

# Sacred Places: Designing 360° Narrative VR Games for Hybrid Use in CAVE and Mobile HMD Setups

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Virtual Reality, Cultural Memory, Digital Storytelling, Heritage and Diaspora

## INTRODUCTION

Landmarks, natural sites, and human-made structures are rarely mere manifestations of nature or human creativity. More often, a place becomes the silent narrator of a love story, a religious ceremony, or a tragic accident— a place, in that sense, becomes a container of memory for an individual, a social group, or even an entire nation. Pierre Nora (1998) uses the term *lieu de mémoire* to describe how a landmark can function as a social memory anchor for collective experience.

Memory can also be understood as flow—a living, dynamic process containing opposing forces such as loss and gain, forgetting and remembrance. From this perspective, the present is interwoven with the past, which is no longer a distant structure to revisit, but a negotiation among images, narratives, and sounds across time. Jan Assmann's (1997) concept of *mnemohistory* frames this understanding, emphasizing the transformative nature of memory: what we experience becomes a node in time, connecting generations and evolving with each reinterpretation.

This is a well-known trope in literature, cinema, and games. In Virginia Woolf's work, the journey to the lighthouse becomes an attempt to reconcile with the past: for both Lily and James, it is a confrontation with complex family relationships and an effort to move beyond their confinements. Within this frame, the lighthouse functions as a symbolic *lieu de mémoire* for Lily and James, and from a narrative perspective, it serves as an emotional structuring device, a focal point around which different tensions are staged and negotiated. *What Remains of Edith Finch* (Giant Sparrow, 2017) provides a compelling example from video games. This first-person exploration

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game, set in an abandoned family house, follows the protagonist, Edith, as she pieces together her past by reconstructing the uncanny “ghost stories” she inherited about her relatives. The exploration unfolds like a rabbit hole: memory here is not linear, but entangled with fictional and real events, rooms, and objects, constantly reimagining what has happened and reshaping the family portrait each time Edith enters a new room. Edith’s journey shares common ground with mnemohistory, highlighting the transformative nature of memory and identity, as well as the spatial connections that bind the microstories of a “cursed” family in a time-agnostic manner (Bozdog and Galloway 2019).

*Sacred Places* is a 360° narrative VR game exploring Greek-Australian immigrant memory through landmarks and ethnographic storytelling practices. It is designed for hybrid use across two platforms: a CAVE (Cave Automatic Virtual Environment, a room-sized VR setup utilizing multiple large-scale displays) and mobile HMDs (Head-Mounted Displays, headsets that house a smartphone to serve as the display and processing unit). The story follows a third-generation immigrant visiting his family’s birthplace, Arcadia, for the first time. For the protagonist, Arcadia’s landmarks unfold as a kaleidoscope of family history; for visitors and players, they evoke a sense of familiarity rooted in a shared immigrant past.

## **RESEARCH QUESTIONS**

While VR heritage projects often focus on reconstruction and memory retention through distinctive environments (Essoe et al., 2022), or on the immersive preservation of tangible and intangible heritage (De Paolis et al., 2023), few explore hybrid CAVE/HMD setups as frameworks for memory activation in non-expert users. *Sacred Places* addresses this gap by exploring memory, cultural identity, and the physical environment through the experiences of a specific community whose bonds with the land remained central to their identity. With a more design- and research-oriented approach, the research questions that guided our design were:

RQ1: How can a virtual storytelling journey use landmarks, sounds, and images of nature to evoke emotional engagement, cultural memory, and a sense of place?

RQ2: How do different embodied experiences (CAVE and HMD) affect immersion, and engagement with spatial storytelling?

## **SACRED PLACES DESIGN**

The project employs 360° videos, interactive objects, oral traditions, audio stimuli, and landmarks as memory cues for a generation that left Greece in the mid-20th century, began anew in Australia, and, upon returning, often found themselves in a nuanced state of identity crisis. Members of this community frequently felt torn between two interconnected states: unable to fully fit into their homeland and unable to fully belong in Australia — half foreigners in both places (Γκιζέλης, 1994, 35). The challenge, then, was to design an experience that spatially reconstructs or repositions this identity, providing a virtual place of belonging.

Home and belonging, however, are semiotic constructions: memories of the past and of the country of origin become the essence of a materialized future — a mnemonic and cultural reference point to which one keeps returning (Märtsin 2023). *Sacred*

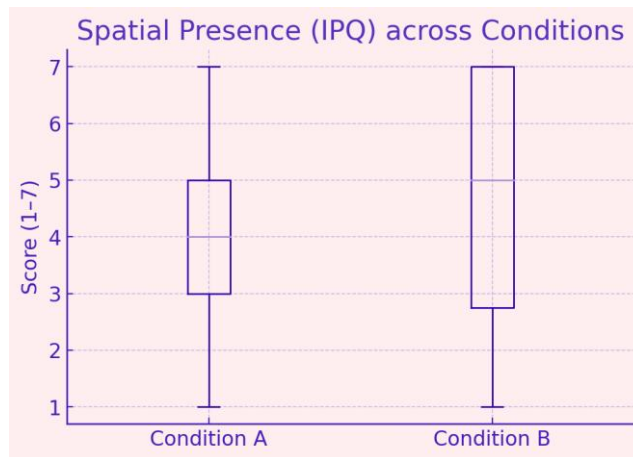
Places emphasizes this concept of an eternal return home as an intergenerational pattern among immigrants.

Our goal was not simply to retell a story through extended technologies, but to design a mnemohistoric “device” that participants could experience by engaging with traces of a shared past — long gone yet not forgotten — while inviting them to bring their own memories into the experience, thereby initiating a cultural dialogue. From a methodological perspective, the design includes:

- Ethnographic research and testimonies from Greek–Australian immigrants, including loanwords and 3D representations of personal objects.
- A VR first-person, non-linear storytelling experience designed as a mnemohistoric device, combining real events with fictional virtual characters and natural landscapes.
- High-resolution 360° videos captured from multiple points of view, allowing participants to navigate rich environments ranging from national geoparks to natural lakes in Arcadia, while tracing the memories of the protagonist.
- A textual narrative integrated into 360° videos, combined with interactive objects and playful interactions, such as virtual birdwatching.
- Motion-capture and full-body tracking design for the ModiCAVE system, allowing free bodily movement and translating gestures into virtual actions. (Theodoropoulos et al, 2024).

## **PRELIMINARY USER STUDY AND DISCUSSION**

In our preliminary study, we compared two systems — MobiCAVE and mobile HMD — focusing on presence and emotional valence. Short post-experience questionnaires combined the Self-Assessment Manikin (SAM) with a brief Presence Questionnaire (IPQ), while a reduced AttrakDiff form and open-ended questions captured differences in immersion, emotional engagement, and narrative clarity. Results indicate that while familiarization across sequential trials generally improved overall spatial presence and emotional arousal, participants reported the MobiCAVE as more immersive than the mobile HMD, particularly highlighting its spatial audio capabilities, which significantly enhanced users’ focus on the narrative. These findings provided valuable insights into human–technology interaction, accessibility, and emotional design.



**Figure 1:** Comparison of Spatial Presence (IPQ) across HMD (Condition A) and ModiCAVE (Condition B)

In the second phase, we will apply qualitative methods addressing memory and identity, enabling more creative forms of engagement with our primary audience: Greek-Australian immigrants from Arcadia. We also hope the project contributes to Digital Games Research Association discussions on embodied cultural games across diverse VR contexts.

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