Poster: Paving the way into virtual reality - a transition in five stages

Daniel Sproll*   Jacob Freiberg†   Timofey Grechkin‡   Bernhard E. Riecke§

School of Interactive Arts and Technology
Simon Fraser University, Canada

ABSTRACT

Many of today's virtual reality (VR) setups are very much focused on technical aspects rather then the benefits of a coherent user experience. This work explores the idea of enhancing the VR experience with a transition phase. On a physical level, this transition offers the user a meaningful metaphor for entering a new world, mimicking a real physical translation from one place to another. On a mental level, it captures the user's attention and evokes anticipation and involvement with the final goal of engaging the user's mind in active co-creation of the experience. We present a conceptual model of a 5-stage transition and describe an implementation we are currently developing, including possible evaluation procedures.

Keywords: Transition into Virtual Reality, Virtual Reality, Immersion, Interface

Index Terms: I.3.7 [COMPUTER GRAPHICS]: Three-Dimensional Graphics and Realism—Virtual Reality; H.5.2 [INFORMATION INTERFACES AND PRESENTATION (e.g., HCI)]: User Interfaces—User-centered design

1 INTRODUCTION

Much has been done in recent years to enhance the technical capabilities of fully immersive systems. Real-time motion tracking, photorealistic wide field of view displays, and high quality spatialized sound - the fidelity provided by these systems approaches the edge of what our sensory system can resolve. Yet, the VR experience conveyed by these systems does not feel completely convincing - it still feels like something is missing.

Recent frameworks of immersion [8] and VR experience [2] stress the importance of not only having a technically advanced VR system, but also the engagement of the user's mind for active co-creation of the experience. Each user has cognitive systems and strategies that evolved to fill in the gaps of our perception in a noisy and often ambiguous real world environment. Active co-creation allows the harnessing of these systems and strategies to fill in the gaps present in every VR system. As Lindeman [2] puts it: *"...the maximum effect of experience is reached by providing support for the user to use his mind to create a platform for the experience"*.

The transition from the real to the virtual world plays an important role in the overall user experience. Several studies have explored the idea of providing a transitional environment [5, 7, 6]. In these studies the use of transitional environments resulted not only in better subjective user experience and higher measures of

---

presence but also affected user perception of the virtual world. Furthermore, it has been shown by Pierce et al. [4] that providing a meaningful and coherent narrative for entering and exiting the virtual environment and making this narrative an integral part of the VR experience is highly beneficial for the overall user experience and thus warrants further exploration.

We aim to build on these ideas and create a holistic transitional process that is meaningfully embedded in the actual VR experience. This transition experience should be a journey in itself.

2 THE 5-STAGE TRANSITION

The common practice of entering VR by just donning an HMD can be disorientating and confusing for the user. Instead we imagine a staged transition process that is engaging and rewarding (for an overview see Figure 1).
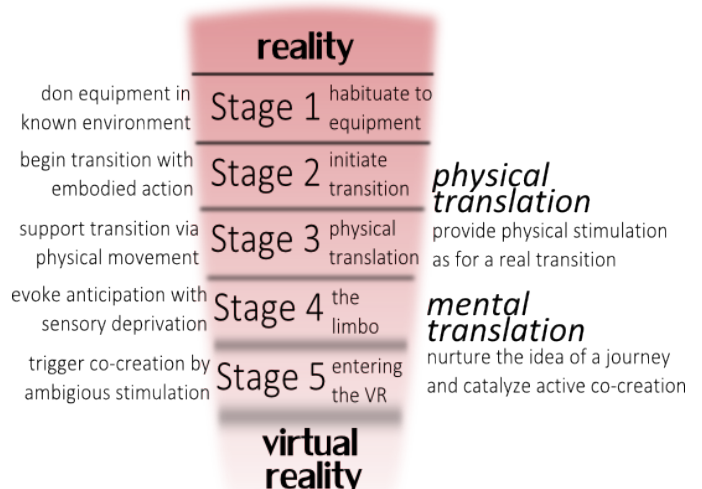

Figure 1: Overview of the 5-stage transition process

2.1 Stage 1: Habituate to VR equipment

The first stage enables the user to become habituated to the VR equipment in a familiar environment. Wearing an HMD with an attached camera displaying the real world the user naturally interacts with the environment in the same way she did before putting on the equipment. This is especially helpful in encouraging exploration of the environment and head movement in the HMD setup. Pierce et al. [4] have successfully employed a similar strategy for their virtual tea-party installation.

2.2 Stage 2: Initiate transition

We believe it is crucial for the user to consciously initiate the transition from the real into the virtual world with an embodied action and by this achieve a sense of agency. In addition, by requiring effort for this initial step, we hope to capture the user's attention

---

*Daniel is a student at the University of Osnabück. This work is completed as part of his internship at Simon Fraser University. e-mail: dsproll@uos.de.

†e-mail: jfreiber@sfu.ca

‡e-mail: timofey_grechkin@sfu.ca

§e-mail: ber1@sfu.ca

and create a more compelling experience by exploiting the effort-justification paradigm [1].

2.3 Stage 3: Physical transition

Our everyday experience has created a deep-rooted expectation that a transition from one environment into another should be accompanied by a physical translation. Therefore the transition process should be accompanied by the appropriate biomechanical feedback, and ideally convey to the user the feeling of actually leaving the room. Steinicke et al. [7] provide a nice example of a transition supported by physical translation. In their application the participant leaves the room by walking into the virtual world through a portal in a wall. This enabled users to physically step into another world and also reinforced their feeling of actually leaving the lab.

2.4 Stage 4: The Limbo

The limbo, a sensory-deprived space between worlds, creates a perceptual break between the real and the virtual environments, casts the transition as a journey through multiple layers of time and space, and builds-up suspension and anticipation.

The limbo both breaks the connection to the real world and prepares the user to enter the virtual environment. A sensory deprived environment is combined with a meditation-like exercise to shift the user's focus of attention and perception inwards, away from the outside world she just "left". As time passes the user's imagination activates in search and anticipation of sensory stimuli, creating a fertile ground for active co-creation in the virtual world. To our knowledge, the idea of limbo has not been implemented so far.

2.5 Stage 5: Entering virtual reality

In the last stage the transition is completed by a slow fade into the virtual world. As the details of the virtual world gradually become clear, the user begins to actively fill the remaining perceptual gaps. Ideally this active co-creation process continues to enhance the experience while the user remains in VR. Both Lindeman et al. [2] and Vidyarthi [8] identified such an encouragement of active co-creation as a central point in creating an immersive experience.

3 DESIGN & EVALUATION

To validate our transition framework we are currently building a prototype of a VR interface incorporating our 5-stage transition. For our first prototype we decided to aim for a very intense experience. Following Lindemann [2] we want to offer "strong emotion" and ideally multi modal "intense stimulation". Meehan et al. [3] found a setting featuring a visual cliff to have a strong emotional effect resulting in high presence ratings.

Having this in mind we decided to construct a flying interface, which user enters by jumping into horizontal suspension. We found that this design choice is a good case study for the 5-stage model because it comprises all critical features. A distinct decision has to be made that is an act of will and results in a embodied action. This in turn is followed by an intense physical translation which provides rich physical stimulation. Furthermore, the entire transition can be integrated meaningfully into a whole. The user begins by letting herself fall forward into the limbo. From there the user slowly fades out of the clouds into the virtual environment. The movement trajectory of the transition is perfectly compatible with the actual physical movement while offering an intriguing and exciting experience.

For the evaluation we will use both qualitative and quantitative methods. To build the prototype, we will use an iterative design approach guided by direct qualitative user feedback for rapid prototyping and fine-tuning. A quantitative evaluation will then be conducted with the final prototype. We will compare measures of immersion, task performance, and distance estimation between a group that uses the transition and a control group that is simply "strapped in".

We are excited to explore the rich opportunities offered by a coherent and meaningful transition into a virtual environment, and hope to help the user make the most out of their VR experience by making the entrance into the virtual world an captivating experience in and of itself.
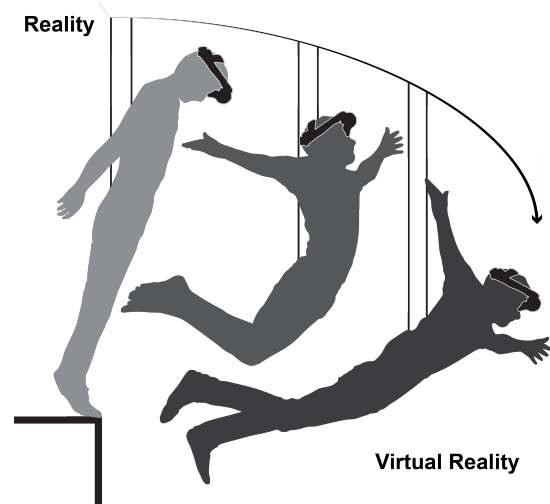

Figure 2: Conceptual illustration of the flying interface prototype

REFERENCES

[1] Elliot Aronson and Judson Mills. The effect of severity of initiation on liking for a group. *The Journal of Abnormal and Social Psychology*, 59(2):177–181, 1959.

[2] Robert W Lindeman and Steffi Beckhaus. Crafting memorable VR experiences using experiential fidelity. In *Proceedings of the 16th ACM Symposium on Virtual Reality Software and Technology - VRST '09*, page 187, 2009.

[3] Michael Meehan, Sharif Razzaque, Brent Insko, Mary Whitton, and Frederick P Brooks. Review of four studies on the use of physiological reaction as a measure of presence in stressful virtual environments. *Applied psychophysiology and biofeedback*, 30(3):239–58, 2005.

[4] Jeffrey S Pierce, Randy Pausch, Christopher B Sturgill, and Kevin D Christiansen. Designing A Successful HMD-Based Experience. *Presence: Teleoperators and Virtual Environments*, 8(4):469–473, 1999.

[5] Mel Slater, Anthony Steed, John McCarthy, and Francesco Marinelli. The virtual ante-room: Assessing presence through expectation and surprise. In *Proceedings of Virtual Environments '98 - Eurographics Workshop*, pages 41–48, 1998.

[6] Frank Steinicke, Gerd Bruder, Klaus Hinrichs, Markus Lappe, Brian Ries, and Victoria Interrante. Transitional environments enhance distance perception in immersive virtual reality systems. In *Proceedings of the 6th Symposium on Applied Perception in Graphics and Visualization - APGV '09*, volume 1, pages 19–26, 2009.

[7] Frank Steinicke, Gerd Bruder, Klaus Hinrichs, Anthony Steed, and Alexander L. Gerlach. Does a Gradual Transition to the Virtual World increase Presence? *2009 IEEE Virtual Reality Conference*, pages 203–210, 2009.

[8] Jay Vidyarthi. *Sonic Cradle: Evoking Mindfulness Through immersive Interaction Design*. Masters thesis, Simon Fraser University, Surrey, British Columia, Canada, 2012.