

Inscribe : Designing for Reflection in VR

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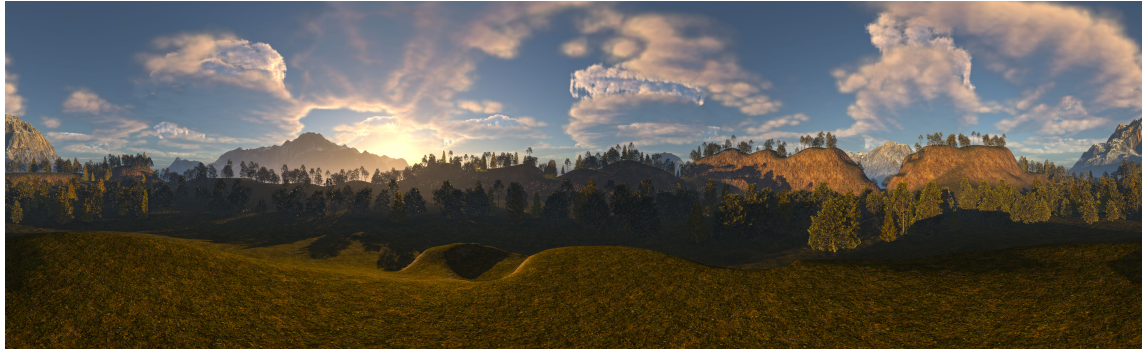


Fig. 1. An equirectangular projection of the world environment of Inscribe.

1 ABSTRACT

Reflection has been shown to positively affect emotional wellbeing in both the private and professional spheres, but finding an ideal environment to reflect in can be difficult. To explore how virtual reality might help in this area, we have created Inscribe, a WebXR reflection space that explores the environmental context of reflection. Inside Inscribe, users are able to change different environmental parameters that have been shown to affect mood and feelings of security in the physical world. Users are also encouraged to develop a sense of ownership over the space by uploading and displaying personal media through a browser-based dashboard.

Underpinning our design choices are lessons drawn from the worlds of neuroarchitecture, landscape architecture and environmental psychology; fields that have established practices surrounding the design of similar contemplative spaces in the physical world. At present, Inscribe exists as a working prototype, soon to be used in a research-through-design study.

In this paper, we use Inscribe to explore three themes that we believe to be important considerations when designing reflective experiences in VR: **environmental control**, where we show the value in allowing the user to manipulate their surroundings, **directed attention**, where we utilize the affordances inherent to VR to create opportunities for focus and finally **access to space**, where we emphasize VR's value in making spaces for reflection available to those who are without them in the physical world.

CCS Concepts: • **Human-centered computing** → *Human computer interaction (HCI)*; **Virtual reality**; **Web-based interaction**.

Additional Key Words and Phrases: reflection, VR, environmental psychology, neuroarchitecture

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2 INTRODUCTION

It is often observed that there is no single definition of reflection in HCI [3]. In Donald Schön's practicum of professional reflection—overwhelmingly the most cited in the field—a reflective experience is possible as either "in-action," when the action to be reflected upon is happening, or "on-action," when the action has passed, and the reflection happens post facto. Although this dichotomy is how Schön's work is traditionally summarized, Slovák's application of these theories to Social/Emotional Learning (SEL) [19] teases out a less discussed feature of the theory: the "virtuality" of the practicum, where Schön emphasizes the importance of allowing students to experiment in a safe space where there is less emphasis on results or pace. We doubt that Schön expected this term to be taken literally, but it is the exploration of this safe space in VR that we seek to highlight, as it both draws attention to an omission in current reflection research and creates a bridge to the rich conceptual territory of contemplation, as it is understood in the worlds of landscape architecture and environmental psychology.

It is here, where the existing understanding of reflection in HCI (which acknowledges the importance of environment but does not seek to define it) intersects with the existing community of professional environment designers, that we hope to locate Inscribe.

3 RELATED WORK INFLUENCES

In this section, we review existing research on reflection, especially as it relates to VR. We then discuss existing research in the fields of neuroarchitecture and environmental psychology that might apply to future reflective VR.

3.0.1 Reflection in VR. Given that consumer access to affordable VR headsets is a relatively recent development, tools for reflection in this space are few, and tend to gear around meditation rather than reflection [18][11, Navarro-Haro et al. [14]]. However, the wide variety of approaches that do exist, such as journaling for reflection [22], reflecting with voice guidance in a creative space [21] and sharing audio reflections [17], demonstrate its rich potential as a reflection space.

However, there are also potential drawbacks to be addressed. Jian and Ahmadpour's RIOR model [8] examines how immersion may *prevent* a reflective experience, writing that "immersion begets passivity," dulling a user's critical faculties, and recommend that techniques from theater be deployed to re-impose reflective distance from the experience.

It is also the case that frameworks for reflective design in different contexts can be usefully applied to VR. In this vein, Aipperspach, Hooker Woodruff's *Data Souvenirs* project [1] lays out guidelines for designing reflective technologies in the physical world. Included in their paper are suggestions for reflective designs to be single or limited-purpose, provide data relevant to a single reflective task, be comprehensible enough to promote reflection while still encouraging interpretation and support the development of meaningful artifacts that acquire meaning with age.

3.0.2 Environmental Psychology. The *Data Souvenirs* project is framed loosely around Kaplan and Kaplan's Attentional Restoration Theory (ART) [9]. ART is broken down into four parts: extent (the feeling of immersion), being away (from habitual activities), soft fascination (the ability for attention to be captured effortlessly) and compatibility (people must want to be there). These, we feel, are all qualities that deserve consideration when designing VR reflection spaces as well. In a similar vein, utilizing Appleton's 1978 habitat theory that introduced prospect and refuge [2] (also mentioned in *Data Souvenirs*) can help designs craft more comfortable environments that emphasize a feeling of safety. And it is not unreasonable to assume that these theories have application in VR. Several studies have found that the experience of nature in VR was nearly equivalent to terms of psychological and physiological benefits [4, 10].

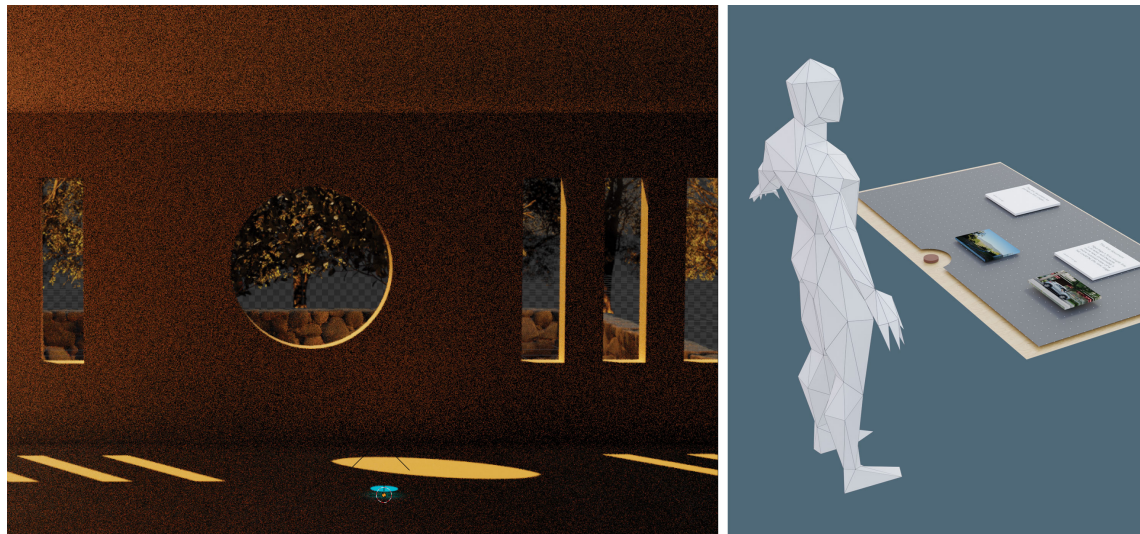


Fig. 2. On left, the Inscribe built environment utilizes both rectilinear and curvilinear window shapes. On right, concept design for the reflection table.

3.0.3 Neuroarchitecture. Given the advances in neurology over the past half-century, it has become increasingly possible to test these theories in a laboratory setting. And, since its inception in 2013, the field of neuroarchitecture has been engaged in exactly this, attempting to ground theories of emotional response in neurological evidence [6]. Questions of what parts of the brain are triggered by different environmental cues can help us tease out which aspects of the aesthetic experience are learned, and which are innate [5, 20]. And, as Homolja et al. point out, VR could offer an effective way of isolating and studying these effects in a more direct way [7].

4 DESIGN

Inscribe is a WebXR experience, composed of three interrelated parts. During a session the user moves around the environment, a configurable contemplative space that they can customize to make their own. Inside the environment, users can activate the reflection table which is a simple media viewer and text editor that allows users to type short reflections and, if they wish, associate them with uploaded media. When they leave the VR experience, the reflections they create inside it are still available through the dashboard, a website that serves as both the entry point to the VR space as well as a means to upload media to it.

4.1 The Environment (Environmental Control)

Inscribe's environment is composed of three distinct areas: a building, a garden that contains the building, and a surrounding world that contains them both.

The building can be configured in accordance with neuroarchitectural findings reported by Nanda et al [13] that suggest the built environment is responded to at a pre-cognitive level. They confirm the findings of Madani Nejad [15], whose work theorizes that curvilinear forms elicit an emotional response, and are judged as safer, more private and less stressful. They also confirm findings that suggest enclosed rooms are more likely to elicit avoidance decisions and a desire to exit.

157 The very existence of the surrounding garden is inspired by numerous studies that have demonstrated not only that
158 the presence of windows and landscape artworks enhance wellbeing, but that concept of “restorative environments,”
159 originally suggested by Kaplan and Kaplan in 1989, likely translates to VR. The garden’s design draws on Appleton’s
160 theory of prospect and refuge here, using trees to both give the user a sense of safety, but also a frame from which to
161 observe the distant scene.
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163 The surrounding world (ie. the prospect) is designed to accentuate the effects of the first two areas, and draws on a
164 table of contemplative landscape characteristics, developed by Olszewska and Marque [16]s. Elements such as “long
165 distance view”, “Large space of absence” and “Natural asymmetry” have been consciously worked into Inscribe’s world
166 design.
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168 169 170 **4.2 The Reflection Table (Directed Attention)**

171 Inherent to the medium of VR is the takeover of a single sense. While many films have used this image to create
172 dystopian science fiction, the dramatic telling obscures an important, positive quality of the same situation : there are
173 things about our everyday life that we would like blocked; distractions which keep us from applying our attention in
174 ways that feel more in keeping with our intentions.
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176 Inscribe builds on these qualities by providing the user with a simple interface for capturing responses and reflections.
177 Although our upcoming study will primarily focus on the impact of the environment on reflection, the design of the
178 reflection tool will be important to the success of the study. The style of reflection we have chosen to support comes
179 from the tradition of reflective writing and journaling. This allows us to draw on existing reflection research such as
180 Mols, Hoven and Eggen’s 2020 work on Everyday Life Reflection [12] as well as earlier work such as Echo by Isaacs et
181 al. that uses reflection as a means to engage with captured experiences from your past.
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184 185 186 **4.3 The Dashboard (Access to Space)**

187 The decision to develop Inscribe as a WebXR experience rather than a traditional app or downloadable is tied to a
188 central tenet of the project : spaces to reflect should be made as accessible as possible. Such spaces are not always
189 readily available in the physical world. As was noted by Browning et. al, in relation to green space, Americans spend
190 over 500,000 days in hospitals every year, and in the United States and Europe alone over nine million adults live in
191 assisted care facilities.
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193 Although the price of standalone VR headsets has dropped significantly over the past few years, they are still not a
194 common household item. This being the case, there is a high likelihood that users of Inscribe could be borrowing or
195 using an institutionally owned headset. WebXR is rapidly becoming the standard for online VR experiences, and its use
196 requires no proprietary software or license. Users need only access the built-in web browser and log in. By building the
197 experience this way we hope to not only broaden the scope of potential users, but to allow communities to share the
198 same headset while maintaining the individualized user experience.
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201 202 **5 FUTURE WORK**

203 As of the writing of this paper, we are continuing to refine the Inscribe prototype, and are working toward conducting
204 an explorative study with end users. We will be prepared to share a working demo with workshop participants. In the
205 near future, we are also interested in incorporating both audio and social reflection into the experience.
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6 CONCLUSION

Inscribe is designed to help explore how the themes of aesthetic control, focussed attention and access to space might affect successful reflection. Its design draws on research from the fields of neuroarchitecture and environmental psychology, with the underlying assumption being that these fields have much to teach us about how successful VR experiences for reflection might be designed in the future.

We believe Inscribe is a provocative prototype of how VR can be crafted to support reflection, perhaps even as a reflective intervention to be interleaved with an individual's existing practice. As we intend to add social capabilities in future iterations of the Inscribe environment, we would be interested in workshop participants' thoughts on the existing design and how we might best navigate the many considerations in facilitating a successful social reflection experience.

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