Title: Bridging 2D Animation and Virtual Reality: A Spatial Narrative Framework based on the Elemental Tetrad and Chained Diegetic Displays

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1. Abstract

The animation industry currently stands at a convergence of creativity and technology, as real-time game engines increasingly displace traditional rendering pipelines. This shift presents a distinctive challenge: how to integrate the expressive, hand-drawn qualities of 2D animation into the interactive, user-centric environments of Virtual Reality (VR). This paper introduces a hybrid production pipeline and a spatial narrative framework designed to bridge this gap, with particular attention to the needs of independent creators and small-scale animation studios.

Drawing on "The Cigar(t)" as a primary case study, a project in which the narrative spatially unfolds across two parallel screens to trigger chained reactions, we detail a workflow transitioning from 2D digital illustration to 3D layout. We analyze this experience through Jesse Schell's (2008) Elemental Tetrad (see Figure 1), balancing four critical pillars: Aesthetics (2.5D parallax), Story (chained reactions), Technology (mobile VR stack), and Mechanics (spatial interaction). Building on this framework, we draw on Henry Jenkins' (2004, 2006) theories of Narrative Architecture to treat the VR environment not as a static projection surface, but as a spatial event in which the story is embedded within the very architecture of the virtual world.

To deepen "player-viewer" engagement, the framework employs game-design strategies including Gaze-Directed Pacing and Spatial Audio Signposting. These mechanics are evaluated against Mel Slater's (2009) concepts of Spatial Presence and the Plausibility Illusion, with the argument that stylized 2D aesthetics can sustain high levels of immersion provided the environment responds consistently to user agency. From an industrial perspective, by sidestepping the high technical overhead, 3D rigging demands, and rendering times typically associated with full CGI VR production, this pipeline offers a cost-efficient and viable business model for indie studios. Moreover, positioning animated content as gamified XR applications on spatial marketplaces, such as the Meta Quest Store, opens an innovative distribution channel, allowing creators to circumvent the saturated algorithmic gatekeepers of traditional flat video-on-demand (VOD) services and redefine audience discoverability in an increasingly competitive digital landscape.

2. Theoretical Framework

2.1 From Linear to Transmedia Storytelling & Worldbuilding

The convergence of traditional animation with modern interactive media calls for a re-evaluation of narrative through the lens of transmedia theory. As Jenkins has argued, transmedia storytelling is not simply the reproduction of a story across different platforms, but the construction of a coherent "world" in which each medium offers a distinct experiential contribution. Within our hybrid model, the transition of 2D animation into VR is accordingly more than a straightforward projection of video into a virtual room. Instead, the 3D space is reconstituted as an organic environment, an autonomous node within the broader transmedia universe of the work.

2.2 Animation as Narrative Architecture

In traditional cinema and 2D animation, rhythm and plot are governed primarily through montage and the management of time. When content migrates to virtual reality, however, the governing principles shift decisively toward game design logic. As illustrated in Figure 1, we analyze "The Cigar(t)" through Elemental Tetrad, which balances Aesthetics, Story, Technology, and Mechanics to ensure a unified user experience. Under this lens, the mechanic of Chained Diegetic Displays transforms the cinematic "cut" into an act of physical movement: to follow the narrative, the user must turn their head, becoming an active participant in the story's rhythm through Gaze-Directed Pacing. Space thus emerges as the primary carrier of narrative, converting the passive viewer into an active explorer.

2.3 Immersion, Spatial Presence, and the Plausibility Illusion

The integration of non-realistic, 2D elements into a 3D immersive environment raises legitimate questions about the quality of the resulting user experience. According to Slater (2009), the sense of Presence comprises two distinct components: the Place Illusion and the Plausibility Illusion. Crucially, the latter does not depend on photorealism. In the production pipeline developed here, the combination of Spatial Audio Signposting and the interactive behavior of the chained displays sustains the Plausibility Illusion even in the presence of abstract 2D aesthetics, ultimately enabling deeper emotional engagement on the part of the viewer.

3. Methodology & Workflow

Figure 1: The Elemental Tetrad of Game Design applied to the "The Cigar(t)" spatial narrative framework.

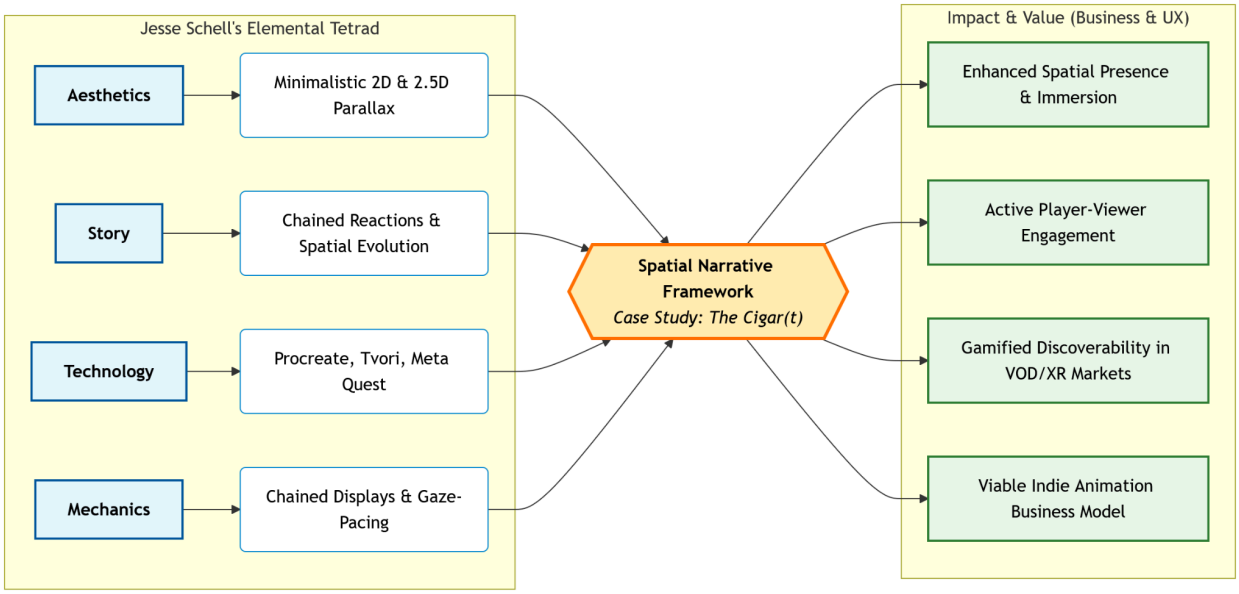

Figure 1: *The Elemental Tetrad of Game Design applied to the "The Cigar(t)" spatial narrative framework.*

Keywords: 2D Animation, Virtual Reality, Game Mechanics, Spatial Narrative, Discoverability.

References

- Jenkins, H. (2004). *Game design as narrative architecture.* In N. Wardrip-Fruin & P. Harrigan (Eds.), First person: New media as story, performance, and game (pp. 118-130). MIT Press.
- Jenkins, H. (2006). *Convergence culture: Where old and new media collide.* NYU Press.
- Kyriakoulakos, P., & Mouri, E. (2021). *Creative Practice and Production in Animation.* Athens: ASIFA Hellas.
- Mouri, E. (2009). *Frame by Frame (2nd ed.).* Athens: Nexus Publications S.A..
- Pearce, C. (2007). *Narrative environments from Disneyland to World of Warcraft.* Birkhauser Verlag AG.
- Schell, J. (2008). *The Art of Game Design: A book of lenses.* CRC Press.
- Slater, M. (2009). *Place illusion and plausibility can lead to realistic behaviour in immersive virtual environments.* Philosophical Transactions of the Royal Society B, 364(1535).
- Symeonidou, S. (2025). *Transferring 2D Animation to Virtual Reality: Tools and Implementation Techniques.* Undergraduate Thesis, University of the Peloponnese, Department of Performing and Digital Arts.