The Hunter and the Horrors

Impossible Spaces in Analog and Digital Immersive Environments

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Introduction

The rise of immersive experiences is due to many factors. As Pine and Gilmore point out,[1] the way we consume products and services has changed because now we prioritize experiences. In order to create more and more compelling experiences, various brands make use of mechanics that offer unique experiences for their consumers who want to satisfy their hunting attitude.[2] This represents an important milestone in the proliferation of immersive events. While the term "immersive" has increasingly become a marketing buzzword due to the proliferation of VR technologies, the notion of immersivity is also changing in the performing arts.

1. B. Joseph Pine and James H. Gilmore, *The Experience Economy* (Boston, MA: Harvard Business Review Press, 2011).
2. Adam Alston, "Audience Participation and Neoliberal Value: Risk, Agency and Responsibility in Immersive Theatre," *Performance Research* 18, no. 2 (2013): 128–38.

What "immersive" means in the context of an analog or digital stage production is debatable. Nilsson et al. suggest a new typology for the concept, which consists of the following: "(a) immersion as a property of the system, (b) immersion as a response to an unfolding narrative, the diegetic space, or virtual characters, and (c) immersion as a response to challenges which demand the use of one's intellect or sensorimotor skills."[3]

The first type is primarily a manifestation of technological devices which enable virtual environments to respond to a user's actions. Yet the latter two types are also partially psychological. Immersive theatre—leveraging virtual technologies or not—can be considered as such due to how the genre subtly challenges the sensorimotor and meaning-making skills of the audience members, as well as how stage space is utilized in such scenarios.

How to Approach the Concept of Immersion?

When the experiencers step into an immersive environment, they find themselves in a state of "willing suspension of disbelief"[4] that will be followed by "active creation of belief."[5] This latter stage is what Ryan describes as "a process involving the mind, [that] turns the user's sojourn in the virtual world into a creative membership. For an agent embodied in a multi-dimensional environment, selective and productive interactivity can no longer be rigidly distinguished, because navigating the virtual world is a way to bind with it, a way to make it flow out of the acting body."[6] According to Ryan, the key to immersive interactivity "resides in the participation of the body in an art-world," and thus reconciling

3. Niels Christian Nilsson, Rolf Nordahl, and Stefania Serafin, "Immersion Revisited: A Review of Existing Definitions of Immersion and Their Relation to Different Theories of Presence," *Human Technology* 12, no. 2 (2016), 11.
4. A term coined by Samuel Coleridge in *Biographia Literaria* (1817).
5. Janet Horowitz Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspac*e (New York: Free Press, 1997).
6. Marie-Laure Ryan, *Narrative as Virtual Reality 2*: *Revisiting Immersion and Interactivity in Literature and Electronic Media* (Baltimore: Johns Hopkins University Press, 2015), 286.

immersion and interactivity "will propose a genuine simulation."[7] But how does the participant identify that they are in a space for simulation—in an immersive simulation—that does not jeopardize the safety of the audience members while still creating a liminal experience?

Erving Goffman's "frame analysis"[8] can help us in this regard. Goffman deeply scrutinizes William James's question, "under what circumstances do we think things as real?" As a possible way to address this, he created the frame analysis, which deals with the issue of how experiences are defined and organized, attempting to explain how various actions are acknowledged, for instance, as "play" or as "serious." If we see two girls, one running from the other one, we see this event as an exercise. This framework is primary as it does not depend on a more fundamental interpretation, and it can be transformed into further scenarios. If we look again, then we can see that one girl is chasing the other one. Here, the primary framework has changed into "they are chasing each other." Goffman calls this transformation "keying," and this can take various forms such as make-believe, practicing or demonstrating. As an addition to keying, another way to transform the meaning of an action is "fabrication," which is an "intentional effort of one or more individuals to manage activity so that a party of one or more others will be induced to have a false belief about what it is going on."[9] A crucial element of keying is that, unlike fabrications, there are no false beliefs involved and the viewers are aware of the transformation.[10]

7. Ryan, *Narrative as Virtual Reality 2,* 286.
8. Erving Goffman, *Frame Analysis: An Essay on the Organization of Experience* (Cambridge, MA: Harvard University Press, 1986).
9. Ibid., 83.
10. Here I won't discuss Goffman's "theatrical frame" concept, as he applies this term to traditional theatre, attributing a crucial function to the 4th wall.

The concept of keying can help us understand the perceptual process taking place when entering an immersive world. We perceive something that happens to us as something impossible, and we wonder about this impossibility while we also feel it as very real—we are the subject of a liminal experience. Yet immersion does not involve fabrication, it does not fool us; rather, we explicitly key this transformation as voluntarily entering into an illusory or fictional world with the aim of being immersed in it.

Immersion as the Sense of Impossibility—Entering Liminal Dimensions

I have argued elsewhere that in putting on a VR headset, "by the combination of the use of 'human interface' with the ritualistic situation of taking on the virtual reality headset, participants can be part of an initiation ceremony, a rite of passage."[11] These rites of passage are characteristic to the situation of switching between worlds, between immersive environments. This switching constitutes the keying in this case: it is not a real liminal experience but represents a threshold.

Here, I will use the concept of liminality as it was defined by Victor Turner as a quality that creates disorientation for the participant when he/she is no longer in the pre-ritual status, but also has not begun the transition yet.[12] Later, I will present case studies where we can see how the creators make use of these keying techniques and how they create various types of liminal experiences and immersive spaces that enable these.

When discussing techniques of engagement, Griffith mentions that spectacles create engrossment by virtue of three defining characteristics "that not only separate them from ordinary two-dimensional representational forms but also come to infuse their very ontologies."[13] These characteristics are the following:

11. Ágnes Karolina Bakk, "Magic and Immersion in VR," in *Interactive Storytelling. ICIDS 2020. Lecture Notes in Computer Science*, ed. Anne-Gwenn Bosser, David E. Millard, and Charlie Hargood (Cham: Springer, 2020), 327–331, https://doi.org/10.1007/978-3-030-62516-0_29.
12. Victor Tuner, "Liminal to Liminoid in Play, Flow and Ritual: An Essay in Comparative Symbology," *Rice University Studies* 60, no. 3 (1974): 53–92.
13. Alison Griffiths, *Shivers Down Your Spine: Cinema, Museums, and the Immersive View* (New York: Columbia University Press, 2013), 285.

1. Remediation: co-opting existing tropes and ways of seeing and "resignify[ing] within stunningly new environments."
2. Reverence: this is the "revered gaze" which is the response of the audience to the recognition of labor and effort involved in creating the spectacle.
3. Fantasy: "The desire to be elsewhere without actually going elsewhere seems to be hardwired into the human psyche as the evidence of centuries both secular and profane culture suggests. Immersive technologies bring that fantasy a bit closer to our reality."

This last characteristic is what constitutes an important perceptual response on the side of the participant. Fantasy is an important factor that can influence how intensely we feel immersed in a space, but this sense of immersion provided by the space can also be due to the remediation phenomenon that one can identify in immersive spaces.

Immersion in Theatre

Immersive theatre can be called a separate genre that does share common traits with theatre but focuses more on the audience and their participation in the process of performance. Bennett suggests that there are developments in sociology of theater parallel to developments in immersive theatre. Audience studies conducted mainly by governmental bodies are increasingly using social science methods. As Bennett states, "the audience has become an important object of study, not necessarily or even frequently motivated by the discourses of theatre studies, nor by our theatre history making, but by the economic realities of the cultural industries."[14] This is leading to a new style of immersive performance genre that appeals to a wider audience and is encouraged not only by the creators but perhaps by all of the stakeholders in the world of theatre, including the audiences and the governmental bodies. One of the inclusive experiences which these new theatre performances can offer is to erase the border between the performer and the audience, transforming

14. Susan Bennett, *Theatre Audiences: A Theory of Production and Reception* (London: Routledge, 1990), 226.

spectators into participants via high levels of interactivity and the illusion of agency. This erosion of the fourth wall is not only happening physically: different performative mechanisms help the audience members step into the magic circle on a cognitive level. These performative mechanisms and design choices, such as 360-degree freedom of movement within a stage space, moments of audience interaction, sensory overloads which offer subtle meaning-making strategies for the audience, and a narrative arc that can promise surprise, help the productions to create a more engaging world[15] and constitute the basis of the burgeoning genre of "immersive theatre." Biggins, relying on a cognitive theatrical approach to stage audiences, states that such immersive experiences "can be defined as a sensation of complete engagement to the point of forgetting anything outside the immediate moment."[16]

Looking at Physical Spaces through the Lens of VR Design

With cinema, animation, and other screen-based experiences, a sense of immersion is manifested by the interweaving of the represented and perceived spaces. With immersive theatre—as within the theme park model—immersion is manifested in a designated space.[17] One of the key factors that can enhance immersion in these spaces is the multilayered space design that creates a certain sense of virtual interiors. In order to create the sense of the multilayered design, the creators take into consideration the specificities of a space and overload it with sensorial and iconic set design elements that have a very strong stylistic characteristic as well as a worldbuilding potential—sometimes having references to the plot as well—and thus enable the participants to feel they are in a maze-like world that has many story potentials to be unfolded.

15. Ágnes Karolina Bakk, "CURATE IT YOURSELF! Game Mechanics and Personalized Experience in the Immersive Performance Installation Strawpeople (Das Heuvolk) by Signa," *Well Played* 10, no. 2 (2021): 116–134, https://doi.org/10.1184/R1/14919645.v4.
16. Rose Biggin, *Immersive Theatre and Audience Experience Space, Game and Story in the Work of Punchdrunk* (London: Palgrave, 2017), 13.
17. Florian Freitag et al, "Immersivity: An Interdisciplinary Approach to Spaces of Immersion," *Ambiances* (2021), https://doi.org/10.4000/ambiances.3233.

A new way of addressing immersive virtual interiors is through the lens of the VR headset itself. Design strategies can be used to create new spatial experiences for interactive and location-based VR experiences which can be adapted for creating physics spatial sensations as well. The analog or mixed-reality performance spaces that I will present below rely on the technical concept of "impossible spaces" (used in VR studies) and offer a new way for us to understand how these immersive productions can create such virtual interiors that seem rather impossible.

Designing Impossible Spaces in VR

Research in spatial cognition shows that people typically form inaccurate cognitive maps "that often contain not graphical, but categorical and hierarchical representation of the given world."[18] Impossible spaces[19] refer to a design mechanic for virtual environments which aims at maximizing the virtual space in which the experiencer navigates. These spaces are virtual environments "that violate the laws of Euclidean space and because of that cannot exist in the real world."[20] In VR, this concept applies especially to environments that employ natural locomotion, for example, productions which incorporate self-overlapping architectural layouts and create a maze-like trajectory for the experiencer. Fitting large virtual environments into smaller physical spaces, where participants are guided in their physical location in a way that they do not encounter the boundaries of the world, is also another sense of spatial impossibility. All contribute to more seamless expressions of virtual reality by using redirection techniques.

18. Khrystina Vasylevska, Hannes Kaufmann, Mark Bolas, and Evan Suma Rosenberg, "Flexible Spaces: A Virtual Step Outside of Reality," *2013 IEEE Virtual Reality* (VR) (2013), 109.
19. Evan Suma et al, "A Taxonomy for Deploying Redirection Techniques in Immersive Virtual Environments," *2012 IEEE Virtual Reality Workshops* (VRW) (2012): 43–46, https://doi.org/10.1109/VR.2012.6180877.
20. Ibid., 44.

Suma et al. identify various types of redirection techniques that can be used when designing a digital virtual environment with the aim of creating the sense of impossible space. By taking into consideration several aspects such as geometric applicability, noticeability to the user, and content-specific implementation details, the researchers identify two primary modes of redirection: *repositioning* and *reorientation*.

Repositioning techniques are continuously translating the virtual environment about the user's position, which "allows the user to walk to areas in the virtual environment that were not previously accessible within the confines of the physical workspace. This may be disorienting if the virtual world is translated unexpectedly, and may make the virtual environment even appear unstable."[21]

The reorientation technique is used in VR when the user reaches the boundaries and then is instructed to turn around during which a rotation gain is applied.[22]

This latter technique can be used only in the case of digital environments, while the first one can be identified in several immersive artistic productions. I will point out that the repositioning technique can be identified in immersive productions as a sense of impossibility, and this is possible due to the remediated characteristic of immersive productions. Before I analyze these spaces, it will be useful to clarify what I mean by the sense of embodiment that helps the participant to feel present in these spaces.

Sense of Embodiment in VR and Analog Spaces

Having a sense of presence in VR can enable the users to feel as though they are in a virtually impossible space, and this presence is often discussed in the literature. Here, I rely on a particular understanding of the illusion of embodiment in VR that can be adapted to the sense of embodiment in analog and in mixed-reality immersive spaces as well. In their

21. Ibid., 44.
22. Suma et al, "A Taxonomy for Deploying Redirection."

analysis of "the sense of embodiment," Kilteni et al.[23] rely on the concept of a "strong sense of presence" that helps to define the term and characterize the sense of self-representation required for the sense of immersion as being constituted by the following elements:

1. The Sense of Self-Location: defined as one's spatial experience of being inside a body and which involves "the relationship between one's self and one's body," while presence is "the relationship between one's self and the environment."
2. The Sense of Agency: defined as the feeling of having "global motor control, including the subjective experience of action, control, intention, motor selection and the conscious experience of will."[24]
3. The Sense of Body Ownership: defined as the feeling of the body as being the source of the experienced sensation and one's self-attribution of a body.[25]

All these elements can be enhanced by using synchronous visuotactile correlations, "where the tactile event is seen visually on the body from the first-person perspective position of the eyes"[26] with haptic feedback or with individualized avatars that could strengthen the feeling of ownership. This visuotactile correlation can be used even more—as expected—in physical environments as a part of the set design, especially when the audience's attention is guided in a way that enables the audience members to observe the overlapping of the multisensorial elements. In the following section I present two case studies that create the sense of impossible space in physical environments with the help of multilayered spatial design by relying on the elements of New Horror and the mechanisms of science of magic.

23. Katerina Kilteni, Raphaela Groten, and Mel Slater, "The Sense of Embodiment in Virtual Reality," *Presence: Teleoperators and Virtual Environments* 21, no. 4 (2012): 373–387.
24. Olaf Blanke and Thomas Metzinger, "Full-Body Illusions and Minimal Phenomenal Selfhood," *Trends in Cognitive Science* 13, no. 1 (2009): 7–13, https://doi.org/10.1016/j.tics.2008.10.003.
25. Manos Tsakiris, Gita Prabhu, and Patrick Haggard, "Having a Body Versus Moving Your Body: How Agency Structures Body-Ownership," *Consciousness and Cognition* 15, no. 2 (2006): 423–432. https://doi.org/10.1016/j.concog.2005.09.004.
26. Ray Hyman, "The Psychology of Deception," *Annual Review of Psychology* 40 (1989): 133–154.

Case Studies in Analog and Mixed-Reality Immersive Spaces

Senses of impossibility can also be found in analog (traditional) immersive performances. For example, space can be utilized to disorient the audience. I use the term "virtual interiors" in the sense that the participants encounter these interiors as an enlarged space enabled by an approximation of the sense of lucid dreaming and of impossibility. This way, these elements of space design can change our mental map about these spaces by disorienting the audience members, making them feel lost. Creating a disorienting space can be a challenge for designers as spatial possibilities are often limited by physical borders and by the narrative framework.

Here are two cases to consider in the context of analog and mixed-reality spaces:

The Open Heart (2019) was created by Danish-Austrian theatre company SIGNA, and it is an example of an analog immersive experience. The performance was enacted in an actual hospital building in Aarhus, Denmark, on one of its floors. When entering the structure, participants were greeted as visitors who were there to learn about the suffering of others and—in a storytelling conceit—take the capacity to suffer away from the hospital residents. Participants were required to change clothes (including their undergarments) upon entering. Each performer then guided and mentored two participants throughout a twelve-hour performance. The set design of the various spaces was overcrowded and disorientating. The performers used various types of pace-changing and attention capturing techniques to ensure that participants had difficulty forming a realistic mental map of the spaces. Meanwhile, throughout the twelve hours, various grotesque and violent acts were performed: actors ate from filthy surfaces and some performers hurt themselves in close proximity to participants. SIGNA also set up dormitory areas where tired audience members could sleep, yet these spaces were also crowded and uncomfortable. Besides the violence, various picturesque elements from horror films were reenacted, such as being woken up by a performer wearing a pig-head mask or seeing performers in a trance caused by acts of violence.

An example of a mixed-reality immersive experience is *SOMNAI* (2018), created by American-New Zealand creative studio DOTDOT. In the performance, participants step into a building which appears to be a plain warehouse. They are greeted by an actor dressed in white who immediately offers non-alcoholic cocktails or bonbons. After presenting tickets, depositing personal items and smartphones in the cloakroom, and removing footwear, all are invited into a changing room, where those who wish can put on a bath gown. The participants are then divided into groups of six. They step into a room that radiates the atmosphere of a New Age cult: silent music, scents from various candles, and a very welcoming woman initiating a conversation. She asks about the participants' dream histories and explains that, in this sanatorium, one can master the skill of lucid dreaming—of remaining asleep yet aware of one's dream. The woman also tells a story of a nervous little boy who will do anything to fulfill his mother's (imagined) expectations. But he has lost his white handkerchief. As the woman tells this part of the story, she discreetly puts a handkerchief into the pocket of one of the participant's bath gowns. Thus begins a rushed experience of being shown through various analog and digital immersive spaces, and the resulting sensory overload leaves only blurred memories of the experiences. The performance takes place throughout a two-story venue in which the participants are guided by actors. The dramaturgical rhythm of the actions is not unified; there are moments of waiting and contemplation, especially when the audience encounters various screens and projections or when they are putting on VR headsets. Like with *The Open Heart*, here the creators have used many picturesque elements of New Horror. A performer playing a young boy (as in the woman's story) runs through hallways and demonstrates various magic tricks in a children's room with automated toys (swinging ponies and scary rabbits). All the spaces that participants are hurriedly guided through have designs evoking the 1970s and 1980s, recalling the look and feel of classic New Horror films.

Looking Back at the Multisensorial Effect of Horror Movies

It is important to note that in many cases, as in those above, the sense of immersion can be enhanced on a sensory level by the effects of the horror genre. The genre of horror, together with melodrama and pornography, is called a "body genre" by cinema theorist Linda Williams. She suggests this term because for her these genres go to extremes in their representation of the human body in distress or ecstasy. In these movies, as an audience perceives a (usually female) body they become "caught up in an almost involuntary mimicry of the emotion or sensation of body on the screen."[27] The cinema viewer experiences a kind of sensory empathy with the characters through both pleasure and pain, and the revulsion or elation felt is a large part of the appeal. Many film scholars point out how cinema has a multisensorial element, and the experiential film aesthetic gains a more emphasized presence with many interpretation possibilities about how movies can create sensorial experiences. Luis Rocha Antunes describes the experiential film, which for him implies:

> . . . not only the result of formal and compositional elements of style, narrative and themes but also the result of the intersection of those elements (especially film style created through camerawork, editing, light, colour and sound design) and our perceptual, multisensory nature as spectators. Our perceptual experience of a film is thus not a mechanistic method of receiving, processing and integrating a film's sensory information, but rather an active, dynamic set of perceptual processes that are proactive and creative (although its autonomic levels are not within the reach of our conscious control).[28]

According to Antunes, movies and similar media can elicit very strong responses from the vestibular system—the part of our inner ear which regulates balance and spatial orientation. He states that "cinematic walking demonstrates the possibility of an immersive experience of walking with a vestibular basis."[29] Antunes offers a thorough analysis of walking in film and emphasizes that while some movies demonstrate characters walking in ways which enhance the audience's sense of orientation and

27. Linda Williams, "Film Bodies: Gender, Genre, and Excess," *Film Quarterly* 44, no. 4 (1991): 374.
28. Luis Rocha Antunes, *The Multisensory Film Experience: A Cognitive Model of Experiential Film Aesthetics* (Bristol-Chicago: Intellect, 2016).
29. Ibid., 52.

balance, others do not. Movies can easily disorient us spatially because not only are they flat imagery, but we as an audience also lack kinetic agency completely: we're stuck in our seats. In general, loss of orientation is a side effect in film, and it enhances fearful elements in some horror movies.[30] The level of the kinesthetic engagement is higher in horror movies due to the genre's stronger sensorial characteristic. Losing the sense of orientation can enhance the effect of horror movies and can result in heightening the sensorial response of the viewer, creating more confusion and harsher responses to the expected horrific events that are manifested through the picturesque effects of New Horror.[31]

In her book *The Horror Sensorium*, Angela Ndalianis states that "[t]he spaces of horror media not only fictionalize—in vividly sensory ways—their own sensorium, but they also demand that we cognitively and physiologically respond to their fictions by translating their sensorial enactments across our bodies."[32] According to Ndalianis, New Horror films are a type of newly made horror film produced after 9/11 which, even though they belong to the experience economy era by offering sensorial and often haptic experiences, feel less real than the earlier horror productions. Immersive theatre performances have to directly engage multiple senses of the participants, and through this they can create very striking physical responses.[33] For Ndalianis, these horror films create a similar physicality because, "as a genre, [horror is] capable of intensifying the range of reactions and experiences in which we can become enmeshed when connecting with media texts and, over the last decade in particular, the proliferation of horror texts across media have amplified their focus on sensory encounters."[34] In the case of the cinematic medium, the horror environment constitutes the "aesthetic of disgust. In SIGNA's performance, the participants gain experience through 'carnal elements' such as sweat, saliva mixed with dirt, real time violence, and

30. See Antunes's analysis of the films of Gus Van Sant in *The Multisensory Film Experience.*

31. Angela Ndalianis, *The Horror Sensorium: Media and the Senses,* (Jefferson: McFarland & Co, 2012).

32. Ibid., 3.

33. This portion has been published before in Bakk, "CURATE IT YOURSELF!"

34. Ndalianis, *The Horror Sensorium,* 6.

also taxidermies." We can say that these "sources of disgust boost the hunting attitude of the audience, and it is this attitude that actually guides the experiencer through the performance space and unfolding story."[35]

Remediating Horror Movies in Immersive Spaces

The continuous disgust one encounters in almost every room in *The Open Heart* enhances the expectation of the next shocking element in yet another room. This disturbs the participants' attention and disrupts their sense of spatial orientation. It is not coincidental that immersive experience designers at companies like SIGNA and DOTDOT also rely on remediated picturesque elements of horror. As a defining characteristic of many new mediums, the act of remediation as described by Jay Bolter and Richard Grusin "ensures that the older medium cannot be entirely effaced; the new medium remains dependent on the older one in acknowledged or unacknowledged ways."[36] In this case, the immersive theatre makers rely on the remediation of horror elements (as Ndalianis also identifies in the context of dark rides), and they also use predefined trajectories in order to further enhance the sense of disorientation. In this way, they create a kind of impossible space that can seem bigger than the current physical space where the participant is located.

This sense of impossible space can be created by using a fixed trajectory for the audience members where the audience is invited to become an active participant in exploring the space by following a trajectory. This predefined scenography gives a sense of "impossible physical space" which the audience maps out with a special type of body awareness and proprioception. Benford and Giannachi define "trajectory" as the road of the spectator through the mixed-reality performance.[37] We can see that the spectacular character of the interfaces, the dramaturgy of various technologies (meaning how they follow each other), and the care-

35. Ágnes Karolina Bakk, "Sending Shivers Down the Spine: VR Productions as Seamed Media," *Acta Universitatis Sapientiae Film and Media Studies* 17, no. 1 (2019): 217.

36. J. David Bolter and Richard A. Grusin, *Remediation: Understanding New Media* (Cambridge, MA: The MIT Press, 1999), 47.

37. Steve Benford and Gabriella Giannachi, *Performing Mixed Reality* (Cambridge, MA: The MIT Press, 2011).

ful spatial guidance enhanced by the strict trajectory do not offer too many options to the members of the audience. The act of onboarding is one of the special elements of trajectories. Onboarding constitutes the preparatory phase which precludes the audience members stepping into an immersive space. In the very act of starting or finishing a VR production or stepping into an analog or mixed-reality immersive theatre experience, all the actions that are accompanying these acts can have a performative effect (this is why all these environments should have the potential to be interactive), which is a characteristic of the medium of performance. The participants of a VR production here enter the "magic circle"—a concept used in Live Action Role-Playing (LARP) design practices which refer to the participants' entering the storyworld of a LARP. The magic circle is the protocol where the LARP game starts or ends (in a physical, temporal sense as well), and in this protocol there are various rules pre-established by the given LARP's framework. This strategy is very similar to an actual magic trick: it is essential for the magician to convey relevant information about the conditions that are, seemingly, raising the chances of something impossible being about to happen.[38] In this way, the magicians are embedding the trick into a storyworld that enables the audience to perceive the trick as an impossible act. This act of embedding, which we can also call "onboarding" in this context, is an initiation stage of an experience that takes place in an immersive environment. For this process, creators can also use stage mechanisms developed by magicians that are described by the science of magic in detail. This interdisciplinary area studies the use of magic tricks and their effects on our cognition and perception, which can offer valuable insights for various types of experience design. The onboarding process can also borrow practices from the science of magic by making use of attention framing techniques, forcing techniques (e.g., the method of controlling a choice made by a spectator during a trick), and pseudo-explanations.

38. Peter Lamont, "A Particular Kind of Wonder: The Experience of Magic Past and Present," *Review of General Psychology* 21, no. 1 (2017): 1–8.

Besides relying on the previously mentioned mechanism, these productions exploit space in a way similar to Disneyland: the theme park "draws its power to entertain an international audience of all ages from its skillful incorporation of aesthetic effects that find their resonance in the visitor's genetically inherited ancestral memories—a nostalgia of considerably longer standing and more compelling power than a childhood devotion to Dumbo."[39] Especially in case of SIGNA's performance, the audience members enjoy an ongoing visuotactile input which promises a new layer of the storyworld to be unfolded by exploiting the hidden and less hidden corners of the immersive space, creating a sense of impossible space.

The concept of an impossible space, I believe, can also be applied to analog and mixed-reality spaces, mainly for these reasons:

1. In the case of VR productions experienced via headset, the user is presented with a technologically pre-designed sense of presence. The rendering of the images follows the body movements of the user, and these images provide immediate feedback if they interact with the virtual environment. The third characteristic—the sense of body ownership—in this case means that the user identifies themselves with an avatar image synchronized to a certain degree with their actual bodily movements.
2. In both analog and mixed-reality environments, these properties are still highly relevant but should be reinterpreted. In the case of mixed-reality performances where VR and/or AR productions are blurred with analog spaces, the following conditions should be fulfilled in order to enable the participants to experience a sense of embodiment. Sense of self is here tied to physical space: while virtual experiences might be embedded in a mixed-reality performance (like in the case of *SOMNAI*), participants orient their bodies to actual rooms with physical walls. On the other hand, the designated spaces in such environments

39. Charlie Haas, "Disneyland is Good for You," *New West Magazine*, December 4, 1978, https://www.dix-project.net/item/1633/new-west-magazine-disneyland-is-good-for-you.

> where virtual or augmented reality spaces manifest can be considered as portals to another reality, meaning a magical entry point. The sense of agency might be limited in these cases, but the agency, when encountering such experiences, can be analyzed as the ability of the participant to switch between the digital and the analog environments. The sense of body ownership is manifesting in a different way than in the case of VR: as the digital and analog environments have a different effect on the experiencer, the perceptual system of the experiencer is carrying out an active sense-making procedure by which the proprioceptive senses of the participants can merge the two types of experience and become much more sensitive, this way also raising the experiencer's sense of body awareness.

In the case of analog performances (such as *The Open Heart*), the sense of self-location can be interpreted as such: the participant should localize their body in relation to the overall space of the immersive production. They should be able to construct a certain type of mental map, which can later be re-written or re-interpreted depending on how the participant's perception confirms or gets confused by the initial mental map. The sense of agency in these spaces means that the audience members not only have the possibility to move around, but also to have some agency on the narrative and to be in control of what experiences they want to gather throughout the production.[40] As for the sense of body ownership, in digital cases, a heightened level of immersion is established if the system is designed in such a way that enables the participant to identify oneself with the virtual body—which is obviously not a requirement for analog cases—as we (leaving aside pathological cases) identify ourselves with our physical bodies. However, a heightened level of awareness of one's own body can be brought on by all the sensorial aspects of the virtual interiors of an analog immersive space that can have an effect on the body.

40. See Alston, "Audience Participation and Neoliberal Value."

Conclusion

In some cases, immersive performances can be interpreted as theme parks[41] and as video games, especially due to the mechanics they use in their world-building procedure. They build on a specific sense of immersion that I have defined with the help of impossibility: one is transported into a virtual environment that requires the participant to accept this impossible event. In order to familiarize the audience members with the fictional world of the performance in the quickest way, creators use various initiation and guiding techniques and rely on well-known film genres that can help the audience understand their role. One of the easiest solutions to establish this is to rely on the horror movie genre, maintaining the audience members' sense of moving throughout a space with the hope (and fear) of witnessing an act of violence with a feeling of safety, as they know that nothing can happen to them. According to Alston,[42] the participants of these experiences often have a neoliberal hunting attitude of being responsible for their own luggage of experiences and they are easily guided by various attention-manipulating mechanics. He further states that the immersive productions often mirror the neoliberal value set and so they also address the participant's sense of risk that manifests in the hunting attitude. This and the horror effects (that many of these productions use) create a special type of somaesthetic experience. Somaesthetics encompass the theoretical, empirical, and practical disciplines related to the bodily perception and performance. In the case of these productions, the sense-making through the special design that mobilizes the experiencer's body creates a long-term effect in the body that enhances the sense of presence. This sense of presence becomes stronger as the horror triggers dopamine and adrenalin, and, as a result, a heightened effect of participation and risk taking can be observed.

41. Ágnes Karolina Bakk, "How Interactivity Is Changing in Immersive Performances," in *Interactive Storytelling. ICIDS 2017. Lecture Notes in Computer Science*, ed. Nuno Nunes, Ian Oakley, and Valentina Nisi (Cham: Springer, 2017).
42. Alston, "Audience Participation and Neoliberal Value."

These effects and mechanics lead to a sense of impossible space, as the experiencers are immersed in the fictional space of the production—in the virtual interiors—rather than attending to the architectural and spatial characteristics of the actual, limited physical space. Some other mechanics that enable the audience to follow the trajectory designed for them can be better understood and framed with the help of the science of magic such as forcing techniques (e.g., used during onboarding) which create specific types of liminal spaces and a specific type of sense of embodiment that is required when stepping into the virtual environment and the impossible space.[43]

The concept of impossible space applied to designing physical immersive experiences can be a novel approach to enhance the engagement of the participants. It requires a thorough overview of the storyworld but also a deep understanding of what feelings the creators intend to enable by their productions. Immersive theatrical experiences, and installations as well, can acquire a new significance by creating a novel sense of liminal space that engages the experiencers' senses and allows them, through the maze-like experience, to have new encounters and learn more about the world and themselves.

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