

Embodied Communication Design: Enhancing Engagement and Memory Retention Through Immersive Experiences

Eleonora D'Ascenzi, Denise de Spirito

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Traditional communication design strategies have predominantly emphasized cognitive engagement, often overlooking the role of the body in shaping how we internalize and retain information (Wachsmuth, 2019). However, with the evolution of communication paradigms, emerging approaches such as story-living—facilitated by advanced digital technologies like extended reality (XR)—are prioritizing embodied knowledge. These approaches transform audiences from passive receivers into active participants who “inhabit” the story, fostering deeper emotional connections and enhancing memory retention (Sheedy, 2016). This research investigates how embodied communication strategies, through sensory immersion and active physical participation, promote more profound emotional engagement and create lasting memories (Ryan, 2004). The study adopts a transdisciplinary approach, integrating theories of embodied cognition, communication design theory and immersive storytelling design, while drawing on case studies that explore the role of embodied practices in creating impactful narratives (Landow, 2009; Marinis, 2013). The case studies reveal that embodied experiences often evoke emotions such as awe—transformative responses that expand cognition and improve memory retention (Shaffer et al., 2023). Furthermore, synesthetic engagement through multiple sensory channels and physical actions significantly enhances the immersive quality of experiences, deepening participants’ connection to the content (Ryan, 2004; De Marinis, 2013). By positioning the body as a central agent in communication design, the study illustrates how embodied knowledge transforms memory into an interactive process, amplifying narrative impact and promoting audience co-creation of meaning (Darley, 2003). The findings highlight the potential of embodied communication to foster personal growth and behavioral change (Vallance & Towndrow, 2022; Keltner & Haidt, 2003). The research suggests that future applications in extended reality environments could unlock new possibilities in education, media, and public engagement by further integrating physical and digital realms (Anderson, 2018).

1. Introduction

In contemporary communication design, storytelling is undergoing a significant transformation: from a linear transmission of visual and verbal content to a multisensory, immersive experience that engages the body as an active participant (Tanaka, 2011). This shift reflects a growing interest in embodied knowledge, understood as a form of knowing rooted in sensory, emotional, and motor experience. As extended reality (XR) technologies - such as virtual reality (VR), augmented reality (AR), and mixed reality (MR)- become increasingly integrated into design practices, new narrative paradigms are emerging (Arcagni, 2020). Among these, the concept of *storyliving* has gained particular relevance, describing experiences in which audiences do not simply observe a story, but inhabit it through physical and sensory immersion (Stichter, 2022). This contribution seeks to explore how embodied strategies in communication design may enhance emotional engagement and potentially support memory retention by enabling users to

physically and perceptually participate in narrative environments. The investigation builds upon interdisciplinary theories of embodied cognition, immersive storytelling, and communication design, aims to understand how the integration of bodily experience within immersive media may influence both the affective and cognitive dimensions of user experience: immersive experiences like XR and interactive storytelling strengthen in fact the link between bodily perception and cognitive processing, making memories more deeply rooted (Miltiadis, 2020). Methodologically, the paper combines a critical review of relevant literature with an analysis of two selected case studies: *Gender Swap / Body Swap* and *Victimario*. These projects serve as exemplary practices that operationalize the theoretical principles of embodiment within immersive environments. Their examination enables a grounded discussion of how physical interaction and sensory stimuli may activate embodied memory processes, foster empathic responses, and transform users’ engagement with content. The relevance of these case studies lies on how narrative structures mediated

through bodily action and multisensory feedback may lead to more durable cognitive traces and heightened emotional resonance. The structure of the paper unfolds as follows: the first section addresses the theoretical background, outlining the role of the body in information processing and discussing the historical dominance of visual culture in Western design paradigms. It then introduces the notion of *storyliving* as a framework for embodied narrative experience. The second section presents the two case studies and examines them through the lens of embodied communication. The final section offers a critical discussion of the findings and draws conclusions regarding the implications for future design applications, particularly in relation to immersive technologies and experiential communication strategies. By bridging theoretical inquiry with practice-based analysis, this paper aims to contribute to the growing discourse on embodiment in communication design, emphasizing the potential of immersive and multisensory approaches to create more impactful, memorable, and emotionally resonant experiences.

In this study, *embodiment*, *cognition*, and *immersion* are treated as analytically distinct and operationally non-overlapping constructs. *Embodiment* is defined as the degree to which sensorimotor coupling, proprioceptive alignment, body ownership and agency are instantiated within the designed experience; in practice, embodiment is indexed by first-person perspective taking, visuomotor synchronicity, haptic/proxemic engagement, and the stability of self-location. *Cognition* is defined as the set of processes through which meaning is constructed and memory is encoded, consolidated, and retrieved; in this framework, cognition is operationalised through indicators of narrative comprehension, autobiographical/episodic encoding, and reflective appraisal, with specific attention to habit-memory versus episodic memory and to the distinction between phenomenal and access consciousness. *Immersion* is defined as a property of the system–user configuration that modulates the user’s attentional absorption and sense of presence; immersion is operationalised by technological affordances (sensory bandwidth, interactivity, fidelity), attentional load, and reported presence, and is not equated with embodiment. Conceptually, *embodiment* refers to how the body participates in experience, *cognition* to how meaning and memory are formed, and *immersion* to how the environment/systems scaffold presence.

2. The role of the body in information processing and the power of visual imagery in enhancing memory

Traditional approaches to communication design have largely prioritized cognitive processing and visual representation, often underestimating the central role of the body in shaping how we perceive, internalize, and retain information (Wachsmuth, 2019). However, emerging perspectives from embodied and enactive cognition suggest that the mind is not an isolated computational device but rather a dynamic process that is grounded in the sensorimotor engagement between organism and environment. The enactivist view, as developed by Varela, Thompson, and

Rosch (1991), posits that cognition arises through a continuous and reciprocal interaction between the body, the brain, and the world. Concurrently, perception, should not be considered as a passive reception of stimuli, but an embodied action (Jones, 2006). Within this framework, the body is not a secondary vessel for cognition but the very condition for knowledge formation. As Foucault (1966) proposed, the body operates as the “zero point” from which spatial and experiential meaning emerges. Similarly, phenomenological thinkers such as Husserl (1999) distinguished between *Körper* (the objective, physical body) and *Leib* (the lived, subjective body), emphasizing the latter’s capacity to generate intentionality and awareness. This distinction underscores the idea that bodily experience is constitutive of consciousness (Merleau-Ponty, 1945/1962). Recent developments in new materialism further challenge Cartesian dualisms by viewing the body not as a passive container of experience, but as an active, agential materiality that participates in the co-constitution of meaning. Barad (2007) and Bennett (2010) argue that matter itself “acts,” proposing that knowledge emerges through intra-actions between human and non-human agencies. This theoretical lens enriches the embodied approach by situating cognition within material ecologies rather than isolated subjects. This perspective challenges mind-body dualism, emphasizing their inseparable connection through experience. Damasio (1999) further expands on the embodied nature of cognition by highlighting how bodily processes shape perception, influence cognitive functions, and position emotions as fundamental to rationality and self-awareness: the body is not only a medium for interaction with the world but also a foundational structure for meaning-making and cognitive development. Furthermore, Pallasmaa (2007) emphasizes the body as the core of experience, serving as a reference point for identity, memory, and imagination, rather than merely a perceptual viewpoint. Through its sensory channels—sight, hearing, smell, taste, and touch—the body serves as the primary receptor of environmental stimuli, transmitting them to the brain for processing and interpretation (Jones, 2006). Concurrently, research on vision, in particular, has highlighted the crucial role of mental imagery in enhancing memory performance by providing a cognitive framework that supports encoding, storage, and retrieval (Marre et al., 2021), demonstrating that the ability to visualize information actively strengthens memory retention, as individuals who engage in mental imagery recall details more effectively than those who do not. Mental imagery, within this broader embodied framework, should not be reduced to a static cognitive function associated only with visual recall. Instead, it can be conceptualized as a set of sensorimotor simulations that re-enact perceptual and affective states in the absence of external stimuli thanks to the use of advanced digital technologies (Salta & Katsaros, 2024). Mental imagery includes a variety of modalities (such as visual, auditory, kinesthetic) and involves both voluntary imagination (e.g., visualizing a past scene) and implicit, embodied recall (e.g., anticipating the feel of a texture or motion). For this reason, particular conditions such as *aphantasia* – a condition where individuals are un-

able to voluntarily generate visual mental imagery- demonstrates that memory can still function effectively in the absence of explicit visual simulation (Zeman et al., 2015). This suggests that memory encoding may also rely on non-visual and non-imagistic forms of embodiment, including proprioceptive and affective traces. Such findings reinforce the view that mental imagery is not a singular or universal mechanism but part of a distributed system of multisensory and bodily cognition. These processes, often described as embodied simulations, are central to memory encoding and retrieval (Gallese, 2009). In this scenario, embodied mental imagery strengthens memory by simulating sensory experiences and reinforcing encoding by highlighting significant implications for fields like communication design, immersive storytelling, and interactive media, where integrating physical experience could enhance engagement, memory retention, and emotional impact. Therefore, memory should be understood not as a cognitive archive of past events, but as a phenomenologically rich, corporeally grounded process. This reframing has significant implications for communication design and immersive media, where the strategic activation of embodied imagery -across sensory modalities- can enhance narrative engagement and long-term retention.

3. Beyond the supremacy of the visual communication

While visual media have long dominated communication practices, particularly in Western traditions since the Renaissance (Pallasmaa, 2007), there is a growing recognition that perception and meaning-making extend well beyond the ocular domain. From an embodied cognition perspective, meaning is not limited to its semiotic dimension -i.e., the interpretation of signs within symbolic systems- nor is it solely phenomenological, defined as the lived, first-person experience of perception. As such “meaning” is understood as a dynamically constructed phenomenon, shaped by the body’s interaction with the environment (Jones, 2006). It involves not only the cognitive decoding of symbolic representations, but also the affective and proprioceptive dimensions of being-in-the-world. For example, the tactile sensation of a surface, the ambient quality of light, or the reverberation of sound in a space all contribute to how a communicative experience is interpreted—not through abstract logic, but through embodied resonance (Pallasmaa, 2007). However, the prevalence of visual-centric paradigms has contributed to a reductive model of communication in which experience is filtered primarily through sight, often at the expense of other sensory modalities. This ocularcentrism, as Calvino (1988/2012) warns, contributes to a saturation of images that risks disconnecting individuals from embodied experience and diminishing the richness of multisensory engagement. The overload of visual stimuli in communication design can create a sense of disconnection from reality and embodied experience. For this reason, more integrated, multisensory approach is needed, recognizing the body’s active role in constructing meaning. This shift towards a holistic sensory experience is supported by research in neuroscience and cogni-

tive science, which highlights the interconnection between different sensory modalities. Studies on synesthetic perception demonstrate that sensory channels do not operate in isolation but instead interact dynamically to shape cognition (Foresti, 2022). The olfactory system, for instance, has a direct connection to memory and emotion, influencing perception in ways that surpass the immediacy of visual stimuli (Deiana, 2021; Priyadarshini, 2020). Similarly, proprioception -the sense of body position and movement- plays a crucial role in spatial awareness and self-identification, as demonstrated by Botvinick and Cohen’s (1998) rubber hand illusion experiment. In light of these findings, Pallasmaa (2007) argues for a reintegration of sensory plurality in perception and design, advocating for what Bachelard (1975) describes as a “polyphony of the senses”. As such, by moving beyond the primacy of sight, communication design and spatial experiences can be enriched through a multimodal approach that engages touch, sound, smell, and even taste. Frampton (2016) reinforces this perspective, emphasizing the role of embodied perception in architectural experience, where elements such as light, temperature, material textures, and acoustic resonance contribute to a deeper, more immersive engagement with space. This perspective aligns with Kahn’s (1962) assertion that “form comes from wonder”- a process rooted in sensory awareness that fosters knowledge and connection with the world. By embracing a synthetic and embodied approach to communication, perception is no longer restricted to visual immediacy but becomes a multisensory process of interpretation and active participation. This paradigm shift not only challenges the historical dominance of vision but also reaffirms the fundamental role of the body as a bridge between external reality and cognitive experience, especially for memory retention. While visual imagery is crucial for memory, embodied knowledge extend it across the entire sensorimotor system. Fuchs (2018) supports this view, describing body memory as the accumulation of habits and interactive schemas that shape perception and recall. Memory is shaped by the interplay between body and cognition, where subjective experiences drive neural adaptations (Koch et al., 2012). Rather than being purely abstract, memory is embedded in bodily movements, sensations, and interactions. Neuroscience and phenomenology confirm that repeated bodily experiences form a corporeal foundation for learning and recall (Repetto & Riva, 2023).

4. Storyliving and the role of the body in narrative engagement

As noted by Vallance and Towndrow (2022), the act of telling a story opens up opportunities for engagement in interpretive processes, since it provides participants with “a space to feel, empathize, and process experiences, both their own and those of others” (Astiz, 2020, p. 1). This engagement has been shown to mediate the relationship between the storytelling medium and the reader’s perceptions in terms of credibility, memory of the story, and the intention to share it (Sundar et al., 2017, p. 672). Furthermore, Darley (2003) suggests that “the idea of reality will ultimately and completely fade when we reach the point where

a fully convincing reality can be generated within information-processing systems” (p. 36). However, it is the body and the sense of embodiment that have radically changed the perspective: storytelling has evolved into story-living. In immersive experiences (Extended Reality-XR), narration takes in fact on a dominant role, as emphasized by Sheedy (2016), who argues that storytelling transforms into the lived experience of the story itself (story-living). This shift emphasizes the body’s central role in experience and design, introducing *story-living*, where narration, immersion, and physical engagement intertwine. Unlike traditional storytelling, *story-living* involves all senses through a synesthetic approach, fully immersing participants from unique perspectives. Ryan (2004) suggests that the body is the medium through which experience unfolds, with the spectator actively shaping the narrative through involvement and interaction. This blurs the boundaries between the physical and digital realms, broadening the concept of reality (Landow, 2009), where the presence of the human body at the heart of the experience introduces an element of unpredictability (Papasarantou, 2020). The body exists in a liminal space between two worlds (Turner, 1969): the spectator is neither completely in one place nor the other but navigates both spaces through perceptual “acrobatics”. It is through extended realities (XR) that the boundaries of immersive, synesthetic experiences are being pushed further, involving all the senses. In the immersive nature of story-living, the central element is undeniably the body, as it automatically reacts and responds to environmental restructuring. Engaging in story-living requires total immersion, understood as the degree of involvement of sensory channels (Kim & Biocca, 2018), in an organic, user-driven experience that varies for each individual (Bailenson, 2018), with perceived realism in terms of credibility and plausibility of the story and its characters, as well as the naturalness and ease of interaction with the environment (Weber et al., 2021). This approach offers significant interactivity and audience involvement, allowing participants to become an integral part of the story itself. Unlike traditional storytelling, in which the audience is typically passive, story-living allows participants to experience events firsthand, actively contributing to the narrative’s development. This deeper involvement can create more meaningful and engaging experiences, offering fresh perspectives and opportunities in narrative and virtual entertainment. While short-term memory retains limited information for brief periods (Revlin, 2013), long-term memory influences cognitive processes over time, distinguished by its connection to sensorimotor and proprioceptive systems (Longo & Haggard, 2012). Unlike short-term memory, which operates mainly at a symbolic or abstract level, long-term memory is deeply embedded in bodily experiences, integrating multisensory signals from the environment. Within this broader framework, it becomes essential to distinguish between different forms of long-term memory. *Habit-memory* refers to the non-conscious, embodied knowledge that supports the execution of routine, procedural actions (such as walking, grasping, or orienting oneself in familiar environments) without the need for deliberate recall (Fuchs, 2018). By con-

trast, *episodic memory* (also referred to as *phenomenal memory*) involves the conscious recollection of specific events situated in time and space, typically accompanied by a sense of personal agency and experiential re-living (Tulving, 2002). Immersive storytelling design primarily engages episodic memory, as it constructs narrative environments that are temporally structured and emotionally salient. These experiences stimulate the encoding of memory traces through multisensory immersion and embodied interaction, enabling participants to “live through” and “inhabit” events rather than observe them. The presence of narrative coherence, spatial anchoring, and emotional resonance enhances the likelihood that such experiences are retained not as abstract information, but as situated episodes within the participant’s autobiographical memory. This dynamic interaction among body, narrative, and perception aligns with a deeper understanding of consciousness. Block (1995) differentiates between *phenomenal consciousness* -the subjective, qualitative dimension of lived experience- and *access consciousness*, which refers to the subset of information that becomes available for reasoning, verbal articulation, and executive function. Immersive storytelling environments are particularly effective at amplifying phenomenal consciousness by offering richly layered sensory and spatial simulations that intensify the user’s sense of presence and emotional involvement (Kiltner et al., 2012). In particular, the related concept of *Mixed Embodied Presence*, as articulated by Papasarantou (2013) provides a valuable framework for understanding how bodily awareness, kinesthetic perception, and memory are seamlessly integrated within mixed reality environments. This integration emerges through a progressively embodied engagement, which generates a coherent and immersive sense of *being-there* across both physical and digital dimensions. Through this interplay, immersive narratives do more than transmit content: they shape how experiences are *embodied*, *encoded*, and later *articulated*. This perspective not only enhances the experiential and mnemonic depth of storyliving, but also contributes to broader theoretical discussions in cognitive science regarding the embodied, situated, and multilayered nature of memory and consciousness (Varela et al., 1991).

5. The importance of the Case studies

The relationship between embodied knowledge and technology has become increasingly central in contemporary society, to the point that the body is often described as the “theatre of technologies” (Riccini, 2015). Zannoni (2022) emphasises the skin as an interface for mediating interaction with external objects, highlighting a shift in which the human-artifact connection extends beyond cognition to become a physical extension of the self. Similarly, Cipolletta’s notion of the “metrobody” (2014) captures the body-technology relationship as a dynamic filter that mediates between physical reality and emerging technological environments. Immersive technologies such as VR and AR intensify this mediation, blurring the boundaries between real and virtual space and reshaping experiences of presence and identity. As Haraway (1991) observes, “communications technologies are the crucial tools recrafting our

bodies. These tools embody and enforce new social relations” (p. 202).

These perspectives underscore the transformative potential of embodied experiences, which engage participants in active rather than passive modes of memory processing. Within this context, immersive communication design, grounded in embodied cognition, can foster deeper connections with content, enabling personal reflection as well as behavioural and emotional change. The integration of scientific and artistic approaches opens new possibilities for communication and narrative design, where embodied knowledge becomes a resource for enhancing memory and shaping experience. Building on this conceptual framework, the following section outlines the methodological approach adopted in this study. A qualitative, multiple-case design was developed to connect the literature review with two case studies, ensuring that theoretical constructs—embodiment, cognition, and immersion—were not only discussed abstractly but also examined in concrete design practices. The central aim was to examine how embodied strategies in XR and performative environments contribute to emotional engagement and memory processes, ensuring that theoretical concepts such as embodiment, cognition, and immersion were not only discussed abstractly but also observed in concrete design practices. The methodological approach was articulated as follows:

- **Research Design:** qualitative, multiple-case design was adopted to connect a critical literature review with two purposefully selected exemplars. The aim was to generate analytic generalisations about how embodied strategies in XR and performative settings support emotional engagement and memory processes.
- **Case Selection Criteria.** cases were selected through purposive sampling against the following criteria: (i) explicit deployment of XR and/or performative interaction; (ii) centrality of body-based interaction (visuomotor synchronicity, haptic/proxemic cues); (iii) availability of sufficient documentation (project materials, videos, curatorial/artist statements, interviews, scholarly commentary); (iv) relevance for communication and spatial/architectural design; (v) complementarity of modalities (a full-body VR protocol and a hybrid performative/digital setting).

As such, the research centered on two case studies - *Gender Swap / Body Swap* and *Victimario* - which were selected for the originality of their integration, in line with the parameters previously outlined. Both projects exemplify different modes of bodily involvement, memory activation, and emotional engagement, and offer valuable insights into the role of immersive design in shaping cognitive and affective responses. The *Machine To Be Another* project, designed by BeAnotherLab, pioneers a highly transdisciplinary and innovative approach, emphasizing the interconnectedness of various sectors to foster empathy at both individual and collective levels, mediated through embodied knowledge.

5.1. Gender Swap/Body swap

Gender Swap / Body Swap represents an ongoing artistic and experimental research project that offers users a profound shift in perspective by immersing them in the experience of body swapping. Through this innovative interaction, two users share each other's embodied perspectives in real time, enabling them to explore the dynamics and sensations of gender reversal. This immersive experience goes beyond the confines of neuroscience laboratories, reaching a wider audience through installations and exhibitions. The project fosters mutual respect and understanding by allowing participants to exchange perspectives, addressing gender inequality. The emphasis on embodied knowledge is central to this experience, as participants explore their new bodies, experimenting with perception, proprioception, and self-awareness. The use of embodiment activates deeper memory retention, as the physical experience becomes a medium for reflecting on ingrained behavioral patterns and the dynamics of embodied boundaries. This sensory exploration enhances the understanding of gender as a more fluid and expansive concept, while also promoting transformative insights. The *Body Swap* experience, lasting 10-15 minutes, involves an interactive protocol with facilitators guiding participants through various interactions, including mirror exercises, that provoke self-perception and perception of others. By acclimatizing to their new bodies, participants experiment with their embodiment and the third-person perspective, activating new cognitive and emotional responses. The experience is not only fun and introspective but also highly emotional and often transformative, reinforcing the link between embodied experience and memory retention. From a design perspective, *Gender Swap* leverages full-body VR immersion (via head-mounted displays and synchronous movement) to achieve a high degree of sensorimotor coupling, enabling a first-person perspective shift. This interactivity stimulates embodied simulations that support long-term episodic memory encoding. It exemplifies how interaction design can be structured around body-based identity exploration, providing a compelling model for inclusive communication strategies and affective learning environments. The immersion here is primarily full-scale VR, characterized by high levels of presence, proprioceptive alignment, and mirrored physical feedback. The experience engages users in a spatially situated protocol, in which they physically perform synchronized gestures within a bounded environment, often facing a mirror or seated across from each other. These spatial constraints are not incidental—they are integral to the design of perceptual coherence, where proprioception, visual alignment, and interaction coalesce to generate a sense of body ownership and self-other merging. From a communication design perspective, the project demonstrates how physical space—organized through facing positions, mirror symmetry, and tightly choreographed timing—facilitates empathic narrative transference. This spatial framing is essential to the production of episodic memory, as participants recall not only the content of the experience but the kinaesthetic and emotional affect pro-

duced by being-in-the-body-of-another. The interaction here is neither symbolic nor abstract: it is sensorimotor, affective, and spatial, grounded in embodied feedback loops. This design logic parallels architectural phenomenology, wherein space is experienced not as neutral container but as co-producer of perception and meaning. Gender Swap demonstrates that immersive environments can be choreographed like architectural spaces to structure memory formation through bodily presence, thus extending the implications of immersive narrative beyond the screen into the material grammar of space itself.

5.2. *Victimario*

Designed as an interactive experience, *Victimario* allows spectators to engage with the life story of a perpetrator by inhabiting their body, emphasizing the power of embodied knowledge. Participants physically mimic the protagonist's actions in the virtual world—such as standing up or grabbing an object—creating a strong sense of connection between the physical and virtual realms. This immersive, performative experience is facilitated by both content and context, fostering a unique blend of documentary and performative art. The embodied experience is central to this project, as each action experienced by the protagonist in the documentary corresponds to a physical gesture in the real world, replicated by a live artist (e.g., a caress or a push). This physical participation enhances memory retention, as the spectator's body is actively engaged in the storytelling process. The fusion of performative art and advanced technology stimulates empathy and immerses the viewer in a synesthetic experience rich in sensory stimuli, reinforcing the emotional and cognitive impact of embodied knowledge on memory. *Victimario* represents a hybrid form of immersion that merges live performance with digitally mediated narrative, positioning the spectator as both witness and participant. The embodied interactions—delivered through haptic simulation and proxemic engagement—serve to ground the story in visceral, non-verbal memory processes. Unlike abstract representations, the physical re-enactment of morally charged gestures anchors the narrative within the participant's own bodily memory, intensifying ethical reflection. From a communication design perspective, this project illustrates how performative interaction can function as a narrative interface, extending the boundaries of immersive journalism, documentary storytelling, and spatial design. *Victimario* is an interactive performance-documentary that invites users to inhabit the perceptual world of a perpetrator. Unlike traditional narratives that abstract moral reflection through detached observation, this project spatializes ethical engagement by requiring participants to physically reenact the protagonist's actions within a carefully orchestrated setting. Through real-time mirroring of movements—guided by facilitators or live performers—the user becomes immersed in a dual space: the physical space of action and the narrative space of the crime. From a communication design lens, *Victimario* leverages the interface of the body to challenge narrative distance and induce affective dissonance. The experience is akin to a responsive performative environment, where

gesture, proximity, and object interaction construct an ephemeral but structured space of meaning. The spatial-temporal alignment between the virtual story and the user's physical movement produces a layered sense of co-presence, where bodily memory is formed through motor and emotional participation. The project exemplifies how immersive storytelling can activate episodic memory through kinaesthetic moral tension. In this sense, *Victimario* blurs the boundary between designed space and embodied ethics, pointing toward a model of spatial design in XR where architecture becomes not merely representational, but performative and affective. It demonstrates the potential of immersive environments to function as moral laboratories, where spatial configuration and bodily engagement co-create emotionally charged, memorable experiences.

5.3. *Gender Swap/Body Swap* and *Victimario* as a catalyst of episodic memory

In both case studies the activation of episodic memory plays a central role in shaping the user's cognitive and emotional engagement. In *Gender Swap / Body Swap*, users engage in a real-time perspective shift facilitated through full-body virtual immersion. The experience is characterized by synchronized visuomotor and proprioceptive feedback, enabling participants to “inhabit” another person's bodily perspective. This highly embodied configuration fosters the encoding of narrative as a lived event, rather than an observed sequence. Neuroscientific evidence suggests that such sensorimotor congruence enhances episodic encoding by strengthening the association between sensory input and the self-referential frame of memory (Bergouignan et al., 2014). Moreover, the presence of the body within the virtual environment—referred to as *body ownership*—has been shown to improve contextual memory recall, suggesting that embodied self-location acts as a scaffold for episodic memory.

Similarly, *Victimario* involves participants in a performative and interactive reconstruction of a perpetrator's life narrative. Through embodied mimicry of gestures—such as standing, pushing, or caressing—the participant's physical body becomes the medium through which narrative content is enacted. This enactive dimension of memory formation aligns with the enactment effect, leading to superior memory retention compared to passive observation (Engelkamp & Zimmer, 1994). The project's reliance on haptic cues, spatial proximity, and kinesthetic empathy facilitates both cognitive encoding and emotional imprinting, reinforcing the participant's ability to recall the experience as a personally situated episode. Crucially, both projects operate at the intersection of habit memory and episodic memory. While basic motor routines and sensorimotor adjustments rely on procedural, non-declarative memory systems, the narrative and affective components are encoded as temporally-bound episodes involving phenomenal consciousness—the subjective “feel” of the lived experience (Block, 1995). These case studies thus highlight how immersive storytelling, when grounded in bodily engagement, facilitates the transforma-

tion of narrative content into autobiographically anchored memory.

6. Discussion, conclusion and future directions

The findings from this study reveal that embodied experiences, particularly those involving immersive technologies in a performative way, provoke profound emotional responses (“awe”) which in turn foster transformative changes in cognition, memory retention, and self-awareness (Shaffer et al., 2023). The process of engaging with these experiences via synesthetic interaction - where multiple sensory channels are activated and physical actions are incorporated- deepens participants’ connection to the content and enhances the immersive quality of the experience (De Marinis, 2013; Ryan, 2004). By positioning the body as a central agent in the process of communication, the research demonstrates how embodied knowledge can transform memory from a passive process into an interactive one, amplifying the impact of narratives (Darley, 2003). The findings from this study reveal that embodied experiences, particularly those involving immersive technologies in a performative way, provoke a spectrum of profound emotional responses—including empathy, dissonance, vulnerability, and awe—which contribute to cognitive transformation, memory encoding, and heightened self-awareness. These responses are central to affective embodiment, where emotional arousal and sensorimotor engagement work together to consolidate experience into episodic memory. This dynamic stands in contrast to traditional communication design, which often neglects the body’s role in perception, emotion, and retention. Traditional communication design refers in fact to practices rooted in linear and visual storytelling where users engage primarily through visual or symbolic channels without active bodily participation. These models tend to separate cognition from sensorimotor interaction, assuming a disembodied spectator. In contrast, immersive and interactive media frameworks demonstrate that memory is an active and dynamic process shaped by embodied cognition. In these settings, participants actively engage with the narrative, using physical actions, sensory interactions, and emotional involvement to deepen their connection to the content. This interaction fosters stronger memory retention by linking cognitive functions to bodily experiences, enhancing the durability and significance of the memory. As Longo (2001) notes, the body is an active mediator between the self and the world, organizing information and perceptions. Consequently, the projects discussed in these case studies enhance the sensory experience of the body, ensuring users remain aware of their corporeality while navigating virtual realms. When experiences engage both the physical and virtual body, they create more meaningful and impactful encounters. These insights validate the central thesis of the paper: immersive and embodied experiences, when intentionally designed and really inhabited, can activate episodic memory more effectively than traditional media, while also shaping emotional engagement and personal transformation. The case studies support this claim by showing how bodily participation, narrative structure, and technological

mediation could be combined to create lasting cognitive and affective impacts. From a design standpoint, this opens several important directions. First, immersive storytelling should be developed as a multi-sensory, body-centric design strategy -not just a technological upgrade. Second, XR designers need frameworks to assess levels of embodiment in users- not only in terms of presence, but also emotional resonance, memory formation, and self-perception. Third, it is crucial to approach virtual content as a space to be inhabited. Even when digital, these environments are experienced spatially, and designing them with architectural awareness ensures that users can move, explore, and engage with the content as they would in a physical environment, reinforcing both cognitive and emotional immersion. Furthermore, as Heim (1995) argues, the technology of virtual environments can often lead to a shift where the physical body becomes “ethereal” and the virtual body assumes more tangible presence. In negative cases, this may lead to a phenomenon of “submersion,” where the physical body is diminished or even temporarily forgotten (Kiltner et al., 2012). Despite the transformative potential of immersive media, this risk of submersion in the environment, when users lose awareness of their physical body, underscores the need for careful balance in designing these experiences. This phenomenon can have in fact profound psychological effects, such as altering social behaviors and self-perception, exemplified by the “Proteus effect” (Yee & Bailenson, 2007). Moreover, the “split body” or “double body” concept, as outlined by Penny (1994), highlights the fragmentation of the sense of embodiment, where users feel detached from their physical self due to overwhelming virtual experiences. Therefore, balancing immersive technologies with body awareness is crucial for maintaining both physical presence and meaningful engagement. While both VR and AR are part of the XR spectrum, they afford different types of embodied presence: VR offers full sensory immersion by replacing the user’s environment entirely, often increasing the sense of presence but also the risk of bodily dissociation or “submersion”. In contrast, AR overlays digital content onto the physical world, maintaining stronger ties to the user’s actual body and space, thereby enabling situated interactions that feel more anchored and context aware. Each modality influences presence and memory differently and must be accounted for in communication design strategies. These differences affect how designers should choreograph sensory input, guide attention, and calibrate bodily awareness within immersive media. As such, Future applications in extended reality environments (XR), hold significant promise for unlocking new opportunities in fields such as education, media, and public engagement. These environments can be leveraged to create more immersive and impactful learning experiences, media content, and public interventions, enabling individuals to explore complex topics from fresh perspectives (Anderson, 2018). As XR technologies continue to evolve, the potential for these tools to shape both individual and collective experiences will expand, opening up new possibilities for creating meaningful interactions and fostering empathy. To further validate and refine the findings from this research, it would be es-

essential to develop a comprehensive framework for assessing the embodied experience within immersive environments. Such a framework could help guide future design efforts, ensuring that immersive technologies not only enhance engagement but also support positive emotional and cognitive outcomes. This framework should account for factors such as sensory engagement, body awareness, emotional impact, and the potential for behavioral change, enabling designers to create experiences that are both immersive and meaningful. However, the research also acknowledges certain limitations. One limitation lies in the diverse nature of user experiences within immersive environments. Individual differences in body awareness, sensory processing, and emotional responses may influence how users engage with and respond to immersive technologies. Future research should seek to explore these individual variations more deeply, considering how demographic factors such as age, gender, and cultural background may shape users' interactions with virtual spaces. Additionally, the technolog-

ical constraints of current XR environments may limit the full realization of embodied experiences, particularly when it comes to replicating the physical sensations associated with real-world interactions. As technology advances, these limitations are expected to diminish, but further investigation is necessary to ensure that such experiences are accessible and inclusive for all users. In conclusion, the continued development of embodied communication strategies and immersive storytelling techniques holds considerable promise for the future of interactive and transformative media experiences. By prioritizing the centrality of the physical body and designing communication experiences that thoughtfully integrate both the physical and virtual realms, immersive experiences can be created that foster empathy, personal reflection, and meaningful engagement across diverse sectors.

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