Application of Liminal Aesthetics in Immersive Environments as a Coping Methodology for Extreme Environments and Space

Blanka Deroko, PhD

Abstract

As the human species is continuing its evolution beyond the boundaries of Earth, a new ontological paradigm is opening before us. The modes of engagement with each other and our environment are exponentially changing. Moreover, thanks to technological and scientific developments, we have the unprecedented opportunity to expand and intensify our experiences in a conscious manner. The burning question of the moment is how to support humanity in this ontological shift. The considerations are manifold. As new technologies and scientific perspectives begin to engage the human body, psychology, and particularly the sense of self, we are challenged to formulate new philosophical and practical approaches. In this investigation, I outline a new direction in human-environment interactions that results in more fluidity and gives a sense of embeddedness in the new experiential space, be it technology or the space beyond Earth.

Keywords: Space, Environmental Design, Installation Art, Digital Media, Games, Adaptability, Psychological Balance, Human Agency, Hybrid Subjectivity.

Introduction

It has been established that psychological well-being can be maintained and even enhanced through specific environmental interventions.[1] Art and design, in the context of health-mediating tools, currently falls under the auspices of digital therapeutics, a relatively new area of study. However, there is an earlier tradition of addressing the physical and/or digital environment vis-à-vis human experience, which I discuss in more detail. As the context of space travel presents new challenges for environmental designers, both direct physical manipulation of the environment and digital sensorial stimulation of the body are promising interventions. Further, I share a methodology, I have developed in my doctoral research, which is designed to bridge the experiential gap between human and extreme environments while stimulating the sense of expansion, wonder, and well-being. First, however, let us look at the existing terrestrial strategies to manipulate human affect and sense of embodiment in space.

Immersive Environments—A Review of Existing Terrestrial Strategies

In this section, I focus on several areas, which are the basis of my theoretical work as well as R&D investigations. These include software and immersive environments, which

[1] Carol D. Ryff and Corey Lee M. Keyes. "The Structure of Psychological Well-Being Revisited," *Journal of Personality and Social Psychology* 69, no. 4 (1995): 719, doi.org/10.1037/0022-3514.69.4.719.

are virtual, real, and blended, art installations, and environmental design. Each one of these areas has a set of unique benefits, which can be synthesized into a larger gestalt. In the context of space travel, the attractiveness of digital solutions, for example, lies in the possibility of miniaturization of the electronic components. Since the size of the payload is important, the portability and size of the technology required to produce the effects needs to be considered. Further, the psychological efficacy of proposed solutions needs to be studied and calibrated carefully in space. In the area of art production, several strategies have been developed in terrestrial settings, and with specific modifications, they can be applied in mediating the negative psychological effects of space travel and small enclosed environments.

Games and narrative-driven experiences have a well-documented history of applications in influencing psychological and behavioral patterns.[2] Closed-loop environments or games that calibrate human responses in real time and adjust the stimuli accordingly are especially effective.[3] Such systems rely on real-time biofeedback such as eye movement tracking, transcranial electrical brain stimulation, magnetic resonance imaging, and electroencephalography to assess the state of the subject at different points of the game. The effects can be created through perceptive experiences or direct brain stimulation. The range of applications spans from the performance of simple cognitive tasks through complex aesthetic experiences and story driven games. Video games that integrate engaging cognitive training with real-time biosensing and neurostimulation are the most effective tools when it comes to cognitive and behavioral changes. These findings correlate with my own research, which focuses on defining the tools for achieving equilibrium states in the human psyche.

In my interdisciplinary approach, I additionally look to art installations and environmental design for strategies. Art installation is a genre of art production that has drawn special interest since the Dada movement became immersive in the '60s and '70s and was carried into the digital forms of expression in the '80s. The richness of possibilities to invoke affective responses in such environments is a fertile ground for artistic and design investigations aimed at the transformation of human experience. Many of the video and sound installations from the 1990s and 2000s address this yearning for experiential transcendence of the body. Often, a multimodal sensory stimulation that invokes the feeling of being transported into another's point of view, mind, or internal landscape can induce this state.[4] The ability to modulate this affective response is useful, and it is further explored in my work, which I discuss in more detail in the next section.

---

[2] Jyoti Mishra, Joaquin A. Anguera, and Adam Gazzaley, "Video Games for Neuro-Cognitive Optimization," *Neuron* 90, no. 2 (2016): 214, doi.org/10.1016/j.neuron.2016.04.010.

[3] David A. Ziegler et al., "Closed-Loop Digital Meditation Improves Sustained Attention in Young Adults" *Nature Human Behavior* 3 (2019): 746–57, doi.org/10.1038/s41562-019-0611-9.

[4] Blanka Deroko, "The Liminal Event and Its Symbols: On the Intersection of Human and Technology," PhD thesis, University of Plymouth, 2021, 152.

Generally speaking, the ability to influence human cognitive and affective states can provide various immersive tools that can be utilized for long-duration space travel.

Finally, environmental design interventions in real space have the potential to mediate stress and anxiety. The lack of personal space, for example, can become a stressor and lead to conflict in enclosed spaces during prolonged missions.[5] Soundproofing and visual delineation can act as simple design tools to mediate personal space. Temporary, inflatable furniture and art can serve as small payload solutions to lack of variation in the small capsule spaces and provide physical support to the body and mind. Additionally, the ergonomics of weightlessness is a very interesting physical aspect that can be utilized in tandem with more ephemeral interventions.[6] The strategies for supporting the human body in microgravity can lead to creative solutions, which by addressing spatial relationships can be revelatory in expanding the human sensorium.

3. Liminal Aesthetics—A Synthesis of a New Approach for Space Travel Applications

Interventions that create adaptable and liminal spaces are promising solutions in the context of long-duration space travel as well as enclosed habitats. The employment of art installation tools in the form of traditional sensory stimulation and immersive technologies, coupled with real-time biofeedback tools, can be used to create responsive environments that change with human psychology. This overarching aesthetic gestalt closely mimics real-world human experiences and can prove very effective in calibrating human psychological responses.[7] The type and content of the somatic stimulation provides the field for my current explorations, realized as an artwork, called *The Symbol*. This dynamic event facilitates the coming together of human and technological expressions in a way that finds an equilibrium between the human internal and external experiential landscapes.

The Liminal Atelier is a laboratory for *The Symbol*. Here, we work on creating strategies to induce human subjects with the sense of expansion and growth often associated with liminal states. The psychological and physical stress associated with cramped spaces, lack of external view, and lack of experiential variety can be mitigated through these interventions. This approach is based on my doctoral thesis, in which I develop the protocols for creating an integrated liminal event, of which *The Symbol* is an instance. In my conception, the symbol, as a concept, is a fusion of the act of perceiving and creating in the same instant, with the human playing a central role in calibrating the system

[5] Nicole Kobie, "The Design Secrets Nasa's Using to Keep Astronauts Happy in Space," *Wired Magazine*, August 1, 2019, www.wired.co.uk/article/space-travel-design-mental-health-interiors.

[6] Sanjana Sharma, Sands Fish, and Ariel Ekblaw "Astronaut Ethnography: A Design Research Approach to Microgravity." Paper presented at the 31st IAA Symposium on Space and Society. Proceedings of the IAF International Astronautical Congress, 2020.

[7] Deroko, "Liminal Event," 144.

through perception and affect. It is important that while maintaining its hybrid nature, the concept of symbol includes and points to the human life form.

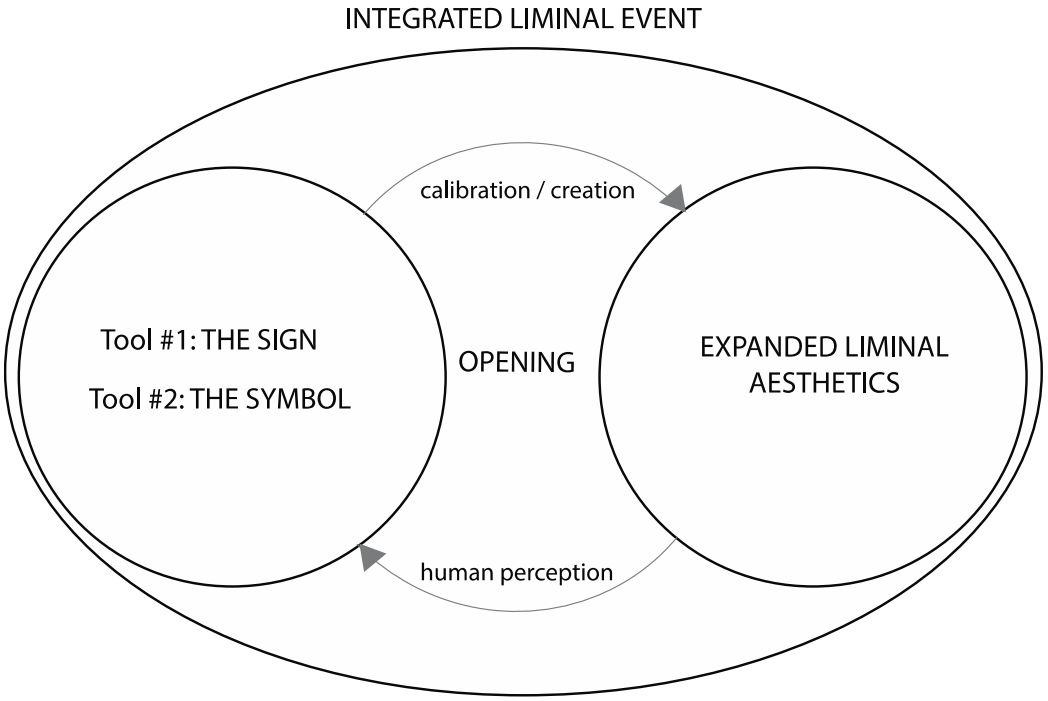

Figure 1. The location of the symbol within the integrated liminal event. The artwork *The Symbol* incorporates the whole structure of this event and begins with Tool #2: the symbol.

To initiate the feedback loop, viewers create the symbol through their participation and aesthetic experience. I define aesthetics as a complex of human affects emulated in response to a sensory experience, and I seek to create a balance between the internal feeling that it produces and the outside stimulus. For clarification, I consider the aesthetic judgement, the idea of beauty and ugliness, a secondary construct that is infused with cultural contents and that is not useful for my purposes. Rather, I look towards definitions of aesthetics as an equilibrium between the inside and the outside experiences. Also, for my purposes, it is important that it feels like something to have an aesthetic experience. This feeling is unique to every human and often escapes language. In fact, verbalization can nullify the experience, as it is incapable of communicating the vibrance and complexity of the internal space. The symbol, on the other hand, is a sensory token that can be expanded or collapsed through dimensions, and as much as it is an aesthetic experience, it is free of aesthetic judgment in a sense of it being good or bad, beautiful or ugly. In its capacity for transformation, thus created, affective space is akin to what the

philosopher Jacques Rancière describes as "art becoming life."[8] This aliveness liberates art from Plato's concept of art as an imperfect imitation of life.[9] The effortless interactivity and complexity of this piece signals art as capable of capturing and carrying through the pattern that we recognize as life.

The problem of effective technological interventions has been always related to the ontological disparity between human and machine. The points of connection, understood as interfaces, both mechanical and digital, tend to create discomfort in humans. I address this issue in depth in my doctoral work,[10] where I discuss causes, effects, and manifestations of this discrepancy, in the most extreme cases leading to shock. In my work, I aim to bridge the disparate ontological spaces in a way favorable to all participating entities. I build the points of connection between technology and human, inside and outside on a level of intensity. Machine intensity, understood as electrical impulse, matches human affect induced through the phenomenology of the space created in real time. In other words, the balancing does not happen on the level of meaning, but on the level of affect. Atmosphere, as it relates to weather and air, is an appropriate manifestation for eliciting and describing states and stimuli that escape language and are more engulfing than acute. This approach, as exemplified by the symbol, can serve as a substitute for experiences of the outside landscapes in long-duration space flights and enclosed habitats. It can also be experienced simply as an abstract space with balancing qualities akin to outdoor spaces.

Currently existing solutions to traversing this ontological split require humans to perform some type of work to interact with technological objects. Conversely, the symbol creates a technological space of ease and effortless creativity for the human counterpart. The human, instead of addressing technology, simply occupies the same experiential space, not by doing but by being. The human activates the space by simply stepping into it. The emergent cocreated sensorial phenomenon is there as a platform for further calibration of the event, poised for other activities to be achieved. Thus, situations that are overstimulating to the human nervous system can be engaged under acceptable conditions. To achieve this, I employ different types of biofeedback coupled with a custom interpretive software, which is currently being developed. My research points to the fact that the degree to which people find themselves in this state of balance corelates with their degree of willingness to stay in the experience, their level of positive engagement, and their level of integration of the experience.

Conclusion

My approach, as exemplified by the symbol, has a wide range of applications under circumstances creating psychological discomfort. My original conception of creating a

[8] Jacques Rancière, *Dissensus: On Politics and Aesthetics* (New York: Continuum, 2010).
[9] Plato, *The Republic* (New York: Alfred A. Knopf, 1976), 286.
[10] Deroko, "Liminal Event."

harmonious coming-together of human and technology can be used for and further expanded into stressful environments, such as those encountered beyond Earth. The induced, seamless, real-time exchange between humans and their environment yields an integrated and embodied human, who is more likely to engage in a productive manner. The liminal aspect suggests the bridging of two or more disparate ontological spaces. Therefore, expanded liminal aesthetics serves as a strategy for human immersion, embodiment, and presence in foreign environments, through self-regulation of internal states. As a side effect, this connectivity leads to a unique self-expression of the whole system as a cocreation with the environment, be it digital, analog, or hybrid. What follows is the sense of expansion and effortless play, which is, to me, the most important aspect of having a human experience in the first place.

It is a novel approach in that it facilitates subjectivity, which is unfixed and fluctuating between different experiences and manifestations. In other words, it explicitly integrates the changing environment and transforms the psyche with it. The main functionality of the liminal event, realized in practical terms, allows a conscious entity to shuttle between different subjectivities in a fluid and sustained manner. Thus, formulated strategy and tools allow the human subject to come in close contact with the traumatic experience while maintaining reflective and critical skills. In other words, "the Liminal Event is an affective calibration engine, used to move in and out of subjectivities and to claim whatever agency is needed in the moment."[11] Ultimately, I am interested in empowering human beings with tools balancing and promoting the human affect. Thus, the achieved expanded self can cope more effectively in extreme environments and expand the human range of capabilities.

****

Editors' Notes: This issue moves from considering museum-like elements for cultural transmission in space communities in the previous article to Deroko's perspective on applying liminal aesthetics in space environments as a sort of embedded therapeutic solution. Deroko invites the reader to consider ways to encourage a sense of wonder through narrative-driven experiences, and she suggests a variety of solutions from temporary inflatable furniture to biofeedback software for self-regulation of internal states. If the interior designers of the future heed the work of today's space philosophers, the commercial stations and settlements throughout the solar system may indeed be inspiring and empowering places to live. ***Gordon Arthur and Mark Wagner.***

[11] Deroko, "Liminal Event," 200.

About the Author: Blanka Deroko, PhD, is a Los Angeles-based designer, multimedia artist, educator, and entrepreneur. For over 20 years, she has provided visionary strategies, pioneering new products, services and technologies through hands-on design and management as well as authored information technology and media content. She is a public speaker and researcher in areas spanning digital media, human experience design, human computer interaction, art, and technology. As a storyteller and experience architect, she creates liminal environments on the intersection of human and technology to transform and empower people. Her research has been published in peer-reviewed journals, book chapters, and conference proceedings, while her work has been exhibited and broadcast internationally.