no penalty at all whatsoever. The interview is being recorded. Of course, it'll take approximately probably 45 minutes 45 to 60 minutes, the format is going to be very standardized and open ended. So definitely feel free at any time to ask any clarifying questions, or to add additional information to your responses or comments as you feel you need to and I'll place the interview questions in the chat also for accessibility. If you need to return to a question again, or if you'd like to follow up with additional thoughts, definitely feel free to be helpful. Before we get started on Do you have any questions or accessibility needs before we get started?

Absolutely.
Well, let's get started. The first question is really kind of a baseline, I suppose of how you define or describe multi sensory VR?

multi sensory VR, I mean, so there's different types of VR, there's three degrees of freedom VR, which is a lot less of your senses being utilized. And then there are six degrees of freedom VR, which is full scale, full room scale, VR, which incorporates a lot of just just with the headset, and the controllers can activate many sense sensories. So there's, you know, depending on which VR system you're using, and then there's also accessories to the VR headsets that you can purchase, like vibration packs, or scent makers to add your headset. So it just depends on your, your VR rig, or things in the real world that you are incorporating into a VR experience to add to the sensory. But a $6 VR headset, just by itself is going to activate your sense of sight. There's often vibrations in the controllers. So touch, there's a little bit of touch activation, there's a sense of presence, because you are in a place. And specifically if you're in a social VR experience, you're experiencing interaction with the virtual reality. So I mean, there's so many ways to describe multi sensory VR, depending on what rig or Yeah.

In other words, do you feel it's very, it's very dependent on the technology that's employed in the design from the beginning?

Yeah, I mean, VR just initially has some sensory things that it activates, but But yeah, you can keep adding to it. There's also, something that happened to happen to me in the beginning, specifically when I was using VR a lot in creation, is that I started to have Phantom controller syndrome. So I started when I was in the real world, I started to feel like I was compelled to, like try to teleport, even though I didn't have the controller in my hand. So that so in some, in some ways, the sensory experience in VR can can sometimes follow you into the real world.

Very interesting.

fascinating, because I think the the concept of movement between spaces, you know, that idea of how we teleport within a VR environment, versus how we teleport within our own even coming, you know, going in and out of the headset, as a mode of that teleportation that that transportation or transients, is a very sensorial experience, you know, between like, technology and body. Right? Yeah, I

just shared in our chat. This is a social VR report that I did with Institute for the future. And so we, we there are some there's some content in that report, that is on multi sensory experiences.
Always love excellent resources. Thank you. For the next question. Can you briefly describe or outlinks if you'd like your experiences, designing multi sensory VR environments, and you can go very broad or you know, like the the resource you just provided, you know, something very specific in describing your experiences and designing the space for these spaces and these experiences.

09:57
Yeah, I mean, there's two projects. That I worked on that are different. One was a mixed reality, which created a, which I added multi sensory components to in the real world to enhance the VR experience. So that one was called labyrinth. And in that experience, I created a spiral maze. And at the end of the maze, in the center of the maze, there would be there was a magical looking book with all these particles flying off of it. And while they were doing the rest of the labyrinth, before they got to the center, I saw I performed the experience for them, I brought a real book with a fan behind the book and put it I had marked it off on the floor of the of the real space where the virtual book and would be. So I aligned it with the virtual experience. So that when they came around this imaginary corner, they would feel the particles touch, you know, blowing on their skin. And they, and then I performed some dialogue, encouraging them to reach out and see if they could, you know, grasp that virtual book. And so and so yeah, in designing that I just really wanted the reality and the virtual reality to actually align in a way that made sense to their senses.

11:39
Interesting. Wow. And do you feel like the the experience of that kind of provided a sense of familiarity and wonder at the same time?

11:53
Yes, it did. And as soon as they grabbed the book, I let them know that I was going to be taking the headset off. And welcome to them back. I always try to when I demo anything in virtual reality, I invite them in. And then I welcome them back out. Because I feel like our brains need a marker to like, note that they are doing a recalibration into different experiences. So So yeah, I would I welcome them back. And and when they would see the book, like they knew they had the book in their hand because they could feel it. But as soon as I took the headset off and welcome them back, they would look around, like, look at the book and like oh, and like hold the book. Like it was like they cherished it more because it felt magical. But then it was something they brought, it felt like they brought it back from this magical world into the reality. So there's Yeah, yeah, definitely that crossing. Yeah, makes sense. Hmm.

Also, something that I've done in some of the demoing and experiences is, I put something like a poster, or use a word that is used in the virtual reality experience. So they get to hear or see something that's going to be repeated in the VR experience. So there is this part of their I'm hoping that part of their brain is trusting the experience more and can be more present with it, because there is a part of their brain that art feels like it understand something about what they're going into. Or Yeah, or experiencing so

13:54
interesting that that is very interesting, especially in terms of like, tapping into a memory of sorts, you know, even if it's just a memory within the narrative itself.
14:06
yeah. And create trying to create some kind of slight continuity between the real world and the virtual world. So that there's more you can actually experience more belief when you make it into the magical world because there's a con something continuity, oh, this reminds me of something else that I noticed and I think it's in the report somewhere. But when I, I was doing the social VR report, I started I'm gonna do a lot of stream of consciousness stuff. Okay. Um, I remembered, I was like, Why are certain platforms Why does it Why do I feel less present in certain platforms and more present than others? And I kept like inquiring with myself about that because there were specifically like ones that I was just like, wow, some Think feels more flat about this experience, even though it's social. And, you know, everything looks the same, what is different? Like, what is the thing that's different, and I found it was shadows. For me at least. And I suspect it might be the same for, for a lot of humans, because shadows create depth for us. And they give us a sense of presence, like I'm controlling this shadow on my face right now. And, and, and I'm, yeah, so it's making sense of my world. So in virtual reality, if that's such a, we don't even notice it consciously. But we are our perception is informed a lot by light. And, yeah, and so in virtual reality, I was finding like, oh, the experiences that actually fake a shadow, in a really like, where it follows you and stuff. It, I felt more present, I felt like I was there more and that the world wasn't so flat. I mean, everything's three dimensional, because you can go around it, but without the right lighting, things can just even though they're three dimensional, can feel very flat.

16:23
that's a fascinating graphical point, I think it is the the subtle nuances sometimes you know, that a new user wouldn't necessarily be able to put their finger on and, you know, perhaps, you know, the, as you said, the experience would be off, and they might kind of wonder, you know, what's the situation it is it's a very nuanced thing, you know, such as, like, the, the sound and maybe less so than, than, or more so than color, you know, the faith is gonna define a world.

16:54
Yeah, right. And, yeah, now that you said sound, it is a worlds that are a void of sound, they also can be create the sense of like, aloneness. And, and, and, and it's, yeah, I mean, you have to have a headset on, if you have a headset on. Like, if you don't have a headset on, you're still hearing the real world around you. But if you have a headset on, and you're only hearing nothingness, in a virtual experience, that it's kind of disturbing, it feels a little like, oh, oh, I'm kind of like, I don't know, if you've done much research on AI, humans, but how there's an uncanny valley feeling because there's just something slightly off, that can happen in I think, in virtual worlds, also an uncanny valley kind of feel where it's just like, I can't fully believe this, and I don't fully trust this, I feel like if, if a environment a virtual environment has, is void of sound, there's a little bit of an uncanny valley, that might happen. And so I think that even if it's just like slight little white noise, or you know, ambient sound of the place, allows one to drop in with more presence and trust into an experience. And, and I think shadows kind of do that to going on to a show, I described one experience I created. And that one didn't have a lot of direction by anyone outside of the art piece in the sense of like me creating it, it was more of an experiment that I had a collaborator on. But it wasn't like anyone was informing what I needed to create, per se, other than we want to uniquely present this book to our to our people. So can you do that, um, there was another experience that I created that was more of an
interactive VR experience. And I was creating it so that people could physically go in and out of
headsets to go to different stations of virtual reality stations. So in a real room, or in a
real conference room, I had different areas that people could go put on the headset and actually
interact with a virtual world. And then take the headset off and move and then physically move
to the next VR station. But they were all in the same. All the experiences were in the
same virtual world, but we wanted them to have a break from being inside VR, and also just
practicing going in and out of the virtual reality. So we were trying it was a way we
were using it as a provocation to think more creatively about the future. And because they were at a
future conference, and so we were trying to, you know, get their imaginal part of their brain, you
know, working. And so we felt like it was an intriguing way to provoke creative thoughts and
futures thinking, to have an opportunity to think about, you know, what, if this is how you went about
your day, you know, your day or your social day after you were done with work? Yes. Yeah, that
would be an interesting thing to consider, you know, how we, we carried on with this technology and
like a more a more natural way, as you said, in and out.

20:55

What technology technologies do you most frequently use when you're composing multi
sensory VR environments, you mentioned earlier about the three degrees of freedom versus
six degrees, as far as the room space and scale and the sense makers and vibration packs,
and certain aspects of the tech, you know, that come into play when you're really considering
the artistic composition of the piece? Can you say a little more about those, those particular
technologies?

21:24

Um, so for me, and in the projects I've particularly done, I've predominantly just stuck with the
headset and the controllers and always use six degrees of freedom. I three degrees of freedom is
just not that interesting to me. I like that the six degrees of freedom I like the sense of agency that
you can get and the embodiment that you can get, and people get less nauseous in six
degrees of freedom than they can and three degrees of freedom. So, for me, that's what I've used,
but I've demoed a lot of other artists, experiences and used other technologies to demo their their
stuff. So I've used Ek, I think it's EKG, where it's, uh, attached to their, to the participants head with
with the VR. And they are actually trying to move things in the experience. And they're using their
brainwaves to move, move objects in the space. So there is that's a very unique and emerging
technology, absolutely. biofeedback, biofeedback. So there's people exploring with that. And I've
demo used to help demo their pieces. There is a piece called tree, I think it's called tree, I can look
up the actual title if you want me to suggest some artists and art pieces. But there's one that I
demoed where, before you actually go into the VR experience, you plant a real, real seed into a pot
of dirt. And then and then you put the headset on, and you're standing on a vibration pad. And you
have a bar, a vibration body, torso pack on also. So you have VR, torso, vibration, and floor
vibration.

And during the experience, they were using a scent creator. And the whole premise of it is that you
are the seed that you just planted, you start under ground. So you can smell soil, you're smelling
soil, and you're looking around in the VR and you're seeing that there's like big worms in the ground
next to you. And then you feel a vibration under your feet and in your chest. And you start to lift out
of the ground. And you can look at your arms and your arms are actually sprouted leaves that are
having and then you’re watching yourself grow and you’re getting farther off the ground. But when you look down, you see that you are rooted in the ground and you’re becoming a tree and it’s a very, you know, sped up experience but not so sped up that you feel nauseous. It’s a very, they bring you on a very lovely experience but you empathize with being a tree and that experience and then you also hear sounds of the forest and they have, as you’re growing as this tree, they keep introducing new scents. And around the end of the experience, they introduce a chainsaws in the background and the smell of fire. And well, and you can look down and see animals running, and such. And, yeah, so you definitely end up having a feeling as empathy for being a tree, which is something you can’t, can’t ever really impart for human experience, except for maybe through a virtual experience like that. It’s the closest we will have to like, literally kind of experiencing maybe what a human would experience as a tree.

25:52
Wow.

25:54
Yeah, but if you want me to share some of these links to these projects, I can share those with you.

26:01
I mean, if you have time, you know, after the interview, that would be fantastic. That sounds very, very fascinating. Oh,

26:09
and in the lab that I am, I get a I’ve been contracted at, often. And I work with them, often the emerging Media Lab at Institute for the future. During all of our research, and demos and stuff like that, we also get to try different virtual, multi sensory technologies. So I’ve gotten to try technologies that actually blow a pressure onto your hands. So it feels like you’re grabbing a ball. Like if you see it in the virtual world, and you go to grab it, it feels like there’s a ball there. I mean, obviously, you can, you know, squish past it, but but it does feel like there’s a ball there. So there are many technologies coming, coming out and still being developed and being figured out. What are the affordances? And when would you use these? And when are they most effective? And when they’re they just like, not really necessary? And they’re just kind of overstimulating.

27:13
Exactly. That's extremely interesting. So, in your experience, what kind of methods or tactics again, you know, in a very designerly way, or an artistic way, or in a very practical way, as you said, you know, what's necessary? What methods or tactics you find most beneficial to include to create kind of a sense of immersion in the environment?

27:48
Well, besides, you know, me thinking that shadows are very important. I'm in the actual headset, I do believe that sound design is important. When creating a virtual experience, even for like, if you're an architect, and you're creating an architectural experience for your client to go into, if you want them to have feel good, while they're looking at it. Sound Design is important. You know, what sounds you want them to hear, you know, is this house already, you know, the real house that you’re going to be potentially building? Is it going to be near the ocean? Maybe you want to add the ocean sound to
that. So sound considerations, I think are really important. No matter what experience you're creating for virtual reality, like, humans are very much connected to sound. And if they're hearing, you know, the real world, and it doesn't pair with the virtual world that you're wanting them to experience it. it lessens the virtual experience. Kind of like in the real world when I'm trying to talk with you. But let's say a dog is barking. it lessens my experience of being present with you. So so that's a big consideration for me when creating virtual anything virtual, setting the stage almost in a narrative way, with the sensory elements?

29:29

29:35

Yeah, exactly. Exactly. And I mean, it just depends on what I'm creating. I'll apply different things. But yeah, it's your storytelling. I mean, it's you're, you're creating an ability to live a story. No matter how short that story is, if it's an architectural story, I'm going to live that for like maybe five minutes of walking through the space, but what is going to add to that story that your, as an architect are trying to tell? Or what is going to add to, you know, if you're creating something for a doctor to show to their patients, what's going to add to that story of living that whatever it is they're trying to get you to experience? Yeah, I mean, I found it very effective to have like, if there are particles, you know, magical elements, that if you can somehow replicate those magical elements to stimulate some of their physical body sensations in a conceptual way, like with, with a, with just a fan fans can like, depending on how hard they're blowing, or how directly they're blowing, or how dispersed a fan is blowing, can create a lot of interesting sensory inputs that can guide their experience and their and tell a story, you know, like, if, if they're gonna, in the virtual world, look through a loop, they're inside a building, and they look through a little peephole, maybe you want to have a very light breeze, you know, going, going through a little cardboard cutout hole, when they go to look at just to give them the sense of like, Oh, I really am inside a building right now. Um, yeah, I mean, it's gonna be different for whatever application however, whatever you're designing for, it's going to be different. But I do I do feel like some of the things I brought up are important to consider to think about.

31:53

Absolutely. Let's see, the next one. And I think, you know, you hit on a few of these already. Are there any particular design decisions about sensory or aesthetic aspects that you find primarily factor into you talked a little bit about the construction, and even testing, but on the the user experience side of the composition, other aspects in particular, that are, should be primary considerations for the user?

32:32

I mean, the ones that inform the things that I create, I try to keep a trauma informed practices, when I'm creating experiences, because virtual reality is experienced as, as a real, like, It stimulates so much of our senses. And our brains are so easily can so easily switch from not believing to believing in a virtual world that I personally tried to be mindful about. Things that might trigger traumas, or be traumatic or a stress stressful, because I never want any of my experiences that I'm creating to cause trauma or trigger trauma. Now, every you know, people who already have trauma, those can be the details can be very, very, very personal in the sense of like, you know, maybe they don't like stripes, and that's traumatic to them. So I can't think of those kinds of traumas, per se. But I can think about like, Oh, you know, I shouldn't have them in a dark, closed small room for too long, because
there's a large swath of the general population that that is uncomfortable, unless, that is what I'm trying to create is a feeling of discomfort. But even doing that, I have to consider like, oh, before I put this headset on this person to experience this, what do I need to inform them about prior to putting them in this experience? Oh, I should let them know if you have, you know, triggered by spiders or, you know, small enclosed rooms, or you have epilepsy or any of these things I need to warn you like there's blinking lights or whatever. So it's a, that's trauma and formed practice of like, creating transparency of what they're about to experience, because that has been something that I have not appreciated when going to like, VR demo places and going and trying new things, is that they don't really tell you any or this was the practice, you know in the beginning because it's still Such a new technology, it's a Lino been in consumers experience for like the last four years. So there wasn't any best practices at the time, but they're not best practices became my best practices of like, I always want to, you know, frame the experience and, you know, be transparent about, you know, things that I think maybe the general population could potentially, you know, be disturbed by. So, yeah, I also think about when I'm creating the experiences.

Um, so there's some experiences where I give verbal directives or, or there's a script in the virtual experience, that's like, asking them to do things. And I often try to remember to frame it as, in the sense of, like, not everyone has the same physical abilities. And so therefore, modify it, you know, I'm, I'm asking you to do this, but feel free to modify your movement for you to do the best self care for your, for your own individual body. So I try to keep that in mind, when creating virtual experiences, where there's directives is keeping in mind that, oh, the person in this experience, they might have like, a bad back. And if I'm asking them to touch their toes, maybe that's, you know, that's not going to work for them. But if I also add, or modify this in whatever way you need to, then that gives them permission, because sometimes participants, including myself, can get very caught up in the experience, and not do a lot of self care. And remember, things about myself, because I'm in this magical world, and everything just seems so possible, like I can fly, I can, like, be big, I can be small, like, if I have these controls, like you start to lose a little bit, you can, depending on how long you're in there, and, and just how susceptible you are to like, allowing yourself to believe in this virtual space.

So yeah, there's a lot to keep track of. So like, that's why I keep talking and talking because there's just so much to unpack and, and consider when creating designs. But I think, you know, starting with that idea, you know, of having, you know, approaching any piece with the idea of these trauma informed practices and concepts of accessibility, and also of, you know, making it accessible to people who may be different, differently abled, or neurodivergent? Or have these different things, it's, uh, you know, it's an interesting place to start as an artist from the very beginning, you know, to Yeah, I don't think it's a common practice, I, I am a quirky one, I think because I have traumas, I have C PTSD. So I have a complex post traumatic syndrome. So I think I'm definitely unique, because I come at it from that perspective, when I'm creating. And then also, I am a facilitator of a movement modality called dance ability. And dance ability is about embodiment, in whatever body you happen to be in. So if your abilities are only that you can move your eyes, that doesn't mean you don't have movement, it means you have the ability of moving your eyes and you can dance with those or move, you know, do movement practices and embodiment practices with just with whatever movement you have. So I think both of those things, definitely inform have informed how I approached virtual reality for sure.
I think that's understandable what you know, is, but it's a I also think it's an undervalued place, that a lot of engineers, or a lot of computer scientists, you know, consider as a starting point is to start at a point of embodiment of the user. It seems like it's not necessarily included in the concept of a build you know, from the beginning very frequently So, yeah, it's incredibly valuable you know, even for me I'm, I'm, I'm personally terrified of heights, and I found it obscene how many builds? They would put the floor in last or you know, right up hovering, like, right thing to stand on. And physically you actually buckle. You know, before even if you perceive the space as you know, it, okay, it's not real. But you do feel it very physically real. It's visceral.

Yeah, it happens. So, yeah, and some I mean, another thing I keep in mind is I always, I always want to try to create in environments or experiences that are least likely to make you feel nauseous. Now, there are some people that no matter how many variables that you create, that should inform their brains that they that they don't need to feel nauseous. You know, people, there are certain people that just get motion sickness very, very easily. But it was interesting, in the beginning of my experiences with VR, and demoing, how many people in the general population would get nauseous, but I started to quickly understand why a large chunk of people were getting nauseous, and it wasn't them. It was the experiences that people were creating. And yeah, you need a horizon horizons are very helpful. Having something that represents your hands is super important, because then you can actually see a part of yourself if you're not a full body, at least you have your hands. Yeah, like having something you're standing on. Like, if you're just floating in space, like that can be very nauseous making and make your brain feel like Oh, did I take? Did I eat something poisonous? Like, Am I dying right now? Like, when you know, if you feel nauseous? I am? It was, it's been interesting to notice, like, oh, there are certain things that our bodies are so calibrated to the real world, that if you take certain things out of the calibration, your body is like, Oh, you ate something or you're like, you need to lay down.

Or you're under threat, or you know, as you were saying before, your brain perceives the concept of threat, you know, and your sensory organs, your skin, you know, perceives them threat very quickly.

Yeah, and it was interesting. So one of the first experiences I got put into was a game. And it was like, you have to kill an ogre game was very cartoon esque. Um, and so I was like, because I already knew I have I get fighter flight. But I was like, Oh, you know, like, I'm rash. I rationally know, oh, I'm going into this, you know, ogre killing, comic book looking game. That's not scary looking. Okay, I'll go in there. So it was in the experience. And I was like, you know, okay, he's coming at me. And I literally went, my, my rational brain got hijacked. And I went into fight or flight. And I was really feeling like I was being attacked, and I needed to, like, fight back. And I completely forgot that I could take my headset off. And someone around me was like, take your headset off, take your headset off. And I was like, I just was like, yeah, it hijacked me. And I was like, Wow, that is something that I'm taking into my, you know, consideration of creating experiences that people lose themselves, they
can lose themselves and their rationale. Even if they've prepped, like, I'm going to use my rational
brain when I go in here, and I am not going to be triggered. I'm not going to like it. Our brains are
really powerful at creating meaning and accepting things. Absolutely. And protecting, protecting us.
Yeah, very quickly.

44:04
Like, it's perfect. You know, this is really just very much about, you know, your own take on
it, you know, your perception of, you know, importance or design. And so, yeah, you know,
again, you know, it's the stream of consciousness is great. The next question really deals
with it, I think, again, you know, you've hit on these topics a little bit about making
suggestions for the user. Things that you do digitally or physically in the VR environment are
constructed through the sense experiences to kind of make suggestions for how you know
for use or to enable the user for exploration or, you know, a final goal. Are there any
particular tactics that you find effective or you know, if you have examples or anything, you
know, like the

45:00
Yeah, so like I've, I've talked about, like using fans where they can kind of allow a person to realize,
like, oh, there's something beyond this doorway, or, you know, oh, these sparkles I'm seeing I can
feel. So there's those, I also, there was wires on. So that one Labyrinth, the labyrinth experience,
there were wires on the floor, because at the time, it was a tethered headset. And so I taped the
wires on the floor. But in the experience, I also created little flames over the wires in the virtual
space. So if there was only one direction they could go, and so I would gave a prompt of like, do you
see that fire, you know, you want to get beyond that fire. So go ahead and step over the
fire. But even if they accidentally slightly stepped on the wires, it actually informed them like oh, like,
that's the fire, you know, like if they felt the bump or whatever. So, you know, like, you can
also like inform the if you're using a space that has objects in it. And that, you know, you can
incorporate those objects to not only keep the person from going into them, you can also inform
them how to like move around the space with how to keep keep things keep track of certain things,
because I, I felt like if I didn't put a fire or something right there, that if they stepped on it, they might
twist their ankle or freak out a little bit. But they were being visually told there's something slightly
slightly dangerous right here. And it wasn't like tall fire, it was very short. But it was like, you know,
they know what fire is in the real world, they know it's slightly something you need to be careful
around. So Oh, they're gonna be careful around this segment of the experience. Exactly. So those
are things outside of the experience that I was, you know, mixing realities to inform the experience.
Also, inside the experience, you're informing the user of how they're going to be using the space.

And so you know, if you want them, it's easier to inform them around things that match with the real
world so they know what pressing a button is. So if your button looks like a button in the virtual
world, it's more self explanatory. But if you're trying to do something more experimental or that is
designed in a new way, it can be helpful to either have a voice that instructs, or if you're just trying to
get them to intuitively do it, I have found personally that if you make it kind of do a pulsing glow, like
an attractor mode, where you can attract their eye to things you want them to engage with. So I'm
sure there's many ways of creating, getting someone to look at something you want them to look at.
And that is just one of many things is like creating a glowing, pulsing. Something that makes that
theme thing kind of stand out more.
And it's important to try and be intentional with all the walls you use. In a virtual world, do you want them to feel closed in? Do you want them to feel welcomed, if you want them to feel welcomed, I mean, it's a virtual space, you can make the space really big, you can add as many plants as you want it, that's what's great about the virtual spaces, you can think about it in the same way you do with the real world except for you don't have the same financial constraints. And you can move walls really easily. Whereas in the real world, you're kind of stuck with a structure. So in the virtual space like create like if you want it to feel welcoming, create a really like large open tall spaces. Inform the participant of the feeling that you're trying to elicit from them by you know, whatever, buildings or not buildings here are creating in the space. If you want to create you want them to follow a certain pathway. Like, define that pathway somehow, if it's in a forest, you know, maybe you line the rocks up a certain way, or make the forest a certain density in certain spots. So you're, you know, subconsciously kind of guiding them through the space. you know, put a deer up ahead. So they're like, Oh, I want to look at the deer.

50:26
I mean, a lot of psychology is utilized, I mean, is utilized not only by architects, but I mean, virtual architects should also be, you know, thinking about human psychology when they're creating for humans. You know? it makes sense. I mean, because, uh, you know, if we're, if we're making suggestions for users, I think the, you know, there's the ethical concerns, you know, but also deeper concerns, again, you know, psychological concerns of how we're making those suggestions, I suppose.

51:02
Yeah, there was a space that I created in a virtual world where I could actually make the virtual world editable by anyone. And it was all in headset creation tools. So I don't know, do you know what ins headset creation tools are versus desktop creation tools? Okay, cool. So yeah, so it was a world where it was all in headset creation tools. So I left a note in the world that said, You are welcome to create here is my creation prompt. And I would come back to the world and just kind of see what people created. And they all stuck with my creation prompt. So it was a, an experiment of trusting the Oh, and also in the world, I was like, and if there's anything that I find insulting or in inappropriate, just know, I'm going to be erasing it. So if you want it, you have to save it. files or whatever. Um, but yeah, so. So I informed that space with prompts. And, and, and in and transparency, I was very transparent, what, you know, what the space was for and what, what I had what I was saying, I had control over, you know, in this space, and why. So I find, you know, signage can be really helpful in guiding, I mean, just like in the real world, but you can do it much more magically. And you're not, you know, virtual spaces that does not have the same parameters as the real world with gravity. And it helps them kind of, when given the prompt, they kind of stay within that lane, rather than, you know, exploring off in zone directions, maybe

53:01
Yeah, I was actually quite surprised, especially since the platform that I was on was predominant, had a predominant, young teen boy, a population. And they can be really interesting with the things they like to create in virtual reality. So I was like, I was fully thinking I was going to come back to the space and it would be, like, filled with inappropriate things. But I was really surprised they actually
stuck with the prompts. I mean, yeah. And yeah, it felt really good to trust my community in that way. And then, like, prove my assumptions wrong. Oh,

53:50
oh, we’re getting to the end of our, our, our interview. Okay.

53:59
So with the design considerations in mind, that we kind of just talked about for, you know, designing the environment towards enabling the user, how do you prioritize based on the needs of, you know, individual projects that you work on in terms of resources, technologies, as well as methods in terms of in terms of customers?

54:25
Well, you mean, the customers that are commissioning me to create the experiences or the lab leads or, you know, the the financers, those kind of, right? Well, it's quite interesting, um, desktop developers that are creating virtual objects are virtual worlds on the desktop. And that requires a lot of training and a lot of time to learn those skills and those tool sets. So clients or people that are commissioning you, if if there are wanting, highly refined, highly interactable detailed and semi realistic virtual worlds are virtual objects, that's going to cost them a lot of money. And so I often when I've consulted with people said, like, you know, you can, if you think you know what you want, you might want to do a prototype with someone like me, who's using in headset, creation tools, where I'm creating prototypes that are not realistic, but they are fleshing out things you think you want, and things you know, and interactions you think you want. Because by the time someone creates a desktop type, detailed experience, you spent a lot of money. And if you're not happy with something, that programming to like, change things costs a lot of time and finances. So I often recommend clients or people commissioning something more detailed like that, to start off with an in headset creator who's basically, you know, doing sketches of their ideas, and creating more simple interactions to play with their ideas that they're they think they want, yeah, they often come with a very solid idea of what they want, but then you don't really know what you want, until you've experienced it in headset and started playing with the ideas and see some of the things that maybe wouldn't work.

57:02
Absolutely. I think the customers, you know, sometimes the expectations, you know, expectations and intent, kind of bought up against perhaps, but up against the purpose of the the project itself sometime, right. With any design projects, you know, or any commissioned piece, you know, a lot of times, but I wonder specifically, you know, as far as like when you get into, you know, you made the distinction between the desktop versus kind of multisensory scape, you know, a build scape and how those the purposes and goals may shift and change a little bit.

57:48
Right, right. Also, a lot of clients are people commissioning, that immediately, if especially if they haven't done any VR work before, they automatically think that the virtual world has to be very realistic looking. And they don't fully understand that some of the things that they're asking for, can be accomplished with primitive shapes and, and basic, suggestive elements in the world. And that,
unless they're designing a product, like, some details just don't need to be that detailed in virtual reality. So it just depends on what their goal is, with whatever they're asking to have built. But yeah, like, if you're doing landscape design, for a client in virtual reality, it doesn't need to be hyper realistic plant, right, you just need a basic shape that kind of suggests like, Oh, this paint plant is pointy, or this plant is kind of wispy, or this plant is short or tall, or, you know, like, a general shape and color to be able to do a landscape design. And that is very easy to do with the internet in headset creation tools, where they can walk through it really quickly. And yeah, so that might be a case where you don't need to have crazy scripting abilities and be super advanced unity user IDs, you know,

59:27
yeah, exactly.

59:31
The next one kind of riffs off of that just a little bit because I think in the design process, it's important to consider notions of failure or areas where you know, things have been unsuccessful or, you know, fallen through. So can you talk a bit about an artistic decision or a design method or tactic that was unsuccessful and VR experience How it was or how it may have been corrected in the design process?

1:00:03
Yeah, I'm thinking about one experience that I helped create, I kind of did some consulting and like user experience, kind of, I'm informing on at the lab that I work with sometimes. And it's something that, well, you know, I, I'm sure, there are things that have failed, but I never think of them as failures. Because I just I think I'm very highly adaptive. So I haven't had huge failures, if there been failures in my designs, um, I've just learned from them and like, change the design, going. So far, I haven't had anything drastically go wrong. There was one experience, I'm the one that I had created stations, where people would go in and out of the experience. And on the stations in the virtual world, there were activities people needed to do, there were some interactivities that people were having a hard time understanding what they needed to do. And I still haven't fully understood why they were having a hard time because there were literally were like, signs with prompts of what they needed to do. So I guess there is a mystery of like, Oh, you know, it is hard to get people to do things in a sequence that you want them to do. Because they're overstimulated, they're taking in the sights and sounds of the virtual world. Things seem to be more, you know, people who don't tend to be curious and real in the real world, because they're just so like, Oh, it's just everyday, I'm just doing this I'm not, you know, they're not feeling curiosity. But when you as soon as you put them in a virtual headset, and it's a totally different environment than they were just in, I think it triggers curiosity in their brains. And so they start not paying attention to prompts and just taking in the verge what's going on in the virtual world. And I think maybe, I'm actually uncovering a little bit of what maybe was going on for them, like I hadn't really unpacked it as deeply. Until right now. I probably had too many interesting things happening off in the distant and, and at the same time, a lot of things in in the foreground in front of them, that they could look at and interact with, that maybe they they were overstimulated and just couldn't focus on the easy prompts and the easy actions that I was asked that the the spaces are asking them to do. So maybe that is a consideration that I need to, like, if I'm going to have an in a highly interactive component, that I need to make sure that the area in which they're doing this very detailed, interactive, like sequence is not super busy. And maybe
there's not a lot in the distance. Or maybe there's like a little slight wall, like they can kind of look over but maybe, you know, like, I don't know, like, there's a lot of things to consider there. But now that I'm talking with you, I'm like, maybe it was just too much input, too many things to look at.

1:04:28
It's fascinating to consider, you know, that some people, you know, may be feel kind of a liberation to explore more, you know, inside of a, I don't know if that's an environment they feel they can control, but, you know, they feel like they're in a separate space, you know, so why not? Maybe, you know, why not explore why not look at all the things that you know, well, and also.

1:04:52
Yeah, well, and also like, it looks so different, or at least the experience that I was had created. looks so different. In the real world, in the sense of it was more cartoon-esque. Because it wasn't a hyper real. And actually, even with the attempts of creating hyper real VR, there's the uncanny valley thing that's still happening. And so it just naturally your brain I think, gets triggered into a curiosity space of like, this is a world that does not look like the world I live in daily, and therefore, you're looking around a lot more and like a little add, like, there's like, wooh, like, there's a lot to take it here. And my brain is trying to, like, make sense of this cartoonish ask. Not really real, but sort of real world that I'm in. Exactly, yeah.

Yeah, actually, this was the last question that there was, oh, additional points, or any topics you wanted to make about your methods or experiences. As an artist that you find important VR design that we didn't discuss?

1:06:22
I think I sort of touched on it in the in the safety realms of, of going in and out of VR. You know, I use trauma informed care practices when thinking about the experiences I'm creating. And I also find it important to, to remind people that going in and out of VR is like, you're shifting your body perspective. So when I take them out of VR, I welcome them back. And I encourage them to kind of sit down and pay attention to their breath for a little while. Because what I found when I first started doing VR, and I was in it for like, 10 hours, because I was doing research. So I would, I built up a tolerance to be able to, like, basically spend a 10 hour day in VR with like, bio breaks, obviously, and maybe a lunch here or there. But I was working on a project and doing research at the same time, all in headset. And because because of that I, I really realized like, Oh, my brain, and I would imagine a decent amount of people's brains can calibrate to understanding the virtual world that they're in. So like in virtual worlds, if unless it's a mixed reality experience. in virtual worlds, I can literally put my hand through a table. Without getting hurt like a virtual table, I can just put my hand through it without getting hurt. And your brain starts to calibrate to that reality. If you spend enough, or at least for my brain, I can only speak for myself and I speculate about other people's brains. I speculate like we start to calibrate to what we understand about this virtual world. And if we don't, when we come back out of VR, we might not even be aware that we're a little more klutzy, we're a little more, you know, accidentally smacked my hand on the counter. Oops, I accidentally dropped the glass like I'm, I was just slightly less coordinated in the real world, specifically, directly after using VR for an extended period of time. And I just speculate that that's because my brain started calibrating to the realities of that virtual world, that I didn't have to be exactly placing the cup on the table that I didn't
have to really care if I accidentally stuck my shoulder through a wall. Yeah, and you know, and it wasn't a conscious thing, but because I was doing research, I was like, why am I so klutzy all of a sudden, outside of headset? And let me like, think about that and try and figure that out. So

1:09:29
that's very interesting. Yeah, absolutely. I know there's always that thing you know, we're, you know, the people don't walk through the tables, they never just walked through the VR tables, even though they could, you know,

1:09:40
no, but they do kind of they could, I mean, you don't feel it, but you you're not trying to walk into things in the virtual world. But because your body, your brain and body start to quickly notice if you brush up against things and it doesn't give you a physical. Yeah, a physical sensation and So you've become less detail oriented with your movements in virtual spaces, you're still kind of like, Oh, I accept that this is a table and I'm supposed to walk around it. But you're not super careful like that your hip doesn't hit the corner of the table. And in fact, maybe you don't even have a hip radii that maybe your avatar is not doesn't even have like a torso. So you're not even having to like, use your proprioception to like, be like, Oh, I'm close to that. How close Am I to the table and my hip? You're not doing that. So, yeah. So just stuff to chew on. Yeah.

1:10:39
Well, this will conclude the interview today. And, again, feel free to follow up with any additional thoughts about these questions. If you have any. Just email them over to me, and you can get in touch with me if you have any questions or concerns at all. And I definitely appreciate your time. Thanks so much for taking part in the research study. And it's been a very, very enjoyable and informative conversation for sure.

1:11:09
Thank you very much. And I hope you enjoy the rest of your day and your weekend goes very well.

1:12:35

Thank you. And is it? How do I say your name? Um, Dan is just a B and D and a man. All right, my daughter's actually named Eliza. So no problems.

1:12:51

Well, thank you so much, Dan, and you have a lovely day.

1:12:54

Thank you. Bye bye.

1:12:54

Thank you. Bye bye.
Interview: Participant 4

SUMMARY KEYWORDS
vr, bit, design, environment, question, user, experience, multi sensory, immersion, objects, sensory, methods, artists, real, people, research, rain, arranging, sensory experiences, find

SPEAKERS
Researcher, Participant 4

Researcher 00:15
Hello, see if I can start my video here. Here we go. I think that'll work. Hi. Good morning.

00:36
Pretty well, yeah. All good around here. How are you?

Researcher 00:41
I’m doing pretty well so far. It’s a nice warm day so I can’t complain much. Thank you so much for for sending back the the signed consent form this morning. I don’t want to take up too much of your time. So if it’s okay with you, we’ll just go ahead and get started. And what I’m going to go over is the basic purposes and results from this study and a little bit of information that was already in the signed consent form. And then I’ll start the questions. But again, thank you very much for taking the time to be here today, I really appreciate it and for returning the form which I’ve placed in a secure external hard drive. The purpose of the interview is to collect qualitative data for a research study to explore the practices and methods and experiences of artists who design multi sensory xR environments. The study focuses on the considerations and processes and strategies whether it’s aesthetic or technical or very practical that artists employ when approaching this media specifically that’s used to compose multi sensory xR. The results of the investigation will help me inform academic communities of the way that artists approach compositions towards immersion with designing these specific media environments. In addition, the study will hopefully inform the professional development needs of emerging industry artists. And the research will also contribute to a larger body of knowledge regarding technical communication methods for composing persuasive immersion, from the artists perspective. So the results of the study may be used in reports or presentations or publications. But your identity will remain completely anonymous. And the research will not identify you by name in any of the reporting situations. You also have an opportunity to review a draft of the final report for accuracy of representation. And your participation in the study. Again, it’s totally voluntary, and you can withdraw from participation at any time with no penalty. So I am recording the interview. And it will take approximately like 45 to 60 minutes, approximately depending on the format of standardized, but it’s very open ended. So feel free to ask any
clarifying questions or to add any additional information to your responses at any time or comments as you feel you need to. And I'll place the interview questions in the chat for accessibility. If you need to return to the questions again, or would like to follow up with any kind of additional thoughts about the interview, after it's concluded. Feel free to email me if you have any, you know, follow on thoughts about it. Do you have any questions or accessibility needs before we get started?

Participant 3 03:48
Oh, no, I don't think so. Okay.

Researcher 03:54
Let's see. I'll put the first question in the chat. Okay. How would you define or describe multi sensory VR?

Participant 3 04:08
Um, I think it's simple as creating an experience that is consistent throughout as many of the senses as possible. But actually, even if, if there are two, it's already multi sensory. So more than one. And I would say that this is it. Of course, I wanted to add that usually visual component, like, probably most people would say, VR, meaning, you know, this technology of VR goggles. But in principle, I believe it's, it could be even if you use other means of, for example, just sound if it's spatial sound, it's already a form of VR and Together with other senses, multi sensory.

Researcher 05:06
interesting, it's it's interesting to include, particularly, you know, it's so visual centric, I think, you know, to put priority on a lot of other senses. As you said, you know, spatial and sound was interesting. For the next question, a little follow up. Can you describe designing? anymore? I think your mic might be touching.

Researcher 05:40
Better.

05:41
Yeah. Okay.

Researcher 05:43
Can you describe your experiences? designing multi sensory xR, VR environments?

05:53
Okay. Do you want me at this stage to also give examples? of

Researcher 05:59
Sure. Yeah, sure. If you want to go with specific examples, or in a broad way, it's up to you.

06:04
All right. Because I mean, there might be a little bit diverse, so. But so I would say that, for me, the the most important part of VR, and the reason why I was passionate light in the first place, is this
idea of movement and motion tracking in the capacity to integrate this type of human body mechanics in human computer interaction. So I tried as often as possible to do things that are connected to this, I did do maybe one of the most complex pieces of work training experience that was for a year in school. So over there, it was, you know, this very spatial dimension of the content, there was a lot of movement and coordination involved. There is, so I don't know exactly how much you go into the theory of sensitive with this research. But for example, proprioception was very important to train in this environment, because it's like connected to the boat, and to the reflexes and the coordination that needs to carry. Over here, we have kind of some challenges, or to like, replicate the scale of objects and stuff like that. Um, there was another experience that I would like to remind of, which was on interactive poetry experience, where there was this like, variable type of input, but also an animation happening as you spoke. So when you said something it was happening? And do I have to like, go into more detail or just to describe the project?

Researcher 08:04
Oh, no, no, that's fine. It's, uh, you know, I'm sure a lot of the other the other questions will kind of bring it back around to a little more detail.

08:14
Okay, yes. So maybe, yeah, I can keep some of the information also for the other questions. Nope. I don't repeat myself afterwards. Absolutely.

Researcher 08:30
The next question. Um, what technologies do you find that you most frequently employ when you're composing these multi sensory environments?

Participant 3 08:45
Um, or if you're working on a team, I guess, you know what, what the team kind of uses to employ in these environments with the design and the final design in mind. So we, of course, we use the absolutely development kits, like the head, goggles and all of that. But maybe something that is a little bit more experimental. Sometimes we use Leap Motion. It wasn't, we didn't really manage to carry a project to the end with it with we had a few of them send Indian we kind of gave up on that and just placed it with a more simple interaction. But we tried to sneak motion, the hand tracking device. We do have some dialogue flow, which was the one for speech recognition. So when we need to do something, variable input. Because we didn't do only three 3d based VR, we also the XPS 16 video, we have the actual equipment for filming which was a GoPro on me. And some software that was specific to this equipment for stitching and for visual editing of the content. Also, Adobe Premiere for certain threesixty editing. And for sound, I found that it's called Final Cut. It's a video editing tool for Mac. And of course, like unity. And I also try to use it pretty frequently, 3d modeling tools, the VR native, so sometimes I will use blender and work on the PC, but also Google blocks or to volley. Oh, yeah.

Researcher 10:50
Did you find that this is just kind of something that just came to my mind? Do you find that it's relatively easy or a little bit of a difficult trick to get all of those separate components technologically, to sync together?
11:10
Most of the time, I didn't really encounter very big compatibility issues or anything like this sort of seamless. Very rarely, there might be a small problem, but usually, you know. Okay.

Researcher 11:37
Here’s the next one. Again, in your experience, and this is kind of one that probably expands on the first couple of questions. What methods or tactics do you find most beneficial to include? to creating a sense of immersion in the environment? Whether it’s sensory or otherwise? What kind of approaches do you think have worked well, or what kind of tactics whether technical or artistic kind of work well, to really provide that, that sense of immersion for the user?

12:12
Well, I would say that the most important thing to consider is scenario consistency. And then I would say that the piece of information becomes more real, when it's validating or validated through multiple senses. So if you can see something in 3d, it's convincing. But if you can also hear it, it's more. And if you can touch it, then you have a bit of haptic feedback, even more so. And each layer you can add, I believe it creates more and more convincing for you, but the smallest inconsistency could cause everything to trickle down because your brain can figure out that it's not real.

Researcher 13:12
For the next one, are there any particular design decisions are or artistic decisions about sensory or aesthetic aspects? That you find you primarily look to put into the construction or testing or user experience of xR compositions you mentioned earlier? About proprioception? Are there any in addition to proprioception, you know, that that you really find very beneficial to really kind of encapsulating the experience?

13:50
Um, if I understand the question correctly, hopefully, I found that because our hardware is pretty limited, at least the one that I worked with, we didn't always have the older additional equipment. It was extremely useful. This idea of synesthesia, you know, when one the sense kind of helps you trigger a memory of another single sensation, for example, in the poetry scene. It was a poet poem about rain. And it was a big technical limitation that rain would mean like particle simulation. It was very hard to render. And we had to, like make this without, you know, rain without rain. And just by using the colors, the lighting, even the architecture of the buildings, it was a little city that was slightly England like because in England, it rains a lot and kind of just the general atmosphere would feel a lot like rain. But you wouldn't, you know, and it was even a bit foggy, the colors were a bit. So this maybe makes you feel a bit like when it's cold and humid a bit in the air and all of that. But, of course, it wasn’t a tactile sensation, it was just visual.

Researcher 15:19
So you think all of the, the design of the sensory elements came together to kind of trick the brain in a sense, and to feeling this this presence?

15:36
Yes. And of course, if, if you have the chance, for example, when on the spot to do a bit of scenography, and to arrange everything to the temperature in the room could be, for example, an important element or stuff like that. It helps. But as I said, You don't always have the opportunity, and then you adapt.

Researcher 16:01
Exactly. So as far as arranging things in the room, and can you talk a little bit more about arranging things physically in the space, along with arranging things in the virtual space for the user?

16:17
Yeah, so let me think on, I know that a friend of mine did this thing where you know, about three feet plank experience, flight one, she actually curated this so that you actually have the plank and all of that, for people to feel it, you know, materially there. But for us, we kind of tries to be a bit independent of the circumstance circumstances, because it was also a matter of practicality, I guess. Yeah. So most of the time, we also were responsible for like, distribution, and then we would have to travel with equipment, be very fast, and so on. Maybe less. So. I tried experiences of people who did this, but we didn't have the chance to do like a single scenography. so far.

Researcher 17:19
Okay. That's very interesting, I'll probably circle back around to the question as far as moving, multi sensory environment from one place to another. So I'm very glad that you brought that up, you know, the idea of, of distribution and kind of taking these spaces from one to one place to another. How do you digitally and physically construct the environment to kind of to make suggestions for use, or to enable the user? Now you've kind of alluded to it a little bit about, you know, bringing these senses together to create more of a story, a more of an experience of it. But when you're designing it, when you're in the, you know, out of kind of the development phase and into the testing and kind of prototyping phase, what kind of decisions do you make to kind of propel the user to do certain things or to enable them to perform certain functions?

18:33
Well, we have solutions that are more, or maybe smarter in some that are very good in your Facebook world. For example, one that would be a bit smarter in a game, it was a game jam, about Dracula, and stuff like that. And at the very beginning, nothing really happened, you were just in an environment, like little forest, and you had three objects in front of you. And even if maybe they wouldn't have a very clear explanation of how they got there, like a bow and arrow and some garlic. And it would be kind of clear that they're doing something. And it would be this sandbox, not the level, but the bit of the experience, where you would just interact with objects and you know, be aware that they are doing something, then you can recognize them. In the ceiling experience, it was very important sometimes for users to look in a specific place. So for this, we imported a method that I think I found in Google Expeditions, where you would literally have a arrow that is pointing if you are looking in this direction and the point of focus is here, and just keeps pointing until you reach it. And it works but it was a bit more you know, maybe breaking a bit emerged. Because it's interface that wouldn't exist. This is something I find breaks with emotion, but somehow seems to be very accepted in industry. This user interface that is, I think you would call it non diegetic. Or which is not
part of the. So it also interfaces, you have a 3d object that you can manipulate, but the traditional
no buttons, text, this type of interface, it breaks immersion, because it's not part of the actual,

**Researcher 20:44**
true, yes, there's something along the lines of like an inventory or a toolbox. Something
along those lines, you find that the the user finds it useful, but at the same time, it kind of it
breaks the immersion a little bit.

**20:59**
Yeah, exactly. And some experiences managed pretty well, because they go a bit more towards
skeuomorphism. So you actually have the objects, very well shaped, and you have a paintbrush. It's
not like a paintbrush from that environment, but sometimes just have like a button with something
written on it. And that's not going to be

**Researcher 21:23**
I see. That makes sense. Yeah, that's an interesting point. I hadn't considered that before. It's
definitely something that's not in the real world, but it does make suggestions for the user of
how they're going to use the device. So for the next question, it kind of plays off of that same
question. What design consider with design considerations in mind? How do you, as an artist
or designer kind of prioritized based on the needs of the individual project? Do you do
prioritize based on the resources of your customer, or the purpose for the user? When you’re
first going into a project, because it budget based is it, you know, tool based.

**22:19**
Um, I think it's also a matter of how the team works. Maybe the right define myself as a user
experience designer, I am a little bit the advocate of the user environment. But of course, I'm aware
of the other needs. So I understand the business limitations and the technical things that are
available to us. And I try to not get ourselves into something that is very hard to complete. But
ultimately, I am kind of keeping the sight of the user. And then my colleagues each have their own,
you know, point that they’re coming from?

**Researcher 23:02**
Definitely. Oh, can you talk a little bit about the artistic decisions or design methods that
you’ve used that were unsuccessful, and multisensory VR build and maybe how it was
corrected if it was corrected, or how it could have been corrected in the design process?

**23:35**
Okay, I have synchrony to it. Of course, the most obvious thing is when you discover a clash with the
actual environment of the user, you know, you didn't really consider that they need to make a move
that is very large, and they interference furniture. This is the most obvious one. But other stuff that
we have. Because this is kind of going a bit back, you know, with this interaction between mediums,
VR versus real life, and the sailing experience was an in class experience. So you have the trainer
who had to be in VR present, and you know, point objects synchronized with some students that
were also there with him. And for example, we realized that it's, it doesn't make sense to add sound
to certain parts of the experience because it forced them to wear a headset would be much easier
for them to hear what they are speaking without the headset, even if in principle, we could just send
the voice, you know, via the microphone and so on. But this would involve things like headphones with microphone. And so on. And for certain parts of the experience, we had to just leave the fund entirely aside from design.

Researcher 25:12
Okay, and that was mainly because it was a multi user system.

25:17
Yeah. And they were like in the same room, also, not- it was like an interference between two things. Another, maybe it was a bit. It was, let's say, a prototype that was not validated. I don't know if it's like a design failed. But we kind of define the use case, in a way that wasn't very good. We tried to make like this experience about Africa, rheumatoid, so it's like rheumatoid arthritis. In English, which was like an educational thing for doctors to empathize with the patient's better. And we designed this entire interaction mechanism that was also very much motion oriented, because a, our, our athletes, freedom, impact alters your capacity to move. And after doing a little bit of research and validating our design hypothesis with doctors, they were like, Yeah, but we are really trying to reduce the amount of empathy that we have with the patients, and it is our professional ethic. Because, you know, it's otherwise you cannot keep your sanity, if you just were ears and ears empathize with all the dramatic situations of your patients. The entire room case was kind of weak, we dropped it.

Researcher 26:46
That's pretty fascinating. And you all found that using the multi sensory techniques was a way to kind of heighten the empathetic, the empathetic approach for the doctors?

27:00
Yes, I would say that most definitely. Because it was something very movement based. So the idea was that you, you have character mirroring your movements, and you would need to coordinate them, but they will actually do the work. So the problem was that instead of just mirroring you, they were having difficulty moving, you know, like, like, exactly, like a person who has a AR, and this would really cause you to physically resonate with this difficulty. You know, your muscles getting tensed and stuff when you are just moving slow. The doctors really just said like, No, we don't, we don't want that.

Researcher 27:55
Now returning back, I'm just gonna ask, like, return back to the concept, again, of sorry, of moving the moving these experiences, or the setups for the environment from one location to another? Have you had any issues with doing that? Or, you know, you mentioned that sometimes you have to move them about very quickly from one one environment to the next. And you also mentioned about how sometimes the user clashes with the actual environment? Can you kind of, you know, talk a little more about taking these multisensory, because a lot of them are very locked, you know, they're usually very locked in one place. So can you talk a little bit about, you know, what happens when you kind of move these from one place to the next, the differences or similarities.

28:49
The first thing that comes to mind are the technical difficulties because we like calibrate, and measure everything all the time. And then it becomes very complicated, because people have different heights, we had the sections for the sailing experience, there were sections where you would need to sit on a chair and sexual very would need to be standing. And if someone didn't get this, right, this meaning also, you know, like, the scenario in which So for example, if it's an action that you would usually do by setting the height of the point of view in the VR experience was kind of calibrated to that, if you wouldn't be standing it was it would be to a different height. And we always need to kind of coordinate it. It's also kind of hard the, you know, because people have different heights, and you need to take that into consideration, but that's sort of manageable though. So yeah, the the measuring of the space and this was a primary primary situation and of course, Making enough room in a place? Um, this was challenging a lot of the time.

**Researcher 30:17**

Are there any What are there any additional points about your methods, your personal methods or experiences as an artist that you find important to multisensory VR design that we didn't discuss.

**30:41**

let me think if there is something I left out, somehow, I was thinking, it's not like a real prescription in terms of how to do a VR thing, but more how to prepare for design work, I think that it would be very important for, you know, designers to shift from once they shift from the computer screen, to the environment, to this all surrounding things, you should kind of be more aware of your sensory experiences in general, and try to kind of be more aware and to deconstruct them a little bit and see what types of sensory information you manage to record in your daily life. Because this should pretty much document your work. And I think it's like almost like a research method, I would almost go as far as doing the Eucharistic analysis for daily tasks, you know, like drinking some water or something like this. And to kind of record all of the sensory input connected to it, or things like this, you know, to explore this dimension of life more than before.

**Researcher 32:04**

Do you find there are times like speaking of making it, you know, the sensory experiences in the environment very close to daily life? Have you found any instances where it would be a better design methodology to make it completely different than daily life?

**32:26**

Yes, it's a very interesting question, actually. But there is one example that pops to mind pretty quick of the fact that in real life, most actions are not reversible. So it's not like Undo, you know, and this, I believe, it's something that many people would actually really love to have. And after working a lot in VR, for many hours, I was actually doing housework. And they move an object. Now, I was like, No, no, no, I changed my mind. And I was looking for the undo button with real life.

**Researcher 33:04**

So you'll find there some seepage there, where it kind of crosses over instead of the real world crossing into this, this virtual world kind of sometimes goes in the opposite way. Yeah. Yeah. That's interesting.
33:21
So there are other examples also, but just not remember. Oh, for example, the trajectory of things. I really like that, for example, when you throw a rock in VR, or the ball or whatsoever, you can kind of have this projected trajectory, which makes your actions more predictable. And I think people also, oftentimes, they could benefit from this. I don't know if it's, you know, artistic, or it's more like a practical use, but it comes into handy a lot.

Researcher 33:57
Yeah, definitely. That absolutely makes sense. So this will that was the last question. So this concludes the interview. And again, feel free to follow up with any additional thoughts that you might have about these questions. If you have any, just emailed him over to me. If you think of anything, I called him shower thoughts. You know, sometimes if you're in the shower, and it just comes to your mind. Yeah, feel free to just email if something comes to mind. And you can always get in touch with me if you have any questions or concerns about the research. But I definitely appreciate your time today. And thank you very much for for taking part in the research study.

34:41

34:51

34:58

Researcher 35:01
you as well. Thank you

Participant 3 35:04
Goodbye.
Hey, how are you doing today? I'm good. I'm good. How are you doing?
So yeah, so it's, you know, where we're, I think there's a lot of people here are very disappointed in, and how things have gone to the last few weeks. So.

But, you know, we got to make do with what we got. And, you know, we've already been through a year or so what's another couple of months, I guess, I hope that I hope it straightens out very soon. I had a little bit of a back injury over the weekend. So I have a standing desk. But if you see me kind of moving around a little bit. That's what's going on. Just trying to keep things I straight now a good time. So my husband is actually picking up, like so much of the labor. But we like you said we, we know it's all temporary, so we do all we can?

Well, I won't take up a whole lot of your time. But I do I thank you very much for taking the time to be here today. And for returning the signed consent form, which I've placed on a secure external hard drive for the research data. The purpose of the interview is to collect qualitative data for a research study to explore the practices, methods and experiences of artists to design multi sensory VR environments or xR environments. The study focuses on the considerations and processes and strategies, whether there are aesthetic, technical or very, very practical that artists employ when they're approaching the media used to compose multisensory VR. The results of the investigation will hopefully help me inform academic communities of the way that artists approach these compositions towards immersion when designing these specific media environments, and in addition, the study will inform professional development needs of emergent industry practitioners. So the research will contribute to a larger body of knowledge hopefully regarding technical communication methods for composing persuasive immersion from the artists perspectives. The results of the study may be used in reports, presentations and publications, but your identity will remain anonymous. And the research will not identify you by name and any reporting situation. You'll also have an opportunity to review a draft of the final report for accuracy of representation. And again, your participation is entirely voluntary. If you want to withdraw at any time, during the study, there's zero penalty. So I'm recording the interview. And it'll take
approximately probably like 40 to 60 minutes. The format is going to be standardised but also open ended. So feel free to ask any kind of clarifying questions or add additional information to your responses or comments as you feel you need to. And I'll also place the interview questions into the chat for accessibility purposes. If you need to return to a question again, or would like to follow up with any kind of additional thoughts, even after the interview is concluded, you know, feel free to get in touch with me. Do you have any questions or accessibility needs before we get started?

05:52
No, that all sounds good. Okay.

05:56
I'll put the first question in the chat.
How would you define or describe multi sensory VR?

06:15
Mmm. That's interesting that the use of the word multi sensory there is is kind of interesting. I feel like I would say that, for me, this is an interesting question. Okay. So, um, I would preface it by saying that when we hear the term VR, I think it's used in a lot of different contexts. And it covers sort of a wide range of technologies and experiences. I would say that multi sensory VR, for me, would entail an experience that, from a technical standpoint, has six degrees of freedom. So not only rotation, but also positional information. And that's being fed back into the user through the headset, I would also say that, there would have to be some representation of at the very least the hands, or some other point of input, other than just that, the the head. And in that way, it's accessing the, the surface appropriate receptive and kinesthetics, body bodily sense. And then, of course, audio is plays a very big role in VR experiences. So I would imagine, there would have to be, for me at least, some sort of audio component to it as well.

08:10
Okay. And you'll probably see a lot of these questions really kind of scaffold and build on each other. So there's a lot more opportunities to go a little more in depth as you kind of think through the next question.
Can you describe your experiences, designing multi sensory environments?

08:34
Um, I would say that, so my initial exploration, I come from a media arts background. So my previous creative practice was rooted in the time based installation media installations are using a lot of video and audio, along with some sort of physical, sculptural elements. And, and so that was my, my sort of entry point into VR. When I tried VR, for the first time, I thought, this is a medium I really was taken by and I felt like I had to explore. And my initial experience designing an environment for VR was one of the first things I was struck by in the first VR experience I did, which is just the, you know, when you first put on the headset, it's just the it's just like the home environment for these for these headsets was, you know, I, I looked down and I didn't have a body, right? This embodied viewpoint. And I found that very interesting. I found it really I mean, it. It's funny because, you know, you think, like I could describe it to you like this verbally or or write it down or whatever. And, and and But it's
it's a different experience when you're actually, you know, have the headset on. And you'd think that it'd be kind of unsettling. And it's, it's, it's actually I found it not, I found it. That's what I found really interesting is it wasn't unsettling like that, that I was so immersed within an environment that I didn't notice at first, that he didn't actually have a physical body, even though I still have a physical body, but I didn't have a representation of a body.

So, you know, that for me became the question around which I centered my my first experiences designing for environments was, you know, what, what happens if you start representing the rest of the body, right, we have the viewpoint, the visual viewpoint. What happens when you represent the rest of the body? What What does that feel like? And so, in terms of describing my experiences, designing multi sensory VR environments, I'd say that they were initially centered around giving a user a body. And then of course, when you're designing these environments, you put yourself in this sort of body, this avatar, whatever that you're embodying, but of course, you can't see it, just like in real life, you need a mirror right? to see, to see a external representation of yourself. So you do that, you make that in the experience to see yourself and then that became a very interesting experience of being able to see this external representation of yourself. So I move my my hand, and I see that reflected in the mirror.

But of course, the body that you see in the mirror is not the body you're used to seeing in a mirror, right? It's this avatar that they generated. And of course, it doesn't really move in the way that one might expect it to move. Because initially, those initial experiences were just tracking hands and ahead. And so where your feet are, for example, where your waist is, isn't, you know, you feel where your waist is, internally through your body's kinesthetic and proprioceptive sense, sense feedback. But what you're seeing is not being reflected in that way. And even if you look down, you know, you could kick your feet up and your body in the VR experiences is not moving. Right? Hmm.

So I would say that, in terms getting back to the initial question, I'd say, like, describing my experiences designing it was, you know, I, I became very interested in that in the tension between a disembodied viewpoint how we feel within our physical bodies, and then that disconnect between the what we see reflected in the virtual experience and what we feel within our bodies, and the sort of that and exploring that tension between that between them. Interesting, it's kind of a follow up question.

13:07
Do you consider the reflection of the avatar of the self as kind of a multi sensory relation?

13:22
I do in the sense that, um, and I guess this is, you know, in terms of defining the way that I'm using or I interpret the idea of multi sensory you know, I very much do believe that that proprioception, and kind of kinesthetic sense, our sense perceptions? Oh, yeah. Um, and and so in that sense, I do. I do think that like, seeing, seeing the body reflected, and then move. So we, we feel how our body is moving. So I, you know, I can move my hand and get a sense of where my hand is in space. And then I can see that reflected in a VR environment. Right, right. And in terms of the hands, even though we're only getting the position of the hands in time. And the animation that we're seeing reflected externally is inferring the rest of the body, the position of the elbow, the position of the shoulder, and so on. They're sort of accurate enough that I think that in terms of what I see, it feels more or less real. It feels more or less accurate, in the sense that the sense feedback that I'm getting
in my physical body is matching. What the sense feedback I’m getting through my eyes. Right, right. Right. But that's not the same when you don't track the feet, right, which is, you know, a really interesting thing where

So what then and this is where that six degrees of freedom comes in, where once they start moving left and right, forward and backwards, the feet are either, like they're just dragging, right? They're just sliding in the so my eyes are seeing feet that aren't moving. But my body is feeling feet that are. And so I would say that yes, like that there is I would consider that that external reflection as a multi sensory input, I guess you could say, right, or a way of judging or comparing the two. Interesting.

15:42
For the next question, it's a little more technical. What technologies do you most frequently employ when you're composing in a multi sensory environment? You mentioned the head mounted displays, having, you know, certain priorities in the space. So if you could kind of riff on that just a little bit?

16:08
Yeah. Yeah. So I, I'm really, as I mentioned, you know, when I think about multi Scott century VR, I think of it as a sixth off a six degrees of freedom, experience. And so for me, it's really important to have a headset, but also the space around the headset to move. And then the experiences that I'm most interested in, in creating, because they are so interested in this question of our embodied sense of experience, that I think wireless headset technology is really important, because that tether if you're using a tethered headset, it's this one extra sort of constant reminder, that's it's literally pulling you back into the sort of physical environment that you're in. And then on top of that, the, again, some points of tracking for at the very least the hands, but in my other the my first experience that I worked on, we used external trackers to sew one on the waist into around the ankles, in addition to the hand controllers and the headset. And in that sense, we were tracking one of that 1234566 points on the body. And then we're able to animate a representation of the body on based on the position and rotation of those six points. Okay, and then the rest of the body is sort of inferred from those six points. All right, well, geez, for the, the animation. Well, so to get into the sort of technical details, so the, you feed in the six points, and then there are there's a plugin for unity, which we developed everything within unity, okay. called, what is it called, again, final ik ik stands for inverse kinematics. Ah, okay. And essentially, what inverse kinematics is, is it's a term that's used by animators to describe the, the way in which bones move in relation to each other and joints. And so based on the human human physiology, for example, if you if you know, the position of the hand and you extend your hand out, we know that the elbow is not going to bend up, right, it has to bend down, because that's just the physiology of the body, the human body, right. So if you feed in the sort of rotational constraints of the shoulder and the elbow, then you can infer the position of the forearm and the, this is the bicep, essentially, of the, the, the avatar, okay, based on the position of the hand and the hand and in relation to the head. So these, these algorithms essentially, in a sense, are inferring or animating in real time, the position of the body based on just those six points of data, which is the position and rotation of the head, the hands, the feet and the waist, okay? And it does a pretty accurate job. It's, of course, it can get fooled with certain certain positions that you can put your body into, like if you lie straight down on the ground. If you kind of squat and move in certain ways, It starts to try to get a little confused as to like how your body is moving.
And of course, you can fix that by adding more trackers, right, you can add a tracker to the knees and the elbows. And then of course, that gives you the real-time position of those joints. And that makes more accurate gives you a more accurate depiction of the body. But even just from those six points you can get, you can generate quite a compelling animation of a human body. Um, yeah. So does that answer your question?

Yeah, I think so at the end, if you if you think of any other ones, you know, any other like, audio software, or any apps that you you know, most frequently use?

I, you know, I definitely know there’s like unity, unreal, you know, there’s a lot of things that can auto generate a lot of things. But as you said, you know, a lot of it is like, how you build the space? You know, the planning that? Yeah, been to it before you kind of approach those those software's I think.

Now, in your experience, as a multimedia artist, what methods or tactics Do you find most beneficial to creating a sense of immersion? In the VR environment? Whether it be as you said, you know, through proprioception, or additional senses?

Um, that’s an interesting question, just because I feel like the sense of immersion, a lot of the sense of the immersion that’s provided in VR is just generated from the affordances of the technology itself, I think that as soon as you put on that headset, as long as it’s tracking the rotation, even three, three degrees of freedom, VR, you know, sort of cinema, what they call cinematic VR, spherical cinema, right? where the image is sort of around you, but you have no positional feedback, even that, I think, is enough to give you a sense of being there, or being immersed within that space. It’s very, it’s highly compelling. It’s just I think, something happens in our brain where it’s just what we see, you know, visual feedback is so strong that we can immediately create that sense of immersion. But that being said, I think that then the question becomes, how quickly that sense of immersion can sort of start to dissolve or fall apart, right.

And so in that sense, I think that experiences that I’m interested in, do have that positional feedback. So that becomes one of them is that creating, having an experience that has that allows you to move your body in physical space, and then have that reflected within the virtual environment, so that that is a big one.

Another one is having some sense of agency within the space. So whether that’s just like picking up objects or, you know, and that this ties into the movement, right positional information, moving through a space that gives you a sense of agency within that space, which I think, again, deepens that sense of presence or immersion within the virtual environment. And then yes, I think that sound is really underutilized and unexplored area, and I think a lot of sound artists have been working in this area for Well, you know, years and years, decades, even exploring the way that sound can, on its own can create a sense of immersion or presence. Especially, especially spatialized. down. So you know, really utilizing the way that our sense of hearing is always 360 degrees, right, whereas our sense of vision tends to be for directed.
24:11
Yeah, that's very true.

Yeah. So I think that sound is a tactic that I have tried to explore a little bit, although I'd like to explore it a little bit more. And then lastly, you know, the one that big one that I've really explored is, is really giving a sense of the body in space, right? So and part of that is reflecting, having a representation of your body within that space. Because I think that's a really powerful mechanism through which we receive set feedback or input from the environment. That we're that's I think, largely That kind of runs, under our sense, a conscious sense of sense, perhaps set perception, right? That's roughly not thinking, yeah, we're not often not thinking like, Where's my foot given moment? You know, where is my, my elbow or my arm or shoulder? And yeah, I think we're we that is reflecting, we're getting constant feedback. Yeah, in that way. And you know it. Anyone I mean, you You said you recently had a back injury is it's only when you injure something that you then you become like, constantly. Yeah. Right. Because it's like, oh, I know where this is being carried all the time. Right.

And so yeah, so I think that that's a good example of how, you know, we're constantly getting feedback of where our bodies are in space, it's just that we're not very conscious of it very,

absolutely. It was, it wasn't really something I ever considered in a VR space. My, just anecdotally, my daughter when she was younger, was in the lab. And we're having a meeting. And so we just kind of gave her the Tilt Brush, you know, to play around with Tilt Brush. And she was working for a little bit and said, Mommy, I don't have any feet. Looking down, and I could see her Yeah. She said, I don't have any feet. And I, you know, I'm pretty pragmatic. I said, Well, do you need your feet to complete the task you're working on? Yeah. No, but I don't have feet, you know? Yeah, it didn't take her very long. And for some reason, I had never considered that. No, there's no feet and Tilt Brush, you know, you really need the hands. But to her it was a full body action of Yeah, creation, you know, even at six, you know, to really need to see where her body was in that environment. So it's incredibly fascinating, you know, yeah, yeah. That a six year old can key into it.

Yeah, well, I think that I think it's a learned thing, right? I mean, you've had kids, you like, I've watched my kids grow up from being infants to, you know, toddlers, to, to little kids, and you really do see them, learn through their bodies, right, they learn where they're, you know, the first you can think, Oh, I have these hands, you know, like, and I think that it's something that over time, we just forget about, right? Because if we're constantly thinking about it just be completely distracting. But I think that kids are you know, because they're just learning what their bodies can do. And I think that that, for me is really important. It's a really interesting area to explore, especially within this medium. Because it does so allow us so easily to access. That sense perception.

Yeah, absolutely. Now to kind of build off of that question about the methods and tactics. Are there any particular design decisions about senses and aesthetic aspects that you really kind of make a priority in constructing and testing for the user?

28:17
Um, yeah, that's an interesting question. I feel like all the work that I'm interested in, in designing for or creating is about exploring that sense of bodily engagement with the world. And I think that
sometimes, you know, it's interesting, I think, if I were to build a game or something that is far more sort of task oriented, or a tool, for example, I would do far more testing and sort of, you know, but definitely user testing and tweaking and that kind of thing. But as a art project, I feel like a lot of it is just guided by my own sensibilities, aesthetic sensibilities, and also guided by often sort of underlying conceptual framework that I'm or a question that I'm just kind of exploring through the work. So if people do the experience, and have wildly different sort of experiences, I take that as a good thing, right? Whereas I wouldn't necessarily take that as a good thing if I was building a tool, for example, you know. So I think that that, you know, that's an important sort of question to consider when creating a work like this Work, something, you know, is there a sort of a utilitarian purpose to this? Or is it more of an open ended question? And are we okay with having some ambiguity in terms of the user experience?

In terms of design decisions, I feel like, as I mentioned already, and will probably continue to mention, yeah, I'm interested in this question of body and lived experience and sort of how we learn through our bodies engagement with the physical world. And so, in terms of an aesthetic, or aspect, I think all my work is sort of centered around those questions of, kind of probing how we learn through our bodies and sort of hopefully, asking, you know, hopefully, the experiences that I'm creating are allowing people to reflect on that right about, like I said earlier, I mean, I think that we tend to take these these things for granted. And, and that reflecting upon those aspects of our material situated experience experiences, will help us sort of regain a sense of, of our rootedness within this sort of world.

So now, as an extension, do you include any kind of material properties within your pieces to engage with?

31:47
I haven't yet. Um, but uh, my so I'm, I'm currently trying to develop a work right now where I'm using external sensors to sense to track not only the use the body of the user, so instead of using these trackers that you where it'll, it'll get the inside information from an extra set of external sensors. But the nice thing about these external sensors is that not only do they track the user, but they can also track other people. And so so one of the things that I always found really interesting, and also an area that's often unexplored is when you create a situation where you create a VR experience, for a single, it's generally a single person experience. You know, you have one person who has a headset on and is walking around this physical space, and they're seeing and experiencing something that no one else generally can can experience, right, even if you see a projection or a screen of what they see, you're still not experiencing it in the same way. So I became interested in how to draw the physical into that virtual space, and also how to have that virtual space sort of, be accessible, or sort of spill out of the headset into into real space, physical space for other people who don't have the headset on. And so one of the nice things about these external sensors is that they can track other people, and then you can then represent them within the virtual environment, okay. As whatever you'd like. So yeah, so I, I'm trying to develop a work where,

33:40
you know, one person has a headset is experiencing a virtual environment. But that virtual environment is also populated by people who exist physically, who are also in the space and also experiencing something maybe through our projection. Oh, wow. Yeah, of the virtual space. Right.
So so there's this sort of blend between the two. And, and then, you know, let's see what kind of interesting interactions can take place between two physical people, but one person who's seeing the virtual environment, one person who's seeing, you know, a representation of the or who is in the physical environment, but seeing representation of the array. So in that way, I guess the the quote unquote, real person and practical reality would become the material to engage with. Okay, exactly. Yeah, exactly. So maybe they have to move in a certain way, and or engage in a certain way. And, you know, the, the interactions between these two individuals, one who has a sort of privileged in view of the virtual environment, and one who does not, maybe they have to cooperate or somehow interact with each other, or maybe some sort of interactions emerge through just just from the setup right, the environment

35:01
So this is, I think, the next question we've touched on a lot, but I'm gonna kind of put it in the chat, but I'll ask it and kind of a different way based on what you just said, in this kind of conceptualization, how would you be making suggestions for the user to persuade the interactivity or the engagement in particular ways?

35:32
Yeah, that's a great question. I feel like part of me is really adverse, like I, part of me really doesn't want to give any instructions, I feel like part of me wants to just create a an experience where people are, it's a sandbox people kind of free to do whatever they would like, in the first experience that I made. You know, we gave people verbal instructions. So we there's a sort of onboarding stage where you know, you're putting the trackers on people, you're putting the headset on a person, and this is an area actually, that doesn't get discussed a lot when it comes to VR experiences is the, the before you're in the experience only after you're inexperienced.

36:26
And so yeah, so the the before part, and in terms of how you construct or, you know, there was verbal instructions of, you know, this is where you're going to be, you're and we gave them one simple task, which was, you'll see these four monitors in the space and there have a little button, just turn them on. And when you turn all four of them on, the experience will begin. But we gave them no other instructions Other than that, so And the whole point of having them turned on was one to get them to understand that they can move about the space in the way that they would normally move about any space physically, to give them a sense of the scale of the room. And also to give them a make them aware that they had this body because as soon as you reach out and you see a hand, you know, you can follow that arm and look down and see you have this body. So and also in that experience, there was these virtual cameras that were observing the virtual space, and the feedback from those cameras were appearing on the monitor. So there was a way of saying, Okay, now you see an external representation of yourself, because you see yourself turning on the monitors, right. But it's, so for that experience, that we just simply a verbal instruction. And then as very, like the most minimal basic sort of interaction, you can imagine pushing a button, right and moving. And I like that, I think that for me the experiences that I want to make, and for this new one, I feel like I want it, I don't know exactly, I haven't figured that out yet. But if there is some sort of task or something that's given to the user at the beginning, that's very obvious and simple that anyone can do. That sort of engages them with the environment to begin with. And then after that initial sort of push, you know, it's a gentle push down this hill, and hopefully, the experience takes on a life of its own right,
hopefully, the experience itself unfolds and that, the setup is engaging enough that it that you get pulled into it, regardless of you know, without any instructions without any sort of over sort of goals or or endpoint, if you will.

39:05
Yeah, you know, so in that first experience, it was it was representing sort of echoes of, of yourself through time. And so by the time you go through and push those buttons, and the experience starts, you start to see repetitions of yourself in time and and that in and of itself became enough of a an experience that kept people engaged, right, it can't people interacting with it.

39:33
I guess we love to interact with ourselves. Yeah, right.

39:38
Yeah.

39:40
That's fascinating. So it comes kind of almost a memory archive, like three, three degrees removed. Yes. I think from what you're saying is, you know, you're, you're seeing yourself in VR form inside of VR, while you’re in a physical space. So yeah, so it's three

40:00
Steps removed basically have

Yeah. Well, it's still a deeper sense of engagement. Yeah, well, because you know that the, these reflections of yourself, they will first they at first they don't appear like you at all, because they're far enough in the past beyond our sort of short term memory that we don't necessarily engage them as us, right? Even though they look like us, they don't. It's like, we can't remember the exact actions. You know, you I often heard people going through experiences like Is that me? You know, and yes, that's you. But then, you know, when you're watching these sort of repetitions of yourself, through time, you come to the awareness of anything I do now, in this moment will happen in these repetitions of myself, eventually, you know, 16 seconds later, 30 seconds later, however long the delay is. So then you can do really, and this is where it becomes playful, right? Because once people figure that out, and this is the thing we did, we didn't give people instructions about what was happening. We didn't tell them what was going on, people just kind of figured it out. And once people figured it out, it becomes a very sort of playful experience, right? Because you can do things like, give yourself a high five, right? Because you just do this. You wait 15 seconds later, and you know that you know, and then you can, and then then you can create a whole choreography. Yeah, because you know that anything you do now is going to be repeated. And it That was one of the most interesting aspects of that work and seeing people go through it is that once they figured out what was going on, to see the sort of scenarios that people would create, once they knew that, what the mechanic of the whole experience was?

42:00
That's fascinating. Yeah.
And it became, it becomes a very playful experience. I think that people really, really liked to kind of
explore and see what they could do with it. And yeah, we had one, one kid who did it. It always
seems like it's the kids that really throw themselves into these experiences. We had a kid who was I
think, eight or nine, I think, who did it, he was at the festival with his mom. And he did it once. And
then he loved it. And so he came back at least four or five times. And he was making it was funny,
because he made all these narratives, you turn it into a narrative experience by saying, okay, you
know, he would act out a little scene of like, you know, people huddled around, and then this person,
and then he would act out another scene over here, and he's like, Okay, this person is this song.
And this person, he would play each role, right? Knowing that they, you know, it would be repeated
in time. And it was fascinating to see how, you know, he was creating a story world, essentially
through pantomime using the mechanic, right. So I think, again, those are the experiences I'm really
interested in creating where it's not necessarily about, it's not necessarily goal oriented. It's more of
like I said earlier, like a sandbox, sort of open experience where people can kind of make what they
want out of it, and kind of just have the experience as opposed to having sort of these sort of
utilitarian or, or goal oriented task. Yeah. I think that that's definitely a, you know, a free artistic
expression, manner of handling the user, just to see what kind of happens.

43:55
The next question kind of goes over. Things that may not have gone as planned. Can you talk
a bit about any decisions or methods that you tried in a VR build that were unsuccessful?
And maybe how they were corrected? Or if they weren't, you know, how it was or may have
been changed in the design conceptualization process?

44:27
well, definitely, in that first project, there was many iterations of it. And the first time we showed it, it
was just at a graduate conference. We didn't have trackers for the the feet and the waist. So we
were procedurally generating the feet so they would kind of just as your head in your hands moved
through the space, it was inferring where your feet should move. And so it was kind of giving you this
like funny shuffling walk, regardless of what you were doing with your feet. And so that was definitely
Something where people are like, Oh, that's kind of weird, you know, like, this person looks very
strange, you know, shuffling around when they didn't actually do that. So I'm definitely getting,
making the access to tracking more points in the body became a priority. I do think and then again,
when we exhibited with the trackers, you know, as soon as you have these physical trackers you're
wearing on the body, you become your projects that are at the mercy of the physical world, right. So
if the tracker falls off, for example, or you know, runs out of battery, all of a sudden, like, it doesn't
know where your foot is, and then thinks your foot is, you know, somewhere else, or like your foots
floating over your head or whatever, whatever weird thing that happens with the actual physical
tracker,

45:57
it becomes another point of pressure or pressure point where the experience can really fail quite,
quite spectacularly. Yeah, so that's why my interest in this in this new work is to consider using
external sensors to track bodies where you don't even need you, all you need is the headset, you
won't need anything your hands is literally put on the headset go. Because then that's the other thing
about, you know, I mentioned onboarding, you're literally putting things on people's bodies. So
designing that portion of, you know, how do you make a belt that can fit different types of bodies?
How do you campaign that goes around someone’s ankle? That can go around, you know, different clothing or whatever. So how do you and then the other thing is, as soon as you represent bodies within VR, there's a whole host of other questions that come into play. One of the major disappointments I had I think, in my first project, was I thought the representation of the body was it read as masculine? It was this like, sort of robot II crash test, dummy, humanoid figure, but a very read very much as masculine. And so that made me think a lot about, you know, well, should we give agency to the user to choose their representation, but then as soon as you do that, it, it opens up a whole host of technical problems of how do you allow that to happen? How do you enable people to do that, without creating a sort of barrier into entry into the actual work itself, right.

47:43
So you know, I did a project that was more just a screen based project. But I started to explore sort of more abstracted versions of a humanoid body, which is just geometric shapes, something that read less as male or female, but more just as a abstract representation of a body itself. What else was there, there's a lot there. I mean, I feel like, you know, and that's the other thing, onboarding, right, bringing people into the experience, you know, you as soon as you have that you create, especially in a festival or gallery setup, you know, you don't want to have long lineups of people, you know, that guy just will get tired of like, waiting to do something as if it's some sort of amusement park ride, you know, generally don't have that with, you know, other art forms, like a painting or even an installation or sculpture, whatever, you know, you walk around and see it and experience it.

48:46
So yeah, so those are all sort of challenges and decisions that we had to be well aware of. And then lastly, and I mentioned this before, the onboarding process for our projects, not so I mean, it's, it was kind of playful and fine, open ended. But I do think that some VR projects that are more sort of one want to see this emotionally weighty, the offboarding project in the process becomes really important in terms of, you know, when someone takes the headset off, you know, it could be very jarring to go from, you know, a virtual experience and then be ripped back into the physical world. So I think that there needs to be a lot of consideration to what happens when the headset comes off.

49:37
I was just having a really interesting conversation with some colleagues of mine in the Ph. D. program about offboarding. And how, maybe, you know, we often think of VR experiences as the solitary experiences and maybe offboarding can be, if we put more thought into how we do it can become the area in which we Share our VR experience, sort of like, when you go to the opera or go to the play or go to a movie, it's the hanging out in the lobby after we talk about the movie, you talk about the play, and you have, you have a drink, or coffee or whatever. And, and, and you say, you know, I loved it when this happened, or I remember this and, and, and, and, and, and, and, and maybe you know, VR experiences can learn a little bit about that social experience of in real life social experience of what happens after the experience, when you take the headset off, if you can purposely design or build that into your experience of like, having people who have gone through it, especially if you can do it. I mean, this is all sort of whether you are able to do it. But if you can have multiple singular single user experiences happening at once, but they all end at the same time. And then have all those people hang out together, or at least be in the same area together so that they can share their experiences if they want. Yeah, because I think that's, I mean, I think that's what art is about, right? Like, it's not necessarily about the thing, the object, right, it's about the experience, and then and
then sharing that experience with other people afterwards. I think that's really important. And it'd be nice if more VR experiences I think, consider that.

Yeah, absolutely. Absolutely. I completely agree. Are there any additional points about your experiences that you find important that we didn’t discuss in the conversation?

51:43
Um, yeah, no, I think that, you know, the thing about working in this area is that it's just so rapidly evolving, and it's happening so quickly that I think when we're designing for it, it can be really challenging to keep up with the changes in technology. But it's important to because not only are not only as a technology offering new affordances and sort of new avenues that can be explored by artists and designers to create experiences that are different. But also, you know, they open up a whole host of ethical questions as well. And I think that that's always something that is always I tried to keep in the back of my mind, I presented this work at a conference, it was about a year and a half ago or so two years ago. And I had a student come up to me afterwards and said, you know, have you thought about accessibility issue? You know, how does this work for someone who can't walk, for example? And?

53:10
And that's a question that I think I had, it would still work for people who can't walk. But the representation of how they appear within the space would be interesting. I don't know what it would appear like, actually, I. But I do think that it does need to be taken into consideration when designing those accessibility questions, I think are really important to consider when designing experiences, because I think we often design these experiences already with a sort of able bodied presumption that I think experiences that don't necessarily take that as the base to work from. Could be really interesting, could open up new areas of exploration, that wouldn't be possible if we didn't make those assumptions.

Yeah, absolutely. 100%. I remember, just from a research standpoint, there was a paper presented at a conference. This was years ago at a simulation conference, and it was when Second Life was kind of a huge arena. Not long after it first came online. But there was a discussion of avatars actually have people creating avatars within the world. And the study began about how people in wheelchairs generally are people who are paraplegic, and generally did not select a paraplegic or a wheelchair to avatar, you know, they consider the game as as or the environment is giving them a separate set of agency as an avatar. So the researcher actually put avatars in wheelchairs within Second Life to study how the other avatars interacted with those differently abled people, because I think it was so jarring to see a selection of an avatar as being differently bodied, or differently embodied.

55:23
I'll have to send that to you, if I can find out please do is quite fascinating. And I kind of wondered if you know if it has been translated like those kinds of experiments have been translated into a VR environment for considerations of embodiment and avatars. But it's not necessarily just a matter of accessibility, but also, as you were saying, you know, the social factor of, you know, multiple people within the same space and how they kind of commune
primarily in a bodily way. So that's just kind of an aside, but I think it's something that Yeah, exactly, as you said, you know, it's a big question to return to.

Yeah. And, you know, I think for me, I like I said, I'm interested in the way that bodies how we gain or learn through our bodies. And I think that we have a lot to learn from people who have, who are differently embodied, you know, that their experiences of the world or our, our opportunities to learn, right, and only if we experience or create experiences that enable us to access that, I think is, can we make that happen? I think if we keep building experiences for us sort of normative body type, I think we're, you know, we run the danger of just closing off those channels, which would be really unfortunate.

57:03
Absolutely, yeah. Well, that kind of concludes the interview today and all of my questions. Again, you know, feel free at any time to follow up with any additional thoughts, I call them shower thoughts, you know, 2am thoughts, you know, just kind of wish you had a notepad. But you can feel free to email them to me at any time. If you think about, you know, any additional items from these questions, you can get in touch with me also, if you have any questions or concerns about the research study, But I definitely appreciate your time today. And thank you, again, for taking part in the research study. I think it's gonna be it's gonna be incredibly enlightening.

58:06

and

I really appreciate it. Okay, okay, great.
APPENDIX J

INTERVIEW MEMO NOTES – SAMPLE

Research Instrument Part II: Interview Questions

1. How would you define or describe multisensory VR? makes distinction of XR: number of senses engaged as combo: the ability to interact as close as is possible to match real world interactions - perception involves a ***“memory”*** of presence for the user based on levels

2. Can you describe your experiences designing multisensory VR environments? consideration of limitations of participants as a human and the physical area (1st consideration) **“addressing limitations”** much more consideration of space — friction point between reality as mapped to VR environment: mention of natural interaction **“intention of interaction”** as addressed by limitations - natural/unnatural experience of it. leap of faith; fidelity reality of scene; **“transitional spaces”** matching closely to reality

3. What technologies do you most frequently employ when composing a multisensory VR environment? (you can use a specific project example if you’d like): bare minimum - a way to track position in space and vision point; position of body (6 degrees of freedom tracking) - HMD works best with headphones to simulate spatial sound; calibration- tech integration as crucial: passive Ncomics (all tech has limitations - is the experience compatible with limitations?); smell and visual smoke trigger together: feedback at right moment - perception and behavior to match: motion bases devices - pilot training- information retrieval with certain senses: software for **aesthetic**, sound, visuals - unity 3d. Unreal engine - characteristics of sounds (echoes, muffled, doppler effect): directX, - skills of low level access to build 12 yrs ago - high level now so people that are creative can utilize w/ou low level knowledge; interfaces and user interaction allows for more now - moving more toward artistic/ CREATIVE PROCESS relates directly to more engaging tools

4. In your experience, what methods or tactics do you find most beneficial to include to create a sense of immersion in a VR environment, sensory or otherwise? ability for users to Participate rather than be a spectator;

levels of participation; comes with expectation of sensation; what is appropriate for experience - what is the PURPOSE? technology is last aspect to work with limitations to achieve purpose! **what is important** method of participation? directing attention; difference between functional and engaging - takes an artist to be more involved DESIGN THINKING (more involved with concept and experience!)

5. Are there any particular design decisions about sensory or aesthetic aspects that you find you primarily factor into the construction, testing, and user experience (UX) of multisensory VR compositions?

How do you digitally and physically construct the environment to make suggestions for use or to enable the user?

how genres impact decisions; *experience acting*? balance with use of other people - iterative testing based on interactivity feedback: a priori knowledge as a consideration (low learning curve to adopt in testing) adapting your behavior to fit technology - not other way around - allows for better solutions.
APPENDIX K

WORD CLOUDS FROM INTERVIEW TRANSCRIPTS
APPENDIX L

CATEGORIES OF QUOTES FROM TRANSCRIPTS - SAMPLES

**Subjective**

- Multisensory VR & Subject Formation
  - Aesthetic Expectations & Agency

<table>
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<th>And I have enough experience in VR that if I was feeling that I felt like people who if it was their first time, it would be too much. So really, what we were focused on was going into the space working specifically to create one and inspirational moment. Also, the user experience was really important to us. So in this one piece, the user had the ability to travel around to different locations along this 360 meter sculpture. And they can also that one of the things they could control that, aside from moving around and having different vantage points, they could interact with in these different locations. And they could also control a virtual scene or scene of objects that was moving around through a predetermined rhythm. And so there was a cycle of a swan, and you could speed up or slow down the way these things are moving around you. (Participant 1; pg 4)</th>
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<td>Absolutely, um, um, we there was suggestions, whether they were implied or direct, at many points along the way, whether there was signage. Letting people know how to interact with something, using rope and chips, so as to direct the flow of how people are going to experience the physical space, setting up a projection of the virtual scene that people were inhabiting with the headset behind them, so that other people in the space could see what they were seeing, you know, strategically putting, you know, vouches, in certain locations, so you could have the right angle on things. (Participant 1; pg 7)</td>
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<td>So if you’ve encountered your limitations, then you need to figure out how you can add to the direction where the work will be done, thus for that action to secure? And how can you add to the virtual environment in a way that it does not create does not feel intrusive, in the sense that this is where a person would do right to it to perform that activity. So to some extent, you know, sometimes in some environments, you want the user to have this ability to grab things and pull them closer together. Right? So that option of grabbing and pulling closer to you is a very natural way of interaction. Right? And, or if you’re going to do some sort of walking, you know, there’s some implementations you can do for somebody to have that kind of experience if it’s important for them to experience that as they go through the environment. (Participant 2; pg 2)</td>
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<td>So that multi sensor stimuli, you know, your brain is able to bridge that gap. And so your behavior matches that off the multi sensor environment in that environment. And that was for the specific project. But in other projects, it’s not such an important thing. Right? Depending on what you’re trying to do with that multi sensor experience, if I want to feel how having no gravity affects your motion, then it’s, you have to have smells there. Right? No, or even sounds. But yeah, you have to have some sort of war for you, to, to propel yourself about how and going to do that other types of environments that you can use. (Participant 2; pg 5)</td>
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<td>Once you start thinking with some of these considerations, and what may be considered limitations, it kind of opens your creativity, it’s kind of hard to kind of go past last in one direction, this is actually common in sensory design thinking. (Participant 3; pg 13 - after increases sensory agency)</td>
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What technology technologies do you most frequently use when you’re composing multi-sensory VR environments, you mentioned earlier about the three degrees of freedom versus six degrees, as far as the room space and scale and the sense makers and vibration packs, and certain aspects of the tech, you know, that come into play when you’re really considering the artistic composition of the piece? Can you say a little more about those, those particular technologies?

Um, so far, I’m not sure what projects I’ve particularly done, I’ve predominantly just stuck with the headset and the controllers and always use six degrees of freedom. I have degrees of freedom is not that interesting to me. I like that the six degrees of freedom I like the sense of agency that you can get and the embodiment that you can get, and people get less, can get less nauseous in six degrees of freedom than they can and three degrees of freedom. (Participant 3; pg 5)

**Epistemological**

- Knowledge-making
  - Hierarchies & Privileging of Knowledge

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<th>I would say in immersive environment, stimulating experiences, multi sensory experiences, or a simulacrum of the multi sensory experience that you would have in everyday life. (Participant 1; pg 2)</th>
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<td>I mean, the most salient part of it for me, as I’ve stated, again, and again, is this collaborative effort. And as someone who’s dedicated a lot of time to working in a craft, I think, so much of the artistic endeavors nowadays, in our very specialized culture, I think, it’s very important for people who are creative not to be held back by a lack of technical knowledge. And I think it does a disservice to the potential of creative endeavors that can be executed in VR. If you have to first acquire all of this engineering and technical know-how in order to be expressive. And I don’t know exactly how you resolve that. But I think it should be a collaborative effort, for sure. And I just, I hope there are others I wouldn’t say oddities, but more material based artists— who have the opportunity to work with engineers in order to implement and execute ideas, given the opportunity, I would do it again, in a heartbeat. (Participant 1; pg 11)</td>
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<td>You may pretend you’re putting yourself in the shoes of a beginner, but you have a lot of bias knowledge that a beginner would not have. And you make this assumption that these are unassumptions just because the fact that you’ve been there for so long. So because we are the novices never been in that situation, it’s important to go over the process with them, you know, this is what I want them to learn in this environment. (Participant 2; pg 10)</td>
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<td>And it became, it becomes a very playful experience. I think that people really, really liked to kind of explore and see what they could do with it. And yeah, we had one, one kid who did it. It’s always seems like the kids that really throw themselves into these experiences. We had a kid who was, I think, eight or nine. I think, who did it, he was at the festival with his mom. And then he did it. And then he loved it. And so he came back at least four or five times. And he was making it was funny, because he made all these narratives, you turn it into a narrative experience by saying, okay, you know, he would act out a little scene of like, you know, people huddled around, and then this person, and then he would act out another scene over here, and he’s like, Okay, this person is this song. And this person, he would play each role, right? Knowing that they, you know, it would be repeated in time. And it was fascinating to see how, you know, be was creating a story world, essentially through pantomime using the mechanics, right. So I think, again, those are the experiences I’m really interested in creating where it’s not necessarily about, it’s not necessarily goal oriented. It’s more of like I said earlier, like a sandbox, sort of open experience where people can kind of make what they want out of it, and kind of just have the experience of being in having sort of three sort of utilitarian, or goal oriented task. Yeah, I think that’s definitely a, you know, a few artistic expression, manner of handling the user, just to see what kind of happens. (Participant 5; pg 11)</td>
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Epistemological

- Extended Cognition
  - Distribution of knowledge through design

And in the virtual space, if you could have paused it, and then zoomed in and looked at this object and seeing all of the detail and three-dimensionality and complexity of the thing that you were standing on, you could have had this like, micro macro moment. But I think due to not being just computing power, but also time constraints and rendering capabilities, we couldn't really get things to that level of detail. That's always been something for me, as an artist that I found amazing is, the deeper you look, the deeper you observe, the more there is for you to observe. And I think the virtual space is it begs for us to simulate these sorts of things. (Participant 1; pg 10)

So after you, you kind of create all this series of knowledge that they need to, or you know, whatever the outcome of the experience needs to be - the experience of trying or or looking at somebody going through it, all the different questions and things that from an inexperienced user come up and how to press this, then and only then, then you start thinking about, okay, now I'm going to start to create a model this and the pyramid model of that, (Participant 2; pg 10)

So in some projects that I've worked on, we wanted to simulate being inside this, this house unit, from an ancient civilization, with a lot of the knowledge of how what type of society was, you know, how they managed their, their daily, you know, lives and things like that. And we had to add to those, in order for you to get a complete picture of the experience being in that type of environment, we had to add, not just the passive habits, but smells as well. Because this was where they this space didn't have any ventilation, there was no windows, they had an area where they would burn wood. So you know, it would produce a lot of smoke, that would not easily dissipate. (Participant 2; pg 4-5)

So yeah, it's it, it's easier to edit. You know, Wow, was you have this, this idea? And you first you don't start programming, you start. Okay, let's see what's wrong am I doing that? What is the user going to take from this? And what is important for them to perform or to do? What is the most important method of participation for that in this VR experience? And then from that, then I can start looking at, okay, so if I want them to move things around, yes, it's a game of if I don't know. I need to understand how to connect multiple components. So then I need to give an ability for you to grab and move things around. And then I look at the technologies available. Okay, so how can I integrate this technology to give them that ability to move things from here to there? How do I direct their attention? How do I do all of this, but those are now you're coming down from the main, you know, undefined, but you have a concept. And you start making it into something concrete. (Participant 2; pg 7-8)

It's a very, they bring you on a very lovely experience but you empathize with being a tree and that experience and then you also hear sounds of the forest and They have, as you become it like, the tree, they're introducing new sounds. And around the end of the experience, they introduce a chainsaw in the background and the smell of fire. And well, and you can look down and see animals running, and such. And, yeah, so you definitely end up having a feeling as empathy for being a tree, which is something you can't, can't really really impart for human experiences, except for maybe through a virtual experience like that. It's the closest we will have to like, literally kind of experiencing maybe what a human would experience as a tree. (Participant 3; pg 6)

Because they're overemphasized, they're taking in the sights and sounds of the virtual world. Things seem to be more, you know, people who don't tend to be cutest and real in the real world, because they're just so like, oh, it's just everyday, I'm just doing this I'm not, you know, they're not feeling curiosities. But when you as soon as you put them in a virtual world, and it's a totally different environment than they were just in, I think it triggers curiosity in their brains. And so they start not paying attention to prompts and just taking in the verge what's going on in the virtual world. And I think maybe, I'm actually uncovering a little bit of what maybe was going on for them, like I hadn't really unpacked it as deeply. Until right now. (Participant 3; pg 13)

Archival

- Reception & Framing
  - Engaging Senses with Narratives

And during the experience, they were using a scent creator. And the whole premise of it is that you are the seed that you just planted, you start under ground. So you can smell soil, you're smelling soil, and you're looking around in the VR and you're seeing that there's like big worms in the ground next to you. And then you feel a vibration under your feet and in your chest. And you start to lift off the ground. You can look at your arms and your arms are actually spread out leaves that are having and then you're watching yourself grow and you're getting farther off the ground. But when you look down, you see that you are rooted in the ground and you're becoming a tree and it's a very, you know, you know, but not so you that you feel nauseous. (Participant 2; pg 5-6)

true, yes, there's something along the lines of like an inventory or a toolbox. Something along those lines, you find that the the user finds it useful, but at the same time, kind of it breaks the immersion a little bit.

Yeah, exactly. And some experiences managed pretty well, because they go a bit more towards immersion. So you actually have the objects, very well shaped, and you have a paintbrush. It's not like a paintbrush from that environment, but sometimes just have like a button with something written on it. And that's not going to be (Participant 4; pg 6)

I see. That makes sense. Yeah, that's an interesting point. I hadn't considered that before. It's definitely something that's not in the real world, but it does make suggestions for the user of how they're going to use the device.

That's fascinating. So it comes kind of almost a memory archive, like three, three degrees removed. Yes. I think from what you're saying is, you know, you're, you're, you're seeing yourself in the VR form inside of VR, while you're in a physical space. So yeah, so it's three steps removed basically have **(above interaction)**

Yeah. Well, it's still a deeper sense of engagement. Yeah, well, because you know that the, these reflections of yourself, they will first at first they don't appear like you at all, because they're far enough in the past but our sort of short term memory that we don't normally engage them as us, right? Even though they look like us, they don't. It's like, we can't remember the exact actions. You know, you, I once heard people going through experiences like is that me? You know, and you, yes, you. But then, you know, when you're watching these sorts of repetitions of yourself, you come to the awareness of anything I do now, in this moment will happen in those repetitions of myself, eventually, you know, 16 seconds later, 30 seconds later, however long the delay is. So then you can do really, and this is where it becomes playful, right? (Participant 5; pg 10)

It's fascinating to consider, you know, that some people, you know, may feel kind of a liberation to explore more, you know, inside of a, I don't know if that's an environment they feel they can control, but you know, they feel they're in a separate space, you know, so why not? Maybe, you know, why not explore why not at all the things that you know, well, and also, yeah. Well, and also like, it looks so different, of at least the experience that I had was created looks so different. In the real world, in the sense of it was more concrete. Because it wasn't a hyper real. And actually, even with the attempts of creating hyper real VR, there's the uncanny valley thing that's still happening. And so it's just naturally your brain I think, gets triggered into a curiosity space of like, this is a world that does not look like the world I live in daily, and therefore, you're looking around a lot more and like a little sad, like, there's like, wow, like, there's a lot to take it in. And my brain is trying to, like, make sense of this newworld so. Not really real, but sort of real world that I'm in. Exactly, yeah. (Participant 5; pg 14)

...That is very interesting, especially in terms of like, tapping into a memory of sorts, you know, even it's just a memory within the narrative itself. Yeah, and create trying to create some kind of slight continuity between the real world and the virtual world. So that there's more you can actually experience more belief when you make it into the magical world because there's a sort of something continuity, oh, this reminds me of something else that I noticed and I think it is in the report somewhere. But when I, I was doing the social VR report, I started I'm gonna do a lot of stream of consciousness stuff. (Participant 3; pg 6)
VITA

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Biography
D’An Knowles Ball is a professional researcher and designer and an instructor at Old Dominion University. She conducts research at the intersections of user experience, digital design and strategic communication, while teaching undergraduate courses in art theory and criticism, digital design and literacy, as well as art appreciation and rhetorical criticism.

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