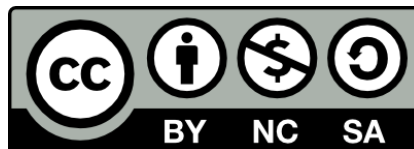# Augmented Reality Narratives:

Homunculus: A Story at the Threshold Between Physical and Virtual Worlds

by

Mitzi Martinez

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partial fulfillment of the requirements for the degree of MASTER of DESIGN in

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Augmented Reality Narratives.

Homunculus: A Story at the Threshold Between Physical

and Virtual Worlds

Mitzi Martinez

MDes Digital Futures,

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ABSTRACT:

This thesis investigates the creation of site-specific augmented reality (AR) narratives. AR is a complex medium comprised of both physical and virtual worlds, employing a screen space where the two are synthesized. As a nascent technology, the methods and language for the creation of AR content are still developing. This paper analyzes elements that come into play when creating an AR narrative, including learned behaviours within specific architectural zones. I consider architecture as a medium and frame for AR narrative, as architecture engages with the mobile device and screen where the story unfolds. My research is informed by different disciplines and theories, including the concept of the architectural fold introduced by Bernard Cache and Elizabeth Grosz. Through the fold, virtual architecture interrupts physical space by annexing it into a new form. My research also applies cinematic language as a means to articulate the on-screen story, and to apply the concept of montage to physical space in real time. All of these elements and concepts inform *Homunculus,* an AR Narrative in the Gladstone Hotel.

ACKNOWLEDGEMENTS

Dedication

To my family for all their support and help, even when my absence writing the thesis may have led them to believe I was a figment of their imaginations.

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1. Introduction

Thesis Background

Places are articulate; they often contain meaningful marks of events. But the scars on the surface of architecture and geography will remain silent without the memory and embodied experience of participants. Participants read the signs in spaces as in books. Participants observe the cracks, the moved belongings, the broken tiles. Through this process, concepts are generated, links are formed and narratives are created.

Spaces frequently provide evidence of effects, but not causes. For example, the effect of a broken window is obvious, but its cause and consequences are left for people to decipher or imagine. As spaces mutate through time, new narrative possibilities emerge; space is a vector of time, of multiple times, actually. As the participant stands in the origin point of the present, in the simultaneous act of reading space and narrating it, lines of possible pasts and futures unfold.

In literature, cinema and most recently video games, spaces invite readers, viewers and players to explore them. Virtual architectures on film and digital games entice the imagination and activate memory through the sensorial functions of the body, evoking experiences of temperature, sound, and images.

The video game *Bioshock* (2007) tells the story of the rise and fall of an underwater utopian city: Rapture. Through the majesty of its Art Deco buildings, the luxury of the furniture and advertisements on the walls, players recognize the period when it was constructed, the magnitude of the dream and political ideas that propelled its creation. Through the ruined architecture, water leaking into submarine skyscrapers, the abandonment, weapons and bodies left behind, messages written in blood on the walls, players discern the war, the madness of the inhabitants, as well as possible futures for the city.

Wong Kar Wai's film *In the Mood for Love* (2000), weaves semiotic levels of its narrative through mise-en-scene and staging. As the camera follows the main characters in their struggle to find closure from their pain, music, beams of light and colours act as a counterweight to the story. Instead of being dark, muted, and quiet, they evoke a world that is dynamic and vivid. This allows a parallel story to emerge. A secondary narrative is audible under the primary one: even in alienation, light and life coexist. Even through pain, beauty persists.

Space is used to convey narrative meaning in these examples, but it is represented rather than physical space. It can be argued that in video games there is a form of embodiment. Players explore the environment, but this exploration is made possible through a virtual avatar. Touching and walking are represented, not physically conducted. Technology is changing that in artistic narrative, and in everyday life. As ubiquitous computing advances, spaces become hybrid and mixed; physical architecture is infused with virtual data.

Surveillance technology, sensors, screens, laptop computers, mobile devices including tablets and phones all send and retrieve information from and to spaces. By connecting to physical spaces, these technologies translate them. This is what Lev Manovich (220) called Augmented Space – a space with the potential to receive or send information by means of electronic devices that extend its domain.

Artists have investigated this as a critical opportunity to produce art that is connected to a milieu that reacts to events around it, allowing audience participation. Moreover, these technologies have enacted a shift in the paradigm of how art is created. They foreshadow the possibility of creating Art works that integrates audio, image, text, interaction and embodied experience with the architecture in a responsive system.

Augmented reality affords new possibilities for narrative exploration, superimposing information through technology to change the experience of physical space. Artists Janet Cardiff and George Bures-Miller, the groups *We Are Circumstance* and *Blast Theory* amongst others push the boundaries towards a more experiential form of storytelling. These artists work with audio, video, staging, geo-location and performance in real territory to guide and direct the actions of the users in the space, prompting them to walk, observe and interact with people, objects and places. The users describe these experiences as "being inside of a movie", in a cinematic experience in which they are immersed in the hybrid space of fiction and reality (*Our Broken Voice*). These works make use of spaces in more than a descriptive way; they link the actions and time of a fictional story to the space and the time of the real world.

Through the mediation of technology, i.e., a screen or audio capabilities, artists are now able to add layers of information that intervene into space, intersecting between physical and virtual realities and different times, or generating new ones. This form of artistic practice creates a bridge between now and then, fantasy and reality, narrative and experience.

Augmented Reality (AR) is rapidly advancing in its capabilities for better graphics, geo-location and directional audio that simulates sounds coming from different directions. Real and virtual worlds are brought together in one screen, a third space that is not virtual nor physical but mixed.

Lev Manovich asserts in The Poetics of Augmented Spaces:

[T]he design of electronically augmented space can be approached as an architectural problem. In other words, architects along with artists can take the next logical step to consider the 'invisible' space of electronic data flows as substance rather than just as void – something that needs a structure, a politics, and a poetics (237).

This thesis considers and implements the design and construction of an augmented reality narrative at The Gladstone Hotel in Toronto's Queen Street West neighbourhood. It is both a hotel and a site for art exhibitions. Through this project and a consideration of its narrative elements, I shed light on the practical dimensions of AR as an art and design medium.

Thesis Outline

The thesis outlines augmented reality technology and its characteristics, then breaks down the elements specific to this media regarding narratives in physical places. This begins with an examination of these spaces, describing the compositional elements that participants relate to. Architecture is examined as a frame for performance and interactions in AR narratives, including the architectonic integration of virtual and physical space.

This is followed by an analysis of the screen where physical and virtual elements come together. The language of cinema and specifically montage is an overarching element for the different narrative dimensions of the story; space, interaction, visual elements, audio and the layers of meaning altogether comprise the storyline.

The thesis project was designed and created by bringing these different dimensions of meaning together: physical space with its learned behaviours, architecture as a frame for our actions with its affordances for sensations, and cinema with its vocabulary of montage within the environment and the screen space in real time.

2. Intervention in space

Augmented spaces

Augmented Reality (AR) is defined by Julie Carmigniani and Borko Furtht as "a real-time direct or indirect view of a physical real-world environment that has been enhanced/augmented by adding virtual computer-generated information to it" (3).

Conceptually, Virtual Reality (VR) and AR are not so much different as they are degrees in how mixed the virtual and the real is in a given space. Paul Milgram and Fumio Kishino created the concept of the Virtuality Continuum in 1994 to illustrate the different degrees and variations existing between the two poles of a completely real environment and a completely virtual one. (3)
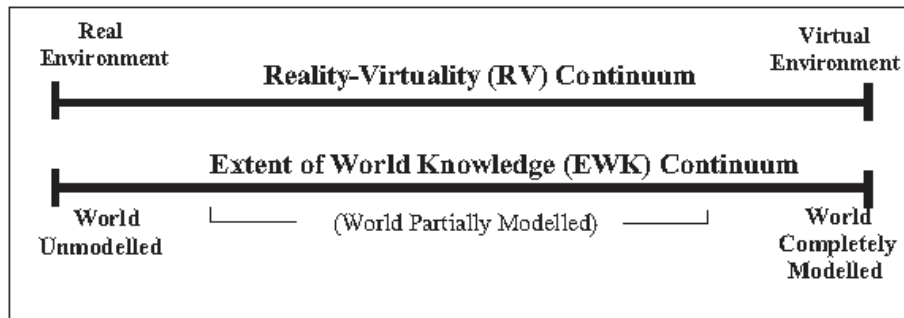
FIG. 1. VIRTUALITY CONTINUUM. PAUL MILGRAM & FUMIO KISHINO, 1994.

Kishino and Milgram consider reality as a continuous line between two extremes, parallel to what they call The Extent of World Knowledge (EWK). EWK refers to the amount of knowledge of the physical terrain contained in the computer that generates the virtual data. Knowledge of the environment comes from mapping the space with sensors and cameras, or is retrieved from the environment via an electronic device armed with GPS, Bluetooth technology, or Near Field Communication tags (NFC). Where there is the mediation of a computational device capable of obtaining partial or total information of the territory that superimposes information on the real world, the space we perceive will

be a mixed space, situated at one point between the two extremes of the Virtuality Continuum. The superimposed information will take into account the environment that the user is in.

However, in terms of how we experience the space, AR and VR are fundamentally different: while VR uproots us completely from the real world, AR adds to it, forcing us to maintain contact with the environment around us to trigger and interact with the computer-generated content. VR overruns the real world, AR intersects with the space. VR takes us to another dimension; AR creates folds in the space, time and reality, while maintaining continuity and fluidity with the real world.

AR is intimately linked to the physical world because it is a context-aware technology. It works by interacting, moving and acting in the real world. Every AR system up to the moment when this thesis is written works with triggers that allow virtual elements to overlay or interact with physical ones. These triggers are either physical objects set in the environment, or geographical data extracted from the place. The visual triggers are printed images called markers or three-dimensional objects that trigger the computer-generated data to be superimposed on top of physical positions or at a certain distance from the trigger. In the case of the geographical data, the computational device sends information from an exact location in the geographical space, and retrieves the AR element to place it on a precise position in the real world. Another AR technology related to the coordinates of the space is the beacon, a small device that is physically placed in the environment to create a geo-fence capable of detecting proximity at a micro-level. The beacon triggers the AR when we are in proximity to it within a very exact perimeter.

Bearing in mind the above-mentioned characteristics of the technology, an Augmented Reality narrative in a specific location is intrinsically linked to the physical

space where it is deployed. In this sense, it is similar to an art installation that intervenes

in a space, changing the way the exhibition space normally works.

Art critic and media theorist Boris Groys analyzes the functions and rules of the

space for art exhibitions compared to the spaces that host art installations ("Politics of

installation" 2). Traditional art exhibitions curate independent works of art, one after the

other in a series, to be viewed by visitors in a sort of stroll that is designed to highlight the

art moving through the space. In this curatorial practice, space is regarded as neutral, as

an extension of public architectural space. Conversely, as Groys points out, art

installations change the nature of spaces from neutral to ones that are charged with the

rules of the artist, where the visitors' interactions and objects become part of the

installation:

> "The installations transforms the empty, neutral, public space into an individual
> artwork and invites the visitor to experience this space as a holistic, totalizing
> space of this artwork. Anything included in such a space becomes a part of the
> artwork only because it is placed inside this space" ("From Medium to Message"
> 60).

Because of this transformation, the installation interrupts the rules and previous

affordances of the space, and imposes the ones of the artist over the delimited area of the

installation. The artist appropriates the space and sets her own rules of behaviours, re-

signifies the territory and establishes the probability of the events that can occur inside

the art installation. The work of the artist is to establish clear rules for the visitor to

interact with the installation. The visitor is engaged with the piece in a similar process to

one that occurs in literature, called the narrative pact. The narrative pact as defined by

J.M Pozuelo (148) is a contract by which the reader accepts the reality system that

operates inside the novel, establishing what is believable in the story world. Through this

process readers and participants become capable of accepting stories in which magic is

possible or objects can talk. With an art installation, a similar contract is established by

which participants accept the rhetoric of the world created by the artist to understand how to interact with the piece and interpret the interactions, settings and objects in it as part of the meaning.

The fact that the art installation transforms everything inside the space into part of the work of art does not completely erase its previous associations or meanings; we don't forget everything that we know as soon as we set foot into one of these spaces. Rather, the art installation re-signifies these everyday objects and places. The intangible values such as the pre-established meanings of a place or its history become part of the artwork as well. The artist works with these values by dislocating them to call our attention towards new meanings. These works of art organize "a complex interplay of dislocations and relocations, of deterritorializations and reterritorializations, of de-auratizations and re-auratizations" (Groys "The Topology of Contemporary Art" 74). In this approach, the artist uses the artwork to intervene or intersect with the space.

Homunculus: Space, Place and the Creation of Meaning

Homunculus is both an installation and a structured story. It obeys the rules of both narrative and installation, generated from the basis of the history, pre-conceived ideas and behaviours of the specific site. How are rules established in a place and what is their effect on our behaviour when interacting with an art installation? How do we make meaning of a story set in a physical place? To unravel these questions I examine space from an experiential point of view and the phenomenology of place, in an attempt to understand how spaces are experienced and read as part of a story.

In *Place and Placelessness* , David Seamon and Jacob Sowers introduce us to the work of Edward Relph, a geographer concerned with the experience of space and, more specifically, its importance as place in human lives:

> For Relph, the unique quality of place is the power to order and focus human intentions, experiences, and actions spatially. Relph thus sees space and place as dialectically structured in human environmental experience, since our understanding of space is related to the places we inhabit, which in turn derive meaning from their spatial context (44).

A place, according to According to Yi Fu Tuan (6), is regarded as such when we endow value to a space and establish its limits. A space on the other hand, is an open extension; it creates a feeling of unrestricted freedom. It is not that is perceived as limitless, but its limits are vaguely defined because its nature is more abstract (Tuan 6). These values configure and re-configure space, changing its meaning while we experience and learn more about it as place, shaping its identity through this process. Identity is not something that is acquired once and for all. It is a constant mutation that occurs gradually in the dialectic relationship between living in the space and the assimilation of these experiences both personally and collectively. On a subjective level, a single space is by nature plural since it is the field where the individual experience occurs. On the collective level, this experience generates both values and actions that can spread to the by contagion, by being socially exposed to these attitudes and actions in the same space. All of these values influence our behaviour since they establish a set of rules for what is acceptable and what is not in certain places. These boundaries have a double function: on one hand, they put confines on our freedom and limit our expressiveness. On the other hand, they provide us with guidelines that help us become familiarized with the milieu by relating it to similar places.

Casey explains these rules through the concept of habitus taken from Pierre Bourdieu's *Outline of a Theory of Practice*, and adapts it to explain how certain attitudes mediate between the place and the subject to aid the linkage between them (686). Habitus is a predisposition to act in a certain way in determined environments. It is not, however,

a personal routine. It is a structure for actions in any given space, and it establishes a certain attitude that has been learned from society and that is re-acted when encountering environments that are alike. Casey adapts this concept to include places, since according to him, a habitus that is fully formed incorporates what has been learned from similar places. Habitus for Bourdieu is related to a class condition. However, Casey points out that the social, historical and political dimensions related to places are present and mediate between the subject and the place, as time and history cannot be separated from the subject.

The limits between hotel and art gallery are deployed in Homunculus to suggest the space of influence of the artist and the perimeter in which the rules for the art installation operate, as well as the rules inherent to the primary essence of the hotel as a place, fed by the personal, social, historical or political spheres of life, as well of the habitus that would influence our behaviour.

As a hotel, the Gladstone has the endowed characteristics of a transit space where people come from all over the world to temporarily dwell. Part of its habitus as a temporary dwelling place is linked to privacy. For instance, one does not linger outside the door of a room where one is not staying, or in the corridors. However, as a gallery for art exhibitions, the Gladstone sets the art precisely outside of some of the hotel rooms or even inside of them. This specific hotel encourages exploration and lingering in areas where the art is shown. Homunculus takes advantage of the habitus of spaces for art. We are expected to explore and contemplate the works of art to analyze and decipher them. The story invites viewers to explore the hotel looking for markers to trigger the AR. These hang on the corridors, stairs, bar and the main entrance.

FIG. 2. MARKER AT THE BAR

The AR works at times like an X-ray vision into the rooms, as a perforation of the walls, or as a complete dislocation of the space, inserting the AR room in the middle of a physical space, rupturing the rules of privacy.

The narrative reveals the memories left behind by visitors to the hotel, allowing us to see what they were doing in this place of transit, and to interact with their personal belongings.

The narrative also works with the limits of the place because characters are connected to each other and bring fragments of other places that remind them of home, where they dwell emotionally. As the characters attempt to identify and gather the elements that make them feel at home, the story reflects on the limits of dwelling.

The characters are long gone, but still dwell in the hotel, as well that in the places that they feel nostalgia for.
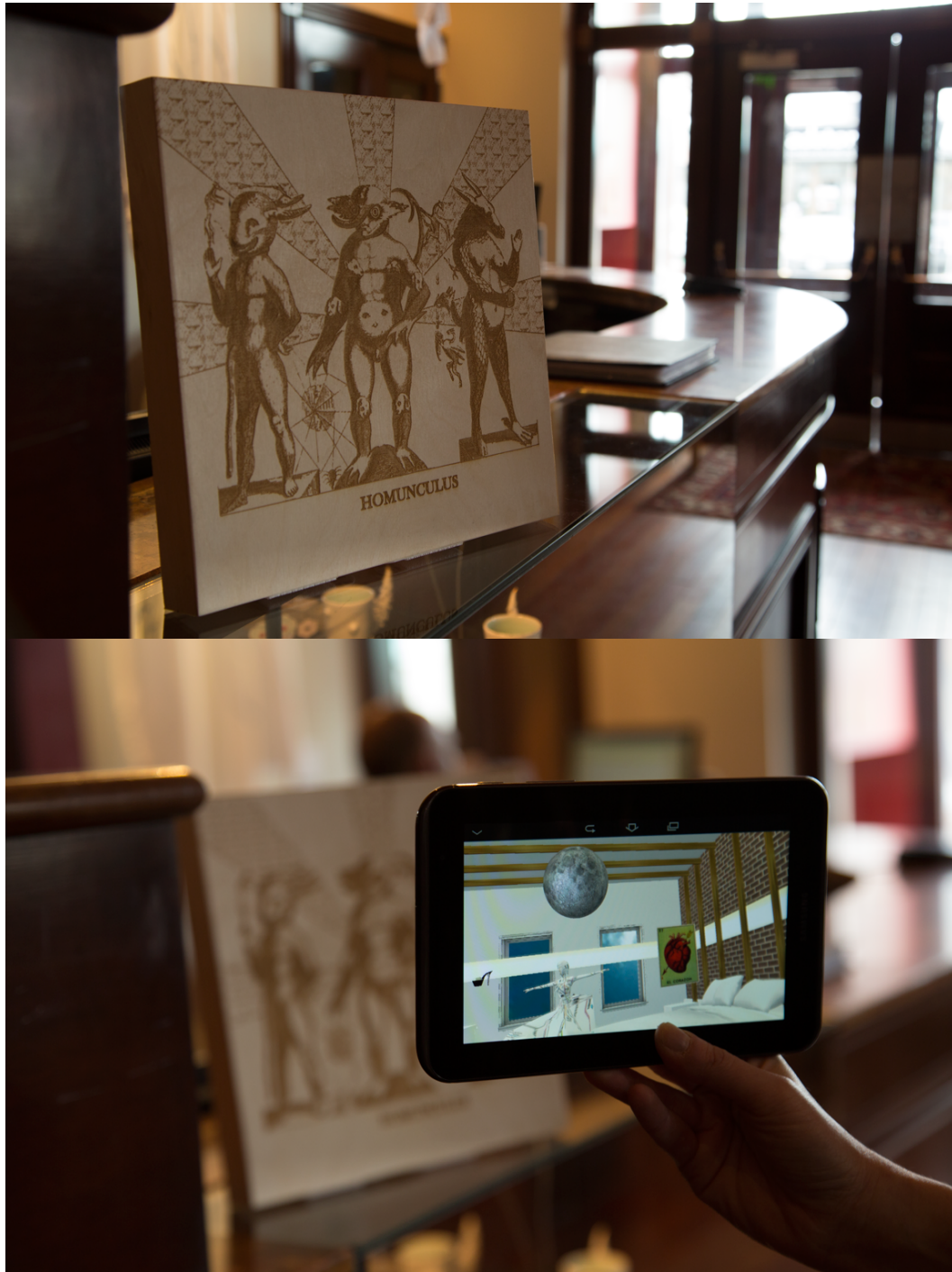
FIG. 3. MARKER AT THE ENTRANCE

In the virtual spaces in the story, Homunculus re-creates the decoration and disposition of the rooms, but it doesn't attempt to fool the viewers into believing that the interior spaces are real. Rather it uses their virtuality as a metaphor for the nature of memories, their intangibility and fragmentation. By the process of inserting these virtual rooms in the physical architecture itself, the AR dislocates it to focus not on the present, but on absence, what is gone.
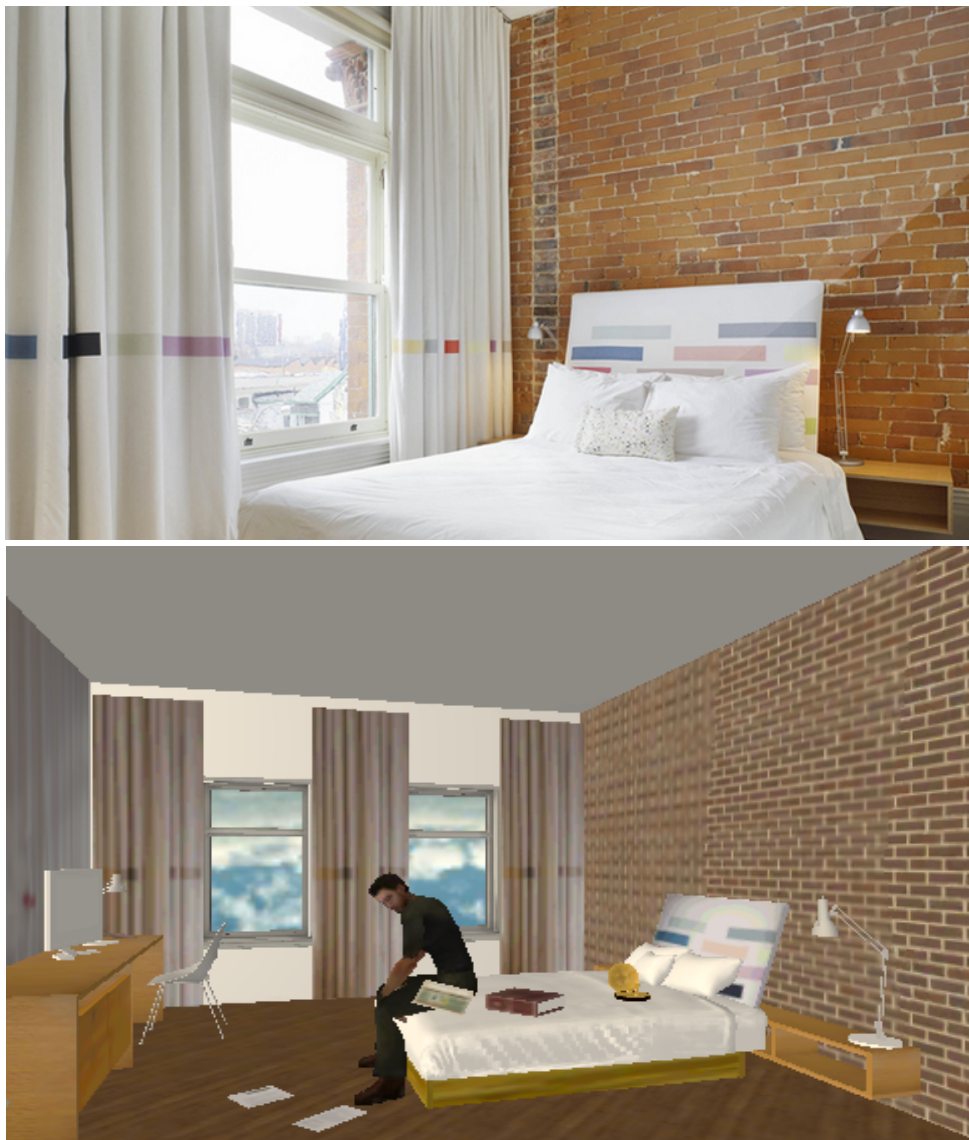
FIG 4. REAL ROOM & VIRTUAL RECREATION OF ROOM 312

In The Practice of Everyday Life, Michel Certeau reflects on the nature of memories, places and storytelling and asserts:

> Places are fragmentary and inward-turning histories, pasts that others are not allowed to read, accumulated times that can be unfolded but like stories held in reserve, remaining in an enigmatic state, symbolizations encysted in the pain or pleasure of the body (108).

Thus, this AR installation inserts itself both in the physical space through responsive virtual rooms, and also in the space conceptually, intersecting with physical dimensions as well as pre-conceptions of the place, the pre-established rules and habitus of the hotel, bending them to create affect.

3. Architecture as a frame for the AR experience

As the immediate environment for lived experience, when setting an art installation on a physical place, we have to consider not only the messages already embedded in the architecture, the signs that will be read, the values already endowed to them as they become places; but also the way its spatial distribution talks to our body and our actions, how they establish the possibilities for the occurrence of certain events, how they are lived and explored, and finally, how it establishes the limits for not only our actions, but also for the work of art, acting as a frame that extracts and underlines certain elements and actions.

Traditionally, architecture has always been narrative. Architecture forms dwellings, and is also concerned with the transmission of ideas that situate human beings in relationship to gods, nature, political powers and cultural meaning. Architectural narratives appear in the forms of text, ornaments, frescos, and stained glass. Architectural narratives are also embedded in the distribution of the space, building size and dimensions, and connections between spaces. Thus architecture is augmented by information designed to bridge between the intangible and the tangible, concepts and

actions, inside and the outside. As Alberto Perez-Gomez points out (2), architecture

supported ritual actions to connect people with cosmogony, mythology, religion, personal,

social and political life:

> Architecture orients, indeed, but its mode of orientation, i.e. what it says, is inseparable from itself. It orients the body in action, framing the actions, traditionally formalized, rituals that allow humans to participate in the totality, the wholeness of culture. Precisely because of its status as the frame for human presence, constituting the space of intersubjectivity, where we appear for the other and therefore appear as ourselves, architecture is intricately related to problems of being in the world.(2)

Architecture abandoned the mimesis of nature and its representational vocation in

the 18th century, when cosmogony ceased to be the uncontested center of all the social

and human activities, but it maintained its concern, if not in practice, at least in theory, to

situate us in relation with the rest of the world, to communicate through the space, and to

convey meaning through the art of organizing the space. Whether with literal narratives,

or through the distribution of the space, architecture theory has always dealt with the

poetic and existential dimensions of dwelling. Over time, it stepped away from the art of

representation of the messages in the walls, it moved forward to art of ordering the space

to connect, divide, produce flows and generate probabilities for certain actions to happen

in the spaces. It became less about knowledge and more about experiencing, less about

the mind, and more about the luring of the senses. In that sense, is a fundamental part of

our lives, it acts directly on us, structuring our experience, giving it an exact location, and

also, dislocating it through the arrangement of fragmentations and folds in the space.

Through the folding of the space an outside and an inside is made possible, but is also

through that folding that continuity with the outside exist. That is why we talk about

fragmentations, dislocations and folds — architecture divides space, presenting a series of

thresholds that connect one zone with another. This can be considered in terms not of

fractures but of folds, where a continuous line of movement joins outside with inside.

Bernard Cache defines architecture as "the art of introducing intervals in a territory in order to construct frames of probability"(23). In Cache's view, architecture arranges the territory through configuration and potential, introducing these inflections to control the probability of certain activities. Architecture intervenes in the space by framing it, and the architectural frames fulfill three main functions, according to Cache. The first is to delimit the interval for an action. The second is to selectively re-establish connections with the separated environment. The third is to adjust these delimitations and re-connections to allow certain activities to occur within the space, e.g. a flat stage is designed to increase the probability of dance or athletics. It is the flatness of the stage and the stadium what increases the probability of dance or athletics to occur in them, and the limit what indicates the area where these activities can occur (Cache 23-27).

Architecture sets the probability of the temperature of the floor. It isolates or amplifies sound, it makes light and shadows appear and lets the sunbeams pass. It also sets the stage for performance, the conditions for running, climbing, or contemplating. The window, Cache notes, "frames the landscape as much as the landscape encompasses the frame" (140). Through this framing, architecture creates affect through the encounter of opposites forces within the canvas, as Grosz points out: "Art is the art of affect more than representation, a system of dynamized and impacting forces, rather than a system of unique images" (3)

Architecture according to Grosz links a series of frames that extract the interior, experience and movement from the chaos of the space (19). Frames allow these tensions to exist. It is through delimitations that we are able to encompass the experience, extract from chaos and intensify sensations; the space is a canvas that talks directly to our body and our senses. Framing is a key condition for organizing an encounter with the world, in terms of habitus and the movement through folds in the space. This includes the sense of

insideness and outsideness and bodily sensations such as being in contact with the floor, the walls and the air. Architecture frames the subject in three dimensions: the mind with the personal and social aspects, the body with its competence to assimilate the haptic experience, and the emotional, that brings both dimensions together translated into a poetic synthesizing of the world. All the aforementioned elements can serve as a vehicle to guide, affect and articulate the experience of an Augmented Reality narrative integrated on the space.

Liquid Architecture and art installations

Homunculus inserts two virtual rooms in a physical space. These virtual rooms are responsive to the visitor as they are triggered by framed illustrations that hang on the wall on the corridors or stairs. The virtual rooms were built to resemble actual rooms of the hotel. The AR was built using Unity3D, a game engine that allows the maker to situate a virtual version of a physical marker in a position in relation to the distance from the camera.

FIG. 5. POSITION OF THE VIRTUAL MARKER IN UNITY 3D

This allows the author to control how much of the room will be visible to the user when the AR is triggered. It also regulates how near or far the user will be from objects. Inside Unity3D, the closer the marker is to the virtual room, the more of the inside of the room will be visible. In Homunculus, the marker was set to make the limits of the virtual architecture coincide with those of the physical building. This was to create a feeling of continuity, like a fold in the wall that opens and closes the space. Virtual rooms may not be tangible, but they are spaces in their own right. They can be described in terms of "liquid architecture"(Dixon , 395) a term coined by Marcos Novak that refers to cyberspace. This term has been expanded to apply to responsive architecture. Virtual 3D space does not have mass or weight, but it does have dimension in the Cartesian plane. Cyberspace and three dimensional virtual spaces can include rooms, locks and thresholds that we traverse to access information. Unlike traditional architecture in the physical world, liquid architecture is dynamic and mutable, it flows, reacts and interacts with the milieu and the stimuli of the environment. Liquid architecture shares these characteristics with interactive art installations which do not just augment the environment, or add layers of meaning. Rather than adding to space, art installations folds it, opening up a perforation that allows viewers to see into other worlds. When art is not purely digital or physical, but rather a mix of both, the author works with dimensions from two different kinds of architecture: classical, fixed and immutable buildings, and dynamically changing virtual architecture. As virtual spaces for AR are currently made visible on the screen of a handheld device, another frame is added to the one that architecture provides: the screen space and its limits.

The screen and the montage of space through cinematic language

   The bond between architecture and cinema is as old as film itself, after all what film does is to emulate a known experience, that of observing and traversing the space. Montage curates a version of the perception of space, playing with the elements in the scene to produce meaning. The camera both reveals a space and represents our physical position within it. This is the position that we occupy in a specific location inside the mise-en-scene, relative to all the elements shown on screen. This staging is carefully planned and structured by the scriptwriter, director, cinematographer and editor to serve the narrative and/or generate an affect. Sergei Eisenstein in his text *Montage and Architecture* written in 1938, describes the montage of space created by the architecture of the Athenian Acropolis as "the perfect example of one of the most ancient films" (Bois, Eisenstein 117) Eisenstein drew analogies between cinema and painting, architecture and literature, stating that "all the arts, throughout the centuries, tended toward cinema"(Bois, Eisenstein 112). But in the specific case of architecture, this analogy is a more direct. This effect is described by Friedberg in *The Virtual Window*: "Legs moving, shot-by-shot, through the Acropolis, the peripatetic body is a movie camera following a "montage plan" (172).

   Eisenstein alludes to not only the arrangement of the scene and the architecture ensemble, but also to the sequence in film and the actual act of walking in the space. To look around from one point in space to another, to change point of view, is the act of montage. This does not mean , as Friedberg notes, that montage can be found in any building or throughout all of urban space. The experience of watching a movie as a spectator is not identical to being in a space. By translating a 3D space to 2D screen space, a dimension is lost. As Friedberg (173) and also Virilio (Friedberg 174) point out; the translation is also from materiality to immateriality or virtuality. Nevertheless, in the

case of an AR narrative, the sequence takes place on two planes simultaneously, the

screen, and the actual physical space through which the viewer walks. Since both the

virtual and the physical spaces of an AR narrative are three dimensional, they offer the

possibility of approaching and circumventing objects and advancing the space. Thus, the

third dimension is not lost, but duplicated. What the screen adds to the narrative is the

possibility of montage using more that just a walk. The montage can now include close-

ups, panoramic views, on-screen/off-screen elements, transitions, depth-of-field changes

and fantastic elements. In summary, the cinematographic language structures a full

narrative while editing the space in real time.

FIG. 6. CLOSE UP IN HOMUNCULUS WATER ROOM

How does this montage of space occur? Eisenstein contended that cinematographic montage "link(s) in one point –the screen– various elements (fragments) of a phenomenon filmed in diverse dimensions, from diverse points of view and sides." (Friedberg 173). When Eisenstein draws a comparison between the architectonical ensemble of the Acropolis and montage on film, he takes into account that, as the walker moves through space, the composition of the buildings, one after the other, appear as a succession of images rich in contrast, a balance of symmetry and tension between forms that are perceived by the eye as a perfect sequence.

In spatial narratives, the path the user follows is key for the montage within the space. AR can't control the user's movements, but similar to architecture, it can guide, influence and propose paths. Architecture itself provides the tools to do so. A wall produces turns and full stops; doors and thresholds provide bifurcations of the path, stairs and corridors lead to specific places. To design an AR spatial narrative inside a building, one must walk through a space and consider the sequences that will be edited by introducing the AR markers and scenes. The markers propose certain routes. When encountered by the user, the virtual scene intervenes in the space, and is inserted into the sequence. The screen of the mobile device frames the space and provides a delimited area for the composition of symmetries, for transitions, shots and the introduction of the on-screen and off-screen space.

The AR screen can generate order and hierarchy in the physical space, defining the features to be explored, and guiding the user. Cinema communicates its message through an arrangement of cues in screen space. These cues add to the depth of the narrative by delivering or withholding information and creating affects. This information is contained in the shot, not only by what is shown, but also by what is left out of the scene, the elements that we can only hear or infer, that are not visible.

These are examples of how cinema can be used to convey meaning in AR narratives, including how the techniques of montage in real space can be used to better understanding what is being edited. Montage is not only relevant to filmmaking, but actual physical and virtual spaces in real time. Montage of real space is achieved through a dislocation of time, editing the space that the user is traversing. AR is composed by combining elements of the virtual and the real, brought together on a screen by means of a camera. Transitions, close-ups, fades in and out, on-screen and off-screen elements, are used to shape a narrative that happens in real time, in a real space. The user maintains physical contact with the space for the duration of the narrative, in a process of editing real space in real time.

4. Narrative structure and spatial storytelling

Fragmentary structures and digital environments

In AR, walls, halls and markers serve as aids to lead a visitor through a story, combined with habitus or one's conditioned response to architecture. However, the user has agency, choosing paths and the order of movements and actions. Thus the narrative must to be structured by its AR author to be understandable in a way that adapts to the choices that a user makes. In *Hamlet on the Holodeck* Janet Murray asserts that digital environments provide us with powerful tools for the creation of narratives, due to their nature. Digital environments are "procedural, participatory, spatial and encyclopedic" (83). By procedural, Murray refers to the capacity of the AR narrative to execute actions, one after the other, in response to user input. The quality of that response will depend on how well-programmed the device is to interpret the world. (Murray 85)

In the case of the AR built for Homunculus, the markers trigger the tablet to display a virtual room in a specific location. The position of the user affects the narrative

in terms of what elements are visible on screen, based on where the user directs the device's camera. This takes us to a second feature of narratives in digital environments; the affordances for user participation. As Murray points out, the sequence of orders executed by the computer is interesting because it is a response to the user's actions, a sort of dialogue between the human and the device. For this reason, the user must be taken into consideration when programming and planning these interactions.

The narrative itself helps to establish the probabilities for the actions of the users. In Homunculus, interaction is central to the exploration of the physical and virtual environment through aspects including distance, angles, points of view, and the selection of the elements inside the room. These trigger elements of the story including audio, voiceover narration and changes in the display of the virtual environment. Each narrative segment is triggered by a specific object. Each is self-contained, and can be encountered without need for the other pieces. Though a shoe in one of the rooms is a small part of a whole story, it is essential to understand a specific segment of the message. However, the shoe does not need the rest of the elements to deliver its small chunk of information. It is freestanding and self-sufficient.

As for the spatial quality of AR media, Murray underlines its power for drama. The virtual environment is a stage where the user and the narrative elements perform. The walk to find the interactive objects can be used as a dramatic element to generate tension between the installation and the user. In Homunculus, the characters – who are trapped in the loops of their memories - are freed by the visitor who finds them and witnesses their stories. Walking and searching by the visitor play a central role in the characters' catharsis.

Murray refers to the encyclopedic nature of the AR media. This includes its power for connecting to big data. This can be used to transport the user to other places, to

generate an intricate web of connections between data, or to display virtual environments with great detail. All of these elements play a vital role in user immersion, the capacity to create not just narratives but experiences (Murray 116). An AR narrative operates on the border of hyper-reality, pushing the boundaries of the real. For Murray, this is one of the most important tasks than an author can pursue in terms of contemporary narrative, to test the boundaries of the liminal world. How far can the limits be stretched before the story loses its sense of reality, before the contract of credibility is broken? To maintain the illusion of the story being real, and to maintain user immersion, the story must adhere to the rules of logic of the world that has been created. This includes the actions and interactions required by the user to advance the story and the behaviour of the interactive system. For this reason, Murray points out that a story for digital media must be planned as a visit. To maintain credibility, the technology used to deliver the story must be acknowledged and inserted into the story. The technology must at least be recognized as a mediator between the user and the narrative world. Thus, the story is more likely to be able to sustain the illusion of being within the real.

In *Seamful ubiquity: Beyond seamless integration* (MacColl et al. web) the authors borrow the concept of seamful ubiquity from M. Weiser (1995) to describe systems in which the joints between the real world and the interactive system are not invisible or seamless, but elegantly integrated, that is seamful. In the case of the narrative presented in here, the markers, the App for the tablet and the tablet are part of the story, referenced as tools made by the main character to help the users in their search.

Given the aforementioned characteristics of the media, AR narratives are often either branched (opening up different directions depending on options taken by the users) or fragmented (self-contained segments that aggregate together to deliver meaning). Users have agency to choose different paths and actions, so the author can't control the

time-line without removing this agency from the user. Fragmented narrative is well-suited to narratives set in a physical places, since it allows to the meaning to emerge from the threading the user makes of the elements, regardless of the order in these elements are encountered.

Fragmented narrative maintains a close conceptual connection with Deleuze's notion of the fold. Examples can be found in the Latin American Neo-Baroque. Deleuze takes the concept of the fold from Cache and creates associations with Baroque architecture to illustrate the concept and transfer it to philosophy. Deleuze describes a new relationship between inside and the outside, based on the fold. In this concept, two individual environments – for example, outside and inside - resolve their tension in the fold, in its ability to include difference and produce a multiplicity of shapes. The fold allows two or more independent units to form inflexions and curves that are extended to the infinite. For Deleuze, the contribution of the Baroque is the possibility of the repetition of forms with infinite variations, in a fractal mode. "The Baroque refers not to an essence but rather to an operative function, to a trait. It endlessly produces folds (…) the Baroque trait twists and turns its folds, pushing them to infinity, fold over fold, one upon the other". (Deleuze 3).

In literature, the Latin American Neo-Baroque takes full account of this principle of folding of the Baroque, to generate labyrinthine narratives. Cortazar's *Hopscotch*, *The Autumn of the Patriarch* by Garcia Marquez, Borges short stories including *The Aleph*, *Tlon, Uqbar, Orbis Tertius*, *Viaje a la Semilla* of Alejo Carpentier; all of these are examples of a literary movement in which space, time and reality exhibit constant folding.

In his book *Barroco y neobarroco en la narrativa hispanoamericana,* Cristo Rafael Figueroa (112) explains that the emphasis in this movement is not on solving the

labyrinth and finding the exit, but in the journey itself. Borges asserts that the solution to the mystery is always inferior to the mystery itself. The mystery relates to the divine; but the solution is reduced to a magic trick[1] (qtd. in Figueroa 112)

This labyrinth is shaped following the six principles of the rhizome and the fold of Deleuze and Guattari; the heterogeneity of the system components, the multiplicity without generating unity, the possibility of multiple connections in every point, a-significant ruptures, decal and a tendency to map the space (Figueroa 112). The Labyrinth figure in Latin american neo-baroque is at the same time character, motive and structure.

This AR narrative, was influenced by the Latin American neo-baroque*,* which inspired my craft as a writer, even before I started working with AR narratives. This literature, Julio Cortazar's *Hopscotch* in particular*,* inspired my fascination with the potential of fragmentary narratives in virtual and non-linear conditions.

In Julio Cortazar's novel, a fold is repeated into the infinite. With the structure of a Mandala, the novel leads us through a fragmented narrative, without no specific temporary or spatial order. Buenos Aires and Paris appear to overlap constantly while the fragmented time-lines join, multiplying the possibilities of what might have happened. With Borges, the labyrinth is also both motive and structure, a key figure in his literature. The time mazes created by him are made of augmentations on the space, as Italo Calvino notes down, Borges duplicates or multiplies space through reference to other books in a real or imaginary library (qtd. in Rojas 239). In *Viaje a la semilla of Carpentier*, time and space both are characters in the story. The timeline goes backwards from death to birth, disarraying and fragmenting the spaces constantly. *The Autumn of the Patriarch* sets its story-space as an axis around which time travels, following a spiral form, re-narrating the

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[1] Original quote in spanish: "La solución del misterio es siempre inferior al misterio mismo. El misterio tiene que ver con lo divino; la solución, con un truco de prestidigitador" (qtd. in Figueroa 112)

same scene and space with little differences and with a bigger scope each time. *Magic Realism* generates folds within reality. It does not create fantasy worlds, but real ones that it breaks into, fragmenting reality and resolving tensions between reality and fantasy through folds in time and space. Homunculus was fed by this literary tradition and its forms and structures.

I chose to use this style not only to maintain consistency between architectural and narrative folding. Neo-baroque narrative folds time and space into characters and structures.

I will now mention the characteristics of this movement that can be found in Homunculus, and that are listed in Jean Franco's Reflexiones sobre una escritura laberintica (37).

The abolition of the linear and chronological. Homunculus includes 3 narrative times: The first is the one of the user following the story, incorporated to it, who generates a narrative in real time. Kate's time, in the past, narrates how the App was made and why, and the third one, is the time in the rooms. This is present time, since the actions in the rooms occur in a loop, until the moment they are witnessed by visitors. The whole story is comprised of fragments, stories inside the story, that are each self-contained.

The narrative space is fragmented but reunites in the form of a maze that the reader has to traverse to understand the narrative. Literally, in Homunculus the user has to walk through the Gladstone Hotel to gather the fragments from within Augmented Reality to make meaning of the story. Although the markers act as hints, the path is made by the user through exploration.

The labyrinth configuration is extrapolated to the characters and their motivations. Motivations in this type of narrative are a series of fragments to be connected to reveal something that is not defined or clear, but linked to notions of unity.

Both the Water Room and the Dispersion Room show characters whose presence is distributed in many places at the same time. The search for self travels along the whole labyrinth of times and places that lead each to this point.

More than stories, the rooms are presented as vignettes, scenes to be decoded, object by object. Reading a letter causes the water level to go up. Turning a compass makes the world turn. All of these elements need to be deciphered by the visitor.

Finally, the role of the reader in this neo-baroque situation is one of an active reader. The receptor has to find the threads and fragments to make meaning of the story; the story is not self-explanatory without participation. It is made by polysemic signs to be interpreted. In Neo-Baroque literature, the reader has to traverse the labyrinth to interpret the narrative. In this AR narrative, the user makes use of para-texts, documents that are outside of the narrative center but help to navigate through the story. *Hopscotch* provides a directional table to guide us through the chapters. Borges includes references to other authors and books to help us decode. Homunculus makes use of the markers and Kate's story to guide the user through the labyrinth of folds.

For all of the above characteristics, it seems natural to implement this narratives for a spatial AR narrative, in more than one way, the stories in the neo-baroque show the principles of interactive narratives. *Hopscotch* with its fragmented story can be read in any order. *The Garden of the Forking Paths* includes multiple times that generate new story-lines. Through fragmentation, a form of interactivity is created, one that engages the agency of the user. Janet Murray notes that fragmentation was an attempt of literature and film to overcome the linearity of these media (42). The new technologies allow us to do this more easily, and literature continues to explore this approach with great depth.. However, the structures used in literature are still a valid way to produce depth in the

story. In AR, the narratives are enriched by enlisting the affordances and capabilities of a media that allows us to create experiences that engage architecture directly.

Although this type of narratives maintain similarities with gameplay since the user participates on the narrative by choosing, threading, interpreting and performing to make sense of the story, the main difference resides on the purpose of these actions. The line between games and electronic art and literature is a thin line, however, Markku Eskelinen helps to clarify this point in *Towards Computer Game Studies*:

> [T]he dominant user function in literature, theatre and film is interpretative, but in games it is the configurative one. To generalize: in art we might have to configure in order to be able to interpret whereas in games we have to interpret in order to be able to configure, and proceed from the beginning to the winning or some other situation (Eskelinen)

5. Methodology and Design

Research Question

How does Augmented Reality expand the notion of narrativity within an architectural framework and which tools are available for the creation of such narrative?

Overview:

Homunculus is a site-specific Augmented Reality Narrative set in the transit areas of the Gladstone hotel and art exhibition space in the Queen West district of Toronto. This project explores the affordances and limitations of AR for the creation of structured experiential narratives in physical spaces. The specific interest of this thesis is to produce fictional scenarios in a real place, creating a bridge between different realities and times. *Homunculus* is created in a mixed space, physical and virtual, that nests 3D generated rooms in the architecture of the building, to embed a connection within the physical space as the scenario for the story and as an experiential space.

Homunculus is an interdisciplinary project, informed by many areas of knowledge, not all reflected in the previous chapters. My research was divided into stages and sections, including reading on the subject, watching videos including documentaries, comparing different views, attending workshops, talking to professionals, and conducting hands-on experimentation and field-based research.

Methodology

The research methodology for this project was an academic and critical research on the fields of architecture, interactive narratives, phenomenology of places and spaces, film and environmental narratives created by other artists; alternated with a creative and experimentation process. The research about architecture feed the experiments with size and distance with the markers for the creation of the virtual rooms, as well as the integration of the AR in the building and the display on the tablet.

The phenomenology of spaces and places led the field research at the Gladstone Hotel, a collection of images, videos, sounds and direct observation of the visitors to the place to establish its identity, habitus, and the way the influence of the architecture in the visitor's path flows. The Film research inspired some of the "shoots" created in the virtual environment, particularly on the off-screen language and the composition of the scenes. Both the work of other artists in environmental narratives and literature inspired some solutions on the creation of the script for the story.

Hence, the methodology of this project was to gather concepts and techniques to try them out in experiments with the script, other narratives made for experimentation, the creation of the virtual rooms and interactions, and the experiments to attach them in physical walls.

In the following section, I will expand on the process and the specifics of this project.

Studio based Process

5.1. Site explorations

As a technology, aspects of Augmented Reality evoke magic; objects that aren't really there appear, seemingly from thin air. This characteristic makes AR an excellent tool for the creation of metaphors, making the invisible visible.

Through fiction, *Homunculus* reflects about the memory stored in physical places and the causes and consequences of nostalgia, the diaspora of who we have been in the past. Guided by this spirit, *Homunculus* attempts to create an augmentation of the space that shows not what is present, but what is absent: the history, memory, and personal and collective past. AR and its mixed spaces are enlisted in the service of a fiction with several layers of meaning. Elements that fulfilled pragmatic or semiotic functions include:

- the revealing character of AR, its capacity to seemingly perforate walls and doors

- the aura of presence and absence that hotels hold in the collective imagination

- the physical space and its affordances for exploration and haptic experience

- features of the mobile device including all of its tools – the camera, speakers and screen– as used to capture the space and frame it, isolating details and directing attention.

 All of these are aspects intrinsic to the project.

The first step, was to find a specific site in which to set a narrative like this. Many aspects must be taken into account in setting an AR narrative in a physical space. On the technical side, the markers cannot be reflective, since the light would interfere with the camera's capacity to recognize an image. For this reason, the easiest and

cheapest way to produce the markers is with paper, which makes them vulnerable to weather conditions.

For Homunculus, since the markers are described in the story as artifacts made by the main character to reveal the memories stored in the hotel, it was important that they maintained semiotic consistency with the narrative. Additionally, since they where going to hang on the transit areas of an Art Gallery they needed to have artistic content that could be interpreted without the use of the App. The markers for augmented reality work by providing the system with singular points of recognition. The more variations the design has, the more stable the AR will be.
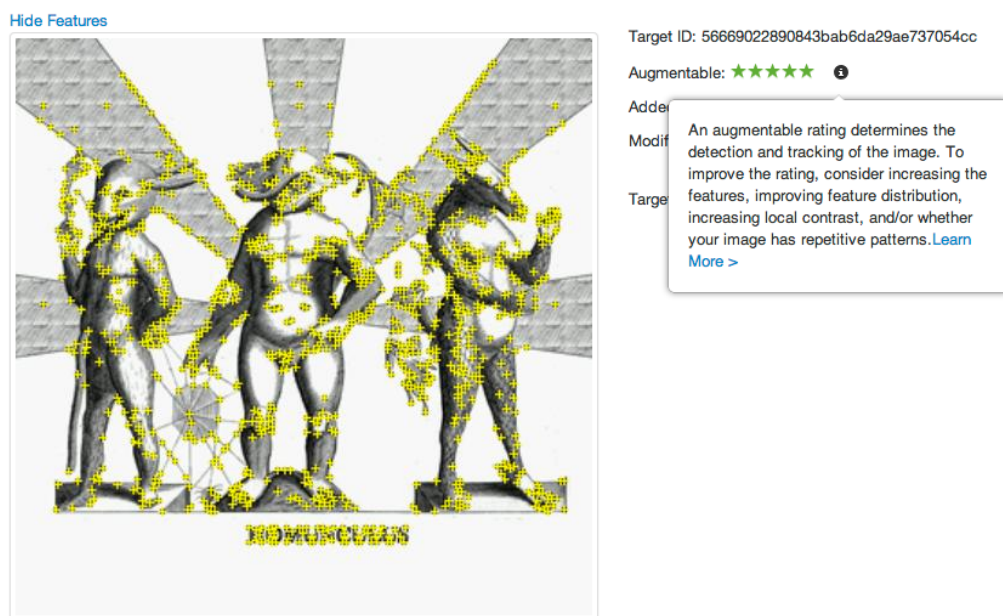
FIG. 7. POINTS OF RECOGNITIONS IDENTIFIED BY VUFORIA TARGET MANAGER

Engravings are great for this purpose since they provide great variation of lines and curves that are different from one another. For these reasons, the markers where made by creating compositions with royalty free 16th to 19th century engravings, that provided for an option to the patterns used nowadays for AR.

To make them suitable for the Gallery, the designs were engraved with laser on thick wood panels to be hang or placed on surfaces as works of art around the space.

FIG. 8. MARKER ENGRAVED ON WOOD

In terms of logistics, it needs to be taken into account that, in order to follow and experience the narrative, users will be walking around the space, lagging in some areas. Their security and the rules regarding circulation of people in specific places must be taken into account. Another important factor is the experiential dimension of the narrative. Every place has a set of rules and behaviours that we adopt when we find ourselves in these environments. An AR narrative needs freedom to walk, to move the phone around, to play with the distance kept by the user in relation to the marker. This demands a certain degree of intimacy with the screen and space. The place also needs to be a believable stage for the specific narrative. The space should contribute and add depth to the layers of meaning. My field research led me to explore transit places, locations

where we dwell temporarily, where a great number of people pass by, but that also fosters a sense of intimacy, a place where people could sit and reflect or reminisce. The idea in terms of the story was to find places where people catch their breaths and put order to their experiences, narrating to themselves what has happened in order to make sense of and assimilate experience. If places had memory, these would not be the venues where things happened, but the ones where all the pieces come together.

Taking all of these aspects into account, the technical, experiential, ambient and consistency required for the story, the options were narrowed down to hotels and cafes. The next step was to document the ambiences; the sounds, light, size, activity and traffic through two hotel-galleries and two cafes. I took photos, recorded video walks, took notes and recorded audio in the Drake Hotel, the Gladstone Cafe, The True Love Cafe and the Gladstone Hotel; the latter was chosen as the best venue.

FIG 9. THE GLADSTONE CAFE AND THE THE TRUE LOVE CAFE AT QUEEN ST, TORONTO.

The Gladstone Hotel is both a site for temporary dwelling and for art exhibitions. These characteristics made it ideal for this story. In the collective imagination, hotels are associated with a capacity to connect us with other locations of the world. The presence of those who stayed in the hotel before us lingers and is present in a room that is temporarily ours, a home in a foreign place. Being at the same time a space for art exhibitions, the Gladstone is accustomed to the disruption provoked by art installations.

Visitors to this hotel expect to explore its hallways and find different art every time, and to walk around and see the pieces that form exhibitions. Thus, at the Gladstone, exploration is already part of the habitus of the place.

5.2. On-site research.

With the general idea for the narrative already done, and the location chosen, the next step was to direct the research towards an experience for that specific place. The method for this research was more than anything field research on the site, documenting the size, the environment, the people, the spatial distribution along the building, as well as getting impressions to write of the scenes that were going to be nested in the building. For this purpose several walks were recorded in video to map the possible routes along the spaces of the building. The floor plans along with photos to map the area, helped plan the order of the narrative. After studying the possible routes, it became obvious that in order to give the user's a coherent story, the narrative needed an introduction and an epilogue to explain the generals of the experience. The AR stories, on the other hand, needed to be independent from one another to aid the users to have a complete story and experience, regardless of the route they would take. The recorded walks in the building helped plan where it was convenient to set the small AR scenes, to guide the users towards the bigger ones, and where to set the big ones, so the users could spent some time exploring them without blocking the way for the hotel guests and visitors to the gallery.

1.WATER ROOM

2.ATOMIZED ROOM

3.TRANSPORTATION TICKET 1

4.TRANSPORTATION TICKET 2

5.TRANSPORTATION TICKET 3
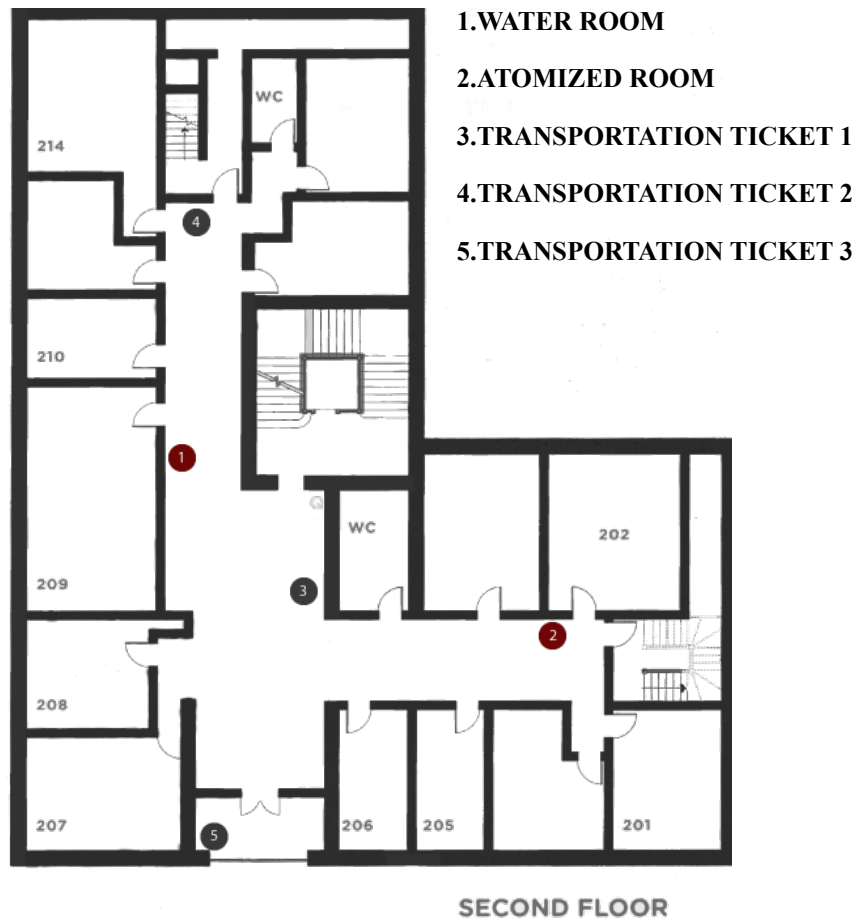
FIG 10. FLOOR PLAN, SECOND FLOOR, GLADSTONE HOTEL

The above map was the original plan for the walk. The main purpose was to contain the installation in just one floor to avoid clashing with other exhibits, and to give the user a logical path. Once the talks with the Hotel started, the plan has changed several times to accommodate other events and exhibits that are happening in the hotel at the same time.

Regardless of this, the narrative route was not set in stone. A space like this one, open to the public, but private owned, is likely to find this kind of eventuality for an art installation that is dispersed throughout a big space. For this reason, the narrative was designed following a fragmented model. To maintain the coherence, rhythm and to be

able to deliver a message that is thread along the whole story, Homunculus has four big plot levels, two of them fixed, two interchangeable, and 3 small ones that function as distractors and that are used in the building to guide the user to the AR rooms.

5.3. Narrative structures process

Homunculus is used to illustrate a process by which the Alchemist of the 17th century attempted to find the primal matter of all things, the soul or the human consciousness. In modern Psychology, it describes the diagram used to represent the part of the brain that process sensations, but also, motor functions that are automatic in response to a voluntary action, it is the part of the brain that help us to walk without having to consciously move every muscle and joint. In literature the term has been used broadly to depict the creation of a being somehow humanoid, but that lacks human nature. In every discipline where is cited, however, it seems to refer to an undefined matter that makes us human, intelligence, consciousness or a soul. Being this a narrative about the essence of places and people, about sensing, exploring and re-collecting instances of our memories, the Homunculus concept seemed like a good vehicle for this idea. From the impressions collected at the Gladstone, the theme and structure for the narrative was decided. The two fixed ones are the introduction and the epilogue. These are not AR based, they are small-narrated movies that occur within the screen of the tablet. The introductions gives the tutorial needed to know how to interact with the markers, a context to the story that explains why the markers are there, and the keys for deeper levels of content of the narrative. The epilogue is triggered when the main two interchangeable scenes have been triggered, and provides a conclusion to the story. The three other markers are there to guide the user between to the two main AR. They are situated in the stairs of the hotel that takes us to the first level, where the first AR room is

hosted, and other two are in the lounges between the stairs and the rooms. Although these small scenes contribute to the story, presented as smaller fragments of memory left behind, they are not indispensable to understand the whole experience. In narrative, these kind of events are called distractors because they lead the user to believe that they are important parts of the narrative, but their real purpose is to lower the tension between one main event and the next, adding atmosphere, context and connection between the main parts of the narrative.

5.4. Available technologies for AR

On the technical aspect, the research was centred on finding the most accessible and functional software to develop the AR for mobile devices. Metaio, Layar and ARToolKit were some of the options considered for developing the app. Software that could work without markers, like Metaio and the paid version of Vuforia were also researched, as well as using the gyroscope to maintain the scene on view when the marker was lost. The app was finally developed in Unity3D with the free Vuforia plugin based on the familiarity that I have with the software already, and its capability for renders of 3D quality images. The decision of not using the gyroscope or mark-less technology was based on the hands-on research and experimentation conducted in this project. The Gyro Droid plugin for Unity, working along with the Vuforia plugin, allows the developer to easily maintain the scene in view when the marker is lost. However, the sense of distance between the camera and the scene is lost since the user can look around the 3d room, but the linkage with the distance between the wall, where the marker was hanging and the tablet is lost until the marker is found again. The experience for the user then is no longer the feeling of seeing an X-ray view of the wall. The scene appears as detached from the physical environment, breaking the illusion needed to maintain coherence with the story. In any case, the story provides a justification of why the markers are in these places and

why they are needed to see the memories stored in the building. At the same time, the markers work as physical clues that guide the user through the space. All of these factors made these features a commodity that had more cost to the content than what it could provide to it.

The linkage with the physical space is key for the experience, and the meaning of the story. In many ways, this written thesis and the literary review, the content of the short stories and the app, are the three parts of the machinery of an art essay that reflects about space, time and our relationship with both, as well as outline a case of how the mediation of technology can add dimensions of experience that are valuable to connect us with the space and the aesthetic experience. For all of these reasons, the AR had to maintain a close connection with the marker and with the physical space.

5.5. Experimentation

Prototype 1: The Three Little Pigs

FIG. 11. RE-ENACTMENT OF A USER FOLLOWING THE NARRATIVE.

In the first stages of experimentation, it was imperative to have a hands-on experience with spaces and narrative. The main purpose was to research how time and space could be superimposed in a physical space without having to develop a full app. The story for this prototype was a re-interpretation of the Three Little Pigs, adapted as a thriller for the 5th floor of 205 Richmond street. Although it was part of an open assignment for a course that I was taking at the time, I took the opportunity to build a simulated AR that could help me inform the design of Homunculus, that it was being developed at the same time. This prototype was a video with voiceover instructions and a narrative, which prompted the user to follow along matching the

images in video with the ones in front of them. As a result, the user followed a path guided by a first-person recorded walk played on a tablet.

The video was made with images taken from YouTube illustrating some of the aspects of the narrative and projecting them in the walls while the voiceover was narrating these events.

FIG 12. SUPERIMPOSED PROJECTION ON THE WALLS

The result was that the user was standing in a room where nothing was happening, while in the tablet she was seeing the same room, but with the overlaid images of a window being broken, or a fire starting.

The video told a fictional story of when the school was an apartment building, where three brothers lived. The three brothers run around the space, trying to escape from a murderer that is destroying their apartments to force them to go out. The experiment was meant to gain experience of layering a fiction on top of a real building, as well as working with the present and the past at the same time. Accordingly, the experiment was aiming to discover the aspects that had to be taken on account when mapping a route for an AR narrative, as well as the time needed to complete the story, how this had to be planned and what was the experience of seeing something happening that isn't actually there, that is, playing with illusionism by means of a projector.

FIG 13. SUPER-IMPOSED PROJECTION OF FIRE ON THE WALL.

Another aspect of this experiment had to do with trying to foresee the cinematographic language that could be used in a narrative made for a mobile device.

To create this narrative, a first person view video of the walk through the space, without any cuts, was recorded to know how much time was required to follow the narrative and walk through the space. Using the video, the voiceover narrating the story

was overlaid and edited over the video of the first person view walk. The first video was removed later, leaving the voiceover narrative already timed as a bed for another video. The video added was the one of the walk with the projections on the walls, edited with seamless cuts to simulate a continuous walk. The video with the walk and the timed narrative was then uploaded to the tablet that was going to serve as a guide for the walk.

Prototype 2: Homunculus

The design of this prototype was made in three parts, the short stories that compose the whole narrative, the app that contains the story, and the structure of the narrative in the physical place.

The story.

The narrative is composed by 3 short stories, Kate's, who takes us through the hotel to discover the memories stored there; the Water Room and the Dislocation Room story.

FIG 14. DISLOCATION ROOM

As a whole, the story reflects about the nature of the memory and the unbreakable tie to the place and the time where they were created. Because memories are not fixed, they don't pick up the exact details of what happened, rather, they hold the essence of what that meant to us, which makes them change over time. Its nature is closer to the imagination than to the facts in the real world, which is why they're represented in the story with fantasy elements. The whole narrative questions our ability to be in the present, while the bonds that link us to other places and times remains in our memory. It's also meant to stress our strong linkage with places that are important to us, how these places remain with us, even when we are away and how our memory of the place is linked to who we were at that time. On the other hand, the story shows how the places contribute as well to our identity, to how we understand ourselves, and to the narrative of our lives.

FIG 15. WATER ROOM

The relationship between the place and the self is uroboric, we mark the places as much as the places mark us. The markers in the story work as a metaphor of how certain

emotions act as filters, but rather than blocking our vision, they allow us to see different dimensions of reality as they attune us with different points of view and sensibilities.

6. Development

I know that we are ants in a world of Giants, so big, that we are unable to see them. I know that snow is the dust that falls from the giants' floor when they jump, as they do in the winter.

I know that when I say orange, you see green, and we both agree that we are seeing the same colour.

I know we share the space with other creatures that are invisible to the naked eye, but that we can glimpse into that world if we half-close our eyes until we see little transparent particles floating in front of us.

I know all of these things, or at least, I used to know them when I was a kid. Some of these certainties faded as I grew up, but some still feel as true. I half-close my eyes and I peek into another world as I see the floating particles. I feel myself sitting next to me in the train station, and simultaneously walking back to the place I called home, 4 years ago.

All of this led me to experiment to try to see what else is beyond. I knew that the amount of light that enters through our eyes had something to do with it. It is light that produces the world we see. The light decides what remains unknown.
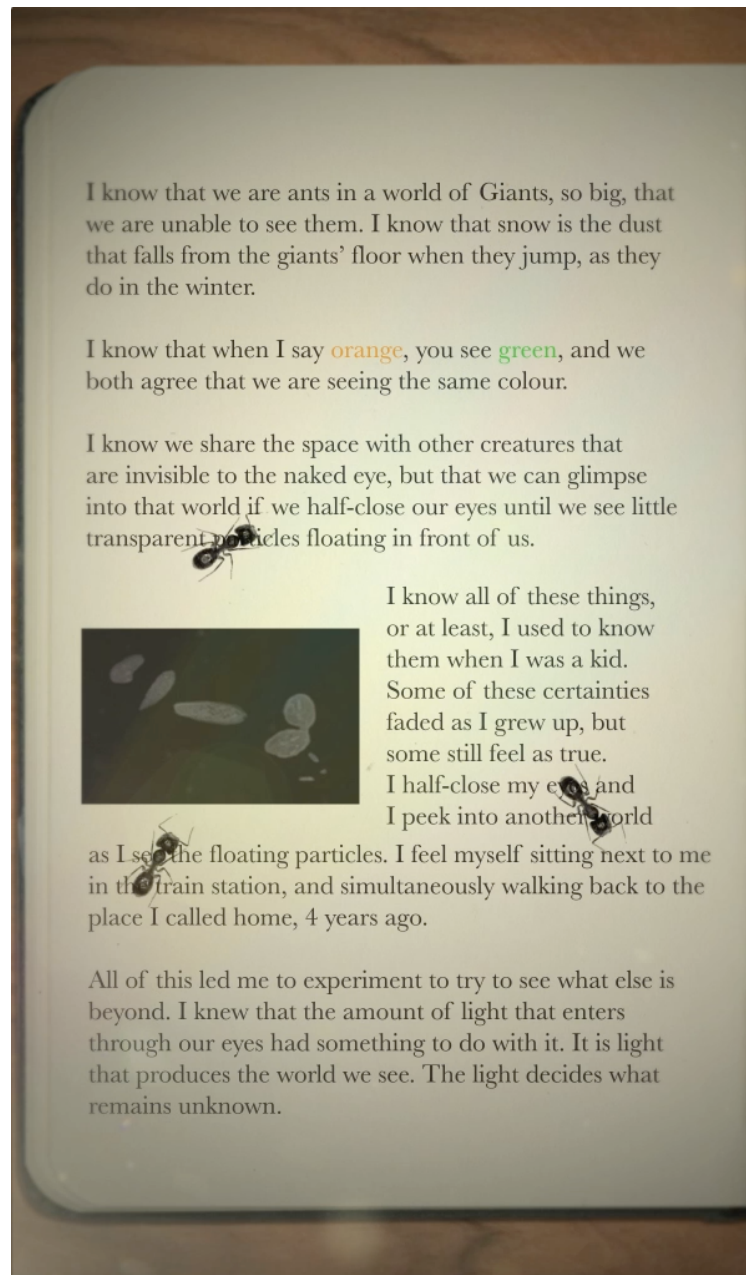
FIG 16. INTRO ANIMATION

The design of the app was planned to maintain the authorial control of the narrative, while giving the user autonomy to explore. The rooms were built to give the feeling of an X-ray vision to dislocate the space, creating folds in the architecture that opened thresholds to the virtual world.

The user has no control over the first part of the narrative, a cinematic that gives the introduction and the tutorial in the form of a diary page with a voiceover narration. The animations overlaid on the page are made to illustrate and to maintain the attention of the user by adding dynamic visual elements.

As soon as this cinematic is over, the user gains control of the camera and can explore the space to find the triggers. The scenes were constructed so the user is on the verge of the room, and can get physically closer to the marker to see objects, select them in the screen to activate them, and look around the room by turning the tablet. The linkage between the app and the marker, aids to the feeling of connection between the physical and virtual spaces. The decision to create the stories with fantastic elements, as well as the x-ray vision was made to stress the affordances of the technology, and to act as metaphor of technology as an aid to reveal what is hidden, the essence and some traits of the human nature;   as well as to generate the illusion of a perforation on reality and on the space, whereby fantastic elements break into.

7. The design of the experience in the space

As said before, the experience was mapped in the space, taking into account the specific site. The markers are meant to be dispersed in the hotel to encourage the exploration. These aims to create a sense of connection with the physical space and with the use of the body to move, hear, observe, understand and feel. As the AR is triggered by a physical marker, the user is forced to pay attention to the real objects, to maintain the

trigger on view, to turn the tablet in relationship with the wall to be able to see different angles of the virtual room, and to get closer or farther gain focus. The virtual rooms were constructed replicating the actual look of the room, to maintain the coherence with the space.

6. Conclusions

As a nascent technology, AR is still developing its language, methods and capabilities for the creation of content to overlay in physical places. Its importance in the field of arts was being overlooked until recently. AR has the power to explore the poetic and metaphorical dimensions of physical spaces. It helps making the invisible visible: the memory, the social, political and transcendent dimensions of objects and places, as it is also capable to create augmentations of time through narratives.

Homunculus was an experiment to generate spaces, an architecture within the architecture, to fold the space and time, to generate questions about reality, and to contribute to the discussion of the language for this media.

Through a marriage of architecture and cinema, Homunculus guides the users through an articulated short story, by creating a montage of the space in real time. It is not, of course, the only way. As geolocation technology and the recognition of 3D objects evolve, the use of makers will become obsolete and the possibilities for the use of new techniques will arise.

In any case this thesis outlines the basic elements that should be taken on account when creating AR in physical spaces. The history, aura and context of a place matters, and being AR a technology of mixed spaces, the social, cultural and personal aspects should not be overlooked if we attempt to create meaningful experiences. In the same manner, architecture as the manifestation of the physical aspect should be taken into account, and its theory can provide for useful tools to design the superimposed

architecture. In the case of cinema, as seen before, its poetics provide for a powerful tool to thread, create meaning and establishing a hierarchy that provide the necessary structure for an understandable message.

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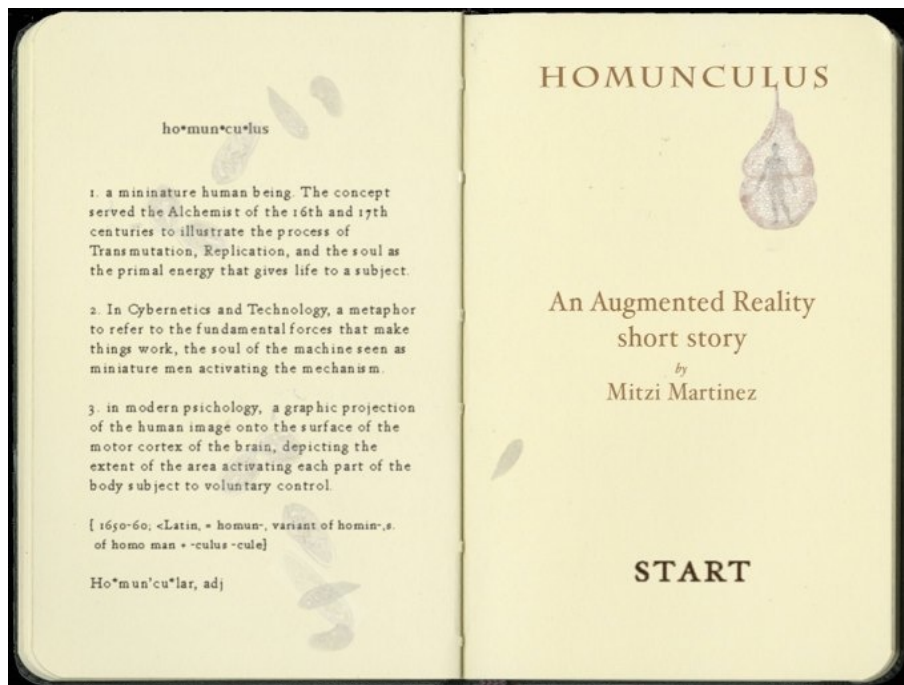1977.

Appendix
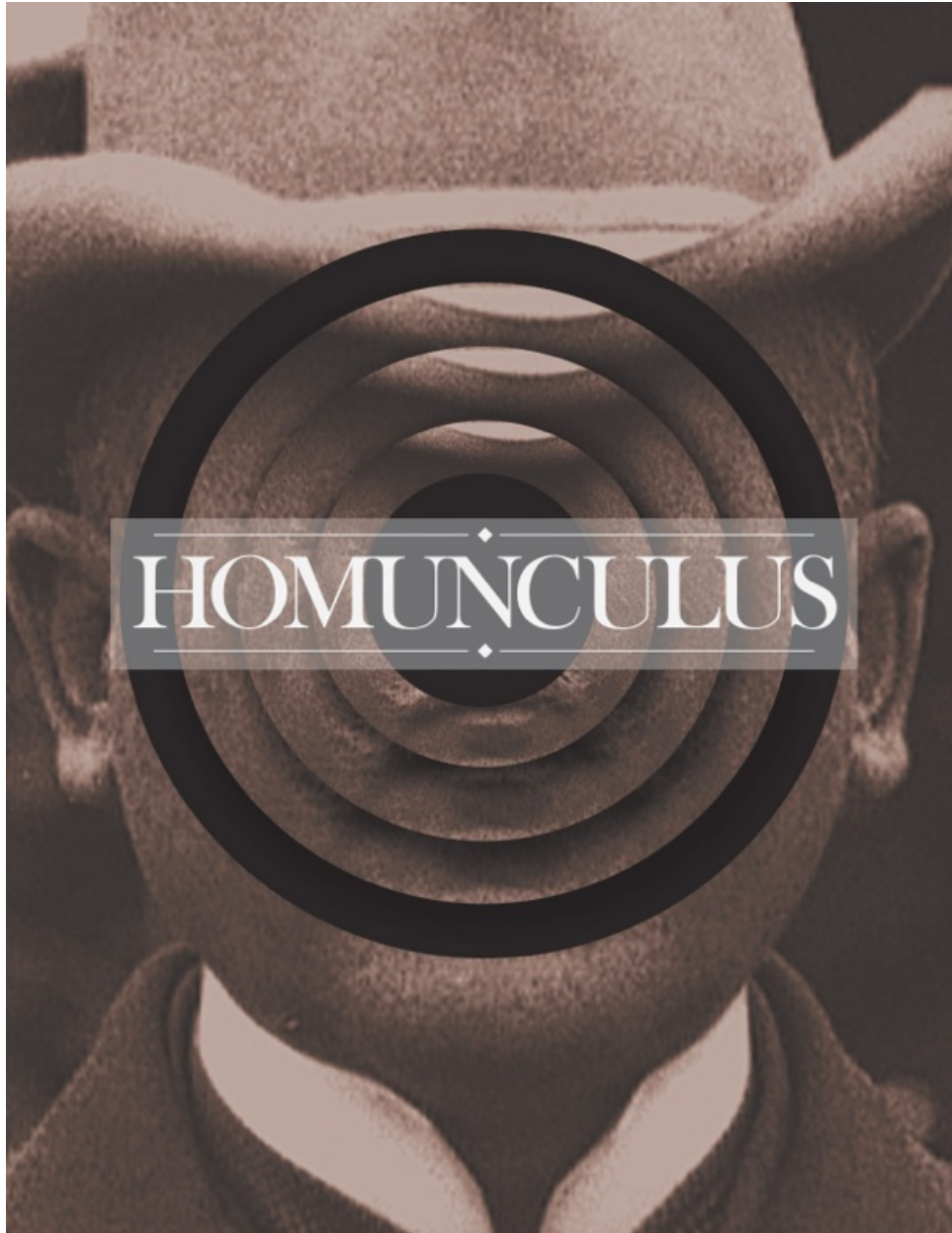
An Augmented Reality Narrative At the Gladstone Hotel.

Appendix A: Homunculus Script

When the user launches the app, a diary page with the START screen loads.

<u>WRITTEN TEXT - PAGE 1:</u>

Homunculus

1. a miniature human being. The concept served the Alchemist of the 16th and

   17th centuries to illustrate the process of transmutation, replication, and the

   soul as the primal energy that gives life to the subject.

2. in Cybernetics and Technology, a metaphor to refer to the fundamental forces that make things work. The ghost in the machine that activates all mechanisms.

3. in modern Psychology, a graphic projection of the human image onto the surface of the motor cortex of the brain, depicting the extent of the area activating each part of the body subject to voluntary control.

(1650-60; Latin, homun-. variant of homin-,s. of homo = man + culus - cule - small)

Ho*mun*cu*lar, adj.
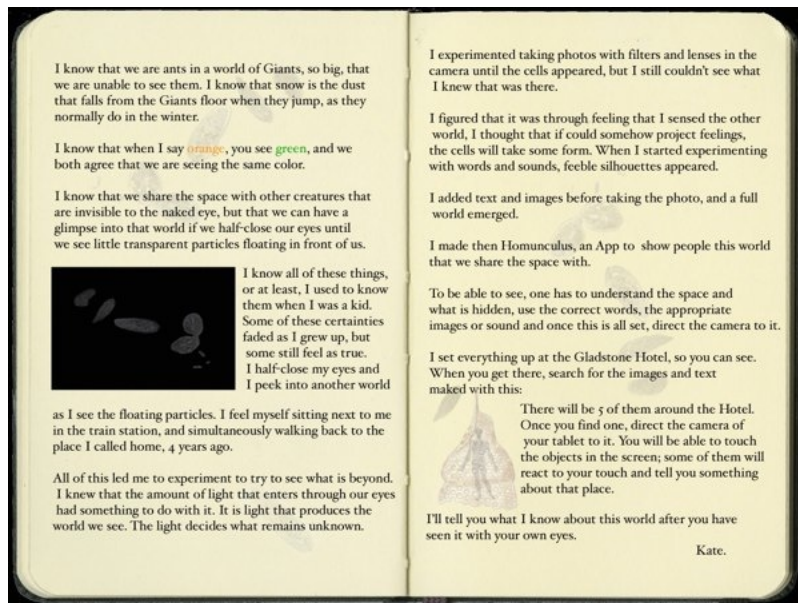
WRITTEN TEXT - PAGE 2:

HOMUNCULUS - An Augmented Reality short story

 by Mitzi Martinez

START.

START - On pressing start, transition to intro animation. We see page 2 of the diary, that shows animation as the voice over narrates what is written on the page

ANIMATION: FADED BROWN ANTS APPEAR UNDER THE TEXT AND RED ONES IN THE SMALL SCREEN IN PAGE 3.

KATE V.O.

I know that we are ants in a world of Giants, so big, that we are unable to see them. I know that snow is the dust that falls from the Giants floor when they jump, as they normally do in the winter.

ANIMATION : TEXT MENTIONING THE COLORS CHANGE ACCORDINGLY ON NARRATION.

KATE V.O.

I know that when I say orange, you see green, and we both agree that we are seeing the same colour.

ANIMATION: CELL-LIKE SPOTS APPEAR IN THE PAGE AND START MOVING AROUND THE PAGE SLOWLY.

KATE V.O.

I know that we share the space with other creatures that are invisible to the naked eye, but that we can have a glimpse into that world if we half-close our eyes until we see little transparent particles floating in front of us.

I know all of these things, or at least, I used to know them when I was a kid. Some of these certainties faded as I grew up, but some still feel as true.

ANIMATION ON SMALL SCREEN: FEEBLE WHITE SILHOUETTES ON BLACK SCREEN.

<u>**KATE V.O.**</u>

I half-close my eyes and I peek into another world as I see the floating particles. I feel myself sitting next to me in the train station, and simultaneously walking back to the place I called home, 4 years ago.

All of this led me to experiment to try to see what is beyond. I knew that the amount of light that enters through our eyes had something to do with it. It is light that produces the world we see. The light decides what remains unknown.

I experimented taking photos with filters and lenses in the camera until the cells appeared, but I still couldn't see what I knew that was there.

I figured that it was through feeling that I sensed the other world, I thought that if could somehow project feelings, the cells will take some form. When I started experimenting with words and sounds, feeble silhouettes appeared. I added text and images before taking the photo, and a full world emerged.

I made then Homunculus, an App to show people this world that we share the space with.

ANIMATION: DIAGRAM OF PHONE DIRECTED TO THE MARKERS, AS INSTRUCTIONS.

<u>KATE V.O.</u>

To be able to see, one has to understand the space and what is hidden, use the correct words, the appropriate images or sound and once this is all set, direct the camera to it.

I set everything up at the Gladstone Hotel, so you can see. When you get there, search for the images and text marked with this:


<u>KATE V.O.</u>

There will be 5 of them around the Hotel. Once you find one, direct the camera of your tablet to it. You will be able to touch the objects in the screen; some of them will react to your touch and tell you something about that place.

I'll tell you what I know about this world after you have seen it with your own eyes.

Kate

AS SOON AS THE NARRATION FINISHES, THERE IS A TRANSITION TO A SCREEN THAT INSTRUCTS THE USER TO FIND THE MARKED ILLUSTRATIONS AND DIRECT THE CAMERA TO IT. AS SOON AS THE CAMERA IS DIRECTED TO ONE OF THE MARKERS, THE SCENE CONTAINED IN THE MARKER IS LOADED.

THE MARKERS WILL BE DISTRIBUTED AS SHOWN IN THIS MAP:

1. WATER ROOM

2. ATOMIZED ROOM

3. OBJECT 1

4. OBJECT 2

5. OBJECT 3

SECOND FLOOR
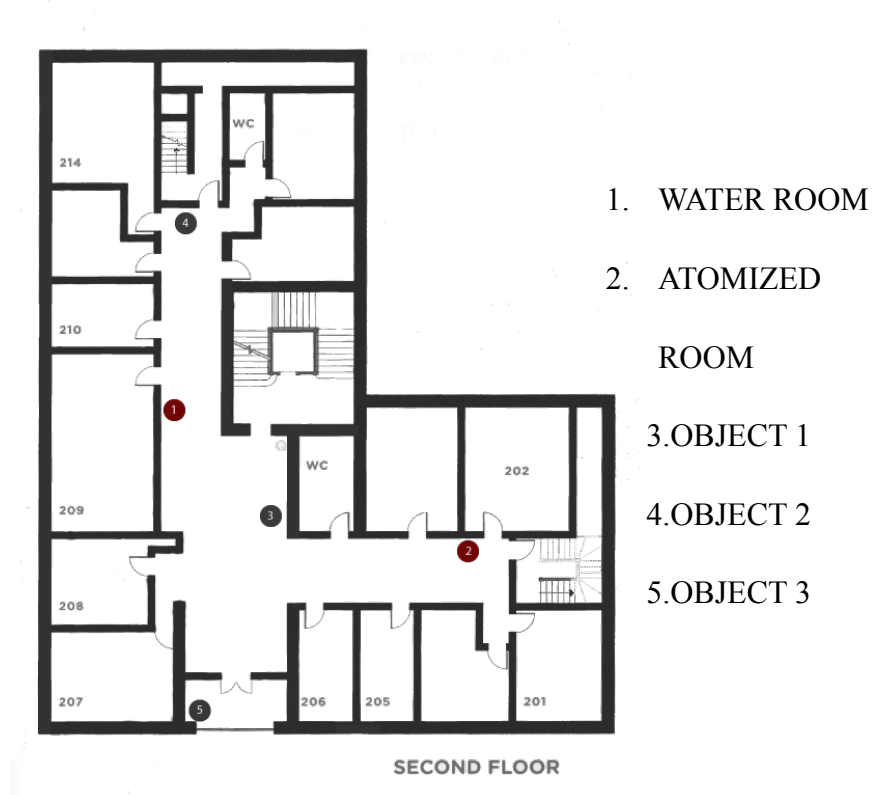
1. WATER ROOM. INT. HOTEL ROOM. DAY.

When the user points the camera at the marker outside of the room (1), the interior

of the room appears in the screen, as if it was X-ray vision. Inside we see a an

unmade bed. On top of the bed there is an open suitcase with an open wood box,

also open, inside. Inside the box there is an old photo (object B) and a book,

Instructions for Light-Keepers (object C). Next to the suitcase there is a letter,

unfolded (object D). On one of the nightstands there is a pen and a letter (object

E), with the Gladstone hotel logo on it. On the other nightstand there is a nautical

compass (object A). There is a Man sitting on the foot of the bed staring at the

floor, as if he was thinking. When the user select one of the objects, she will get a

close up of the object and the memory related to that object is triggered.
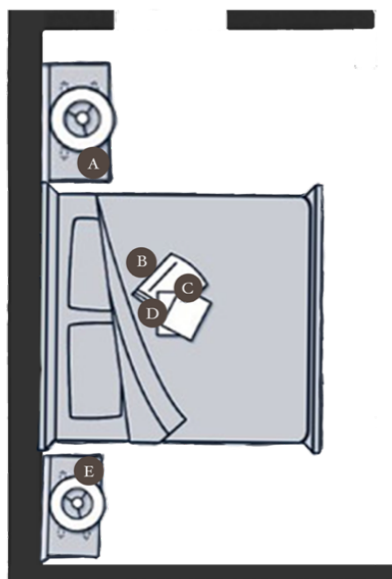
A) Nautical Compass

B) Old photo

C) Instructions for

Light-Keepers

D) Unfolded letter

E) Letter with in

Gladstone

stationary paper.

A) Nautical Compass.

The nautical compass can be turned to the left or to the right. When is turned the east, we hear the traffic outside, when turned to the right, we hear the sea. If there was no sea sound before, it starts when turned to the west, if there was a sea sound, it becomes louder. When the compass is completely turned to the west. The water level goes up up to one fifth from where it was. The compass makes the sky outside turn wherever the compass is turned. This can be noticed by the user as the light and the clouds in the sky outside the window moves to the same direction the compass is turned. When turned to the east, the room becomes darker, when turned to the west, it becomes brighter as the sun enters fully through the window.
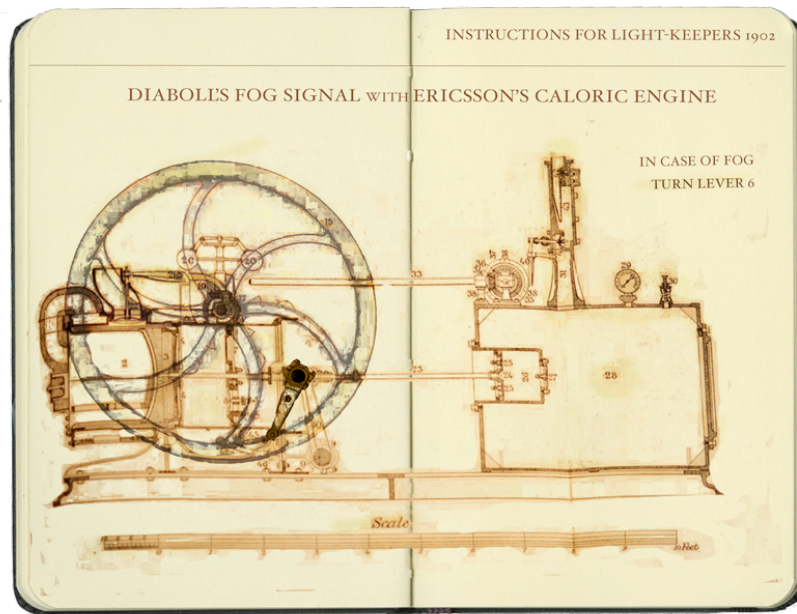
B) Old photograph.

It's an old photo and its mostly blurred, but we can still see two people on the beach, a woman and a kid. After the user touches the photo, we have a zoom in to the photo to a close up of it. A V.O. memory sound is triggered. As soon as the memory ends, we are back to a shot from the full room. The water level gets up one fifth more.

V.O. of woman, with the sound of the sea and seagulls in the back.

You see the balconies on the top of the houses? They are called Widow's Walks. Legend says that they were built so the wives of the sailors could go there to see the ships coming back home. If they saw a torch burning in the front of the ship, it meant the boat had lost a man at sea.

C) Instructions for Light-Keepers book.

When touched, the book opens and we see a close up of the following page:

INSTRUCTIONS FOR LIGHT-KEEPERS 1902

DIABOLL'S FOG SIGNAL WITH ERICSSON'S CALORIC ENGINE

IN CASE OF FOG
TURN LEVER 6

Scale

On

Top of the page it reads: Use along with light signals on low

visibility conditions. The levers are coloured differently, and show

arrows that indicate that can be moved. When rotated, we hear a

fog- horn and the water level goes up by another one fifth.

D) Folded letter. On touch, the we see a close up of the letter, and

and V.O of the character starts reading the letter. When the

narration ends, we get back to the full room view and the water

lever goes up by one fifth, and the sound of the sea goes louder.
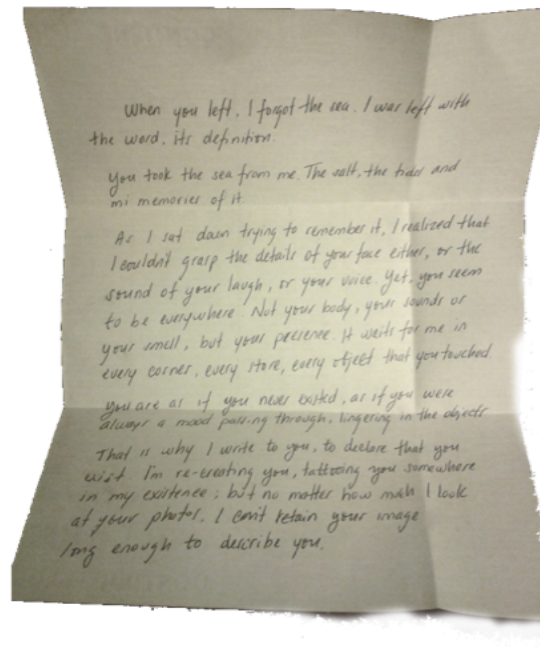
V.O. MAN

When you left, I forgot the sea. I was left with the word, the definition of it.

You took the sea from me. The salt, the tides and my memories of it.

As I sat down trying to remember it, I realized that I couldn't grasp the details of

your face either, or the sound of your laugh, or your voice. Yet, you seem to be

everywhere. Not your body, your sounds or your smell, but your presence. It waits

for me in every corner, every store, every object that you touched.

 You are as if you never existed, as if you were always a mood passing through,

lingering in the objects.

 That is why I write to you, to declare your existence. I'm re-creating you,

tattooing you somewhere in my lifetime, but no matter how much I look at your

photos, I can't retain your image long enough to describe you.

E) Letter on nightstand.
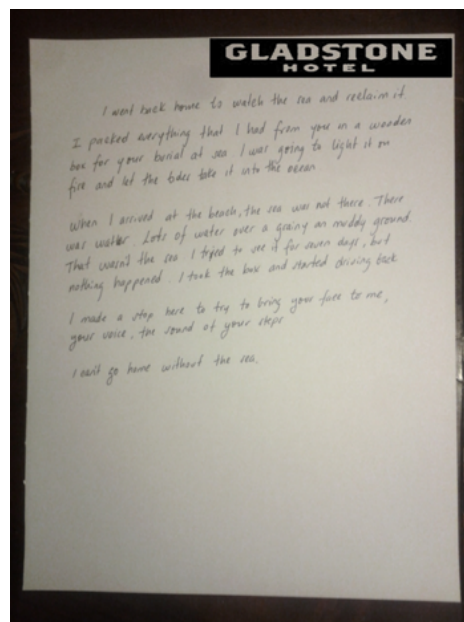
When touched, we see a close up of the letter and the V.O. of the character starts reading it. When the V.O. is over, the water level goes up another fifth and the sea can be heard louder

V.O. MAN

I went back our hometown to watch the sea and reclaim it.

I packed everything that I had from you in a wooden box to do a burial at sea. I was going to light it on fire and let the tides take it into the ocean.

When I arrived at the beach, the sea was not there. There was water. Lots of water over a grainy and muddy ground. That wasn't the sea. I returned to the beach every day for a week, but nothing changed. I took the box and started driving back.

I made a stop here to try to bring your face to me, your voice, the sound of your steps.

I can't go home without the sea.

When the user has finished interacting with the 5 objects, the sea will be filling the room, and the sound of the sea would be as if we where right next to the shore.

The scene remains on screen for 15 seconds and stars fading until all we see is the empty room.

2. DISLOCATION ROOM - INT. NIGHT.

Wide shot. A woman is standing in the centre of the room. She looks as if she is made of chicken wire, and it extends to the floor, giving form to all objects in the room. There are no beds or furniture around. Four objects can be seen scattered around, connected to the woman and made from the same net material. When touched, a an note written in subway tickets or receipts from these places appear on top of the object, the camera gets closer to that object, so we can get a clear look to the object. V.O. of the woman reads the text written in the objects.
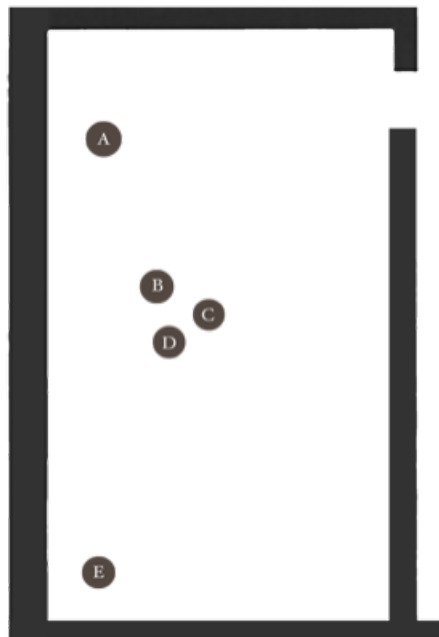
A) Shoe

B) Moon

C) Woman

D) Pharmacy Cross

A) Shoe - When touched, the ticket with the written text pops up on top of it and the V.O voice starts.

V.O. **Woman**

I threw away my shoes in Prague.

They were torn.

I haven't heard my footsteps since.

B) Moon - Text on London tube ticket:

V.O Woman

I saw a giant moon in London once.

It printed my shadow on the ground

I came back to pick it up the next nigh.

It was gone.

C) Woman

V.O. Woman

In every place I've been, I left myself behind.

D) Pharmacy Cross

V.O. WOMAN

I went to a pharmacy in Berlin.

They couldn't cure my heart, so I left it there.

E) Breathing patch

V.O WOMAN

I caught my breath in Madrid.

Turns out, it wasn't mine.

Mine is still on the run.

As the user makes her way between the two rooms with scenes in the Second floor of the Gladstone Hotel, they will find 3 smaller markers laying around the coffee tables and furniture.

These are the ones marked 3, 4 and 5 in the general map.

Object 3. Subway ticket Madrid. Audio recorded at Madrid. Celebration in Alcala Street when Spain passed to the semifinals in the world cup.

Object 4. Transfer from Toronto Subway Station. Audio: Street musician. Toronto

subway station.

Object 5 . London Tube ticket. Audio: Street musician at Subway station.

When the user has interacted with the 5 scenes, the ending the last pages of the

diary are loaded. Same as before, we hear Kate´s V.O. narrating what is written in

the page.
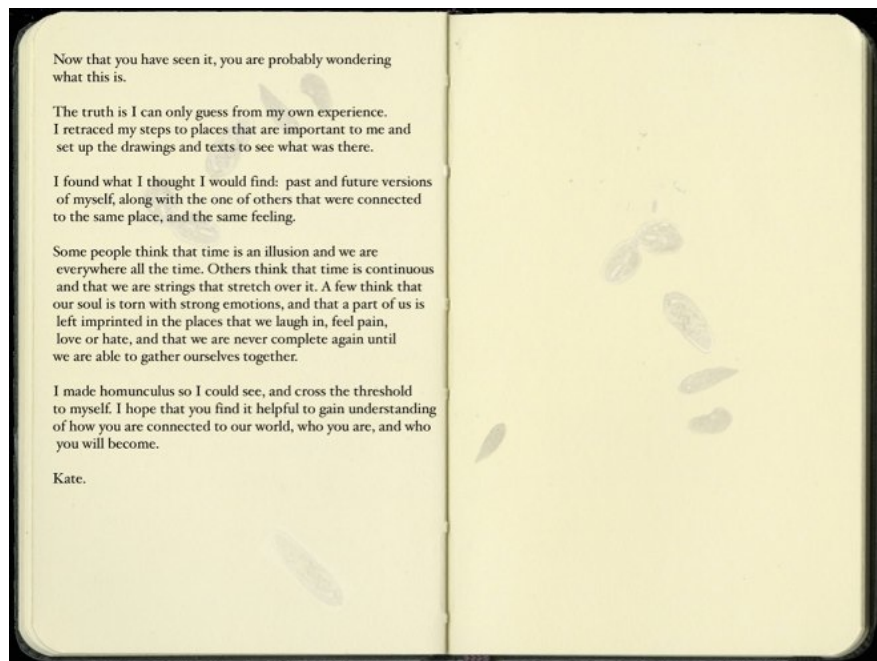
V.O. KATE

Now that you have seen it, you are probably wondering what this is.

The truth is I can only guess from my own experience. I retraced my steps

to places that are important to me and set up the drawings and texts to see

what was there. I found what I thought I would find: different versions of

myself, along with the one of others that were connected to the same

place, and the same feeling.

Some people think that time is an illusion and we are everywhere all the

time. Others think that time is continuous and that we are strings that

stretch over it. A few think that our soul is torn with strong emotions, and

that a part of us is left imprinted in the places that we laugh in, feel pain,

love or hate, and that we are never complete again until we are able to

gather ourselves together.

I made homunculus so I could see, and cross the threshold to myself. I

hope that you find it helpful to gain understanding of how you are

connected to our world, who you are, and who you will become.

Kate.