Aisthesis

Being There or Non-being There: Memory of Experience in Virtual Space[1]

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Abstract. When we are present in a space we have been to before, we remember our experiences or events, people, and things related to that space. However, we can remember a space we have not been to and experiences that do not belong to us. We can have memories of them through transferential spaces created by mediums such as images, films, television, or virtual reality. These virtual spaces enable the transfer of experiences and memories. This study focuses on the relationship between experiences in virtual spaces and memory. It problematizes the change in the quality of experiences in physical and virtual spaces and the memories gained from these experiences. Film and virtual reality mediums are chosen to analyze the changes. The study reveals that depending on the types of mediums, characteristic transformations occur in memories obtained from experiences in virtual spaces.

Keywords: Artificial memory, Personal memory, Transferential space, Virtual reality, Virtual space.

1. INTRODUCTION

To remember a space or an event that happened in a space we need to encounter it or be present beforehand. While experiencing a space that we have been in previously, the space itself triggers the remembering process, and memories that are related to that space begin to emerge in our minds. This mechanism of remembering and acquiring memories is profoundly affected by so-called *second-hand* experiences, which are characterized by encountering movies or virtual reality apparatus. This study examines this phenomenon through the researcher's personal experiences with virtual settings.

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Monologue #1:

Z: I have been walking for a long time. I am both tired and hungry. I have to find a place to eat.
Z: This restaurant […] I can dine at this restaurant […] I remember that their food was delicious.
Z: We came here with X last year, we sat at that table in the corner and chatted.

In Monologue #1, the restaurant as a remembered space is part of the researcher's memory, gained by first-hand experiences. This remembrance incorporates direct experiences and observations of the memory-owner, unlike Monologue #2:

Monologue #2: The Lives of Others

Z: Isn't this the bookstore where Wiesler saw the poster of Georg's book as he passed by?
Z: Ah! Yes, that bookstore […] The bookstore was on this Allee, wasn't it?
Z: Yes. Wiesler, formerly a lieutenant, was then a postman. While he was walking on this Allee, he saw the poster of the book and decided to enter this bookstore.
Z: Wait! I haven't been here before, not even in this city. How can I remember this bookstore and the events associated with it?

In Monologue #2, the bookstore that the researcher had encountered while wandering around the street triggers a recollection and her memories associated with that place come to the surface. However, the remembered bookstore is not a part of a personal memory of the researcher prior to the monologue, as personal memories are associated with being physically present when an experience or event happens. Remembrance of the bookstore and related events are experienced through a film named *The Lives of Others* (Henckel von Donnersmarck [2006]) and memories of them are conveyed through the experience of watching the film (Fig. 1).

The film – *The Lives of Others* – creates «a transferential space in which people are invited to enter into experiential relationships to events through which they themselves did not live» and transferential spaces are thus «artificially constructed» (Landsberg [2004]: 113). These kinds of spaces are virtual as they have no physical (material) presence. To experience them, it is necessary to engage in various mediums (films, television or Internet, etc.). In this case, Wiesler's experiences were taken on by the researcher in the transferential space of the film. The researcher possesses artificial memories of someone else's experiences because the researcher is not physically present in the film's virtual space, she is in front of the screen in a physical space. Since these memories are not natural they differ from personal ones, which are the products of first-hand experiences (Landsberg [2004]). They are artificial memories obtained from second-hand experiences (watching a film or television).

The research aims to discover the relationship between memory and experiences in virtual spaces created by image-based media in the context of presence and to argue the following questions: Is a virtual space just a space of transmission? Are all the memories obtained from virtual space experiences artificial memories? Can these memories become a part of our memory that constitutes our personal history, similar to our memories?

The methodology of the study is heuristic research. The heuristic research was developed by Clark Moustakas and introduced with the publication of Moustaka's book Loneliness (1961).

Heuristic inquiry is a qualitative and phenomenologically aligned research model (Moustakas [1990], Sultan [2019]). «The self of the researcher and the researcher's perceptual field are key dynamics in heuristic approach» (Sultan [2019]: 4). The self of the researcher is a bodily human being. The body is the vehicle of perception, and perception is based on bodily actions. As Merleau-Ponty ([2005]: 239) states «We are in the world through our body […] we perceive the world with our body […] the body is natural self and the subject of perception». Hence, Nevine Sultan (2020) relates heuristic inquiry to Ponty's philosophy since Ponty's philosophy is based on a body-centered phenomenology of perception: «Heuris-

Fig. 1. Encounter with the bookstore and recollection.

tic inquiry is guided by Ponty's philosophy that stresses human perception as performed through our bodies and human interaction and meaning-making as perceptual acts» (Sultan [2020]: 161).

The heuristic inquiry emerges from the researcher's encounter with the topic of interest through an autobiographical experience (Sultan [2019]). The experience in point is the recollection triggered by an encountered space. The recollection gave rise to Monologue #2 (self-dialogue of the researcher) and the main question of the study: I haven't been here before, not even in this city. How can I remember this bookstore and the events associated with it?

The heuristic journey of the researcher began with her lived experience (experience of the movie *The Lives of Others*) and the main question of the study and continued with her experiences and encounters. Through the journey, new research questions arose concerning the main question.

After defining the questions, data were collected to illuminate them. The tool of data collection and interpretation is the researcher herself. The methods of collecting data are open-ended (Moustakas [1990]) in heuristic research. In the study, the researcher gathered data through dialogues guided by research questions with herself. This process revealed the researcher's subjective experiences and encounters related to the research questions. These experiences and encounters were accepted as the data of the study. Enumerated monologues and experiences (VR experiences) in

the paper explain and elaborate researcher's personal experiences, and are considered research data. To illuminate the questions, the data were analyzed through Alva Noë's (2012) definition of presence and presence in physical reality.

2. BEING THERE: PERSONAL MEMORY

Memory brings us to a connection with the past. It is generally defined as a system that preserves the past and imports it to the present. «The past survives under two distinct forms: first, in motor mechanisms; secondly, in independent recollections» (Bergson [1991]: 78). The first is habitual memory, but this study focuses on the second form of memory: independent recollections which are in the frame of explicit memory. Explicit memory concerns personal memory which involves, roughly, our capacities to remember particular events, episodes, or experiences of our own past (Sutton [2020]).

Without actualization, personal memory is in its pure state. It is a pure memory isolated from all perception. Bergson calls it pure memory because it has no psychological existence. Therefore, it is called virtual, and inactive (Deleuze [1991]). «This memory «can only become actual by means of the perception which attracts it» (Bergson [1991]: 127). Put differently, actualizing a virtual memory is «beginning with a virtual state and leading step by step up to the point where it gets materialized in an actual perception» (Ansell-Pearson [2005]: 1117). While a virtual memory becomes actual with the present perception, a memory-image reveals in a person's mind. The memory-image is the contextual frame of actual memory and is comprised of the content of the experience, the person who remembers, space and time. The memory owner must be a part of this image, but s/he does not need to be in the center of it (Larsen [1992]). So, the memory owner does not need to be the subject of the experience, s/he can be a witness to it. «Of course, someone can remember his brother being married although it did not happen to him. Still, unless he saw it, heard it, or otherwise perceived it happening, it is false to say he remembers his brother being married» (Martin, Deutscher [1966]: 164). Therefore, being a part of this mental image requires being there at that time. Presence is «the conscious feeling of being in an external world, at the present time» (Waterworth, Riva [2014]: 2). Being there does not necessarily mean being corporeally in the external world. The conscious feeling of being present depends mostly on the interaction with and access to that place. «Interaction with it is a matter of availability, and the world makes itself available to the perceiver through physical movement and interaction» (Noë [2006]: 1). According to Noë ([2012]:70), «presence is a matter of availability […] Our sense of the presence of objects and properties around us, in perceptual experience, is understood in terms of our being skillfully poised to reach out and grasp them». If one can access the (physical or virtual) world in this way, it means that one is in the presence of that world. «To be in the presence of something is to recognize it as existing contemporaneously with us and note that it comes within the actual range of our senses» (Bazin [2005]: 96). This expression reveals the necessity of simultaneity and being present in a shared space with things. Accordingly, if we remember that something happened, it indicates that we were present at that time and in a shared space with it. Its memory is a part of our past – it is a personal memory. So it can be said that one can have personal memories acquired from experiences in the (physical or virtual) world when the intense feeling of being there is attained.

3. NON-BEING THERE: ARTIFICIAL MEMORY

Throughout history, people have developed many memory aids – wax tablets, photographs, videos, etc. – to counter the temporariness of memories, and some techniques – mnemotechnic – have been introduced to make it easier to remember (Yates [2020]). One vivid example of these memory aids can be seen in the episode of the *Black Mirror* television series titled *The Entire*

History of You (Welsh [2011]): in this futuristic and somewhat dystopian scenario, people have the chance to constantly navigate within their memories through memory implants named as *grain*, which they carry on their bodies. On the other hand, memory aids such as film, video, and pictures can provide new memories besides helping to remember. These mediums can create transferential spaces which invite people to experience events that they have never encountered. They can transfer the experiences of a person to someone else who has not been experienced and thus, one can have memories through these transmissions. According to Landsberg ([2004]: 22), «with the aid of mass cultural technologies, it becomes possible for a person to gain memories that are not his or her natural or biological inheritance». Landsberg (2004) explained how a person can receive memories through such media with the concept of prosthetic memory. «Prosthetic memories do not have a direct connection with the past of a person, but can pretend to be memories of real events that have happened, derived from interactions with a mediated representation, such as seeing a film or watching a television series, not from the first-hand experiences of the person» (Landsberg [2004]: 20). Prosthetic memories are mediated and artificial because, for example, a viewer has experiential relationships with the transferential space created by the film and the events in that space. The space transfers experiences or memories of someone else to the viewer, and the viewer can obtain memories through this film experience which is a second-hand experience. According to Gibson (1954), a picture or model is a vehicle for obtaining experience at second-hand. «A picture or a model is a surrogate which is a stimulus produced by another individual which is relatively specific to some object, place, or an event not at present affecting the sense organs of the perceiving individual» (Gibson [1954]: 5-6) and «one picture may be a surrogate for a wide piece of the absent scene and another may be a surrogate for only a narrow piece of the absent scene, or perhaps only for a single object on it» (Gibson [1954]: 15). For example, when

we look at a picture of our childhood home and loved ones, we do not actually see them. «Since to see something, in normal circumstances, is to encounter it. To see it, you must be with it in a shared space» (Noë [2012]: 84). Therefore, what we see is not the house or the loved ones but their representations. They are only visually present, but they are not there. The house or the loved ones in the picture is virtual since the virtual is not there (Levy [1998]). However, «every picture has a double aspect: it is there for you, as a tangible, physical thing, and a presentation of» (Noë [2012]: 84) someone or something. Additionally, there are two levels of spatial perception: «One being the space in which the picture lies and the other being the space in which the object pictured lies» (Gibson [1969]). One is a physical space in which the picture lies and the other one is a virtual space in which a virtual object lies, because «a virtual space is always housed inside another space – a space of the bodily dwelling» (Grosz [2001]: 23). As a result, even though the space of the picture is virtual, it can be said that the virtual space is essentially a space, only without a material presence. As Ettlinger ([2008]: 25) mentions that in our experience, «we can relate to the space as something that is there, even though we know very well that it has no physical existence».

In the case of watching a film, the transferential space created by the film is also a virtual space. Although one can have the access to this space visually and audibly, one cannot fully access it due to the lack of interaction and bodily movement, similar to a still image. Besides, visible boundaries of the screen continue to emphasize the presence of the viewer in front of the screen. Therefore, she cannot have the intense feeling of being in the virtual space. Consequently, the viewers borrow experiences that are not their own and thus only have artificial memories of virtual space. However, this situation has changed with digital media (such as the internet, computer games, etc.) which has made it possible to interact with the virtual space. Even using an interface or a joystick or a mouse instead of a body as an input device causes negative effects on the feeling of being pre-

sent in the virtual space, it is believed these technologies, and especially virtual reality technology improves the feeling of presence in a virtual world.

4. BEING IN BETWEEN

When it comes to VR, which is a medium through which virtual space can be accessed (Ettlinger [2008]), the virtual space is freed from the borders of the interface and now completely covers one's audiovisual field. «When one looks at something in VR, it is not framed by the dimensions of a monitor, television set, or movie screen. Instead, s/he sees the virtual world as s/he sees the real one. When s/he looks to the left or right, the virtual world is still there» (Bailenson [2018]: 59) even though it is physically absent. «In VR one appears to interact with a world outside one's own body although there is no actual and corresponding there surrounding the person» (Tjostheim, Waterworth [2022]: 38).

Compared to other mediums, VR offers to get behind the screen and put the user at the center of the action (Le Breton [2016]), so one becomes the subject of actions in the virtual space. However, the subject of actions may differ according to the type of VR experience. In a non-interactive VR experience, one has a 360-degree field of view without the boundaries of the screen but cannot interact with what s/he sees in the virtual space. Lanier ([2017]: 239) states that «if you cannot reach out and touch the virtual world and do something to it, you are a second-class citizen within it. Everything else there is connected into the fabric of whatever world it is, but you alone stand apart». However, unlike non-interactive VR, interactive VR is considerably bidirectional, as «one can interact with a virtual world by changing locations, picking up objects and setting them down, flipping switches, and so on» (Sherman, Craig [2003]: 11). So, the transition from a passive subject to an active one with interactive VR also means the transition of virtual space. The virtual space turns into a space of interactive experience for the user, instead of an audiovisual spectacle.

In addition to interactiveness, maximum detachment from the physical space in a VR-based virtual experience is aimed. «Usually, the visual and auditory stimuli of the physical world are shut out and replaced with others. This leaves one part of the sensorial body in the physical world, and another part in the virtual world» (Penny [1990]). Thus, the sensory integrity of the body is disturbed and two partial bodies emerge. While bodily senses such as sight and hearing are transported to virtual space partially, another partial body continues to exist in the physical space with the inner senses of the body such as balance. The perceptual dialogue of the body with two spaces continues simultaneously but unequally. Consequently, the feeling that the body exists in two spaces at a time arises due to the perceptual information layers received from the physical and the virtual space (Thomas, Glowacki [2018]). While in the virtual space, the person can have perceptual experience as in the physical space, yet the physical body of the person continues to exist in the physical space where the virtual space encompasses. This experience of a person who continues perceptual dialogues with both spaces is defined as being in between (Fig. 2).

This binary perceptual dialogue of being in between decreases and breaks the depth of the feeling of being present in the virtual space. To transcend or eliminate this phenomenon, the
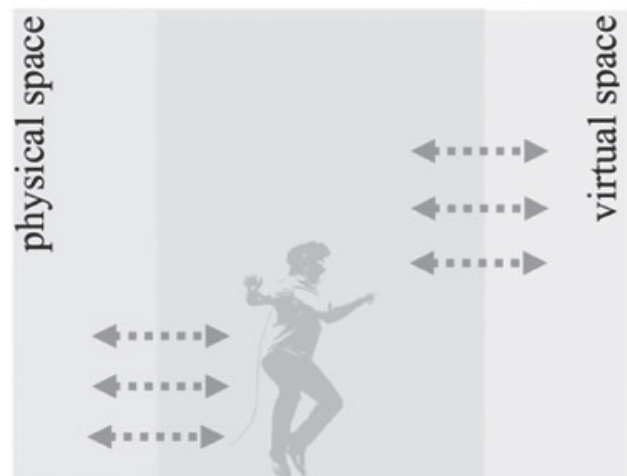

Fig. 2. Being in-between.

Table 1. The factors affecting the formation of presence feeling through which virtual reality experiences are analyzed.

Noë's definition of presence	Presence in physical reality
-interaction with the environment	-first-person POV
	-visible body
-bodily movement	-ability to act
	-the body as vehicle of actions
	-objects, spaces or people interacted with have realities.

state of being in between should be overcome and transformed into the state of being present in virtual space by integrating this dissected sense of being present. In line with this thought, the concept of completion was introduced by the researcher. In the study, the concept of completion refers to the transfer of the other part of the partial body to the virtual space. With the realization of the completion, the breaks of the feeling of being present in the virtual space are overcome, and having the feeling of being there is achieved. To achieve this, three different but interrelated completions are proposed by analyzing the researcher's VR experiences in the context of the factors obtained from *Noë's definition of presence*, and *presence in physical reality*[2] (Table 1): bodily, actional, and spatial completion.

4.1 Bodily completion

The focus of bodily completion is to make the body visible. In physical reality, one's body is visible. However, one who is visually detached from physical reality with virtual reality tools cannot see her/his moving limbs when s/he moves or the rest of her/his body when s/he looks down. When one does not perceive the existence of her/his body visually, the internal senses of the body

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[2] The factors associated with presence in physical reality were acquired by drawing on the book titled *Feeling Present in the Physical World and in Computer-Mediated Environments* by John Waterworth and Giuseppe Riva.

become dominant (Popat [2016]). The sense of a body derives from three things: vision, balance (vestibular system), and proprioception. Proprioception is like the eye of the body, the body's way of seeing itself (Sacks [1987]). The body feels present because of the immanent senses, such as proprioception and the vestibular system. Therefore, to make the body completely visible in a VR setting, there must be visuo-proprioceptive completion. Having a virtual body – an avatar – in the virtual space can be useful for achieving this kind of completion. One can see their virtual body from a first-person point of view (POV) or a third-person POV. In the first-person POV, one looks through the eyes of the virtual body. Here, one's POV coincides with her/his avatar (Müller [2006]). Also, seeing the representations of the moving parts of the virtual body while moving to grasp an object seen in the virtual space enables bodily completion. Unlike the first-person POV, one can see an entire virtual body controlled by him/her with a third-person POV. In such a case, the virtual body moves in the virtual space with the real body of the person synchronously. This provides visuo-proprioceptive congruence between two bodies, so bodily completion emerges. Bodily completion can have a positive impact on the feeling of being in the virtual space, and thus the memory of this experience changes qualitatively.

4.2 Actional completion

During the VR experience, when one moves her/his head left or right, up, or down, through HMD and motion tracking system, her/his gaze changes according to the movements similar to physical reality. However, for the intense feeling of being there, one needs to be able to do more than just move her/his head around – to be able to move the whole body. To walk around in the virtual space, it is necessary to do the same in the physical space or to enact it through bodily movements. With this ability, a sequence of simultaneous and overlapping actions emerges, overcoming the disengagement between actions in both

spaces. In addition to the action taking place in the virtual space, the nature of this action is also important. Popat (2016) pointed out that tactility is identified as a contributing factor in the establishment of presence, yet it is the action of reaching out to touch that provides this effect, rather than the achievement of contact itself. To touch an object or change its location in the virtual space, one must be able to reach and grasp it. An actional completion occurs when bodily movements performing these actions overlap the bodily movements in the physical space. Reaching and grasping a virtual object in the virtual space that has some correspondence with physical reality affects the sense of touch significantly.

As a result, actional completion is also related to and requires spatial completion because the completion of the actions in the virtual space depends on the actions in the physical space. However, if the action cannot be performed physically (hence corporeally) because of a lack of spatial completion, using input devices such as a joystick to act within virtual space also provides actional completion to some extent. Through input devices, actions such as moving within the virtual space, roaming between spaces, grasping virtual objects, and changing their location can be performed. However, performing these acts through the body increases the feeling of being in a virtual space, while using input devices has the opposite effect.

4.3 Spatial completion

In spatial completion, the physical environment that VR experience takes place and the experienced virtual space itself must complete each other in terms of spatial layout and spatial boundaries. In some cases, parts of the virtual space cannot be experienced, even though it is in the visual range. This reveals that the spatial boundaries of the two spaces do not overlap. Non-overlapping boundaries affect actional completion negatively, as one cannot act inside the virtual space as s/he wishes. Therefore, one's movements within two spaces are restricted. In other cases,

one may hit or encounter determined physical obstacles in physical space or the virtual grid system (such as linear indications) visible in the VR experience. The grid system shows the borders of the virtual space and aims to keep in the experience field. These kinds of defined boundaries and grid systems make spatial incompletion visible.

These completion suggestions in the study are developed by the experiences of the researcher through various VR settings. These experiences are described and analyzed according to their scenario, input devices, physical and virtual spatial qualities, and the overall feeling of presence. These experiential inquiries below reveal the possible qualitative alteration of memories acquired through VR experiences by transforming artificial/prosthetic memories into personal/first-hand/natural memories.

VR Experience #1: Here (Lysander Ashton, 2020)

Here is based on Richard McGuire's comic book with the same name. It tells stories of the corner of a particular room and people who have lived there for several hundred years (*Here*, n.d.).

After donning HMD (head-mounted display), displays of a living room from different periods from 1870, 1988, 1942, etc. begin to overlap (Fig. 3). So, how the living room changes over time and different life stories in the living room are witnessed.

One's body is invisible throughout the VR experience since there is not a virtual body in the virtual space that coincides with bodily movements. Therefore it can be said that bodily completion is absent in this case. Also during the experience, the researcher can move around up to a certain point, because her movement is restricted by VR devices such as the cable of HMD. In addition, the discrepancy of spatial layouts and boundaries affects the actional completion negatively. The researcher cannot act inside the virtual space freely and cannot interact in any way with the virtual space, virtual objects, and virtual people. For this reason, she cannot access the virtual space thoroughly and cannot have an intense feel-

Fig. 3. Displays overlap the physical space of the experience.

ing of being present in the virtual space. Consequently, the researcher borrows the experiences of people in the different displays of the living room and has artificial (prosthetic) memories, qualitatively closer to a film experience.

VR Experience #2: Glimpse (Benjamin Cleary, Michael O'Connor, 2019)

Glimpse is an interactive VR experience. Its narrative is about a panda named Herbie who has recently broken up with his girlfriend. Herbie is an illustrator and uses his art to keep his memories alive (*Glimpse*, n.d.).

VR scenario begins after sitting in a chair positioned in front of a screen. The researcher finds herself at an illustrator's desk in the virtual space of *Glimpse* via HMD and joystick (Fig. 4). However, there is no overlap between the virtual space and the physical space in which the experience takes place in terms of spatial layout and boundaries of both spaces. These are indications of the absence of spatial completion.

During the experience, the virtual mirror on the table gathers attention suddenly. When the researcher looks in the mirror, she meets the face of Herbie. The researcher sees Herbie as her avatar form in the virtual space (Fig. 5). The researcher's POV coincides with Herbie's POV. So, the researcher becomes involved in the experience through the eyes of Herbie.

While moving to reach and grasp an object, she encounters the image of the panda's moving limb. This allows the visual and propriocep-

Fig. 4. Physical space where the experience occurs and one's position throughout the experience.

Fig. 5. One's avatar form in *Glimpse*.

tive senses to complete each other. Further, there would likely be some degree of ownership over this virtual body – it comes really to seem to be one's own body (even though one knows it cannot be [Slater (2009)]). But, in the experience, the researcher grasps something through the buttons of a joystick instead of bare hands. The joystick is the tool for action in the virtual space of *Glimpse*. By using it, «one translates the input into some sort of action» (Rubin [2018]: 30). If the tool of action were the body of the researcher instead of the joystick, she would feel that the virtual body in the virtual space belongs to her. Because the sense of body ownership influences the possibility of the sense of presence in virtual space. The lack of actional completion also affects bodily completion. Due to lack of completion, the researcher cannot fully access the virtual space, so she cannot have the feeling of being in the virtual space. Therefore, the memory gained from the *Glimpse* experience is an artificial one.

VR Experience #3: Thresholds (Mat Collishaw, 2017)

In this experience, a space with a high ceiling is seen after VR tools are worn. While walking around the room, big windows, a fireplace, vitrines in which photographs are exhibited and white shadows strolling in the room appear. The researcher moves in the virtual space as she wishes and can interact with the space because of the

wireless VR tools. A virtual hand shows up while approaching vitrines to see photographs. Through the virtual hand, it is possible to get photographs from the vitrines and enlarge or shrink them. the action performed via the virtual hand coincides with the movement of the physical body. This demonstrates bodily and actional completion in tandem. However, the rest of the virtual body cannot be seen below. At this point, the bodily

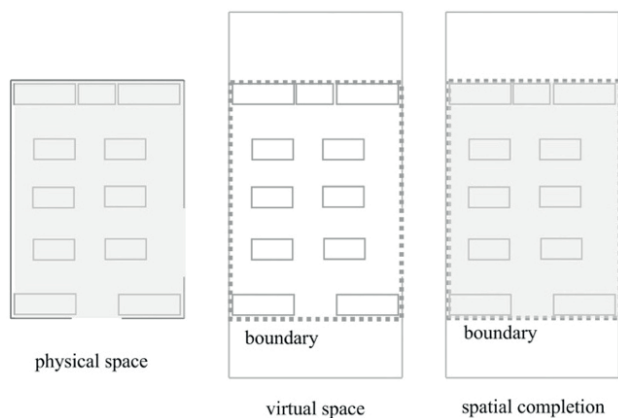**Fig. 6.** Overlapping spatial layouts of the virtual space and the physical space.

Fig. 7. The physical space where the experience takes place, the virtual space experienced through VR tools, and spatial completion by overlapping boundaries and spatial layouts.

completion ruptures for a while, but the negative impact is minimized by spatial and actional completions.

At the end of the experience, it is realized that the physical space where the experience takes place, and the virtual exhibition hall have the same spatial layouts (Fig. 6).

Spatial overlap between the virtual and the physical space in terms of spatial size and spatial layout is a positive effect to ensure spatial completion (Fig. 7). Furthermore, feeling the materials of vitrines and the temperature change while getting closer to the fireplace makes the spatial completion significantly intense.

Through all these completions, the researcher can access the virtual space more holistically and have an intense feeling of being present in the virtual space. Thus, the memory of the Thresholds gets closer to being a part of her natural/personal memory rather than an artificial/prosthetic one.

5. CONCLUSION

The study reveals that depending on the types of mediums, characteristic transformations occur in memories obtained from experiences in virtual spaces. Different mediums have distinctive effects on the feeling of being present there and this feeling profoundly affects the memory. Compared to analog mediums such as film or television, VR has more potential to achieve the sense of being present in a virtual space since VR provides the possibility of bodily movement and interaction with virtual spaces. However, not all VR experiences allow interaction with the virtual space. Therefore, the researcher cannot fully access the virtual space. So, the virtual space remains a space of transmission of experiences and memories of someone else. However, interactive VR experiences pave the way for accessing the virtual space and having the intense sense of being present in a virtual world. Thus, it ceases to be a space of transmission and becomes a space of experience.

However, in the lack of proposed completion types, the feeling of being present continues to rupture. When the researcher has the complete feeling of being present, experiences in a virtual space become parts of our personal experiences. Memories acquired from these experiences have the potential of being part of her memory and personal history. Hence, it can be said that in some cases without completion, the memories show artificial (prosthetic) nature and they may remain within the invisible and imprecise boundaries of the artificial memory. However, not all memories obtained from experiences in virtual spaces are completely artificial.

Consequently, it is thought that it will be possible to fully access virtual spaces, thanks to either VR or different technologies that may emerge in the future and thus, memories gained from these experiences in virtual spaces may be increasingly associated with personal memory.

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