

Augmented Reality Media System Rooted in Bodily Experience and Designed for Cultural Heritage

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Abstract: The purpose of this study is to explore how augmented reality applications establish experiential connections between visitors and the bodies of past people, which help visitors to learn about cultural heritage by experiencing the perceptual memories of past people. This paper explores augmented reality design concepts for cultural heritage from the perspective of bodily experience. The core innovation of this study is to examine how visitors use augmented reality to experience the perceptual memories of past people's bodies, in order to learn about history and culture. This study specifically addresses how visitors can learn about cultural heritage through the experiences of past people's bodies; how visitors' bodies, AR equipment and content, and real cultural heritage constitute a media system, which allows visitors to learn through the bodily experiences of the past; and how media systems and bodies collectively construct a contemporary understanding and memory of cultural heritage, forming a hyper-presence of sites of memory for cultural heritage.

1. Introduction

Augmented reality (AR) applications presenting cultural heritage, both tangible and intangible, must account for the ways in which visitors' bodily experiences influence their understanding of information. Paul Milgram and Fumio Kishino proposed Milgram's Reality-Virtuality Continuum [1], which emphasized the relationship between virtual and real environments in AR design and focused on visitor understanding, situated within the connection between the virtual and the real. However, for visitors placed within virtual history and real environments, their own bodies are the foundational piece in experiencing both virtual content and real environments. When visitors use AR equipment to obtain information, the comparisons and contrasts between their own experiences and the experiences of people from the past will influence their own understanding of cultural heritage.

AR application design can attempt to establish connections between visitors' bodies and the bodily experiences of people from the past, so that visitors learn about cultural heritage and history. Cultural heritage includes objects that people once used, the buildings and environments in which they lived, and the practices, performances, knowledge, skills, and related objects and sites that are seen as cultural heritage. Utensils, tools, buildings, environments, behaviors, knowledge, and skills were all closely related to the bodily experiences of people in a given historical period, condensing memories and feelings of life at that time. AR design can establish relationships between the bodily experiences of visitors and people from the past, offering visitors' bodies a simulated experience of feelings and perceptual memories from that time. The advantage of AR technology is that visitors can experience information in a given space by fusing a real environment with virtual content. The application design must bring together cultural heritage, real environments, and visitors' bodily experiences, by establishing a connection between the bodily experiences of visitors and past people and considering how visitors learn about cultural heritage and history through comparisons or

contrasts of bodily experiences. This paper will explore augmented reality design for cultural heritage rooted in bodily experience by examining how visitors experience cultural heritage and understand the world of the past through the bodies of people from the past, how AR constitutes a media system that allows visitors to gain knowledge through the bodily experiences of past people, and how the media system and the body collectively construct a contemporary understanding and memory of cultural heritage to create sites of memory for the hyper-presence of cultural heritage.

2. Manuscript Preparation

A media system comprised of augmented reality, real cultural heritage, and visitors' bodies can allow visitors to experience past objects and environments through the bodies of past people, thereby creating a contemporary understanding and memory of cultural heritage. A media system unites the body's perceptual fields and descriptions, using bodily experiences and metaphors to shape an understanding of the perceptual memories of past people in contemporary visitors. This system is constantly incorporating contemporary thoughts and ideas, as well as memories and experiences, to build a hyper-presence of sites of memory for cultural heritage.

2.1. Experiencing How a Past World was understood through the Bodies of Past People

Through encounters with the bodily experiences that past people had with past objects and environments (today's cultural heritage), visitors can learn about the relationships between man and nature and man and society from that period, using cultural experiences and metaphors and by comparing and contrasting bodily experiences.

Cultural heritage is an embodiment of social behavior, expressing the understanding that past people had of nature and society. Cultural heritage is an important resource for understanding history, which can help us learn about past societies and lives from multiple perspectives and on multiple levels and offer us a research framework for understanding social behaviors at that time. "Museum collections are meaningful because they present and express social behaviors and activities related to items in the collection, including the work, life, social activity, and spiritual activity of individuals and social groups. Museum collections are the products of these social behaviors and social activities, and as a result, they have their own presences and expressive forms, but at the same time, their own forms and modes of existence record and reflect these social behaviors and activities [2]." Thus, cultural heritage can reflect people's actions within society, and provide a concentrated presentation of humanity's multiple relationships.

Cultural heritage is closely connected with people's bodies, and when brought together, cultural heritage and the body constitute a way of understanding social action. The bodily behaviors of past peoples are intimately linked to the objects and social environments of the past. The body is a key element in social behaviors, and together bodies play the role of medium in many relationships. Merleau-Ponty wrote, "One's own body is in the world just as the heart is in the organism: it continuously breathes life into the visible spectacle, animates it and nourishes it from within, and forms a system within it [3]." People complete social actions with bodily movements and perceptions, and so social actions fall within this system. "The incarnate domain of relations between body and world is an 'interworld' (l'intermonde) [4]," and this world provides social action with perceptual fields and descriptions. Cultural heritage is produced in social behaviors, and it is also the product of the interworld or is the material or behavioral manifestation of what Franz Brentano called representations or imaginations (Vorstellungen) [5]. Thus, the close relationship between cultural heritage and the body could be seen as a medium for manifesting humanity's numerous relationships, and through this medium, viewers can imagine, experience, and understand the work, life, society, culture, and religious activities of a past time.

From a bodily perspective, cultural heritage can reflect the relationships between man and nature and man and society at a given time. Objects, buildings, practices, performances, knowledge, and skills can convey thoughts and concepts, expressing the multiple relationships of man. From these vehicles for thoughts and concepts, we can infer or imagine past interworlds. Through an analysis of this world, we can experience and understand thoughts of the past. For example, tools reflected

people's understanding of and ability to utilize natural environments. From the characteristics of tools from the Stone Age, experts can infer and analyze characteristics of the bodies of people who lived tens of thousands of years ago, why they created and used these tools, and how they obtained the resources they needed to live from the natural environment. Architectural heritage can show the relationships between man and society. For example, from the proportional relationships between religious buildings, spaces, icons, and bodies, and the perspectives from which people looked at the icons, visitors can experience or imagine how people at that time understood religion.

Comparing and contrasting bodily experiences are important ways for viewers to infer or imagine an interworld, and humanity's experiences with nature and culture are its foundations. The body uses comparisons to encode perceptions of the world as information, and movements of the body help to compare the information and form experiences. Summaries of these experiences constitute thoughts and concepts, creating a replacement system for the world. "Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature [6]." Ideas and concepts make up human cognition, reflecting human metaphors for the world. Metaphors reveal cultural experiences and can systematically elucidate social behaviors. Lakoff and Johnson explored orientational metaphors, ontological metaphors, and container metaphors [6]. Experiences and metaphors are the results of comparisons or contrasts of bodily experience, and from the results, we can imagine, infer, and analyze the body's perceptual fields and descriptions of the world.

Through some basic cultural concepts, experiences and metaphors are learned and communicated through the body, and they can establish comparative or contrasting connections between interworlds in different spaces and times, which can construct an understanding of historical knowledge or the foundations of different cultures. "The most fundamental values in a culture will be coherent with the metaphorical structure of the most fundamental concepts in the culture [6]." For example, the spatial metaphors of "up" and "down" provide basic cultural concepts. These basic concepts provide a pre-set cultural context for the body's perceptual realm and description of the world, thereby creating cultural coherence and helping visitors to coherently learn about history in an experiential way. Basic cultural concepts can also establish connections of communication and understanding between different cultures, and these connections are underpinned by people's understanding of the real physical world. "Up" and "down" can be understood using comparisons of bodily experiences in different cultures with similar contexts; in completely different contexts, visitors can understand through interpretation and contrast.

AR technologies can interact with visitors' bodies, intervening in comparisons and contrasts of bodily experiences and influencing the body as a medium. Next, this paper will explore how visitors learn about cultural heritage through the body and AR.

2.2. The Media System Formed by AR Allows Visitors to Learn From the Bodily Experiences of People from the Past

AR equipment combines virtual content with real environments or objects, interacting with the viewer in real time and bringing the viewer's body, AR equipment and content, and real cultural heritage together into a media system. This system can simulate the bodily experiences of people from the past, using virtual experiences and metaphors to express the past perceptual realms and descriptions related to cultural heritage. Through this system, visitors can appreciate the bodily experiences of people from the past, using comparisons and contrasts to experience the feelings of past people, understand cultural heritage, and learn about history.

The combination of real cultural heritage, augmented reality, and the body constitutes an informational pattern for cultural heritage that is rooted in this media system. Shannon has theorized that information is a pattern [7]. Real cultural heritage and knowledge are encoded, transmitted, and decoded through AR technologies, which then interact with visitors' bodily comprehension and action and produces meaning in the interworld of cultural heritage and the body. Through subjective and objective constructions, meaning shapes knowledge and understanding, constituting an informational pattern for cultural heritage. This pattern is characterized by the connections between

cultural heritage, augmented reality, and bodily movement, which creates an “intertwining” [8], thereby describing and conveying knowledge in the interworld.

Visitors’ visual and bodily attitudes are the intertwined relationships between perceptions; visual movements influence kinesthesia and bodily movements influence visual cognition. These two perceptions verify, supplement, and provide context for one another, constantly conveying information to visitors and constituting the body’s understanding of the world. Perception is “a recreation or reconstitution of the world at each moment [3].” This world includes real cultural heritage and invisible history. AR combines virtual objects with reality, and virtual technologies allow history to be seen or perceived with the body in real time. The visible and invisible parts are united into a single entity. “The unity of the object would be conceived of—but not experienced as—the correlate of the unity of our body [3],” and through AR, this unity entwines visitors’ visual and bodily attitudes, that is, “it continuously breathes life into the visible spectacle [3].”

Augmented reality, cultural heritage, and visitors create interactive connections by intertwining vision, gestures, and motion. AR uses 3D virtual objects on the screen to influence what visitors see, sparking the imagination. They inspire visual fantasies and cause changes in the body’s posture and movement, allowing AR to intervene in visitors’ relationships to bodily perception and movement within a cultural heritage context. When visitors look at an AR device’s screen, virtual objects influence their perceptions and AR becomes a new sensory organ for them. When combined with the body, it becomes a new embodiment relation for visitors (Figure 1), a world that combines the real and the virtual and presents it to the visitor. Ihde believes that “the artifact is symbolically ‘taken into’ my bodily experience and directed toward an action into or upon the environment [9].” This embodiment relation transcends visitors’ natural perceptual limitations of real cultural heritage, allowing them to see invisible cultural knowledge or historical landscapes that have already disappeared. What extended perceptions actually present are virtual artifacts (Figure 2), and these artifacts influence visitors’ understanding of cultural heritage and create new interpretations of history. Thus, the media system created by the interactive connections between AR, cultural heritage, and the body virtually create an informational presence of cultural heritage. This lays the foundation for the transmission of cultural heritage through AR.

(human - technology) → environment

Figure 1 Embodiment Relations According to Don Ihde [9].

human → (technology - world)

Figure 2 Hermeneutic Relations According to Don Ihde [9].

Through the combination of artifacts and cultural heritage, this embodiment establishes a connection between the perceptual fields of visitors and people from the past, allowing visitors to learn about how past humans thought and about cultural heritage from the bodily perceptions of these past people. Cultural heritage is comprised of past objects and lives, reflecting and describing the understanding that people had at the time. This descriptive content can be simulated as a reality using AR, which can be understood through virtual artifacts. Establishing connections between bodily fields of perception for visitors and past people can foster cognitive communication between bodies. “If we believe in the world’s past, in the physical world, in ‘stimuli,’ and in the organism such as it is represented by textbooks, this is first of all because we have a present and real perceptual field, a surface of contact with the world or a perpetual rooting in it; it is because the world ceaselessly bombards and beleaguers subjectivity. All knowledge is established within the horizons opened up by perception [3].” AR design can find similarities or commonalities, such as basic cultural concepts, in the perceptual fields of contemporary visitors and past people. Through the pre-existing cultural contexts of these concepts, cultural coherence allows visitors to experience and understand the bodily processing of past people through comparison. Perhaps through interpretation, contrasts of bodily experiences can help visitors to understand and experience cultural heritage from the bodily perceptions of past people. Similarities or commonalities in these perceptual fields can be found in some basic experiences of nature, and these experiences are the

products of human nature, which can include “Our bodies (perceptual and motor apparatus, mental capacities, emotional makeup, etc.); Our interactions with our physical environment (moving, manipulating objects, eating, etc.); Our interactions with other people within our culture (in terms of social, political, economic, and religious institutions) [6].”

(human-AR) → (AR-heritage/environment) → human in the past → history

Figure 3 An embodiment that combines AR and the body and slows visitors to understand history and humans in the past through cultural heritage.

Through experiences and metaphors, thoughts and concepts in AR create a replacement system for the world, which transforms the visitor’s body, AR equipment and content, and real cultural heritage into a media system that can help visitors learn about history and culture from the bodily experiences of past people, thereby disseminating the informational patterns of cultural heritage. This replacement system is a media system, which serves as a way of understanding and conveying this information. In Bavay, “the archeological museum for the Nord Department goes a step further and has been working toward a full 3D model of the second-century forum in augmented reality on the archeological site [10].” This AR system allows visitors to view a 3D virtual restoration of the Roman forum in Bavay from the scale and spatial perspective of an ancient Roman. “With a tablet, the visitor can now browse the sacred site, the esplanade, and the crypt, and see a restored vision of the Roman ruins [10].” (Figures 4 and 5).



Figure 4 The Roman forum in Bavay presented in AR [11].



Figure 5 A visitor experiences the Roman forum in Bavay in AR with the scale and perspective of an ancient Roman [11].

The AR system for the Roman forum in Bavay presents ruined buildings in real-time as 3D virtual artifacts. The visitor holds AR equipment, creating a human-technology relation. The artifacts and the historical site merge with the visitor’s bodily experience. Virtual artifacts and spaces in augmented reality simulate bodies and experiences from the Roman era, and viewers see and experience these buildings from a height and perspective similar to that of a Roman, establishing a connection between their own fields of perception and those of Romans and creating a replacement system to simulate the bodily experiences of Romans at the forum. By comparing (or contrasting) their own experiences with those of Roman bodies, visitors learn about the Roman forum in Bavay. Next, this paper will explore the links between this media system and visitors’ understandings and memories of cultural heritage.

2.3. The Media System and the Body Create a Contemporary Understanding and Memory of Cultural Heritage

Intertwining the media system and bodily experience places visitors within a culturally coherent historical field and collectively constructs visitors’ contemporary understanding of cultural heritage, which shapes their memories for the past, present, and future. Maurice Halbwachs noted, “...in reality memories occur in the form of systems. But these various modes by which memories

become associated result from the various ways in which people can become associated [12].” However, memory is a process of constant construction and “the past is not preserved but is reconstructed on the basis of the present [12].”

When visitors learn about the bodies and experiences of past humans, they are linked over space and time to the perspectives of the people of the past and emotional connections to specific groups are intensified. Through virtual representations of some basic natural experiences (our bodies, our interactions with the material environment, and our interactions with other people in our culture), the media system allows visitors to appreciate the bodily experiences of people from the past in this replacement system. This makes a specific space more concrete and a specific time more present, providing a spatio-temporal framework for understanding and remembering cultural heritage. Virtual artifacts of cultural heritage in augmented reality help visitors experience history by placing themselves within the perceptual descriptions and fields of that time—as an “I” in that time and the world in which “I” lived. Cultural heritage reflects how people of that time understood nature and society, but it also bears collective memory and represents the ideas of a group of people. The replacement system comprised of those past persons’ thoughts and concepts allow visitors to “personally” experience these ideas and have a more human, intimate experience in engaging with these ideas. Media systems create an emotional experience.

Bodily experiences allow the metaphors of media systems to interpret social behaviors through a system of coherent cultural experiences. Jung believed that memory (Gedächtnis) is something thought (Gedachtes); it is knowledge [13]. Memory as knowledge has coherence, and knowledge encompasses thoughts and concepts that give the replacement system its coherence. “Metaphors have entailments through which they highlight and make coherent certain aspects of our experience [6].” Just as “up,” “down,” and other basic concepts provide coherent cultural experience, a media system allows visitors to directly experience social behavior at that time through the body. For example, visitors can use AR simulations at the site of the church at Villiers Abbey to see the magnificence of the church at a past time. Guided by augmented reality, the visitors look up into the lofty architecture of the church (Figure 6). The act of looking up reflects a sense of ceremony and implies the concept of “worship” in cultural experience, giving it cultural coherence. This action frames the cultural experience for visitors and allows the visitors to personally experience people of that time looking up at the church as part of religious belief and worship. Through the visitors’ bodily actions, the media system helps visitors to appreciate the church architecture, and by looking up, visitors experience religious ceremonies of those times, creating a coherent understanding of the cultural implications.



Figure 6 A visitor uses AR to look up at Villiers Abbey [14].

By reshaping visitors’ bodily experiences, the media system can innovatively “recollect” content to reconstruct a contemporary understanding and memory of cultural heritage. Bodily recollection provides fresh materials and pathways for the concrete realization of memory and understanding. Jung believed that remembering or recollection (Erinnerung) particularly emphasized individual experience. It is “basically a reconstructive process; it always starts in the present, and so inevitably at the time when the memory is recalled, there will be a shifting, distortion, revaluation, and reshaping [15].” One of the modes of reconstruction is a historical framework for the continuous past, creating new representations or imaginations (Vorstellungen) in a contemporary way and creating new experiences for visitors through people of the past. By renewing these experiences, reconstructions extend the memory of cultural heritage. Franz Brentano thought that every psychological process is imagination or rooted in imagination [5]. The media system can create new imaginative forms and renew bodily recollections, reconstructing cultural understanding and

memories. In parallel to the AR system used at Villers Abbey, “an interactive comic strip, following in the footsteps of the ghost of Villers has been developed to seduce, among others, a young audience. In the different augmented reality shots, it will be possible to see the ghost of Villers floating through the stone walls [14].” (Figure 7). The ghost reflects a religious vision of the body held by the people of the past. Through the AR characters, the visitors “see” a ghost through the eyes of people of the past and personally experience visions of ghosts that people had at that time. The media system reshapes visitors’ bodily experiences of ghosts, and AR characters create new imaginations and renew recollections, reconstructing the contemporary understanding and memory of cultural heritage.



Figure 7 Virtual characters interact with visitors on the augmented reality platform [14].

Another method is extending the recalled content, but this method creates new representations or imaginations (*Vorstellungen*) and changes visitors’ understanding of heritage and their perspectives on history. By changing visitors’ bodily experiences of the recollections, the media system can provide new interpretations of recollections based in historical fact and change visitors’ understanding of history. In this historical framework, “all thought, like all perception, is situated and perspectival [4].” For example, the Musée de l’Armée in Paris presented an immersive outdoor installation entitled “Immersion 14-18.” In it, “the effects are triggered by the visitors themselves: planes or armored vehicles modeled in 3D present the first theaters of the tank battles and the revolution in the air war. The interiors of the vintage machines are detailed in panoramic photos. The devastating effects of the artillery can also be observed—seen from the sky—by moving the device [16].” (Figure 8)



Figure 8 A visitor holding an AR device looks up at World War I airplane [17].



Figure 9 A visitor looks at a World War I map and plane on his mobile phone [17].

A large World War I map was installed at the exhibition site, and visitors scanned identifiers with AR devices, which caused a 3D simulation of a World War I plane to take off and fly over the visitor’s head. The visitor looked up at the plane through the AR device, sharing in the experience of someone during World War I looking up at a fighter plane and sensing the pressure of war and death. When visitors scanned the map, they looked down on the planes circling over the map, like battle commanders looking down on the map and considering the misfortunes that war brings upon nations (Figure 9). The fighter planes and the map are unchanged, specific recollections, but Immersion 14-18 allows the visitor to experience warplanes and maps from the perspective of an

ordinary citizen longing for peace, creating new representations or imaginations (Vorstellungen) and changing visitors' judgments of and emotional connections with cultural heritage. On the foundation of these similar recollections, the experience advocates for peace. Next, this paper will explore how the media system and the body collectively constitute sites of memory for cultural heritage.

2.4. The Hyper-presence of Sites of Memory for Cultural Heritage

The media system brings together the body's perceptual fields and descriptions to create the "sensorial mimetics" [18] of the augmented reality simulation of cultural heritage. It uses bodily experiences and metaphors to construct visitors' perceptual memories, constructing the direct experience of cultural heritage and history and creating the hyper-presence of sites of memory for cultural heritage.

The replacement system simulates "myriads of stimuli" [18] for perceptions, creating kinesthetic experience. The system fully and directly communicates visitors' sensations and perceptions, creating perceptual memory and direct experience. Through AR simulations, visitors experience the bodily sensations of past people, establishing a connection to the replacement system of interworlds in different times and places, which allows viewers to personally experience the perceptual memories of past people using experiences and metaphors. Reinhart Koselleck believes that body and language are two different modes of memory storage—that we store recollections as perceptual memory and linguistic memory. Aleida Assmann used the terms "die Spur" and "die Bahn" to explain these two different recollections. She notes that die Spur is produced through a one-time impression, while die Bahn is created by repeated movement within the same small space. Perceptual recollections are shaped by impulse, pressures of suffering, and intense shocks. In contrast, the framework of linguistic recollections is social interaction, not the body [13]. The visitor embodiment in the media system combines with the AR simulation to transform experiences and metaphors into symbols, presented in concrete (or even material) form. Intervening in intuition with perceptual stimuli, visitors can engage with simulations of the impressions and perceptual memories in the bodies of past people, directly experiencing cultural heritage and history.

Through AR embodiments, visitors can experience "the existence of perceptual truth" [13] for perceptual memory and cultural heritage created by the media system. Marcel Proust called perceptual memory "mémoire involontaire" and believed that recollections stored through sensory impressions were truer and more direct than recollections stored through the repetition of language [13]. Bodily experiences are what Lombard called "first-order mediated experience" (natural perception) [19]. Although visitors' bodily experiences are virtual in AR technology, the media system uses technology to meticulously simulate sensation and perception, and the information is directly communicated to "first-order mediated experience" from "second-order mediated experience" (technology-mediated perception) [19] through various media presentations. For example, the Airborne Museum in Normandy uses AR technologies in its HistoPad program, which allows visitors to use their tablets to virtually participate in the battle of Sainte-Mère in June 1944 from a first-person perspective. It is an AR simulation of the perceptual memories of a paratrooper who jumps from a plane and lands on the battlefield. In the AR simulation, visitors experience the sensations and perceptions of jumping out of an airplane, thereby directly engaging with the perceptual memories and real existences of paratroopers parachuting into battle through first-order mediated experience. Thus, through an embodiment, the media system can allow the visitor to directly experience the recollections and perceptual memories of bodies from the past.

What makes these perceptual memories so special is the combination of real environments with AR-simulated experiences and metaphors. Virtual reality can allow visitors to experience history through the bodies of past people, but AR media systems combine cultural heritage with real sites in real time. The spaces, objects, and lights of real environments impart real sensations, and these elements offer visitors an incomparable directness and realness in experiencing perceptual memory.

Embodied learning brings AR content into visitors' understanding of past perceptual memory, which transforms cultural heritage into an AR hyper-presence of a site of memory open to society.

“In a network society, hyper-presence is a psychological state of cognition in which a virtual existence is in a state of flux shaped by links or exchanges between information or data. Hyper-presence is a cognitive structure open to all of society. It is an interactive state of distributed cognition on the internet, and it lies within the process of the continued regeneration of symbols or information [20].” Artifacts presented in augmented reality are media content, reflecting today’s understanding of historical and cultural knowledge. Through embodiment, the media system conveys knowledge to visitors, fusing today’s ideas and concepts with cultural heritage. From the bodily experiences of past humans, visitors experience historical and cultural knowledge. This process intensifies visitors’ understanding of the reality of recollection and perceptual memory through the reality of the site. In a network society, media systems, ideas, and concepts are open to society, and all intelligences, including people, agents, artificial intelligence, and robots, can convey information through the network, adding thoughts and concepts to the creative process and conveying new content to this open site of cultural memory. Through networked augmented reality, new content influences the replacement system and the experiences of perceptual memories of the bodies of past people, conveying new information to the visitors’ embodiment. When combined with interpretations of new knowledge, new content constantly constructs the visitors’ memories and conceptions of history. For example, Immersion 14-18 uses the bodily experiences of fighter planes to reshape people’s views about war. Thus, the media system can fuse thoughts and ideas from today with experiences of perceptual memories from people of the past, constantly building a hyper-presence of sites of memory for cultural heritage.

Hyper-presence in sites of memory can activate cultural heritage and enrich cultural memory. Memory is a process of constant construction, and ways of constructing the information and symbols of cultural heritage must change as society evolves. Activated cultural heritage can help visitors to think with new reflexivity, influencing visitors’ reflections on past behaviors and expectations for future circumstances [21]. Reflection can enrich cultural memory and expectation can influence visitors’ future behaviors. Thus, the hyper-presence of sites of memory encourages visitors to experience history through past people and consider tomorrow from the perspective of today, thereby shaping the world of the future.

3. Conclusion

Visitors’ cognition transforms cultural heritage into cultural and historical memory, and AR design must respect the expression of past people’s experiences of objects and environments that once existed (today’s cultural heritage), allowing visitors to directly experience perceptual memories through the body. Cultural heritage contains past social behaviors and cultural meanings, using a media system to appreciate the ceremonies, visions, skills, and practices of the bodies of past peoples, which can blend perceptual memories and cultural heritage and realize the hyper-presence of sites of memory through the internet and AR. In the future, our understanding of cultural heritage will contain knowledge contributed from all intelligences in society, collectively constituting the future cultural ecosystem of heritage sites.

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