



Her Palace

Tianbai Jia

“Very interesting for the cognitive effects it mimics [...] a good use of VR for storytelling.”

ICIDS 2021 Jury

Her Palace: A Virtual Reality Exploration of Subjective Memory Space and Narrative (Re-)Construction

Abstract

Her Palace is a Virtual Reality simulation which provides an interactive and cinematic narrative. It features a female character and her intimate self-reflections on a relationship. Aiming to externalize an internal human cognitive process, the engagement of memory, this simulation bases its interaction design on theories of cognitive science. In rendering memory episodes as narratives, this simulation also reflects on the way narratives are actively constructed in the human mind. This project brings awareness to the mediation processes of both external mediums and internal cognitive mediums like memory and narrative construction. In simulating these two internal processes, this project hopes to reveal that both intrinsically stage the dialectical contradictions between “disconnection” and “reconnection”. Memories symbolize reconnection and disconnection simultaneously—it is the way we reconnect with our past, but its very own existence is also a proof that we are eternally disconnected with the time when these memories took place. In this experience, the narrative is actively constructed by the user’s gazes. Gazes trigger fragments of intentionally disconnected narrative beats, and the coherent narratives are only constructed in the interactors’ minds by reconnecting these fragments. Different gazing behaviors constructs new narratives, just like reconnecting the disconnected constructs new connections. The simulation of these two internal processes hopes to stage the contradictions and complexities of the contemporary human-media relationship by raising many questions but providing no answer.

Keywords

Cognitive science, interaction design, media theory, interactive narrative, storytelling non-human narrative, embodiment

Introduction

In the reality that humans perceive, time is linear. We live in the fleeting present, but we are also constantly re-connected to the past, from where knowledge is accumulated, identity is constructed, and causality is extended. Much of this reconnection is maintained by our memories. When we engage with our memories, our past informs the present. As we engage with our memories, the present becomes our past. In this sense, the present and the past co-exist, with the mediation of memory. Memories are references to the past, whose referents are ontologically irretrievable and eternally disconnected. Because of the linearity of time, at the moment when such a reference is born, its referent dies. Therefore, the ongoing cognitive activity of engaging with personal memories, the aforementioned co-existence of the present and the past, becomes an ongoing contradiction between reconnection

and disconnection, or the living and the dead, where the living present constantly morphs into the dead past, and the dead past is nowhere else to be found yet so concretely shapes the living present.

To reflect on this metaphysical contradiction of memory, this project, *Her Palace*, brings the internal memory experiences to the external medium of Virtual Reality. It simulates the subjective experience of immersing in personal memories in a virtual world. A character in this world tells an interactive, cinematic, yet self-reflexive narrative about an open-ended relationship. The interaction design of this experience is based on theories of cognitive science. The way narratives are rendered in this experience aims to reflect the nature of how narratives are constructed in the human mind.

Mirroring an internal mediation, memory, onto an external mediation, Virtual Reality, this project aims to invoke a medium awareness

HER PALACE

A woman with long, straight red hair is shown in profile, facing left. She is wearing a black, sleeveless dress with a high collar. The background is solid black. The text 'HER PALACE' is overlaid in large, white, serif capital letters across the middle of the image, partially obscuring the woman's face and hair.

1

rather than enforcing an immersion into the media, to surface contradictions and complexities rather than making claims and statements, to ask questions but attempt no answers.

System Design

The goal of this project is to stage and reflect on the postmodern contradictions in contemporary human experience through interacting with a quintessential postmodern medium, Virtual Reality. The contemporary human experience and the Virtual Reality medium are both postmodern in the Baudrillardian (Baudrillard, 1994) sense—a simulation perfectly masks the absence of its origin or reality, such that the simulation itself becomes the reality.

The loss of origin and reality is treated in this project in three ways. One, memory, as the main subject of this project, naturally manifests the loss of origin—the moment an episode

of memory is formed, its original referent dies in time. Two, this project, embodied in the hyperreal medium of Virtual Reality, joins all other contemporary media experiences in creating yet another Baudrillardian simulation that mediates and masks reality. Three, the ultimate goal for constructing this simulation is not to immerse its audience. As the origin or reality are lost in the mediations and simulations, this project brings awareness, instead of immersion, to the process of such mediations, including both the external mediation of Virtual Reality and the internal mediation of memory.

Why VR?

Virtual Reality is chosen to be the medium for this project because of its immersiveness—the deep and visceral integration with the human mind. Unlike print-based mediums (e.g. book) that engage with the human mind only vis-

ually, screen-based mediums (e.g. film) that engage human mind visually and auditorily but only occupies a small visual field, or interaction-and-screen-based mediums (e.g. video game) that adds interactivity to the former but still keeps the human interactor at a distance, Virtual Reality not only engages the human mind across three cognitive modalities, vision, audition, and motor, but it also occupies the entirety of the media consumer's visual field. Therefore, Virtual Reality is the closest approximation of what this project aims to simulate, the human cognitive processes, which is fully immersive and mediates all the information that the human mind receives across all modalities.

Gaze

Because this experience is conceptualized as an externalization of the interactor's internal

process, the interactor should engage with this simulated subject memory space as if it were their own mental space. This concept inspires the core interaction mechanism of this experience—gaze. One of the mechanisms that allow the human mind to actively engage with its internal processes is attention, and one traditional metaphor in cognitive science for attention is the spotlight metaphor (Posner, Snyder & Davidson, 1980). The conceptual semblance between gaze and spotlight (in Virtual Reality software, gaze is literally implemented using Raycast, a form of spotlight) and the fact that the shift of gaze almost necessarily accompanies the shift of attention (Shepherd, Findlay, & Hockey, 1986) both make gaze is the most appropriate external representation of internal attention.

To strengthen the spotlight metaphor of attention with gaze, as well as providing feedback to the interactor's actions, throughout the experience, the default state of an un-gazed

HER



2

PALACE

screen is not fully lit, and the gaze on a screen is acknowledged by its brightening, as if the screen were projected on by an actual spotlight.

Memory

When the attention of the human mind engages with memories, especially episodic memories, a properties of episodic memory are 'salient':

1) The experience of recalling memories resembles the replay of the experience that encoded such memories in terms of brain activity. (O'Craven & Kanwisher, 2000)—recalling memories can sometimes feel like reliving those memories. 2) Episodic memories are associative—the recall of one episode is likely to activate the recall of other episodes related to the former (Hopfield, 1982), which are later referred to as the spread activation mechanism. 3) The associative activation of episodic memories has a repetition priming effect, meaning that the subsequent recalls fol-

lowed by a preceding recall of related memories tend to be faster and more accurate (Neil, 1997). 4) Episodic memories gradually become less accessible over time without rehearsal or recall, whereas rehearsal and recall make episodic memories more accessible (Ebbinghaus, 2013). 5) The recall of episodic memories re-encodes these episodes, and the re-encoded content can be interfered by the context of the re-encoding, resulting in the re-encoded episodes to be a mix between the original episodes and re-encoding contexts (Underwood, 1957). These five properties of episodic memory are modeled by the following interaction design:

Memory replay is modeled by playing film upon the fixation of gaze. The connection between the experience of memory recall and the experience of consuming film—moving images with its soundtrack—can be established through empirical cognitive science studies. One seminal study shows that the brain regions

that encoded the memories are activated when such memories are actively recalled without needing to explicitly trigger such regions with external stimulus (O'Craven & Kanwisher, 2000). Based on this result, if the episodic memories are encoded visually and auditorily, their recall experience is likely to activate the brain regions for vision and audition, as if the visual and auditory stimulus is present and replayed, which is simulated with moving images and their soundtrack in this experience.

The spread activation mechanism in episodic memory is modeled by the spawning of new memory episodes in the virtual space. Before all screens play simultaneously in this experience, the end of one episode spawns a different episode at a different location in the virtual space, which starts playing automatically. The two episodes are related by the common character, story, and visual style. Such spawning pattern is analogous to the spread activation

of the associative network of episodic memory, where the activation of one node in the network activates its adjacent nodes (Hopfield, 1982).

The repetition priming effect of the human memory's associative network is modeled by the progression of how memories are animated throughout the experience—from using gaze to animate a static image, to automatic replay of new episodes, to simultaneous replay of multiple episodes. The threshold to activate the replay of a new episode becomes lower, because the replay of previous episodes has primed the associative network by spreading and accumulating activations across nodes.

The fade of memory is modeled by the moving away of memory episodes—as a memory episode fades, its distance from the interactor increases, making itself less accessible and legible to the interactor. *The rehearsal of memory* is modeled by the interaction mechanism where a fixation of gaze brings the gazed memory epi-

sode back to its original distance, just as attentively recalling a memory episode refreshes the memory.

The interference with memory recall by the current context is modeled by the orbiting of the memory episodes during the simultaneous replaying phase. As one memory episode is gazed at and attended to, other episodes orbit behind the attended episode, creating an audio-visual field that blends multiple memory episodes as they are replayed simultaneously. These interfered memory episodes should be re-encoded in the human mind, and it may even overwrite the previously encoded memory, but the overwriting behavior is not modeled in the experience.

Narrative

There are two levels of narrative going on in this experience. On the structural level, this experience

is designed to follow a traditional 5-act narrative structure (Freytag, 1896):

- **exposition** - The interactor enters the black space and sees the static image. Their gaze lights up and animates the image.

- **rising action** - The end of the first episode spawns the next, and this pattern repeats. In the process, the interactor develops their understanding toward the character, the story, and this virtual world.

- **climax** - Simultaneous replay and orbiting of the memory episodes start and the previous interaction mechanism fails. The experience may feel overwhelming and disorienting. A few memory episodes may be lost as the interactor re-orient themselves.

- **falling action** - The interactor makes effort to keep the remaining memory episodes but realizes that letting them go is the only way to progress this experience.

- **revelation** - The interactor intentionally avoids gazing into the fading memory episodes until they all disappear. The interactor is then left in the empty black space, just like how the

experience started.

This 5-act story arc (circle) is realized solely by the state of the virtual world and the interaction mechanism in this world, so it can scaffold any instantiation of this experience into a complete narrative experience, regardless of what memory episodes are recalled in each instantiation.

On the memory episodes level, a second layer of narrative can be constructed -- the narrative from the memory episodes themselves. The memory episodes recalled in this experience share a common character and a cohesive visual style, but the relationship across the episodes is intentionally ambiguous, fragmented, and disconnected.

This experience features a total 18 episodes of memories, and they appear in random order across 5 screens in the virtual space. The content of the 18 episodes, when put together, should cover a complete circle of development of an interpersonal relationship--solitude, longing, unity, estrangement, and separation--but these emotional states are expressed as sub-

jective sentiments and reflections, rather than concrete story events connected by causality. Because of the independence and openness of each episode, there is not a canonical way of ordering these episodes--each unique instantiation of this experience connects a unique sequence of episodes, from which a narrative can be constructed at the interactor's will.

Additionally, this experience is designed such that an interactor is unlikely to engage with all 18 episodes in one instantiation of this experience. They can comfortably consume the 5 episodes before the simultaneous replay phase starts, but after it the experience becomes intentionally overwhelming, not only because the simultaneous replay and the screen orbiting, but the interactor also has to balance between focusing on individual episodes and rescuing the As the goal of this experience is to externalize the human mind and reflect on its cognitive processes through media experiences, this intentional decomposition of the montage mechanism through random juxtaposition and association of narrative episodes hopes to bring the

unconscious gap-filling process to consciousness.

Medium Awareness

As discussed above, the medium of Virtual Reality is chosen because of its immersiveness, but this project demands a medium of self-reflexivity that brings awareness to the mediation from the external world and the human mind, which includes both the medium itself and the human cognition process. These two intentions seem paradoxical on the surface, because an immersive experience usually aims to make the mediation process invisible and unconscious, as if “absorbing” the audience into the media experience, whereas self-reflexivity and medium awareness aim to use mediation to bring awareness to the medium itself, and they usually break the immersion. However, if examined dialectically, medium awareness is self-contradictory in its nature—the sense of immersion needs to be established before it can be broken,

and an illusion stays real until its illusory nature is made aware.

René Magritte’s painting, *The Treachery of Images* (1929), is the quintessential expression of self-reflexivity—a painting of a pipe with a note below, “this is not pipe”. The painting is not a pipe, but a representation of a pipe. The upper half of the painting creates an illusion, and the lower half brings awareness to the illusion and breaks it. This contradiction reveals the mediation that the canvas bears and acknowledges it without having the viewers absorbed into it. However, if the illusion were not created in the first place, that is, if the representation of the pipe does not look like a pipe, the self-reflexivity would not work.

In this experience, almost all aforementioned design decisions, the choice of the Virtual Reality medium, the mappings between interaction design and human cognition, and the 5-act narrative structure, are designed for immersion. Additionally, the visual style of the memory episodes, including the character’s direct eye contact with the interactor and the

black background of the memory episodes that blends into the black virtual space, also aims to enhance the immersion of the experience, to let the interactor effortlessly and engagingly consume the media experience in their mind. With the immersive experience established, the mechanism of self-reflection is injected in the experience by the following two key design decisions.

First, an extended gaze draws the gazed memory episode closer but also makes it fade to black. An extended gaze signifies a close and immersive engagement with a memory episode. The decrease of distance and the fade-to-black of the memory episode is a slow process such that the fade is initially unnoticeable, and the enlargement of the memory episode caused by closer distance satisfyingly strengthens the immersion. As the memory episode grows increasingly darker, its closeness and enlargement become threatening and pressing. The interactor is therefore pulled out of the immersion and regains the awareness of the media's effect. This mechanism is also a metaphor for the subjective

memory experience where the closer one tries to grasp a memory, the more they realize that the memory is illusory.

Second, the interactor eventually has to intentionally resist gazing to finish the experience. Three factors draw the interactor to gaze into the screens: 1) the screens that display the memory episodes are the only bright and moving objects in the virtual space, 2) the character in these episodes is directly talking to the interactor, making eye contact, and telling a story, and 3) the memory episodes are fading away from the interactor while the interactor knows they can be brought back with gaze. These factors compel the interactor to gaze into the memory episodes, because cognitively human eyes are attracted to bright and moving objects, narratively the previous constructed narrative has built an empathy and attachment toward the character, which invites the interactor to learn more about her, and emotionally the sense of loss motivates the interactor to take actions to mitigate the loss. Under this circumstance, the interactor is forced to the realization that there

is no way forward except to fight these urges to hold on to the memory episodes and let them go. The rupture of immersion and the awareness of the manipulation of the medium become salient in the interactor's uncomfortable battle with the urges on the three levels (cognitive, narrative, and emotional). Different from the previous case, where the release from the pressing and darkening memory episode only requires an instant action, removing of the gaze, this battle against the urge of gaze is an extended self-constraint of conscious inaction -- the resistance has to be maintained throughout the process, and any failure during the process will restart the letting-go.

The similarity between this experience and other media experiences like *The Treachery of Images* (as well as *Drop/let's/fail to connect* from ICIDS2021 Art Exhibition) is that they achieve medium awareness through self-reflecting on the medium's mediation process by intentionally breaking down its own immersion, but this experience hopes to explore beyond the mediation process just within the medium itself.

As mentioned above, this experience aspires to reflect on the entire mediation process between the human mind and the external world, which includes the medium and the human cognition processes (if we consider the human cognition as another layer of mediation between the human mind and the external world), and this is achieved by making the medium not only an extension of the sensorium, as McLuhan claims (1994), but also a mirror of the sensorium, such that a reflection on the medium is simultaneously a reflection of the cognitive processes that the medium mirrors. This goal of cognition awareness above medium awareness is yet another reason why the internal processes such as attention, episodic memory, and active construction of meaning are mapped externally.

Discussion

As stated in the beginning of this document, the goal of this project is to reflect on the contemporary postmodern contradictions in human

experience. All the design decisions that intend to simulate and mirror human cognition, to externalize and bring awareness to the internal processes, and to create immersion and then to break it, aims to reflect on such contradictions. Like all artworks, once created, its experience, as well as the meaning, implication, and significance that the experience invokes, is open to the interpretations by the audience of the artwork. However, there are still two issues that are so relevant to the theme and expression of this experience that it would be remiss to leave them unaddressed.

The first issue is the relationship between this project and the paradigm of distributed cognition. Distributed cognition is one branch of cognitive science. Different from the traditional cognitive science that studies human intelligence mainly as processes inside the human mind, distributed cognition's main claim is that intelligence is distributed between the human mind's internal processes and the external environments. One of the most prominent theses of distributed cognition, probably also most harsh-

ly criticized, is the Extended Mind Thesis (Clark & Chalmers, 1998), which equates an amnesiac person's notebook with a neurotypical person's internal memory because they effectively allow people to produce the same intelligent behavior. Other studies in distributed cognition make more nuanced and less controversial claims (Michaelian & Sutton, 2013), but the central claim of this paradigm stands. It deals with the metaphysical and philosophical issue of what cognitive processes are internal or external of the mind, and more abstractly, where does the mind end, which intersects with the topic of this project.

Examined against the framework of distributed cognition, this project may stand on either side of distributed cognition's claim, depending on the perspective. The development of McLuhan's "mediums extend sensorium" thesis and the externalization of memory experiences in Virtual Reality seem to be in alignment with the claim of distributed cognition because they allow cognition to be outside of the mind. However, it can also be argued that the metaphors

and representations of attention and memory implemented in this project are rooted in the traditional cognitive science, because those metaphors are developed from cognitive theories that almost exclusively deal with the cognitive processes taking place centrally in the mind. It is not this project's intent to comment on distributed cognition either way, but maybe the emergence of this paradoxical relationship between this project and distributed cognition can be seen as an intricate reflection on one of the core issues of distributed cognition—what is the boundary of the mind.

The second issue is to theorize this project in the framework of feminist film theories, especially the concept of male gaze (Mulvey, 1975), as all the interactions of this project revolve around the gaze on a female character. According to Mulvey, male gaze imposes fetishization and control, which this project quite literally embodies—the female characters are displayed and animated on objects (screen) in the virtual space, and the interactor can control the screens through the fixation and removal of their gaze. However, as discussed

in the medium awareness section above, the medium's embodiment of fetishization and control are designed to be consciously reflected upon, rather than immersively consumed. In the revelation phase of this narrative experience, the interactor has to intentionally resist their gaze, to release the fetishization and control, to finish this experience. This uncomfortable and medium-aware self-resistance of gaze is the punchline of the experience. In fact, as this project intends to mirror cognitive processes in an external medium, it also creates a forum to discuss a reverse-mirroring of the male gaze concept from the external mediums to the internal cognitive processes—is engaging with personal memory controlling and fetishizing? Is the internal gaze gendered? If so, where does gender and the power of control and fetishization come from?

The end of this discussion is left with one more question, a question that might have been asked in the first encounter of the title of this project but gets left to the end. The title of this project is *Her Palace*, and the question is, whose palace? Obviously, "Her" refers to the character occupying

the palace, but the palace's rules are created by me, and it is designed for each interactor to engage as a mirror, a re-connection, or an extension to their own mind where their own stories are constructed. When each interactor explores this palace, are they outsiders, am I present, is she really there?



References

- Baudrillard, J. (1994). *Simulacra and Simulation (The Body, In Theory: Histories of Cultural Materialism)* (S. F. Glaser, Trans.). University of Michigan Press.
- Clark, A., & Chalmers, D. (1998). The Extended Mind. *Analysis*, 58(1), 7–19. <https://doi.org/10.1093/analysis/58.1.7>
- Ebbinghaus, H. (2013). Memory: A Contribution to Experimental Psychology. *Annals of Neurosciences*, 20(4). <https://doi.org/10.5214/ans.0972.7531.200408>
- Freytag, G. (2017). *Freytag's Technique of the Drama: An Exposition of Dramatic Composition and art. An Authorized Translation From the 6th German ed. by Elias J. MacEwan (E. J. MacEwan, Trans.).* Andesite Press.
- Hopfield, J. J. (1982). Neural networks and physical systems with emergent collective computational abilities. *Proceedings of the National Academy of Sciences*, 79(8), 2554–2558. <https://doi.org/10.1073/pnas.79.8.2554>
- McLuhan, M. (1994). *Understanding Media: The Extensions of Man (Reprint ed.).* The MIT Press.
- Michaelian, K., & Sutton, J. (2013). Distributed Cognition and Memory Research: History and Current Directions. *Review of Philosophy and Psychology*, 4(1), 1–24. <https://doi.org/10.1007/s13164-013-0131-x>
- Mulvey, L. (1975). Visual Pleasure and Narrative Cinema. *Screen*, 16(3), 6–18. <https://doi.org/10.1093/screen/16.3.6>
- Neill, W. T. (1997). Episodic retrieval in negative priming and repetition priming. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 23(6), 1291–3105. <https://doi.org/10.1037/0278-7393.23.6.1291>
- O'Craven, K. M., & Kanwisher, N. (2000). Mental Imagery of Faces and Places Activates Corresponding Stimulus-Specific Brain Regions. *Journal of Cognitive Neuroscience*, 12(6), 1013–1023. <https://doi.org/10.1162/08989290051137549>
- Posner, M. I., Snyder, C. R., & Davidson, B. J. (1980). Attention and the detection of signals. *Journal of Experimental Psychology: General*, 109(2), 160–174. <https://doi.org/10.1037/0096-3445.109.2.160>
- René, M. (1929). *The Treachery of Images [Painting].* In Los Angeles County Museum of Art.
- Shepherd, M., Findlay, J. M., & Hockey, R. J. (1986). The Relationship between Eye Movements and Spatial Attention. *The Quarterly Journal of Experimental Psychology Section A*, 38(3), 475–491. <https://doi.org/10.1080/14640748608401609>
- Underwood, B. J. (1957). Interference and forgetting. *Psychological Review*, 64(1), 49–60. <https://doi.org/10.1037/h0044616>

Images

1. Her Palace Image
2. Her Palace Poster
3. Simultaneous Replay of Memory Episodes (with fading)

Tianbai Jia is a media enthusiast, filmmaker, software engineer, and a master graduate in Digital Media from Georgia Tech (class of 2021). His background is in film and computer science and his research interest is in creating mindful engagement and self-reflection in immersive and interactive narrative experiences to stage the contradictions in contemporary human lives