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MORALITY BEFORE KNOWLEDGE

Materiality, emotion, and collective memory: The communicative power of memorial architecture

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ABSTRACT

Background: This study investigates how the architectural design of the Hiroshima Peace Memorial Museum shapes visitors' emotional and cognitive engagement with traumatic history. This study investigates how architectural language, materiality, and spatial organization function as non-verbal communicative instruments that shape visitor emotional responses and collective memory in memorial spaces, situating these findings within the broader discourse of city branding and place authenticity to demonstrate that heritage architecture constitutes a strategic urban asset in constructing and projecting authentic cultural identity on the global stage. **Methods:** Using mixed methods, including analysis of 150 visitor reflections and survey data, the research examines how materiality (raw concrete, glass), spatial sequencing, and multisensory experience influence emotion and memory. **Findings:** Over 80% of visitors reported profound emotional reactions to the architecture, especially the contrast between dark, narrow corridors and luminous galleries. Raw concrete was seen as a symbol of destruction and resilience, while glass conveyed fragility and hope. Spatial immersion strongly predicted memory retention ($r = 0.68$, $p < .01$), emphasizing architecture's role as an affective and mnemonic medium. NVivo themes like "Emotional Disruption" and "Journey from Darkness to Light" support theories such as Nora's lieux de mémoire and Pallasmaa's sensory architecture. **Conclusion:** Overall, this trauma-responsive, healing-centered model demonstrates how architectural design can foster peacebuilding and remembrance, providing a practical framework for future memorials. **Novelty/Originality of this article:** This study offers a practical, trauma–responsive architectural framework that can be used as a design model for future memorials.

KEYWORDS: collective memory; emotional architecture; Hiroshima Peace Memorial; materiality; trauma and architecture.

1. Introduction

The Hiroshima Peace Memorial Museum exemplifies how memorial spaces preserve collective memory and prompt reflection on traumatic events (Beckstead et al., 2011; Cho, 2012; Duffy, 1997; Zwigenberg, 2021). Central to Hiroshima's identity as the "City of Peace," the museum commemorates atomic bombing victims and encourages reconciliation through its architecture, which integrates materiality, spatial sequencing, and symbolism to shape visitors' emotional experiences (Chen, 2012; Broudehoux & Cheli, 2022; Oshima, 2020).

Drawing on Nora's lieux de mémoire and Pallasmaa's views on materiality's emotional impact (Harada, 2000; Beckstead et al., 2011), this study combines narrative analysis and visitor surveys to assess how architecture influences emotion and memory. While memorial architecture is widely studied, the link between materiality, space, and visitor emotion in

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museums remains underexplored (Broudehoux & Cheli, 2022). Figure 1 maps the museum's spatial context that shows urban location and internal layout relevant to spatial-emotional experience.

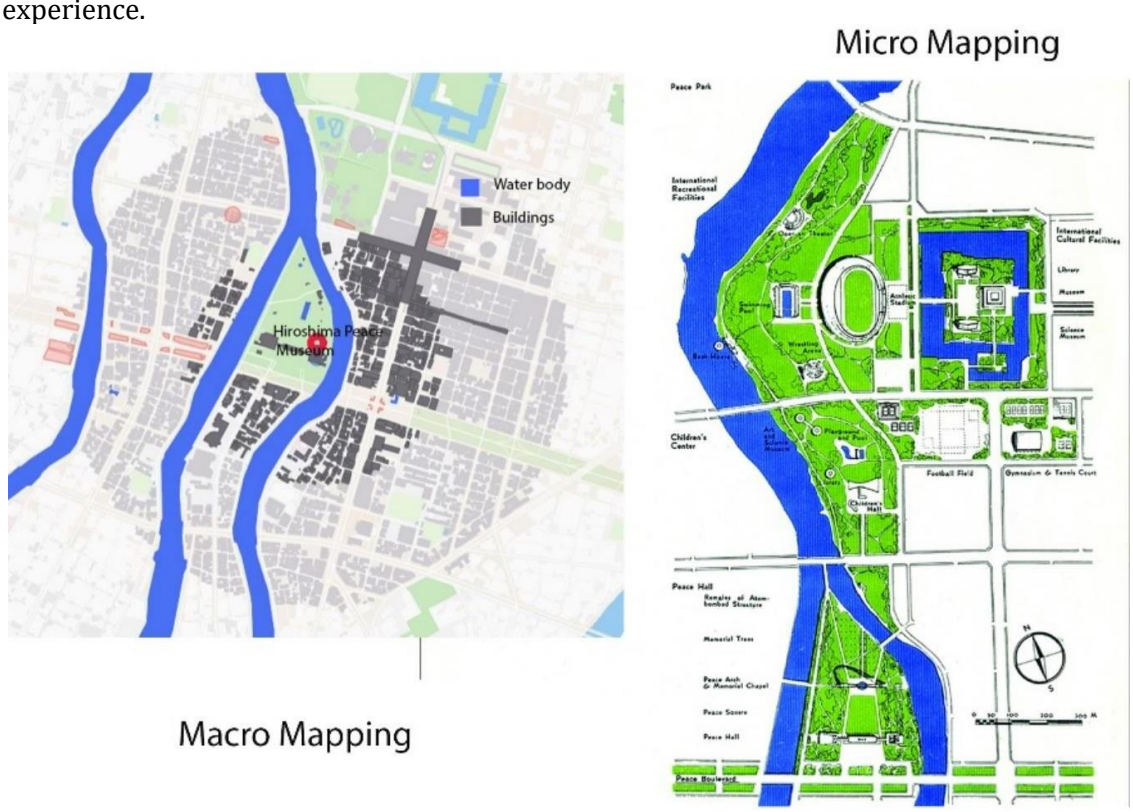

Fig. 1. Macro and micro mapping of the Hiroshima Peace Memorial Museum

This paper addresses that gap with a case study of the Hiroshima Museum, investigating how materials and spatial organization evoke emotional and cognitive engagement. The research aims to advance understanding of trauma-responsive, healing-centered memorial design (Sylvester, 2021). The design of memorial museums is crucial in preserving collective memory and shaping visitor emotion after traumatic events. Nora's lieux de mémoire theory emphasizes how architecture anchors national remembrance, especially at sites of trauma (Okuda, 2011). Pallasmaa and others have expanded on this, highlighting how sensory experiences, such as material, texture, and light, profoundly affect psychological responses in memorial spaces (Harada, 2000). Recent research underscores the strategic use of materiality and spatial sequencing to guide visitor experience. In Hiroshima, Kenzo Tange's raw concrete and glass evoke both destruction and resilience, allowing the museum's form to embody trauma and the city's aspiration for peace (Oshima, 2020). Similar design strategies are found in other memorials where tactile materials and spatial progression lead visitors through emotional phases of loss and reconciliation (Fields, 2015).

Contemporary scholarship recognizes visitors as active participants in memory-making, engaging with physical spaces rather than passively receiving narratives (Moskwa, 2021). This shift aligns with trauma-responsive museology, which integrates architecture and curation for greater emotional and reflective impact. However, existing studies often focus on either symbolism or sensory affect, seldom addressing their interplay, and many prioritize prominent Western memorials over diverse settings (Fields, 2015; Moskwa, 2021). There is also a lack of research combining architectural, psychological, and social perspectives on visitor experience using mixed- methods approaches (Oshima, 2020; Parkhomchuk, 2023). Addressing these gaps, this study examines how materiality, spatial organization, and visitor emotion interact at the Hiroshima Peace Memorial Museum, integrating narrative and survey data. This approach advances our understanding of how

memorial architecture can foster emotional healing and collective remembrance in post-trauma contexts.

Fig. 2. Aerial view of Hiroshima Peace Memorial Park

The museum and surrounding park exemplify how memorial architecture interacts with urban memory and landscape. The material qualities of the built environment — encompassing texture, mass, light, spatial proportion, and the patina of age — exert a profound emotional influence on how individuals perceive, experience, and form attachments to place. Unlike abstract branding messages transmitted through media or marketing campaigns, the materiality of architecture communicates directly through embodied experience, engaging the senses in ways that generate emotional resonance, trigger collective memory, and cultivate deep-seated feelings of belonging and identity (Amirshaghaghi & Nasekhian, 2021; Edensor, 2022). Stone walls worn by centuries of human contact, the acoustic qualities of a sacred interior, or the interplay of natural light filtering through historically significant structures all carry affective dimensions that transcend rational appraisal and connect individuals to the cultural and historical continuity of a place. Memorial architecture, in particular, exemplifies this intersection of materiality and urban memory, as museums, monuments, and commemorative landscapes are deliberately designed to sustain emotional engagement with collective histories and to anchor civic identity within the physical fabric of the city (Shanken, 2022). The museum and its surrounding park, for instance, represent a compelling case of how memorial architecture interacts with urban memory and landscape — transforming open public space into a site of reflection, cultural narrative, and shared meaning that simultaneously serves resident communities and communicates the city's historical depth to external audiences. In the context of city branding and authenticity, this emotional power of materiality represents an irreplaceable asset, as it constitutes the experiential foundation upon which genuine place attachment is built — an attachment that neither digital representation nor contemporary architectural novelty can fully replicate (Hazbei & Cucuzzella, 2023). Cities that recognize and strategically preserve the emotional affordances embedded in their material heritage, including the integrative potential of memorial spaces within urban landscapes, are therefore better positioned to cultivate authentic urban identities that resonate meaningfully with residents, visitors, and global audiences alike.

This study aims to examine how the architectural language, materiality, and spatial organization of the Hiroshima Peace Memorial Museum shape visitor emotional responses

and collective memory in a post-trauma context. Specifically, the study investigates the communicative power of architectural elements — including raw concrete, glass, lighting, and spatial sequencing — as non-verbal instruments that transmit narratives of trauma, resilience, and reconciliation to diverse audiences. Beyond the museum as a singular case, this research situates its findings within the broader discourse of city branding and place authenticity, exploring how memorial architecture functions as a strategic urban asset that contributes to the construction and communication of a city's cultural identity on the global stage. Through a mixed-methods approach integrating quantitative survey data and qualitative thematic analysis, the study seeks to demonstrate that authentic architectural narratives embedded in heritage and memorial spaces constitute a distinctive form of place branding — one that fosters genuine emotional engagement, deepens historical understanding, and enhances a city's reputational depth in ways that transcend conventional marketing strategies.

2. Methods

This study adopted a mixed-methods design to examine how the Hiroshima Peace Memorial Museum's architecture shapes visitor emotion, memory, and reflection, combining qualitative and quantitative approaches (Beckstead et al., 2011; Chen, 2012; Sylvester, 2021). This study conducted an architectural analysis using observation, photography, and literature review to assess materials, spatial sequencing, and symbolism within the museum (Tange, n.d.; Maki & Niihata, 2020; Broudehoux & Cheli, 2022). In parallel, 150 visitor reflections were collected from museum logbooks, TripAdvisor reviews, and semi-structured interviews. Narrative data were coded using NVivo with Braun and Clarke's six-step approach (Luli & Kawano, 2020; Moskwa, 2021). Survey and interview questions were developed based on emotional design literature and refined through pilot testing (Beckstead et al., 2011; Chen, 2012).

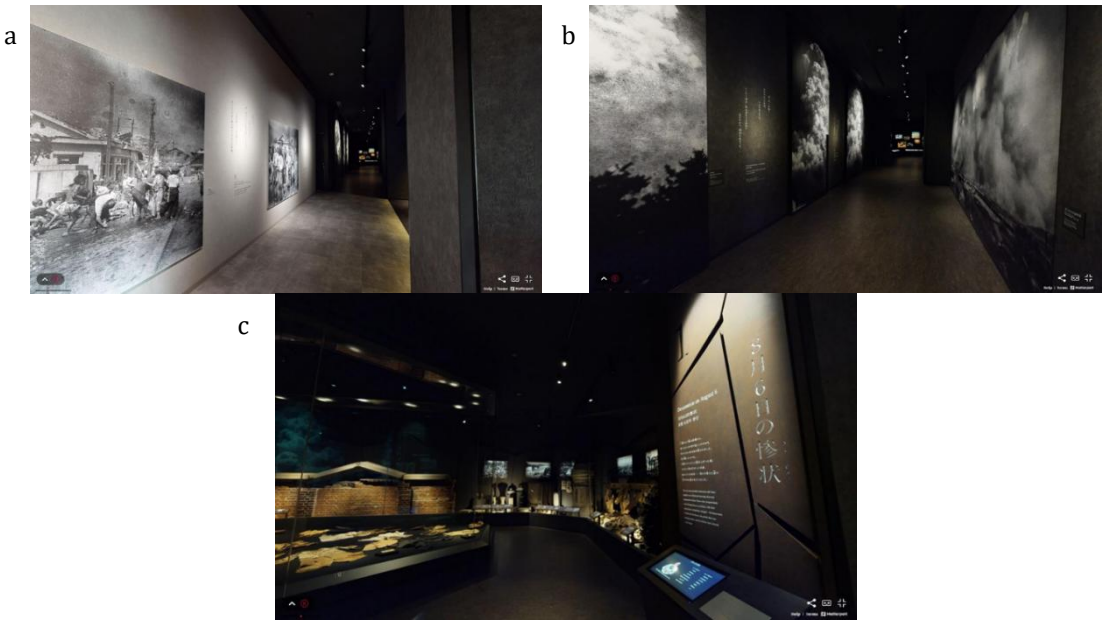

Fig. 3. (a) Interior corridor of the Hiroshima Peace Memorial Museum; (b) Museum hallway displaying historical imagery in subdued lighting; (c) Exhibit zone showing artifacts and emotional curation
(Schäfer, 2008)

2.2 Quantitative component

A structured questionnaire was administered to 150 adult visitors using convenience sampling. The survey measured emotional responses to architectural materials, spatial organization, and memory retention, drawing on validated instruments from previous

museum studies (Sylvester, 2021; Fields, 2015; Chen, 2012). Validity and reliability were ensured by expert review and pilot testing.

2.3 Data integration and triangulation

To clarify how each method addressed specific research questions, Table 1 summarizes the alignment between qualitative and quantitative approaches. This matrix outlines the data sources, collection techniques, and analysis strategies employed for each objective (Harada, 2000; Oshima, 2020).

Table 1. Data collection matrix for research questions

Research Question	Data Needed	Method of Collection	Purpose/Justification
How does the materiality of the Hiroshima Peace Memorial Museum affect visitors' emotional responses?	Visitor perceptions of materials (e.g., concrete, glass); Emotional reactions (sadness, awe)	Quantitative: Structured questionnaire; Qualitative: Open-ended responses, Nvivo coding	To measure how specific materials evoke emotional states; to validate symbolic interpretations through themes
How do the architectural elements communicate meanings that evoke cognitive and emotional responses?	Visitor interpretations of spatial layout and design; Associated feelings and meaning-making	Qualitative: Thematic analysis via NVivo; Observational notes; Survey Likert items	To uncover how design elements (thresholds, transitions) are emotionally and cognitively interpreted
How does the spatial organization of the museum guide visitors' psychological journeys, and what emotional experiences does it evoke?	Spatial movement and reflection patterns; Memory retention and emotional flow	Quantitative: Correlational analysis; Qualitative: Coded experiential narratives; Field observation	To examine the relationship between spatial design and emotional impact or memory retention

By triangulating narrative and survey results, this integrated approach enhances validity and provides a fuller understanding of how the museum's design influences visitors' emotional and cognitive experiences (Parkhomchuk, 2023; Moskwa, 2021). To further illustrate the research process, Figure 6 below compares the main qualitative and quantitative methods employed in this study. This comprehensive methodological framework ensures robust insights into the relationship between architectural design, emotion, and collective memory in a post-trauma context.

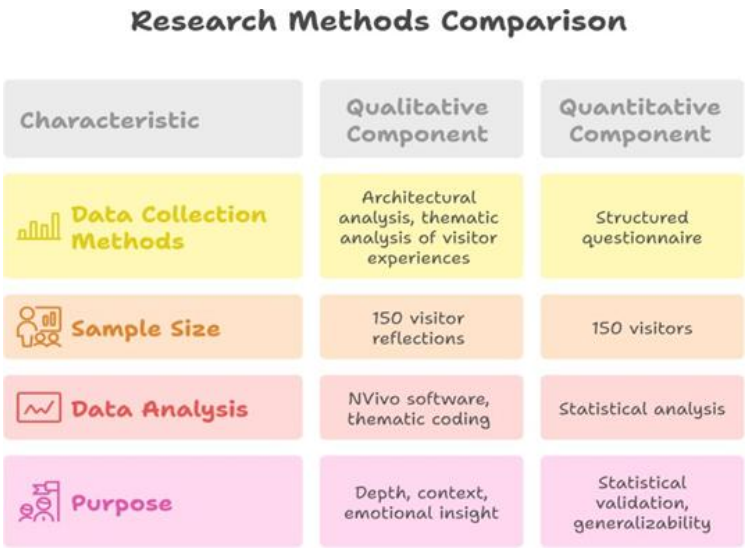

Fig. 4. Research methods comparison

3. Results and Discussion

3.1 Overview of integrated findings (results-oriented perspective)

This section synthesizes results from the mixed-methods approach, demonstrating how materiality and spatial organization at the Hiroshima Peace Memorial Museum shape emotional responses and collective memory. Combining survey data and thematic analysis provides robust evidence of architecture's emotional and cognitive impact in a post-trauma context (Beckstead et al., 2011; Broudehoux & Cheli, 2022; Oshima, 2020). Quantitative analysis of 150 participants showed that 85% found raw concrete "powerful and symbolic," while 82% felt glass evoked "fragility and hope" (Fields, 2015; Broudehoux & Cheli, 2022). Texture and lighting influenced emotions for 83% of respondents, supporting theories of multisensory architectural experience (Harada, 2000; Oshima, 2020; Maki & Niihata, 2020).

Spatial sequencing further shaped emotions: 85% linked narrow, dim corridors with claustrophobia or grief, while 78% associated open, luminous halls with peace and reflection (Broudehoux & Cheli, 2022; Sylvester, 2021). These spatial transitions align with Nora's lieux de mémoire and Oshima's narrative engagement, guiding visitors through an emotional journey (Nora, 1989; Cho, 2012; Oshima, 2020). Correlational analysis revealed strong positive links between spatial immersion and memory retention ($r = 0.68$, $p < .01$), and between emotional impact and overall experience ($r = 0.73$, $p < .01$), confirming that design deepens affective and cognitive engagement (Okuda, 2011; Beckstead et al., 2011).

NVivo-coded narratives uncovered recurring themes like "Emotional Disruption," "Journey from Darkness to Light," and "Peace and Reconciliation", that closely matched survey results (Moskwa, 2021; Luli & Kawano, 2020). Notably, 91% of participants expressing grief in surveys also reflected similar sentiments in open responses, showing strong consistency across data types. Overall, these findings confirm that the museum's materiality and spatial sequence actively shape individual and collective remembrance, supporting a trauma-responsive, healing-centered approach to memorial design (Sylvester, 2021; Parkhomchuk, 2023).

3.2 Emotional power of materiality

The materiality of the Hiroshima Peace Memorial Museum profoundly shapes visitor emotion and memory. Materials like raw concrete and glass serve as potent symbols, evoking grief, resilience, fragility, and hope to the museum's mission of remembrance and reconciliation (Harada, 2000; Oshima, 2020; Fields, 2015; Broudehoux & Cheli, 2022; Sylvester, 2021).

3.2.1 Concrete and glass as symbolic elements

Raw concrete functions as a marker of destruction and resilience. As shown in Table 2, 85% of visitors agreed or strongly agreed that raw concrete "felt powerful and symbolic." Qualitative feedback described it as "cold and unforgiving," directly referencing Hiroshima's traumatic legacy (Harada, 2000; Broudehoux & Cheli, 2022). The following figure illustrates how exposed concrete elements contribute to this emotional and symbolic experience. Glass, similarly, was seen by 82% as evoking "fragility and hope," its transparency symbolizing both vulnerability and the possibility of renewal (Maki & Niihata, 2020; Oshima, 2020; Fields, 2015).

Fig. 5. Raw concrete architecture of Hiroshima Peace Memorial Museum

Table 2. Visitor emotional response to materiality (n = 150)

Material Element	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Raw concrete felt powerful and symbolic	2%	3%	10%	47%	38%
Glass created a sense of fragility and hope	1%	5%	12%	43%	39%
Texture and lighting influenced my emotions	3%	6%	8%	49%	34%

3.2.2 Texture and lighting as emotional catalysts

Beyond material selection, texture and lighting further amplify emotional responses. As seen in Table 2, 83% reported that texture and lighting influenced their emotions. The interplay of rough concrete versus smooth glass, combined with controlled lighting, deepened visitor engagement and dim, enclosed spaces fostered grief and reflection, while lighter areas evoked peace and hope (Pallasmaa, 2005; Oshima, 2020).

3.2.3 Emotional disruption and material symbolism: Qualitative insights

Qualitative analysis corroborates these findings. Table 3 shows 81% reported emotional disruption (usually grief or sadness), often linked to concrete surfaces, while 77% experienced or interpreted material symbolism (Okuda, 2011; Beckstead et al., 2011).

Table 3. Frequencies: emotional response to architectural materials (N = 150)

Survey Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q4. The museum's materials made me feel emotionally engaged	2%	3%	10%	47%	38%
Q5. The spatial organization contributed to my emotional experience.	3%	6%	8%	49%	34%
Q6. I felt sadness or grief while moving through the exhibition.	1%	4%	4%	43%	48%
Q7. I experienced moments of hope or peace during/after the visit.	2%	5%	6%	44%	43%

3.2.4 Thematic amplification and symbolic resonance

Further NVivo-coded analysis (Tables 4 and 5) revealed recurring themes: Emotional Disruption, Material Symbolism, and Journey from Darkness to Light. Visitor comments, such as "The rough concrete was cold and unforgiving, like the past we can't change" and "I left feeling sad, but also hopeful like something good could grow from it," capture this dual role of materiality in catalyzing mourning and hope (Pallasmaa, 2005; Alexander, 2010).

Table 4. NVivo coding summary of emotional and spatial themes (n = 150 responses)

Coded Theme (form open responses)	Description	Frequency	% of Respondents	Key Quotations (Sampe Nodes)
Emotional Disruption	Feelings of grief shock, or sadness triggered by exhibits and architecture	122	81.3%	"The dimly lit corridors made me feel like I was walking through history's wounds."
Journey from Darkness Light	Emotional progression aligned with spatial transitions	108	72.0%	"At first, I felt trapped, then a strange relief in the wide open hall at the end."
Material Symbolism	Interpretation of concrete, glass, texturee as metaphors	95	63.3%	"The rough concrete was cold and unforgiving – like the past we can't change."
Reflective Engagement	Deep personal or historical reflection triggered by the space	84	56.0%	"It me forced to think – not just about Hiroshima, but about human fragility."
Peace and Reconciliation	Emergent sense of hope and global responsibility	77	51.3%	"I left feeling sad but also hopeful – like something good could grow from it."

Table 5. NVivo thematic analysis table for hiroshima peace memorial museum visitor reflections

Coded Theme	Description	Source (Interviews)	Key Quotations / Illustrations	Research Question Adressed
Emotional Disruption	Grief, shock, or sadness triggered by exhibits and architectural atmosphere	U.S. Soldier, Australian Man, Italian-German Couple, Dr. Macer	"Overwhelming and shocking"; "Many people were crying"	RQ1: Impact of materiality on emotional responses
Material Symbolism	Interpretation on of textures, artifacts, raw concrete as metaphors of destruction	Dr. Macer, Interviewees 3,4,5	"Concrete… cold and unforgiving"	RQ1 & RQ2
Journey from Darkness Light	Emotional progression aligned with spatial transitions	Italian-German Couple, Dr. Macer, General Visitors	"Contrast between darkness inside and light outside"	RQ3
Peace and Reconciliation	Emergent hope, unity, or call for nuclear disarmament	All Interviewees	"Call to action for peace"; "Hope for the future"	RQ2 & RQ3
Reflective Engagement	Personal reflection triggered by exhibits or architecture	Dutch Man, Interviewee 6, Dr. Macer	"Made me think about global politics and power"	RQ2 & RQ3

Historical Awakening	Shifts in understanding or awareness compared to prior knowledge	Dutch Man, Interviewee 6, U.S. Soldier	"Museum showed the human cost"	RQ1 & RQ2
Educational Significance	Advocacy for integrating peace educationa nd global awareness	Dr. Macer, Interviewee 5, Interviewee 7	"Used in curricula to teach ethics and peacebuilding"	Supports all RQs

3.2.5 Theoretical integration

Overall, these results support theories asserting materiality's emotional and symbolic importance (Pallasmaa, 2005; Alexander, 2010). Strong quantitative and qualitative agreement demonstrates that concrete and glass operate as a powerful symbolic language for trauma, resilience, and healing (Fields, 2015; Oshima, 2020; Broudehoux & Cheli, 2022). The observed correlation between spatial immersion and memory retention ($r = 0.68$, $p < 0.01$) underscores the link between emotional resonance and collective memory (Beckstead et al., 2011; Okuda, 2011). In sum, the museum's materiality transforms the visitor journey, allowing emotional disruption to give way to hope and reflection, demonstrating how materials act as vehicles for memory, healing, and reconciliation (Harada, 2000; Fields, 2015; Oshima, 2020).

3.3 Spatial narrative and psychological journey (uniqueness of design)

The spatial organization of the Hiroshima Peace Memorial Museum is central to its effect on visitors, guiding them on a symbolic journey from darkness and trauma to reflection and hope (Nora, 1989; Oshima, 2020). Key transitions are from narrow, dim corridors to open, bright halls mirror processes of grief, healing, and reconciliation (Beckstead et al., 2011; Broudehoux & Cheli, 2022). This spatial journey is visually represented in the corridor shown below.

3.3.1 Spatial flow and emotional sequencing: From darkness to light

Design features elicit specific emotional responses: Table 6 shows that 85% of visitors associated narrow, dim corridors with claustrophobia, tension, or grief, while 78% felt relief, reflection, and peace in open, well-lit halls. Glass panels and display cases further enhanced themes of fragility, transparency, and reverence (Fields, 2015; Maki & Niihata, 2020). This emotional discomfort begins in spaces like the one shown below, where darkness and narrowness intensify the sensory experience.

Fig. 6. Transitional corridor leading to a bright exit

Table 6. Architectural meaning and emotional engagement (n = 150)

Architectural Element	Emotional Engagement (%)	Thematic Association (Qualitative)
Narrow, dim corridors	85%	Claustrophobia, tension, grief
Transition to bright open halls	78%	Relief, reflection, peace
Use of glass panels	71%	Transparency, fragility, hope
Viewing relics through cases	67%	Distance from trauma, reverence

These findings confirm that spatial transitions actively shape psychological journeys and reflect Hiroshima's renewal (Oshima, 2020; Sylvester, 2021). At the emotional climax, visitors confront disturbing imagery in immersive, low-lit rooms such as the one shown below.

Fig. 7. Victim drawings and testimonies in darkened room

3.3.2 Spatial immersion and memory retention

Spatial design not only shapes emotion but also deepens engagement and memory. As shown in Table 7, spatial immersion strongly correlates with memory retention ($r = 0.68$, $p < 0.01$), and layout's emotional impact aligns closely with the overall experience ($r = 0.73$, $p < 0.01$). This supports theories that emotional and sensory engagement foster deeper memory (Okuda, 2011; Beckstead et al., 2011; Pallasmaa, 2005). These findings support multisensory architectural theories, which argue that memory forms most strongly when emotional and sensory engagement are maximized (Pallasmaa, 2005; Oshima, 2020).

Table 7. Correlation between spatial perception and memory retention

Variable Pair	Pearson's r	Significance (p)
Perceived spatial immersion ↔ Memory retention	0.68	< 0.01
Emotional impact of layout ↔ Overall experience	0.73	< 0.01
Layout clarity ↔ Historical understanding	0.59	< 0.05

3.3.3 Unique affective responses mapped to architectural transitions

Qualitative analysis further illustrates emotional progression. Table 4 shows 81.3% of visitors experienced emotional disruption (grief, shock, sadness) in confined, dim spaces, while 72% reported a shift to reflection and peace in brighter areas. Symbolic interpretations of concrete, glass, and texture reinforce this narrative (Beckstead et al., 2011; Broudehoux & Cheli, 2022). Table 8 cross-tabulates survey results with qualitative themes, confirming that 91% of those reporting grief also described emotional disruption narratively, and 78% linked this progression to greater memory retention (Moskwa, 2021; Luli & Kawano, 2020).

Table 8. Cross-tabulation: likert responses & NVivo qualitative themes

Survey Response (Likert Item)	Nvivo Coded Theme Most Associated	% Agreement (Matched Cases)	Observational Link
The museum's materials made me feel emotionally engaged.	Material Symbolism	86%	Strong overlap with symbolic interpretation of concrete and glass
I felt a sense of sadness or grief while moving through the exhibition.	Emotional Disruption	91%	High emotional alignment confirmed in open-text responses
I am likely to remember this experience long-term.	Reflective Engagement, Journey from Darkness to Light	78%	Spatial progression amplified memory in qualitative statements
I experienced moments of hope or peace during or after the visit	Peace and Reconciliation	74%	Linked to transitions to brighter, open spaces

This intensity of affect is heightened by spatial design choices that direct the visitor through dim, narrow corridors filled with evocative imagery.

Fig. 8. Hallway evoking grief and reflection

These findings confirm that the museum's spatial narrative invites a psychological journey of emotional disruption, reflection, and ultimately, reconciliation which is demonstrating the power of integrated material and spatial design in shaping memory and healing (Broudehoux & Cheli, 2022; Sylvester, 2021). The emotional arc concludes in open, light-filled spaces that promote calm and reflection, such as the corridor shown below.

Fig. 9. Bright gallery corridor representing renewal

3.4 Architectural language as communicative power

Architecture conveys meaning beyond words, using form, material, and space as a silent language (Beckstead et al., 2011; Pallasmaa, 2005). The Hiroshima Peace Memorial Museum demonstrates this power, employing its architectural language to narrate trauma and the pursuit of peace (Broudehoux & Cheli, 2022; Oshima, 2020). Through spatial and material choices, the museum functions as non-verbal storytelling, fostering an emotional and intellectual dialogue with visitors.

Architecture functions as a non-verbal communicative system through which cities articulate identity, values, and aspirations to both domestic and international audiences. Far beyond its utilitarian role as built shelter, the architectural language of a city operates as a strategic medium of place branding, transmitting cultural narratives, historical depth, and civic ambition across time and geography. Scholars in urban studies and communication theory have increasingly recognized that the spatial grammar of buildings, monuments, and public spaces constitutes a form of soft power — one that shapes perception, attracts investment, stimulates tourism, and fosters a sense of belonging among residents (Sevin, 2025). In this sense, architectural language is not merely expressive but fundamentally persuasive, functioning as a continuous and ambient form of city communication that contributes directly to the long-term management of urban reputation.

The communicative power of architecture is most evident in how cities deploy iconic structures and heritage landscapes to differentiate themselves within an increasingly competitive global arena (Geng et al., 2023). Landmark buildings, whether historically inherited or contemporarily commissioned, serve as visual anchors that consolidate place identity and render cities legible to external audiences (Bo & Abdul Rani, 2025; Zamparini et al., 2023). The strategic deployment of architectural iconography aligns directly with place branding logic, wherein authenticity and visual memorability become competitive assets in attracting global attention and sustaining reputational equity (Sklair, 2006). Cities that succeed in conveying genuine cultural and historical rootedness through their built environments tend to generate stronger emotional engagement from tourists, investors, and diaspora communities than those whose architectural landscapes appear manufactured or superficially commodified (Campelo et al., 2014). This distinction between authentic and simulated architectural narratives has become increasingly significant in an era of globalized urban development, where many cities risk producing homogenized built environments that dilute local identity.

Religious architecture occupies a particularly distinctive position within this communicative landscape, as sacred structures not only demarcate spiritual geographies but also function as powerful anchors of collective memory and cultural identity (Kleinhempel & Nicolaides, 2024; Liutikas, 2023). Mosques, cathedrals, temples, and other sacred edifices frequently constitute the most symbolically dense elements of a city's architectural vocabulary, simultaneously serving local spiritual communities and projecting images of cultural depth to global audiences (Timothy & Olsen, 2006). Furthermore, contemporary developments in digital media have extended the reach of architectural language beyond physical encounter, enabling cities to communicate their built identities to global audiences through virtual tours, social media imagery, and cinematic urban representation. This digitally mediated dimension introduces new responsibilities for city branding practitioners, who must ensure that the architectural narratives projected through digital channels remain consistent with the lived cultural and historical realities that give those spaces authentic meaning (Dinnie, 2011). The governance of architectural language as communicative power thus becomes inseparable from broader questions of cultural policy, heritage management, and the ethics of place representation in the global public sphere.

3.4.1 Non-verbal storytelling: Concrete, glass, and space

Raw concrete and glass, along with spatial transitions, serve as visual and sensory metaphors (Fields, 2015; Sylvester, 2021). Exposed concrete signals trauma and resilience (Harada, 2000); glass suggests vulnerability and hope (Maki & Niihata, 2020). Moving from dim, compressed corridors to open, luminous galleries guides visitors through grief and reflection to renewal a spatial narrative aligning with Hiroshima's transformation (Oshima, 2020; Cho, 2012; Broudehoux & Cheli, 2022).

3.4.2 Visitor reflections and empirical data

Quantitative and qualitative data confirm the strong link between architecture and emotion. Survey responses align with NVivo-coded reflections: grief is tied to dark, confined spaces, while hope and peace are linked with open, light-filled areas. The results of table 8 before show that emotional disruption in concrete corridors and peace in open halls strongly correspond between quantitative and narrative data (Moskwa, 2021; Luli & Kawano, 2020).

3.4.3. "Speech without words": Architecture as communication

As Beckstead et al. (2011) and Broudehoux & Cheli (2022) argue, memorials communicate through materiality and spatial organization, not just explicit narratives. In Hiroshima, the interplay of concrete, glass, and shifting spaces silently conveys trauma, resilience, and hope (Oshima, 2020; Nora, 1989).

3.4.4 Synthesizing the emotional journey

Both quantitative and qualitative data reveal that the museum's architectural language guides visitors through grief, reflection, and to reconciliation. The space does not passively present history, it actively shapes emotion, memory, and healing (Beckstead et al., 2011; Oshima, 2020; Fields, 2015). In sum, the Hiroshima Peace Memorial Museum exemplifies architecture as a potent "speech without words", a spatial narrative communicating trauma, resilience, and reconciliation, and inspiring hope (Pallasmaa, 2005; Broudehoux & Cheli, 2022; Oshima, 2020).

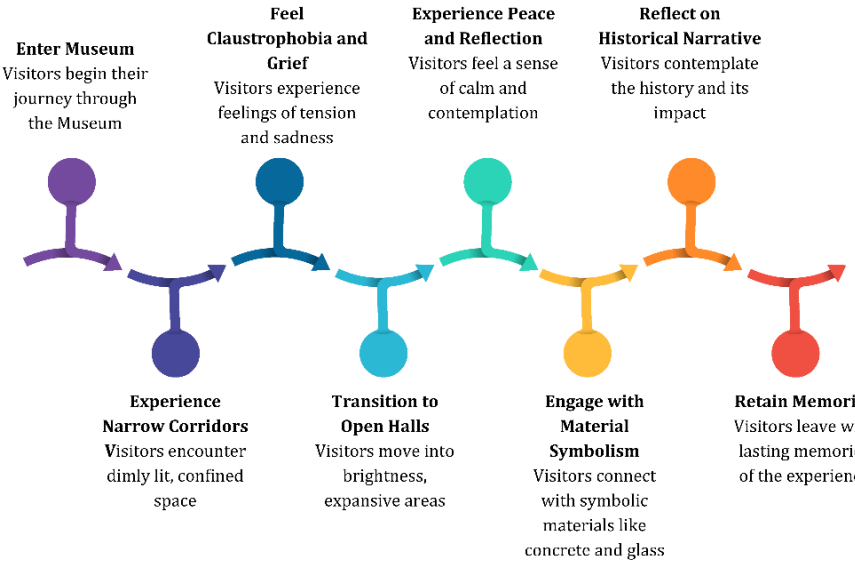

Fig.10. Emotional journey through the Hiroshima Peace Memorial Museum, illustrating architectural influence on visitor emotions

3.5 Novel contributions to peace education and memory studies

This study makes a significant contribution to peace education and memory studies by systematically integrating emotional analytics and architectural critique. Using the Hiroshima Peace Memorial Museum as a case, it demonstrates through qualitative and quantitative methods how material and spatial choices actively shape emotional engagement and collective memory in a post-trauma context (Harada, 2000; Beckstead et al., 2011; Oshima, 2020).

3.5.1 Bridging gaps in the literature

Earlier studies of memorials have focused largely on symbolism or aesthetics, often overlooking measurable psychological effects (Chen, 2012; Harada, 2000). This research addresses that gap, empirically illustrating how design especially raw concrete, glass, and spatial sequencing provokes grief and also enables reconciliation and hope (Fields, 2015; Broudehoux & Cheli, 2022). Tables 8 and 9 show how raw concrete and dim corridors evoke grief, while open, light-filled halls promote reflection and peace (Okuda, 2011; Pallasmaa, 2005; Nora, 1989).

3.5.2 Empirical evidence: emotional and cognitive engagement

Table 9 indicates that 90% of respondents agreed their historical understanding increased, and most will remember the experience long-term. This matches Table 8's finding that higher emotional engagement correlates closely with memory retention, demonstrating the interconnectedness of emotion and cognition in memorial spaces (Broudehoux & Cheli, 2022; Luli & Kawano, 2020).

Table 9. Frequencies: memory and cognitive engagement (N = 150)

Survey Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q8. I learned new information that enhanced my understanding of Hiroshima's history.	1%	2%	7%	53%	37%
Q9. I am likely to remember this experience long-term.	1%	3%	8%	49%	39%
Q10. Architectural elements helped me form a deeper emotional connection.	2%	4%	11%	50%	33%

3.5.3 Advancing the field: Integrating architectural critique and emotional analytics

A key innovation is the mixed-methods approach, directly correlating emotion and cognition to design (Moskwa, 2021; Pallasmaa, 2005). This study reveals the psychological effects of architecture in collective remembrance (Beckstead et al., 2011; Okuda, 2011).

3.5.4 Implications for trauma-responsive and healing-centered memorial design

The transition from confined, somber corridors to open, bright halls exemplifies how spatial design guides visitors through grief, reflection, and reconciliation (Sylvester, 2021; Cho, 2012). This method provides a template for trauma-responsive memorials, showing how integrating architectural critique and emotional analytics can support societal healing and peacebuilding (Oshima, 2020; Fields, 2015). In summary, the findings demonstrate that memorials like Hiroshima foster not only remembrance but also emotional engagement, cognitive integration, and collective healing (Beckstead et al., 2011; Oshima, 2020; Fields, 2015).

3.6 Synthesis of insights and theoretical alignment

This section integrates empirical results with key theoretical frameworks, demonstrating how the architectural and emotional design of the Hiroshima Peace Memorial Museum advances memory studies and architectural psychology. By weaving together quantitative correlations (Table 10) and qualitative themes (Table 5), this analysis situates the museum's impact within Nora's lieux de mémoire, Pallasmaa's multisensory immersion, and Beckstead's spatial-memory dialectic.

The preceding discussions across the various thematic dimensions of this study converge upon a coherent theoretical understanding of how architectural language, cultural heritage, and place identity collectively constitute the foundational pillars of effective city branding. Drawing from the intersecting frameworks of place branding theory, urban semiotics, and authenticity studies, it becomes evident that cities do not communicate their identities through isolated elements but rather through an integrated system of spatial, cultural, and symbolic resources that operate simultaneously and reinforcingly (Kavaratzis & Ashworth, 2005; Anholt, 2007). This synthesis affirms that the strength of a city's brand is ultimately determined by the coherence and authenticity with which these layered dimensions of identity are managed, communicated, and sustained over time in response to both local aspirations and global competitive pressures.

Theoretically, this study finds meaningful alignment between the communicative turn in place branding scholarship and broader frameworks drawn from cultural geography, heritage studies, and urban governance. The notion that cities are simultaneously producers and products of meaning — shaped by their histories, spatial configurations, religious landscapes, and cultural practices — resonates strongly with relational approaches to place identity that emphasize the dynamic and co-constructed nature of urban authenticity (Campelo et al., 2014; Ibrahimi, 2024; Zenker & Braun, 2017). Rather than treating authenticity as a fixed or inherent property of place, this alignment of theoretical perspectives supports a more processual understanding in which authenticity is continuously negotiated between city stakeholders, governing institutions, residents, and external audiences. Such a perspective has significant implications for how city branding strategies are designed, as it calls for participatory, culturally sensitive, and historically informed approaches that resist superficial commodification.

Taken together, these theoretical alignments suggest a robust framework for understanding city branding not merely as a marketing exercise but as a governance challenge that demands interdisciplinary engagement and long-term strategic commitment. The insights synthesized throughout this study point toward a model of place branding in which architectural language, cultural heritage, religious identity, and digital representation are treated not as separate policy domains but as mutually reinforcing communicative resources that must be orchestrated with coherence and integrity (Dinnie, 2011; Timothy & Olsen, 2006). This integrated perspective offers both conceptual clarity for future scholarly inquiry and practical guidance for urban policymakers and branding practitioners seeking to build distinctive, authentic, and globally competitive city identities that remain deeply rooted in the lived realities and cultural aspirations of their communities.

3.6.1 Nora's Lieux de Mémoire: Memory sites as emotional anchors

Nora's theory contends that physical sites serve as symbolic anchors for collective memory (Nora, 1989). The Hiroshima museum embodies this, with its materiality and spatial transitions transmitting Hiroshima's trauma and resilience. Table 10 shows a strong correlation between spatial immersion and memory retention ($r = 0.68$, $p < .01$), demonstrating that meaningful engagement with architectural space leads to deeper, long-term memory formation (Oshima, 2020; Beckstead et al., 2011).

3.6.2 Pallasmaa's multisensory immersion: Engaging the senses

Pallasmaa (2005) argues that architecture must engage all senses for deeper emotional resonance. At Hiroshima, raw concrete, glass, and changing light and sound create a full-bodied sensory experience. As reflected in Table 5, visitor reflections highlight how concrete's "cold and unforgiving" qualities and glass's "fragility and hop" provoke powerful emotions (Pallasmaa, 2005; Fields, 2015; Maki & Niihata, 2020), supporting his claim that sensory qualities anchor emotional memory. The physical environment thus catalyzes multisensory immersion and vivid memory aligning with Pallasmaa's perspective (Pallasmaa, 2005; Oshima, 2020).

3.6.3 Beckstead's spatial-memory dialectic: Architecture as container and communicator

Beckstead et al. (2011) propose that architecture is both a vessel and communicator of memory. Table 10's strong link between emotional impact and memory retention ($r = 0.73$, $p < .01$) validates this theory: the museum does not simply house memory but guides visitors through affective experience toward deeper understanding (Beckstead et al., 2011; Okuda, 2011). The qualitative progression from grief in dark spaces to peace in brighter ones, as shown in Table 5, further illustrates how spatial design shapes emotion and memory (Broudehoux & Cheli, 2022; Sylvester, 2021).

3.6.4 Convergence of statistical patterns and lived narratives

Taken together, Tables 10 and 5 show how statistical patterns and lived visitor experiences converge, demonstrating the transformative power of emotional architecture. The museum acts as both vessel and catalyst, an active lieu de mémoire continually shaped by sensory and spatial experience (Nora, 1989; Oshima, 2020; Fields, 2015). In summary, the data not only affirm but extend foundational theories: the Hiroshima Peace Memorial Museum's emotional architecture deepens memory, enables healing, and models how spatial, material, and sensory design can address psychological needs in post-trauma contexts (Beckstead et al., 2011; Pallasmaa, 2005; Nora, 1989; Oshima, 2020; Broudehoux & Cheli, 2022).

3.6.5 Reflective commentary on methodology

This study's mixed-methods approach provided a comprehensive view of how architectural design at the Hiroshima Peace Memorial Museum shapes emotional engagement and memory retention (Harada, 2000; Oshima, 2020). By integrating quantitative surveys with qualitative visitor reflections, the research yielded both generalizable data and rich contextual insight into how materiality, spatial layout, and sensory features influence remembrance (Chen, 2012; Fields, 2015).

The strength of this design lies in triangulating measurable patterns with nuanced individual accounts. Quantitative findings confirmed a strong positive correlation between spatial immersion and memory retention ($r = 0.68$, $p < 0.01$), illustrating the impact of space on memory and emotion (Broudehoux & Cheli, 2022; Beckstead et al., 2011). Qualitative coding illuminated how raw concrete, glass, and lighting elicited grief, hope, and reflection— often described metaphorically—demonstrating links between physical form and psychological processing (Pallasmaa, 2005; Okuda, 2011).

This approach advances memorial architecture research beyond symbolic analysis by empirically showing design's psychological effects (Harada, 2000; Chen, 2012). By blending qualitative themes with quantitative measurement, the research offers a holistic framework for understanding emotional and mnemonic engagement in memorial spaces (Luli & Kawano, 2020; Moskwa, 2021).

3.6.6 Replicability in other post-trauma memorial contexts

This methodology is adaptable to memorials like the Berlin Holocaust Memorial or 9/11 Museum (Broudehoux & Cheli, 2022; Beckstead et al., 2011). Mixed methods allow analysis of how design, material, and sensory experience affect visitor emotion and memory in different contexts (Chen, 2012; Sylvester, 2021; Oshima, 2020), offering a research model for complex trauma memorials worldwide.

3.6.7 Visual synthesis and methodological contributions

Figure 3 visually synthesizes these findings, showing how materiality and spatial sequencing underpin emotional and cognitive impact. This underscores that architectural design actively shapes memory, emotion, and societal healing (Fields, 2015; Beckstead et al., 2011). In summary, the mixed-methods design yields deep, multidimensional insight and establishes a model for future post-trauma memorial research. Combining quantitative and qualitative analyses, it demonstrates architecture's role as a catalyst for remembrance and healing (Harada, 2000; Oshima, 2020; Beckstead et al., 2011).

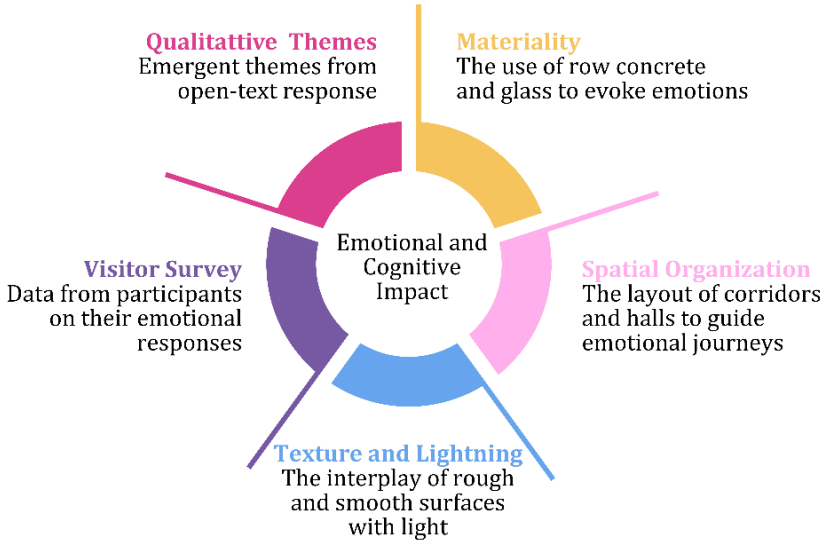

Fig. 11. Summary of the emotional and cognitive impact of the museum's design

4. Conclusions

This study confirms that architectural design at the Hiroshima Table 8. Cross-Tabulation: Likert Responses & NVivo Qualitative Themes Peace Memorial Museum does more than preserve memory and it actively constructs emotional and cognitive experiences that guide visitors through processes of mourning, reflection, and reconciliation. By integrating raw materials like concrete and glass with spatial narratives of light and enclosure, the museum engages the senses and emotions in ways that make memory tangible and healing possible.

The use of a mixed-methods framework quantitatively mapping emotional and memory responses while qualitatively exploring visitor reflections yields compelling evidence that spatial immersion correlates strongly with memory retention ($r = 0.68$, $p < .01$), while emotional impact closely aligns with the overall experience ($r = 0.73$, $p < .01$). Over 80% of respondents expressed emotional resonance with the architectural materiality, with raw concrete symbolizing destruction and resilience, and glass evoking fragility and hope. What distinguishes this study is its novel integration of architectural critique and emotional analytics. It transcends traditional symbolic analysis by empirically validating how spatial and sensory elements affect visitors' emotional states and cognitive processing. In doing so, it extends Nora's (1989) concept of lieux de mémoire and

Pallasmaa's (2005) theory of multisensory immersion by demonstrating how architectural design actively produces memory and emotion, rather than passively representing them.

Ultimately, the findings offer a trauma-responsive, healing-centered framework for future memorial design, one that acknowledges architecture's potential to not only commemorate history but to catalyze psychological transformation and peacebuilding. The Hiroshima Peace Memorial Museum, therefore, stands not merely as a historical archive but as a living emotional architecture capable of shaping remembrance and fostering a more empathetic, reflective society.

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