Asymmetric VR Installation and Repertoire: Time and Space in Collaborative Interaction

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Abstract

In contrast to most of the asymmetric media research in HCI that centers on the efficiency of collaboration, this paper explores the utilization of asymmetric Virtual Reality (VR) installations in storytelling to capture the fragmented time and space inherent in archival materials. I will use my VR project "East Beijing Road" as a case study to discuss how the asymmetric mechanism aligns with the concept of repertoire and enhances storytelling by merging disparate time and space through audiences' collaborative interactions.

Keywords

Asymmetric VR, Repertoire, Archive, Interactive Storytelling

Introduction

The stability of the archive has been questioned by many theorists. The archive is fragmented and ephemeral, changing through time, as argued by scholars like Michel Foucault, Jacques Derrida, and Hal Foster. Instead of crystalizing the past, the notion of repertoire, a concept emphasizing the experience of the past coined by Diane Taylor, advocates for a performative approach to engage with the archive. This essence of performativity is captured in interactive artworks dealing with archival materials, underscoring the meaning and significance of actions taken by the audience. Using two earlier multimedia works, "Immemory" and "Tracing the Decay of Fiction," I will explain how interactive storytelling can function as a repertoire. Going beyond these earlier works, asymmetric VR offers a unique way to capture the concept of repertoire through collaborative interaction. By using my VR installation "East Beijing Road" as an example, I will argue that asymmetric VR is a metaphor for the embedded fragmentation of the archive in time and space, and collaborative interaction becomes an embodied experience of a living archive. Asymmetric VR expands the practice of utilizing the archive in interactive storytelling by activating audiences' agencies in collective engagement and formulating a co-existence of disparate times and spaces.

Interactivity and Repertoire

Theoretical Framework

In playable media, archival material is not static; yet it constitutes a flow of information assembled by the audience's interaction. The traditional notion of complete storage, stable preservation, and perfect ordering of archives face challenges due to the nature of interactivity. This fragmented characteristic aligns with postmodern archival theories. Foucault perceives the archive as a form of knowledge, power, and subjectivity, disrupting the conventional continuity of the archive: archive is "a set of discourses … that continues to function, to be transformed through history and to provide possibilities of appearing in other discourses." [1] The conception of "Anarchive," drawing from Jacques Derrida's *Archive Fever,* serves as a deconstructive force that scrutinizes the hegemonic discourse and stability of the archive as a record and documentation. [2] Hal Foster's "An Archive Impulse" explores how contemporary artists engage with the archive, emphasizing the archive's capacity "to connect what cannot be connected" and challenging the representational totality of the archive. [3] The archive theories from Foucault, Derrida, and Foster highlight the fragmented nature of recording the past, prompting questions about what, how, and why certain aspects of the past are remembered. Forgetting, rather than being viewed solely as an act of repression, is potentially contributing to the generation of new modalities. [4] Paula Amad introduces the concept of "counter-archive" to describe materials that exist to be forgotten due to their non-essential nature and devoid of utilitarian or evidentiary purposes. [5] The postmodern perspective invites a reconsideration of the archive as a dynamic and evolving form. Terry Cook advocates a paradigm shift in archive science, encouraging a transition from perceiving the archive as a static object to recognizing them as processes contributing to collective human and organizational memory. [6] Wolfgang Ernst considers the archive as an entropy, representing a form of order rather than a fixed state. [7] This process-oriented approach highlights the motion, particularly in the digital epoch, where archival materials are ephemeral and constantly changing.

Creating interactive works involving archival materials through playable media goes beyond preservation; it constitutes a form of reenactment that forms a physical and psychological experience of the past. [8] Pierre Nora distinguishes between the archive and reenactment: an archive is a lieu de mémoire that crystallizes a particular historical moment, while reenactment is milieux de mémoire which is a living environment of memory producing the social sense of

historical continuity. [9] Engaging with archival materials in interactive media unveils the performative nature of the archive itself. Interactivity transforms the archival experience from a passive encounter with a singular narrative of the past into an active engagement. Through reenactment, a singular archive takes on a form of openness and multiplicity, shaped by the personal experiences of those interacting with it.

Therefore, the re-enacted past in an interactive work function as a repertoire. Diane Taylor introduces the concept of repertoire, mainly referring to embodied memory encompassing "performances, gestures, orality, movement, dance, singing – in short, all those acts usually thought of as ephemeral, nonreproducible knowledge." [10] This stands in contrast to "archival" memory, which mainly pertains to written text in the Western context. The distinction between archive and repertoire resonates with Wendy Chun's elucidation of the disparity between storage and memory. Chun argues for the enduring ephemerality of digital media, implying that while digital media is ephemeral due to constant degeneration, it is enduring through the process of refreshing and regeneration that is accompanied by the degeneration. [11] The repertoire shares the characteristic of memory in digital media that is time-based being transformed through the interactive process.

Interactive Artworks as Repertoire

In the multimedia work "Immemory" (1997) by French filmmaker Chris Marker, the audience interacts with the fragmented texts and moving/still images, exploring seven interconnected zones: cinema, photography, war, poetry, memory, travel, and the museum. Marker's chosen fetish animal, the cat Guillaume, suggests detours from the main pathways in each level. "Immemory" presents fragmented memories, allowing the audience to travel through different time zones akin to a time machine. This work is a continuation of Marker's lifelong dedication to questioning the stability of the past: "I will have spent my whole life questioning the function of memory, which is not the opposite of forgetting, but rather its underside." [12] A similar interactive work to unfold the memory and archive is "Tracing the Decay of Fiction: Encounters with a Film," created through the collaboration of Pat O'Neill and the Labyrinth Project. In this piece, the audience explores the abandoned traces of the Hotel Ambassador, a vintage building erected in 1920 in LA, renowned for the glamorous Cocoanut Grove nightclub and the 1968 assassination of Democratic Presidential Candidate Robert Kennedy. It forms a synthetic space that blurs the lines between past and present, history and fiction.

These two interactive works serve as examples of repertoire, where nonlinear narratives across different times and spaces are unfolded through the audience's actions. They go beyond presenting individual texts or images, seeking the meaning of connections among them, woven together through audience interaction. Interactivity, viewed as a performance, generates new meanings from archival materials. The process of interaction is a repertoire that transforms static textual and image information into an individual embodied experience.

Asymmetric Media

Asymmetric media design differs from symmetric media design, which aims to establish balanced power and transparent communication among participants. For instance, the symmetric media model named "WYSIWIS," meaning what you see is what I see, establishes a framework of collaborative tools, enabling synchronous content and media use. [13] Differently, the asymmetric media involves unequal engagement with the media, lacking mutual reciprocity in communication. Asymmetry in digital media is defined as "the capacity of individuals in a group to have different means to visualize and interact with virtual content." [14] Everyday technologies such as Zoom, showcase various levels of asymmetry, where hosts and participants have different powers, like screen sharing, muting participants, or participating in the chat. Many multiplayer games have a certain level of asymmetry with different player embodiments, roles, and skills. [15] Asymmetric media disrupts reciprocity in participant presence levels, which makes designers embrace symmetric media design to enhance reciprocity and provide a balanced power for effective communication. [16]

Nevertheless, asymmetry design has the potential to create engagement, connection, and immersion with careful design. In Harris and Hancock's study on asymmetric game design, they use their game as an example to explore utilizing gaming mechanics to increase players' perceptions of connectedness, social engagement, immersion, and comfort of game control. [17] Asymmetric media also has the potential for collaborative learning, akin to symmetric media. [18]

Asymmetry VR is the "co-located users access the same virtual environment using different kinds of technology." [19] Ouverson and Gilbert proposed the asymmetric VR framework, the Composite Framework of Co-located Asymmetric VR (CAVR). This framework includes five dimensions of asymmetry: spatial co-presence, transportation, information richness, team interdependence, and balance of power. Spatial co-presence implies the users feel a shared presence in the mixed-reality environment despite using different inputs to navigate the collective space. Transportation focuses on the actual interaction within the mixed-reality environment through various interfaces. The VR headset has higher transportation compared to AR devices with lower transportation. Team interdependence measures the alignment of goals among group members. The balance of power is defined as the "degrees of access and control of information in the asymmetric space." Finally, information richness describes the "extent to which the technology delivers and captures information about the mixed-reality space which is valuable to the interaction for each member of the group." [20]

Repertoire in Asymmetric Media Design: East Beijing Road VR

"East Beijing Road" is an asymmetric VR installation that reimagines the stories of a building with a history spanning over 100 years on East Beijing Road, adjacent to the Bund—a waterfront area and a protected historical district in Shanghai, China. All residents in this building were compelled to move out due to an ongoing gentrification policy. I reconstruct a synthetic space based on 3D photogrammetry models captured in this building. The audience, both inside and outside VR, must use distinct interfaces, assume various roles, and experience different visual presentations to collaboratively achieve individual goals and unfold the stories of this building. Old and new, digital and analog, real and fictional, and virtual and physical elements interweave. I will use this asymmetric VR design as a case study to elaborate how the asymmetric media design can serve as a metaphor for fragmented time and space inherent in the archival practice, and how collaborative interaction in this mechanism can blend different times and spaces together as a repertoire.
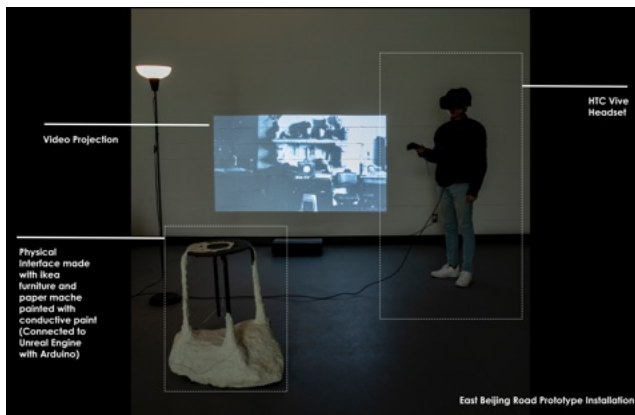

Figure 1. Prototype Installation Set-up

Technical Description of the Work

In late 2021 and early 2022, I collected data before and after the residents moved out, including interviews with a long-time resident, utilization of photogrammetry technology for constructing 3D models, and capturing digital photographs. Combining these data, I used the Unreal Game Engine to create a virtual environment to reimagine this architecture. This VR installation aims to reactivate the narratives of a vanishing building through audience interactions both inside and outside of VR. This installation includes three components: a VR headset, a physical interface, and a video projection. Inside VR, the audience uses controllers to interact with "debris" scattered in the virtual environment. Outside VR, the audiences interact with the virtual environment by touching an Ikea chair coated with paper mache and conductive paint. I used Arduino Uno to get the touch and proximity sensing data from conductive

paint and use this data as input for triggering events in Unreal Game Engine. Audiences outside VR can also view a virtual environment through video projection, offering a different visual presentation than inside VR. Collaboration between audiences inside and outside VR is essential to unravel the fictional and non-fictional narratives in the virtual environment. This setup establishes an asymmetric relationship between the audience inside and outside VR, with three layers of asymmetry in the project's design: characters, visual presentations, and interfaces.

Different Characters

The audience inside the VR, wearing the VR headset, plays the role of a person walking by this building, inadvertently embarking on an explorative journey. The audiences outside VR take on the roles of the "ghosts" who once resided in this building. Two distinct characters from different time periods meet in this building, symbolizing the present and past respectively. This concept is inspired by the film Rouge (1987), directed by Stanley Kwan, where the ghost of a courtesan seeks her lost lover, spanning a 50-year period and culminating in the modern cityscape of Hong Kong, representing the displacement of the old world. In this VR installation, audiences inside and outside VR need to help each other because the audience inside VR seeks assistance from the "ghosts" outside VR to find the traces of leaving this virtual building, and the "ghosts" require the audience inside VR to find their lovers for a last dance before the building completely disappears. Audiences inside and outside VR with different roles are motivated to achieve individual goals by collaboration.
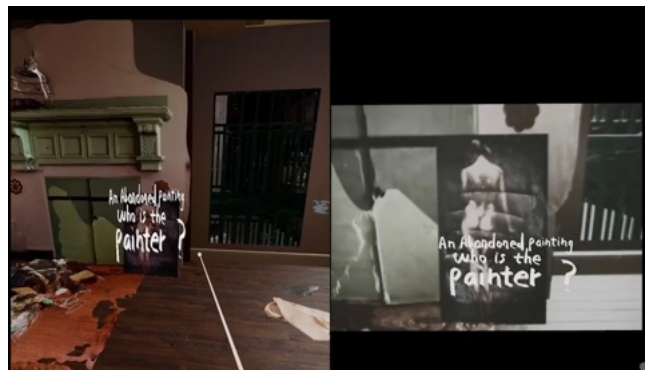

Figure 2. The left image is the view inside VR and the right image is the view of the video projection outside VR

Different Visual Presentations

Because of the different roles embodied by audiences inside and outside VR, they see different visual presentations: the audience inside VR sees a rendered 3D space in color, while those outside VR observe black-and-white, hand-processed 16mm Bolex footage. The Bolex footage captures the rendered 3D environments and transforms them into a different representation in monotone with traces of hand-processing in a dark room. The perceptions of the environment by

audiences inside and outside VR take different forms: 2D versus 3D, and color versus black-and-white. Audiences inside and outside VR encounter this reconstructed building in two different forms, symbolizing two distinct times. These two presentations create a sense of discontinuity and continuity simultaneously: the reconstructed synthetic space is perceived in two different manifestations inside and outside VR, merging through collaborative interaction.

Different Interfaces

Audiences inside and outside VR interact with different physical interfaces. Inside VR, the audience uses controllers to trigger "debris," unfolding narratives with the assistance of those outside VR, who touch the chair to make the "debris" appear in the virtual environment. The collaboration between audiences inside and outside VR utilizing different interfaces, enables them to achieve individual goals. For example, when the debris is activated, the audience in VR can trigger the music "In the Faraway Place," from the Chinese film Spring in a Small Town released in 1948. This music becomes a metaphor for the main character's desire for love and hopes for the future during a time when the country awaits restoration. In the scene of an elderly home, the audience can trigger the "debris" to hear the stories of this long-time resident's story. This asymmetric VR installation introduces two different forms of touch: physical touch and virtual touch. The "ghost" audiences can use physical touch to activate the debris scattered around the virtual environment, while the audience in VR can employ "virtual touch" with controllers to trigger the stories.

Discussion

The three-layer asymmetry provides an experience characterized by unstable, unbalanced, and incomplete information among audiences inside and outside VR. The imbalances and incompleteness in media design are a metaphor for the fragmented time and space inherent in the archival practice of unveiling the past in the digital epoch. No complete information is visible without collaboration between the audiences inside and outside VR, which implies the partiality of the archive. It is an embodied experience that the past can only be revealed through collaborative interaction. The story of the building on East Beijing Road becomes a repertoire because of the collaborative engagements of the audiences. This project is an embodied experience of uncovering the past. Touching the chair and triggering debris in the virtual environments go beyond the function of serving as inputs, these actions are integral to the storytelling and the experience of "touching" the archive. Following the CAVR framework, audiences inside VR and outside VR are co-present in this building with different roles, interactive interfaces, and visual presentations. This asymmetric design encourages audiences to collaborate collectively to achieve individual goals; meanwhile, it serves to blend different times and spaces in performing the archive.

Conclusion

Asymmetric VR provides a unique mechanism to capture the dynamism and performativity of the archive. Compared to symmetric media design, the power dynamics in asymmetric media facilitate collaborative engagement, offering an opportunity in interactive storytelling to connect distinctive elements, such as disparate time and space. In "East Beijing Road," asymmetric design reflects the theme that the displacement of ongoing gentrification in the metropolitan city makes the city into an urban palimpsest, layered with heterogeneous times and spaces. This mechanism also has potential in the interactive storytelling of other contexts portraying the old versus new, visible versus invisible, past versus present, encompassing multiple locations, times, and protagonists. Asymmetric VR provides a collective embodied experience, unfolding the past as a repertoire, a performative and living archive enacted through collaborations and actions.

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