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Reiterating the Spirit of Place: A Framework for Heritage Site in VR

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Abstract

This study proposes and tests a virtual reality (VR) framework aimed at reiterating the Spirit of Place (SiP) of heritage sites, conceived as a perceiver's perception of place formed through the dynamic interplay of tangible and intangible influences within a given location. The framework applies Gilles Deleuze's concepts of 'difference in itself' and 'repetition for itself' to create interpretive VR experiences that evoke SiP by integrating natural features, built structures, cultural memories, historical narratives, cultural narratives, and symbolic associations. Through a controlled experiment involving both video and VR interactions with heritage sites, participants reported elevated emotional connections and a deeper engagement with SiP in the VR environment. This confirms that VR can serve as an effective medium for heritage preservation, capturing the site's distinct identity and fostering embodied engagement shaped by users' memories and cultural familiarity. These findings validate the framework's potential to convey the unique identity of heritage sites, offering a transformative tool for virtual heritage applications.

Keywords: *Spirit of Place, Virtual Heritage, Heritage Site, Virtual Reality, Deleuze's Simulacra*

1. INTRODUCTION

1.1. Background and Purpose

According to UNESCO, cultural heritage includes artifacts, monuments, groups of buildings, and sites that serve as tangible connections to the past [1]. Heritage is not merely a collections of objects but embodies a form of present-day reverence and attachment [2], which is vital for understanding our current culture [3]. However, preserving these sites, especially those that are in ruins, significantly altered, or completely lost, presents substantial challenges. Traditional restoration methods inadequately reflect the historical complexity and cultural significance of these sites. The Spirit of Place (SiP), which encompasses both tangible and intangible elements, is essential for conveying the unique atmosphere and identity that define a site, and its preservation is instrumental in fostering a deeper Sense of Place (SeP); communities with strong SeP are more inclined to engage in preservation efforts [4]. However, it becomes increasingly difficult to foster public

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attachment or emotional connections to these places, especially when physical remains are absent or severely degraded.

To address these challenges, virtual reality (VR) presents a technological solution that facilitates novel representations of heritage sites [5]. While some argue that digital reproductions might distort the authenticity of heritage sites by creating simulacra that confuse users, VR has the potential to capture both the tangible and intangible aspects of a site, contributing to the preservation of its spirit [6]. VR offers a pathway to represent heritage in a way that acknowledges both the original spirit and the inherent differences introduced by digital reproduction, while still fostering emotional engagement and connection.

This study proposes a VR framework that enhances heritage preservation by fostering emotional connections with users while respecting site authenticity. Utilizing Gilles Deleuze's concepts of 'difference in itself' and 'repetition for itself' [7], the framework goes beyond static replication to dynamically evoke the SiP in VR. 'Difference in itself' introduces subtle variations, such as changes in lighting and spatial layout, offering users a unique experience with each interaction, creating a sense of discovery and continuity. In contrast, 'repetition for itself' maintains core features like iconic structures and cultural symbols across interactions, encouraging a sense of familiarity and attachment. By integrating these concepts, the VR experience becomes a living, evolving representation that mirrors the layered, multifaceted nature of physical heritage sites. This approach allows users to develop and deepen their connection to the heritage site over time, demonstrating VR's potential as a transformative medium that preserves and reinterprets the essence of a site beyond physical limitations [8].

1.2. Research Question and Hypothesis

Given the challenges of VR in conveying heritage site's SiP, this study asks:

Research Question 1 (RQ1): How do perceivable tangible elements in VR influence participants' perception of intangible elements within the SiP framework?

Hypothesis 1 (H1): VR experiences that incorporate 'difference in itself' through sensory immersion and spatial adjustments will enable participants to perceive tangible elements as enhancing and reinforcing the cultural and historical significance of intangible elements, creating a cohesive SiP.

Research Question 1 (RQ2): How can Deleuze's concept of 'repetition for itself' evoke the SiP in VR?

Hypothesis 2 (H2): Repetition of core elements in VR, with subtle variations that sustain familiarity, creates a dynamic experience, allowing users to reconnect emotionally with the SiP and encounter new dimensions of the heritage site's identity.

1.3. Academic Significance

This study introduces a new approach to heritage preservation using Gilles Deleuze's concepts of 'difference in itself' and 'repetition for itself' in VR. Through this approach, the study aims to reinterpret the SiP by moving beyond mere replication, applying these philosophical principles as practical tools in VR to actively evoke emotional responses and foster deeper connections with heritage sites.

'Difference in itself' in VR introduces subtle variations, like changes in lighting, texture, or sound, creating dynamic experiences that mirror the evolving nature of physical heritage sites. These variations allow users to form personal, meaningful connections with the site, offering fresh perspectives with each encounter. This approach encourages personal exploration, deepening the SiP experience. Meanwhile, 'repetition for itself'

maintains a stable foundation in VR by preserving core elements (iconic architecture, cultural symbols, or sensory details) across interactions, providing familiarity and continuity [9]. This repetition fosters a stable emotional connection, allowing users to form consistent responses that reinforce their sense of place in the VR environment. The continuity of repeated elements enables a deeper attachment to the site, similar to what they might feel toward the physical location.

This study establishes these philosophical concepts as foundational and measurable in VR [10]. The research proposes a framework for measuring emotional engagement and SiP in VR environments through both quantitative and qualitative tools, such as self-report questionnaires and interviews to assess user experiences. By testing these metrics, the study lays groundwork for validating Deleuze's concepts within VR, assessing how they contribute to user engagement with heritage sites. If validated, Deleuze's concepts could provide a strong basis for VR in heritage preservation. This method bridges abstract philosophy with empirical practice, positioning VR as a meaningful tool for preserving and enhancing the SiP, and thus broadening the field of heritage preservation into the digital domain.

2. PREVIOUS RESEARCH

2.1. Limitations of Traditional Heritage Preservation Methods

Traditional heritage preservation methods, including restoration, conservation, and educational outreach, focus primarily on safeguarding the physical attributes of heritage sites, such as structures and landscapes, through techniques like repairing damages or slowing deterioration by controlling environmental factors [11]. These efforts often extend to community engagement programs, particularly targeting youth, to foster responsibility for heritage conservation. However, these methods frequently fall short in capturing the intangible qualities that define a heritage site's SiP, such as memories, cultural identity, and emotional resonance [12]. While physical preservation ensures structural accuracy, it struggles to convey the deeper cultural and emotional significance that shapes visitors' personal and collective connections to a site [13]. According to UNESCO, heritage is not merely a collection of objects but encompasses broader emotional and cultural meanings essential to understanding present-day identity [14].

This study proposes a VR framework that balances physical accuracy with experiential depth. By adding layers of cultural and personal engagement (such as memories, past associations, and place-specific familiarity) this framework aims to create immersive experiences that integrate tangible and intangible aspects. This approach seeks to foster meaningful connections between users and heritage, capturing each site's essence beyond what traditional methods can achieve.

2.2. Virtual Heritage

Virtual heritage (VH) is the use of digital technology to preserve, recreate, or represent cultural heritage, aiming to communicate the historical, cultural, and aesthetic significance of artifacts, sites, and traditions to a global audience. The concept of VH has evolved significantly since the late 1990s, with early definitions focusing primarily on visualizing heritage through interactive 3D models and immersive environments. Stone and Ojika (2000) describe VH as a medium that "records, preserves, or recreates artifacts, sites, and actors of historical and cultural significance" using computer-based tools to provide educational and emotional experiences by manipulating time and space [15]. Jacobsen (2007) further develops this by emphasizing VH as a tool not only for architectural reconstructions but for fostering a deeper understanding of ancient cultures,

transforming virtual spaces into "living museums" where users can engage actively with history [16]. Champion refined this more by highlighting VH's goal of conveying not only physical features but also the "meaning and significance of cultural artifacts and the associated social agency that designed and used them," integrating a deeper cultural perspective into VH applications.

VH bridges the gap between past and present, making historical knowledge accessible and engaging, especially where physical access to heritage sites is limited or impossible. VH offers benefits like interactive learning, enhanced cultural appreciation, and the preservation of at-risk sites through digital means. However, it also faces challenges, particularly regarding authenticity and maintaining the integrity of cultural narratives.

2.3. Emotional Connection Research

The relationship between perception, presence, and emotion in VR environments is complex and highly interconnected. Diemer et al. (2015) emphasize that VR can elicit strong emotional reactions through specific perceptual cues, visual, auditory, and tactile, that simulate real-life experiences [17]. This sensory input, or "bottom-up" perception, creates a sense of presence, which is the feeling of being physically located within the virtual environment. According to Diemer, presence in turn enhances emotional engagement because users respond to VR scenarios as if they were genuinely occurring. This immersive perception makes VR a powerful tool for engaging emotions, especially for applications like exposure therapy in mental health, where evoking fear or anxiety is necessary to treat phobias.

The heightened sense of presence in VR amplifies emotional responses, fostering a deeper connection between users and the virtual environment. Users may feel emotions like awe, excitement, or fear, depending on the VR content and context. Diemer's findings suggest that VR's capacity to engage perception and presence makes it ideal for applications where emotional impact is essential, such as cultural heritage, therapy, or immersive storytelling. By aligning perception and presence, VR creates compelling experiences that resonate deeply, making users feel genuinely involved in the simulated environment.

2.4. Immersion and Presence Research

Immersion and presence are fundamental concepts in virtual reality, essential for creating convincing experiences. Immersion refers to the degree to which technology can envelop the user, isolating them from the physical world to create a vivid and realistic environment. Slater (1999) defines immersion through the technical characteristics of VR, such as field of view, fidelity of sensory inputs, and inclusivity, which together produce a strong sense of surrounding and vividness in virtual spaces [18]. For instance, in VR setups where participants can see only the virtual environment and interact with it using real-time body tracking, immersion is maximized because the virtual experience dominates their sensory perception.

Presence, on the other hand, is the psychological sense of "being there" in the virtual environment [19]. It emerges when users feel they are part of the VR environment rather than just observing it, thus responding as if it were a real space. This feeling is affected not only by immersion but also by how users cognitively and emotionally connect with the VR content. Hartmann et al. (2013) note that spatial presence theory underscores this sense of "being there" by highlighting users' attentional and embodied responses to VR, while Champion (2020) expands on cultural presence as an aspect of presence in VR, emphasizing users' connection to cultural elements within VR heritage projects [20]. These theories suggest that immersion and presence interact to help users feel engaged in VR experiences, especially in virtual heritage, where presence plays a vital role in evoking emotional and cultural connections.

3. THEORETICAL BACKGROUND

3.1. The Spirit of Place (SiP) & Sense of Place (SeP)

The concepts of SiP and SeP are inherently complex and multifaceted, spanning across various disciplines such as phenomenology, cultural studies, and environmental psychology. To date, no single, fixed definition exists for these terms, as the study of how people perceive, interact with, and attribute meaning to places is influenced by disciplinary perspectives. Attempting to constrain their meaning into one universal definition would undermine their applicability across different fields. For the purposes of this article, it is useful to analyze SiP and SeP within the ontological framework of phenomenology, which focuses on human experience and perception. However, it is essential to incorporate insights from related disciplines to capture aspects of these concepts that may not be fully covered by phenomenological discourse.

The International Council on Monuments and Sites (ICOMOS) defines SiP as encompassing both the tangible (buildings, sites, landscapes, objects) and intangible elements (memories, narratives, rituals, traditional knowledge, values, colors, odors, etc.) [21]. This holistic definition underscores that SiP includes the physical and spiritual elements that imbue a place with meaning, emotion, and mystery. This interpretation provides an interdisciplinary view of SiP that is useful across fields like heritage preservation, architecture, and urban planning. Scholar Edward Relph, a key figure in place studies, argues that SiP pertains to the intrinsic qualities and collective character of a place, giving it a unique identity beyond individual emotional attachments. SiP captures a place's historical, cultural, and physical elements, creating a collective significance that resonates with people on a universal level, even if they have no personal connection to the place [22]. Relph further explained that SeP, by contrast, is the subjective emotional attachment individuals or communities develop towards a place, shaped by their personal experiences, memories, and cultural context. While SiP evokes a shared understanding of a place's identity and significance, SeP is deeply personal and arises from individual interactions and memories. This distinction is crucial for virtual environments, where SiP can be broadly communicated and experienced, while SeP is more challenging to replicate due to its reliance on personal experience.

In heritage preservation, evoking SiP in virtual environments is especially important to foster public appreciation and encourage sustainable conservation. Replicating SiP digitally can enhance user engagement and appreciation of heritage sites, even for those without personal experiences with these places. This makes SiP a more accessible and universally impactful concept in virtual heritage environments, while SeP remains challenging to replicate due to its reliance on personal experiences.

3.2. Deleuze's Concepts of Difference & Repetition

To address the limitations identified in traditional virtual heritage reconstructions, this paper introduces Gilles Deleuze's concepts of difference, repetition, and simulacra as a theoretical foundation for representing SiP in virtual environments. Deleuze's ideas encourage us to view digital spaces not as mere replicas of physical sites but as interpretations that evoke new meanings through interaction and difference[23].

Central to Deleuze's theory is simulacra, which challenges the traditional view that a copy is inherently inferior to its original. Instead, Deleuze suggests that simulacra are creative, producing unique meanings through variation rather than aiming to exactly replicate the original [24]. Applied to virtual heritage, this implies that digital reconstructions need not be perfect copies to convey SiP. Instead, they can embrace difference, allowing for reinterpretation through user interaction, thereby fostering new emotional connections and enriching the user experience of SiP.

Deleuze's concept of difference is particularly relevant for understanding how repetition with variation can deepen the user's experience of a virtual heritage site. In virtual environments, each interaction with the site is unique, shaped by users' engagement with both the tangible (architecture, landscape) and intangible (cultural narratives, emotional resonance) elements. "Difference in itself" suggests that these variations are integral to creating a richer and more meaningful user experience. Features like dynamic lighting that changes with user exploration, spatial elements that evolve based on interaction patterns, or recurring motifs that subtly transform over time exemplify how "repetition for itself" can introduce layers of meaning and variation.

By allowing users to form their evolving relationships with the virtual site, the environment becomes dynamic and adaptive, fostering a deeper connection with the heritage represented. Through Deleuze's concepts, this paper proposes a dynamic approach that encourage the design of virtual environments as 'living' spaces, where even repeated elements, such as architectural details or narrative cues, adapt to user engagement, ensuring every encounter feels fresh and personal. This method offers users a deeper, more meaningful engagement with heritage sites, transforming virtual environments into experiences that resonate emotionally and culturally, rather than serving as simple replicas [24].

3.3. Framework for SiP

SiP reflects a location's unique identity, shaped by the interaction of tangible and intangible elements within a stable spatial context. This neutral spatial location acts as a backdrop, allowing these elements to define the SiP. Tangible elements, such as natural landscapes and built structures (as described by ICOMOS), form the place's physical identity, while intangible elements (e.g., cultural memories, historical narratives, and traditions) add emotional and cultural significance. Together, these elements create a distinct sense of SiP within a given location, as noted by Relph.

SiP is experienced phenomenologically, where individuals interpret a place through personal experiences, memories, and cultural associations [25]. This interpretation is dynamic, shaped by each individual's unique background and cultural context. Deleuze's concepts further enhance the understanding of SiP by considering tangible and intangible aspects as continuous influences that reshape the SiP. In virtual environments, SiP can be reiterated, with digital recreations capturing a place's core identity by adapting these elements digitally, thereby extending engagement with heritage beyond physical boundaries.

By applying Deleuze's concepts, SiP becomes adaptable for digital spaces, allowing these environments to serve as platforms for a deeper engagement with heritage [26]. The refined definition of SiP for VR content in heritage sites is as follows: Spirit of Place is a perceiver's experience of place, a construct formed through the dynamic interplay of tangible and intangible influences within a specific location. As an interface, place is where natural features, built structures, cultural memories, historical narratives, and symbolic associations converge, with each element influencing and being influenced by the others.

This mutual interaction forms a distinct identity, eliciting an embodied engagement that according to Merleau-Ponty is shaped by the perceiver's past experiences and cultural familiarity. SiP elicits an embodied engagement shaped by the perceiver's past experiences and cultural familiarity, forming a distinct identity. Figure 1 visually represents the relationships within this definition.

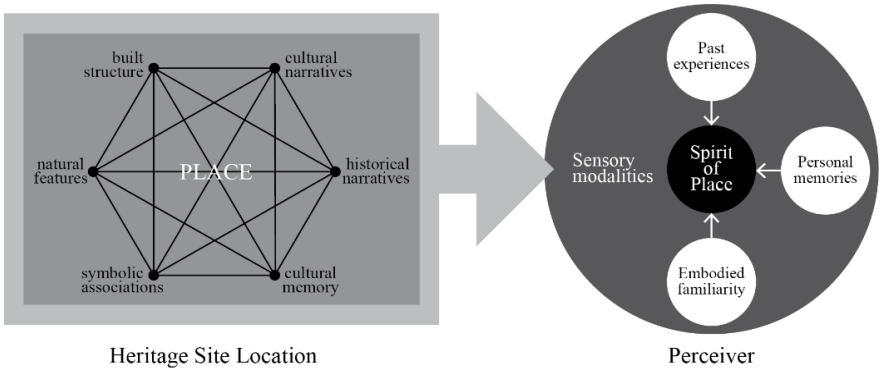

Figure 1. Relationship diagram within the refined definition of SiP

4. RELATED RESEARCH

4.1. Case Analysis of Virtual Heritage Projects

The Virtual Avebury study (Falconer et al., 2018) demonstrates how virtual reality can enhance engagement and a sense of place for destroyed heritage sites like Avebury Henge. By providing an immersive, sensory-rich environment that replicates the ancient landscape, the simulation allowed users to feel transported to 2300 BCE, supported by soundscapes that deepened their spatial awareness. While VR fosters place attachment through realism, the study highlights limitations, such as hyper-realistic interpretations that risk idealizing the past and a lack of interactive fidelity, which restricted some users' engagement [27].

The Mernda VR Project (2022) focuses on reconstructing Mernda's Mayfield Mill in Australia through VR, aiming to engage the public with lesser-known heritage sites. Using photogrammetry and 3D modeling, the project allows users to explore this 19th-century site, providing a preservation alternative and immersive storytelling outside traditional museum contexts. Despite offering a meaningful educational tool, Mernda's VR model faces challenges due to hypothetical reconstructions from incomplete data, which may impact historical accuracy [28]. This project underscores VR's potential for cultural storytelling while addressing concerns about the speculative nature of virtual heritage.

The Knossos Palace project uses digitization methods like photogrammetry to produce a detailed virtual version for remote and on-site exploration, improving accessibility while preserving the physical site. However, device limitations necessitated optimization that reduced visual detail, and varying interaction mechanisms between VR and AR modes highlighted current technological constraints in providing a fully immersive experience. The navigation and interaction mechanisms, although functional, differ significantly from the tactile and multisensory engagement offered by physical exploration of sites [29].

Analyzing virtual heritage projects through Deleuze's concepts of 'difference in itself' and 'repetition for itself' highlights how these projects engage users by crafting dynamic identities for heritage sites in VR. Each project utilizes 'difference in itself' to go beyond mere replication, reinterpreting site identities. In Virtual Avebury, for example, sound and environmental elements evoke the spirit of a Neolithic past distinct from its present-day remains. The Mernda VR Project digitally reconstructs the Mayfield Mill, offering a contrasting view of rural Australian heritage against its degraded physical state. By contrast, the Knossos project prioritizes visual accuracy, reducing interpretive difference and focusing on factual replication, which limits VR's transformative potential.

‘Repetition for itself’ in these projects allows users to reconnect with history through reinterpretation. Virtual Avebury achieves this by preserving Avebury Henge’s spatial layout while adding sensory cues, enabling a renewed experience of its historical essence. The Mernda VR Project digitally revives rural heritage elements, "repeating" them in a new digital form that emphasizes educational engagement. In contrast, Knossos emphasizes architectural fidelity with minimal interpretive or sensory variation, resulting in a ‘repetition of the same’ that prioritizes visual accuracy over imaginative reinterpretation.

4.2. Distinctiveness of This Study

The Virtual Avebury project recreates the lost Avebury Henge, offering an immersive VR experience that highlights its cultural and ritual significance. Similarly, the Mernda VR Project reconstructs the deteriorating Mayfield Mill in Australia, integrating tangible and intangible elements, such as social and historical contexts, to engage users with rural heritage. By contrast, the Knossos project preserves an intact heritage site with a focus on visual accuracy, but it lacks engagement with intangible cultural narratives.

This study uniquely validates Deleuze’s concepts of ‘difference in itself’ and ‘repetition for itself’ within an intact heritage site by modifying tangible elements in VR to evoke SiP. By adjusting spatial orientation, fidelity, and lighting, the study enhances user engagement and emotional connections, offering insights into how VR can be a dynamic tool for fostering meaningful and evolving interactions with heritage. Unlike projects focused on reconstructing lost sites or static preservation, this research positions VR as a transformative medium for heritage interpretation.

5. METHODOLOGY

5.1. Research Methodology

This study investigates how Deleuze’s concepts of ‘difference in itself’ and ‘repetition for itself’ manifest within a VR application interpreting a heritage site and how these principles evoke emotional engagement, contributing to a Spirit of Place (SiP) experience as hypothesized. The methodology employs a sequential, quantitative approach, with participants first watching a video of the heritage site to establish a baseline understanding of its tangible (natural features and structures) and intangible (cultural and historical) elements. They then engage with an immersive VR experience that introduces interpretative variations through tangible alterations, utilizing Deleuze’s principles to create varied experiences (‘difference in itself’) and foster emotional connection (‘repetition for itself’). A post-experiment questionnaire assesses participants’ perception of the site’s tangible and intangible elements, their interrelationships, and their emotional engagement.

The case study focuses on the Kongōrikishi (Nio) statues at Tōdai-ji Temple (Nara, Japan), selected due to its intact condition and existing VR application, which allows for virtual exploration. The Nio statues (Figure 2) as a case study facilitates:

- Baseline Familiarity: The video provides foundational knowledge, presenting the tangible (physical details of the statues, architectural, and natural surroundings), intangible elements (historical & cultural significance) and highlighting their interrelations. The video embodies “difference in itself,” emphasizing the distinctiveness of the heritage site’s identity. This provides a clear foundation for understanding the site's unique identity.

- Interpretive Variation: Building on the video, the VR experience enhances user interaction by introducing variations aligned with "repetition for itself." Varying lighting (morning, evening, and night) reveals different ambient colors and shadows that transform the appearance of the statues. Similarly, the spatial settings enable varying perspectives, observing the statues from afar or examining them up close. These variations encourage users to reinterpret the statues, deepening their connection to the heritage site.
- Enhanced Engagement: The immersive VR experience aims to evoke an "authentic" spirit of the site, fostering emotional engagement through virtual exploration.

Figure 2. Image of a Nio statue (left image) [30] and its virtual iterations [31]

5.2. Research Procedure

Participants begin by watching a 3-minute documentary-style video of the Nio statues, in 720p at 30fps, to introduce the site's tangible and intangible elements, establishing a foundational context. This video serves as a baseline, familiarizing participants with the site. They then experience the VR simulation of the Nio statues using the "VR Japan" application on a Quest 3 headset, that features an interpretation of the site with the ability to adjust lighting settings (morning, evening, night) as outlined in Figure 3. However, the VR simulation is still limited in technological features, specifically in the method for locomotion (teleport) and no design features to enable interaction with object within the virtual environment. This setup introduces varied ambiances that align with Deleuze's concept of 'difference in itself,' enhancing their engagement with the site's tangible and intangible aspects.

Figure 3. Experiment Flow Structure

The research procedure outlines participant selection, experimental conditions, and data collection. A sample of 8 participants, with a range of academic levels and backgrounds, were chosen to provide diverse responses reflecting VR's experiential impact across backgrounds. Drawn from an academic setting, participants include undergraduate and postgraduate students, and faculty members. Although the sample primarily consists of young female participants, individuals of varied faith backgrounds, including Buddhism, are included to capture a range of spiritual connections to the site. The small sample size and homogeneity of participants could limit the generalizability of the findings, potentially underrepresenting broader demographic and cultural perspectives.

Data collection includes two questionnaires:

a. Pre-experience Questionnaire: Gathers demographic data & baseline experience with immersive media.
b. VR Post-experience Questionnaire: This includes multiple measures and structure below:
   - Immersion Level: Assessed using Slater's Framework for Immersive Virtual Environments (FIVE) to evaluate inclusiveness, extensiveness, vividness, modality matching, and embodiment.
   - Presence: Evaluated using Hartmann's Spatial Presence Experience Scale (SPES) [32].
   - Deleuze' concepts: Assesses awareness of the tangible, intangible, and dynamic influences between as 'difference in itself', and how alterations in tangible elements within VR influence subject's perception of intangible elements (e.g., lighting's effect on atmosphere), capturing the 'repetition for itself' concept.
   - Emotional Engagement: Measures the depth of emotional connection to the heritage site.

A mix of ordinal (categorical & Likert-scale) data and open-ended responses allows for both quantitative and qualitative insights into VR's impact on participants' engagement with the heritage site, as outlined in Table 1. To validate qualitative data (open-ended responses) for quantitative analysis, it is necessary to convert it first using the Applied Thematic Analysis (ATA) method, an inductive and systematic approach to identify and analyze themes from qualitative textual data, aiming to transparently and credibly present participants' experiences and narratives [33]. Descriptive analysis involves calculating the mean and standard deviation for each item to identify trends in emotional engagement, immersion, and SiP perception.

Table 1. VR Experience Questionnaire: Immersion & Presence Metrics

RQ	Concepts	Items	Data	Data Type	Question
RQ1. How do perceivable tangible elements in VR influence participants' perception of intangible elements within the SiP framework? **RQ2.** How can Deleuze's concept of 'repetition for itself' evoke the SiP in VR?	Spirit of Place	Tangible	Natural Features	Likert scale (1-5)	Able to view natural features
			Built Structure	Likert scale (1-5)	Able to view the statues & its surroundings
		Intangible	Cultural Narratives	Likert scale (1-5)	Able to perceive the cultural, historical, symbolic significance of the statues
			Historical Narratives		
			Cultural Memory		
			Symbolic Association		
		Emotional Engagement		Likert scale (1-5)	Feeling of awe and respect for the statues
				Open-ended respond	Mention emotions felt during the VR experience.
	Deleuze's Concepts	Influences		Likert scale (1-5)	Able to perceive tangible influences on intangible elements
				Open-ended respond	Mention tangible aspects in VR that convey the cultural and historical significance of the site.
		Difference in itself		Likert scale (1-5)	Able to view the statues & its surroundings
		Repetition for itself		Open-ended respond	Describe differences between site representation in the video and VR
	Immersion	Inclusive		Likert scale (1-5)	Feeling fully present and comfortable navigating
		Extensive		Likert scale (1-5)	Able to navigate in a natural way
		Surround		Categorical	The device used is VR

				HMD
		Vivid	Likert scale (1-5)	Able to view the statues & its surroundings
		Matching	Likert scale (1-5)	Able to perceive tangible influences on intangible elements
		Embodiment	Likert scale (1-5)	Feeling fully present and comfortable navigating
	Spatial Presence	Possible Action	Likert scale (1-5)	Able to perceive tangible influences on intangible elements
		Self-Location	Likert scale (1-5)	Able to navigate in a natural way

6. RESULTS AND ANALYSIS

6.1. Case Study Sample Overview

Participants' ages ranged from 20 to 49, with a mean age of 25.63 and a standard deviation (SD) of 9.65, reflecting a young adult demographic in Table 2.

Table 2. Research subjects' age distribution

Data	Min	Max	Mean	SD
Participants Age	20	49	25.625	9.650

The age range of 20 to 49 captures diverse adult perspectives, with younger participants reflecting familiarity with digital media and older participants offering contrasting views on VR's cultural and emotional impact. However, the relatively small sample size (8 participants) limits the generalizability of these findings. This age distribution provides an opportunity to explore how different age groups might perceive the Spirit of Place (SiP) in VR environments, particularly focusing on younger adults' resonance with digital media and VR.

The study's participant demographics include various representations of gender, religion, and nationality in Figure 4. This diversity enables a more comprehensive analysis of how SiP perceptions vary across cultural, religious, and gender contexts, even though the sample size has limitations due to academic-based recruitment.

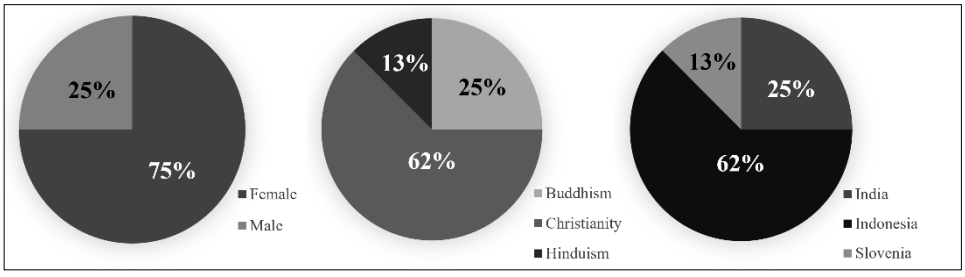

Figure 4. Demographics (gender, religion, & nationality) Proportions

- Gender: A greater number of female participants suggests that the findings might reflect more on how female users engage with VR representations of heritage. Future studies with a more balanced gender distribution could further clarify any gender-specific differences in SiP perception.

- Religion: Inclusion of Buddhist participants provides insights into culturally aligned perceptions of SiP. For non-Buddhist participants, contrasting responses offer perspectives on how SiP resonates with different cultural and religious lenses.
- Nationality: Mix of nationalities introduces diverse cultural perspectives. However, the overrepresentation of Indonesian participants may skew interpretations toward regional familiarity. Expanding to a more globally diverse sample could mitigate this limitation.

6.2. Comparison of Physical Site and Virtual Site

The study notes specific tangible features (like the gate and statues) and intangible influences (such as cultural narratives and historical significance) as perceived from the video documentation and their VR adaptations in Table 3. The comparison highlights VR's ability to convey both tangible and intangible elements, even with some modifications. However, certain aspects, such as the absence of natural surroundings in VR, may alter how users perceive SiP.

Table 3. Video Elements & VR Alterations

Video Documentary				VR
Tangible (T)	Intangible (I)	Influences		Tangible Alterations
		T → I	I → T	
• Natural features • The main gate • Statue's location & orientation • Statues' details • Cubicle screen • Lighting setup • Gate signage	• Protection icon in Buddhism • Historic artistry • Memories of revered sculptors • Symbol of life, death, and guardianship	The physical scale, nature, statues & gate location influence intangible elements, shaping perception of SiP.	Cultural, historical, and symbolic narratives influence design, placement, & preservation of the statues & gate as Buddhist & Japanese cultural values.	•No natural features •No main gate •Placement and orientation of statues •No cubicle screen •Lighting setup

6.3. Perception of influences, the 'difference in itself', & 'repetition for itself'

The themes and results of the analysis indicate that Sensory Immersion (SI), which measures how effectively physical elements in the VR environment (e.g., lighting, sound, textures) enhanced participants' immersive experiences, received high scores. This suggests that VR effectively conveyed sensory details, fostering a strong sense of immersion. However, Cultural Significance (CS), evaluating how well the VR environment communicated cultural or historical meanings, showed lower scores, indicating that these aspects were not as effectively conveyed. Additionally, the relatively low scores in Active Exploration (AE), which reflects participants' level of active engagement and interaction within the VR environment, suggest that participants engaged more passively, with limited exploration of the virtual space.

Some of the datasets (influences & 'repetition for itself') are in the form of qualitative respond. In order to assess these data quantitatively it needs to be converted using the Applied Thematic Analysis (ATA) methods. An analysis based on themes that represent the subject's respond could be examined in Table 4 ('influences') & 5 ('repetition for itself').

Table 4. ATA to quantified data for Deleuze's 'influences'

Subject	Theme			Likert scale (L)	Total Score
	SI	CS	AE		
1	1	0	1	5	4
2	1	1	0	5	4.5
3	1	1	0	4	4
4	1	0	0	4	3
5	1	0	0	5	3.5
6	0	0	1	5	3
7	1	0	0	5	3.5
8	0	0	0	5	2.5

The analysis on Table 4 shows the results of converting qualitative themes for 'influences', consisting of Sensory Immersion (SI), Cultural Significance (CS), and Active Exploration (AE), into a 5-level Likert scale using the ATA methods. These themes represent the aspects of VR that participants perceived during their experience. **Score Calculation Formula: (((SI*2)+(CS*2)+(AE*1))+L)/2)**.

Table 5. ATA to quantified data for Deleuze's 'repetition for itself'

Subject	Theme				Total Score
	PS	LA	SP	DC	
1	0	1	1	0	2
2	0	1	0	0	1
3	1	0	0	0	1
4	0	0	0	0	0
5	0	1	1	0	1
6	0	1	1	0	2
7	1	0	0	0	1
8	0	1	1	0	2

The results in Table 5 reveal that LA and SP were the most frequently identified themes, underscoring their central role in shaping participants' perceptions. Participants often recognized how lighting and ambiance influenced their sense of presence within the VR environment. Conversely, PS and DC were less frequently noted, suggesting that the VR experience was less effective in conveying the physical scale of the site and the clarity of intricate details. These findings indicate that while the VR environment succeeded in creating a vivid and immersive atmosphere, it faced challenges in fully representing the tangible dimensions of scale and detail that might enhance the perception of SiP. While for 'repetition for itself' there are 4 individual themes (categorical), where each subject's respond could be included in more than one category. The formula calculates how many categories that each respond covers: Score Calculation Formula: **PS+LA+SP+DC.**

Table 6 presents the descriptive statistics for three key datasets: Influences, Difference in Itself, and Repetition for Itself, highlighting participants' perceptions during the VR experience.

Table 6. Influences perception, 'Difference in itself', & 'Repetition for itself' Level

Dataset	Min	Max	Mean	SD
Influences	2.500	4.500	3.500	0.655
Difference in itself	4.000	5.000	4.500	0.535
Repetition for itself	0.000	2.000	1.250	0.707

The Influences dataset, with a mean score of 3.5, indicates a moderate impact of the interaction between tangible and intangible elements on participants' perception of the SiP. This suggests that while participants recognized the interplay between physical and cultural/emotional aspects, the effect was not overwhelmingly strong.

The 'difference in itself' dataset shows a high mean score of 4.5, reflecting ability to notice and appreciate the distinct variations introduced in the VR environment, such as changes in lighting and ambiance. This high score confirms that VR successfully employed dynamic alterations to enhance user engagement and perception.

In contrast, the 'Repetition for Itself' dataset reveals a low mean score of 1.25, suggesting that participants perceived limited variation within the repeated elements in VR. While this low score indicates that VR effectively maintained continuity and familiarity, it also highlights a missed opportunity to introduce more dynamic changes within the repeated elements to enrich the perception of SiP further.

These results underscore the strengths of VR in creating engaging variations but also point to areas where repetition could be leveraged more creatively to deepen users' emotional and cultural connection with the heritage site.

Tables 4, 5, and 6 provide valuable insights into the core concepts of 'Influences,' 'Difference in Itself,' and 'Repetition for Itself.' However, the study should address certain gaps:

- The low scores for CS and PS highlight areas where VR could better convey cultural narratives and scale.
- 'Repetition for itself' scores suggest the need for more variations within repeated elements to enrich user engagement.

Improving these aspects could enhance the VR's ability to convey a cohesive and emotionally resonant SiP. The analysis highlights the strengths of VR in fostering sensory immersion while suggesting specific areas for refinement in future applications.

6.4. Immersion, Presence & Emotional Engagement

ATA approach categorized participants emotional engagement into feelings of 'joy, neutral, and fear'. Table 7 describes a high score in feeling 'joy and fear' suggesting that participants connected emotionally with the VR experience.

Table 7. Immersion, Presence, & Emotional Engagement Level

Dataset		Min	Max	Mean	SD
Immersion Level		3.667	5.000	4.438	0.427
Presence Level		0.500	1.000	0.745	0.167
Emotional Engagement	Joy	4.000	5.000	4.677	0.577
	Neutral	3.000	4.000	3.333	0.577
	Fear	5.000	5.000	5.000	0.000

This result aligned with the high immersion and presence score, as catalyst for emotional engagement. The analysis presented in Table 7 highlights the significant role of VR in fostering emotional connections to the SiP. High immersion & presence scores (mean 4.438 & 0.745, respectively) validate VR as a potential medium for inducing emotional responses. This is supported by the emotion response interpreted from the questionnaire, where emotional states of 'Joy' & 'Fear' (mean 4.677 & 5.000) shows higher score than 'Neutral' (mean 3.333). However, the study reveals critical areas for improvement, including the low presence score (mean 0.745), suggesting technological (e.g., teleport locomotion methods) or design limitations (e.g., no interaction features

with objects within the virtual environments) that may have hindered participants' sense of being in the VR environment. The lack of clarity surrounding 'Neutral' responses and the contextual ambiguity of the high 'Fear' scores indicates the need for additional qualitative data to interpret these findings more effectively.

Future research should enhance technical quality, explore the reasons behind specific emotional responses through interviews or observations, and refine the VR design to elevate presence and emotional engagement for a more cohesive representation of SiP. Qualitative data, such as in-depth interviews and observational insights, can be particularly valuable for capturing nuanced emotional responses, allowing researchers to better understand how users connect emotionally with the virtual experience and inform design adjustments that resonate more deeply with user's feelings and perceptions. The data underscores that VR's immersive capabilities can foster emotional bonds with heritage sites, essential for conveying SiP in virtual environments. Integrating qualitative methods in future studies can ensure that emotional engagement is both measurable and actionable, leading to more impactful virtual heritage representations.

7. DISCUSSION

7.1. Addressing RQ1

The findings from Table 6 demonstrate that participants effectively perceived 'difference in itself,' as evidenced by the high mean score (4.5 out of 5). This indicates that VR's tangible modifications, such as lighting adjustments and spatial configurations, successfully highlighted the interconnectedness of tangible and intangible elements, aligning with the hypothesis that VR can convey a cohesive SiP. However, the relatively low score for CS (Table 4) suggests that tangible alterations alone were insufficient to fully evoke a connection to deeper cultural meanings. This highlights a need for additional narrative elements or context-specific cues within VR to bridge this gap and enhance users' understanding of the cultural and historical significance.

7.2. Addressing RQ2

The results for 'repetition for itself' reveal a lower mean score (1.25 out of 5), suggesting that participants recognized continuity but perceived minimal variations within the repeated elements. While this supports the hypothesis that VR repetition fosters familiarity and emotional engagement, as confirmed by the high emotional engagement and immersion scores (Table 7), the lack of dynamic variation within repeated elements limited the depth of participants' experiences. Introducing subtle but meaningful variations within repeated elements could enrich the user experience, enabling users to uncover new dimensions of the heritage site's identity across interactions.

7.3. Implications of Virtual Heritage

The study validates the applicability of Deleuze's concepts in VR, demonstrating how 'difference in itself' and 'repetition for itself' can dynamically evoke SiP. VR's ability to balance familiarity with novelty positions it as an effective medium for representing heritage sites, extending beyond static replication to provide a dynamic and emotionally engaging experience. However, the findings also underscore key areas for improvement. Enhancing VR's ability to communicate cultural significance and scale through richer narrative integration, alongside more varied repetitions of core elements, could deepen users' engagement and understanding. By addressing these limitations, future VR applications can better bridge tangible and

intangible elements, fostering a more cohesive and meaningful connection to heritage. Therefore, the sintering of DISCUSSION is as follows:

- Enhanced Narrative Contexts: Integrate detailed cultural and historical narratives tailored to diverse user backgrounds to strengthen cultural significance. This could be achieved by integrating contextual audio-visual storytelling, such as voiceovers or interactive text, that dynamically adapts based on the user's exploration path. Additionally, embedding interactive artifacts or characters within the environment could allow users to engage directly with cultural narratives.
- Dynamic Repetition Design: Introduce layered variations in repetitive elements to balance familiarity with exploration. For example, statues or motifs could subtly transform in appearance, lighting, or texture based on user interaction or time progression. Repeated auditory elements, like temple bells or chants, could vary in tone, rhythm, or layering depending on the user's location or movement, creating a sense of evolving engagement while maintaining thematic consistency.
- Deeper Emotional Insights: Incorporate qualitative interviews to capture nuanced emotional responses.
- Technical Optimization: Improve graphics, interaction design, locomotion method, and spatial configurations to enhance presence and realism.

These refinements aim to maximize VR's potential to evoke a rich SiP, bridging heritage authenticity with immersive virtual experiences.

8. CONCLUSION

This study demonstrates the application of Deleuze's concepts, 'difference in itself' and 'repetition for itself,' in VR to evoke the SiP in heritage sites. Findings revealed that 'difference in itself' was particularly effective in connecting tangible modifications (e.g., lighting, spatial configurations) to participants' perceptions of intangible cultural and historical narratives, with a high mean score of 4.5. However, the relatively low score for CS highlights the need for additional narrative elements to fully convey deeper cultural meanings. Similarly, while 'repetition for itself' established familiarity through continuity, the low variation in repeated elements highlights the need for dynamic, contextually meaningful repetitions to enhance engagement and deepen connections with the site's identity.

The study also identified limitations that may have influenced the findings. The predominantly young participant sample, familiar with immersive media, may not represent broader demographic or generational perspectives. Additionally, reliance on quantitative self-reports limited insights into the nuanced emotional connections participants experienced with intangible elements, such as cultural narratives. To address this, future research could incorporate qualitative methods such as semi-structured interviews to explore participants' personal reflections on their emotional engagement, focus groups to facilitate discussions on shared and divergent experiences, and thematic analysis of participants' narratives to identify recurring emotional and cultural patterns. Furthermore, the relatively low presence scores highlight the need for technical improvements in VR design, such as enhanced graphics and interactive features.

Future research should address these limitations by incorporating diverse participant demographics (incorporate diverse professional, cultural backgrounds, and broaden the age range to include older adults and adolescents, whose perspectives, experiences, sensory perceptions, and spiritual connections may differ.) and qualitative methods, such as interviews, to explore users' emotional responses in greater depth. Incorporating

advanced technological features, such as natural walk locomotion methods for navigating the virtual environment, can heighten the sense of presence and immersion by aligning physical movement with virtual exploration. Design features that combine storytelling with intuitive interaction, such as allowing users to touch, rotate, or activate artifacts to reveal embedded narratives, can deepen emotional engagement and create a more personal connection to the cultural and historical aspects of the site for a richer and more impactful user experience. Additionally, adopting a layered approach to 'repetition for itself,' where subtle variations are introduced across VR sessions, could create richer and more engaging experiences that reveal new dimensions of the site's essence.

By addressing these challenges, VR heritage applications can fully leverage Deleuze's concepts to create meaningful connections with cultural heritage. This study underscores the potential of VR to serve not merely as a replica of heritage sites but as a dynamic medium that captures and sustains their Spirit of Place, bridging tangible iterations with intangible essences.

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