

Optimizing Scene Transitions for Sustained Narrative Immersion in Virtual Reality Films

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Abstract: This paper investigates the challenges involved in adapting traditional film editing techniques for Virtual Reality (VR) films, with a particular focus on developing effective scene transitions that sustain narrative flow and enhance viewer immersion. It analyzes conventional editing methods and juxtaposes them against the unique demands of VR, leading to the proposal of solutions tailored to the immersive nature of VR. These solutions employ techniques such as the Dramatic Covenant, Long Take, and Field of View (FOV) adjustments, which are designed to improve spatial continuity and boost audience engagement in VR environments. The findings reveal that, although traditional techniques lay a fundamental groundwork, the unique characteristics of VR require a specialized approach that honors the viewer's immersive experience and their interaction within the narrative space. By developing practical strategies for filmmakers, this paper makes a contribution to the evolving field of VR films, thereby deepening our understanding of its unique narrative capabilities.

Keywords: film; narrative immersion; optimization; scene transition; virtual reality

1 INTRODUCTION

Literacy, traditionally understood as the ability to read and write, has continually evolved with new media forms. Media literacy extends this concept, encompassing the skills required to effectively understand, analyze, and interact with different forms of media [1]. This type of literacy is dynamic, expanding with each new media technology, from print to digital platforms.

The introduction of film brought a unique dimension to media literacy. It required audiences to learn to interpret visual narratives and understand cinematic techniques. This form of literacy involves decoding symbols, themes, and messages conveyed through the visual medium, which differs significantly from textual interpretation [2].

Virtual Reality (VR) marks a significant shift in media consumption, demanding a new form of literacy. Furthermore, VR literacy transcends traditional media engagement, requiring users to navigate and interact within a three-dimensional, immersive environment [3]. It challenges users to not only interpret content but to actively participate in it. In VR storytelling, scene transitions become pivotal in maintaining narrative flow and immersion [4, 20]. These transitions cannot simply replicate traditional film techniques; they require rethinking how stories unfold and how audiences engage with the narrative space.

This study explores the feasibility of applying traditional film grammar, such as "Invisible Editing", in VR [5]. Invisible Editing, which aims to create seamless transitions in film, faces unique challenges in VR's immersive environment, potentially causing disorientation or disrupting user immersion. Therefore, this study examines alternative approaches to VR scene transitions, such as the Dramatic Covenant, Long Take, and Field of View (FOV) techniques. Furthermore, this study contributes to a broader understanding of VR as a frontier in media. As VR technology continues to evolve, so will how we understand and interact with media. This ongoing transformation highlights the need for continuous research and adaptation in media literacy and VR storytelling.

Residual sections of the paper are organized as follow:

In Section 2, reviews the required literature and cases, and in Section 3, discusses the proposed VR scene transitions. A summary and conclusion are provided in Section 4.

2 FILM EDITING AND ISSUES OF ADOPTING FILM GRAMMAR IN VR

The emergence of film as a distinct medium can be traced back to the time when filmmakers (directors) began selectively capturing reality and presenting it from their unique perspectives [6]. A prime example of this early phase in film is the world's first film, *The Arrival of the Train* (1896) (Fig. 1). This 50-second work, consisting of a single shot of a train arriving at La Ciotat station in France, demonstrated a straightforward portrayal of reality. While initially simple in its approach, focusing on real-time depiction without scene transitions or complex editing, this film laid the groundwork for the evolution of cinematic language. Its influence was instrumental in transitioning from static, single-shot scenes to the dynamic, multi-shot sequences that define contemporary filmmaking. *The Arrival of the Train* thus stands as a fundamental piece in the development of film, particularly highlighting the progression in scene transitions and editing techniques, marking a significant shift in how stories are told in cinema.

In the United States, Edwin S. Porter's *Life of an American Fireman* (1903) is a landmark in the history of film editing, showcasing early experimentation with narrative structure and editing techniques (Fig. 2). This film is particularly notable for its pioneering use of cross-cutting, a technique where two separate scenes are edited together to unfold simultaneously, creating a sense of urgency and narrative complexity [3]. Porter's innovative editing not only depicted the actions of the fireman and the unfolding drama inside the burning building in parallel but also revolutionized the way stories were told in cinema. This film played a crucial role in the evolution of cinematic language, moving it towards the sophisticated storytelling methods we see in modern cinema and solidifying the importance of editing as a key element of filmic expression.

During the era of silent cinema, approximately from the

mid-1910s to the late 1920s, the cinematic medium experienced prolific advancements in expressive techniques, with filmmakers globally exploring and refining the language of film from multifaceted cultural and artistic perspectives [6]. Among the notable works of this period, Sergei Eisenstein's *The Battleship Potemkin* (1925) emerges as an iconic silent Soviet film, renowned for its pioneering montage theory and intellectual montage sequences (Fig. 3). Contrasting with this, Edwin Porter's *The Great Train Robbery* (1903) demonstrated the nascent stages of cross-

cutting, skillfully alternating between the narratives of the bandits' escape and the ensuing chase, thus innovatively presenting simultaneous time and space (Fig. 4). As the art of filmmaking advanced towards the works of D.W. Griffith, the language of editing crystallized into an essential tool for directorial storytelling, transforming from a mere technique into a core component of cinematic narrative [7]. This evolution brought about the refinement of temporal compression and the crafting of dramatic climaxes, heralding the maturation of cinematic storytelling language.



Figure 1 Arrival of a Train, 1896



Figure 2 Life of an American Fireman, 1903

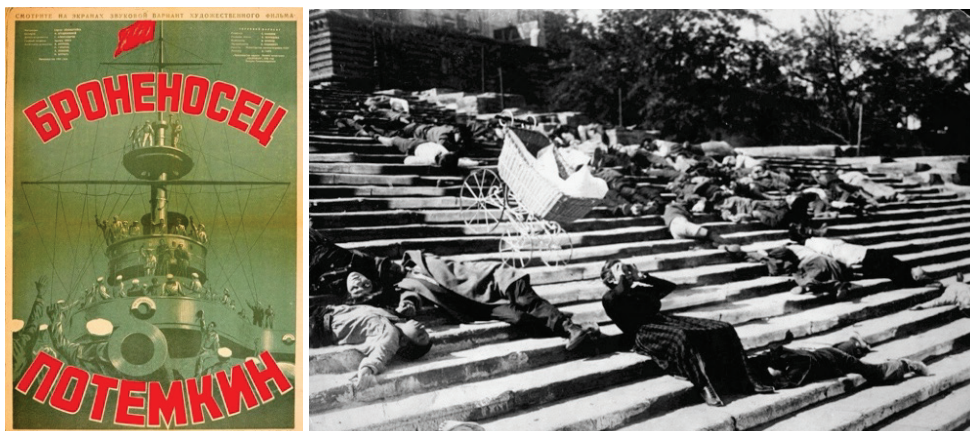


Figure 3 The Battleship Potemkin, 1925

In the realm of VR, the aim is to foster a sense of physical presence within a computer-generated environment [8]. This contrasts with traditional film editing, which relies on the

seamless division and recombination of time and space to create a narrative flow — a practice commonly referred to as "Invisible Editing" [5]. The direct application of filmic cuts

in VR may lead to a jarring 'teleportation effect,' disrupting the user's sense of immersion and continuity. Furthermore, cinematic techniques like gradual camera movements, which in film serve to guide the audience's gaze and emotions subtly, can provoke discomfort in VR, as they contradict the natural perception of motion [9]. The central challenge for

VR storytelling, then, is to devise scene transitions that preserve the user's sense of spatial continuity and personal presence within the virtual environment. Neglecting this consideration can result in abrupt, disorienting transitions, akin to forced teleportation, which disrupt the natural flow and coherence from a content creation standpoint [10, 21].



Figure 4 *The Great Train Robbery*, 1978

3 POSSIBLE PROPOSITIONS FOR VR TRANSITIONS

This section discusses alternative approaches that VR can adopt, distinct from the forceful and violent scene transitions that may result from adopting film grammar.

3.1 Dramatic Covenant – Explicit & Make Believe

In theatrical performances, audiences engage in a form of voluntary suspension of disbelief, recognizing the non-reality of the performance space [10]. This understanding is crucial in VR scene transitions as well. Here, as in theater,

the audience implicitly agrees to accept the virtual space as a part of the narrative reality. This agreement, akin to a covenant, allows for a seamless transition between different spaces in the narrative. In films, a similar concept is evident, as seen in the film *Dogville* (2003), where the mere drawing of lines or placement of boxes serves as a covenant, signifying a transition in space (Fig. 5). This adaptation is promising as it uses familiar storytelling devices, with the audience's voluntary consent, to bridge different media forms.

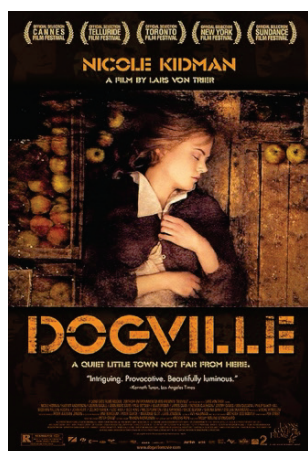


Figure 5 *Dogville*, 2003, a view of the film set from above

To illustrate further, consider various examples of real-time scene transitions in theater, such as blackout-induced set changes, rotating stages, house curtains (left, right, up, and down), changes in lighting, and background transformations through projection mapping. When applied to VR, these

methods allow for seamless scene transitions that create a sense of continuity for the audience [11].

Furthermore, encouraging the audience to imagine spatial movement collaboratively, as seen in *Dogville* (Fig. 6), or employing more explicit methods, such as rapidly

showcasing the process of resetting for a spatial change, such as dismantling stage settings, constructing a new building, and arranging props, maintains a natural form of spectatorship. In essence, onstage expressions involve a

'covenant' with the audience, and applying this concept in VR aims to explicitly reveal these agreements, transitioning the audience into a state of voluntary emotional immersion.



Figure 6 Dogville characters interacting with objects replaced by white signs and outlines



Figure 7 The Player, 1992, an opening sequence scene using the long take technique

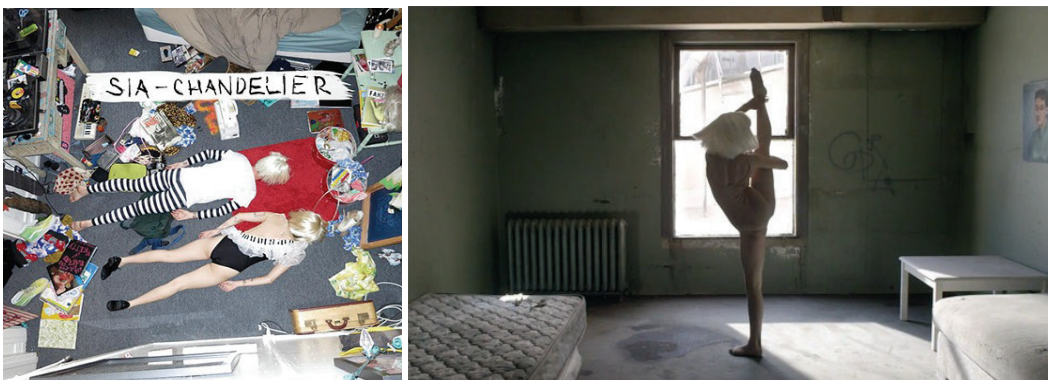


Figure 8 Chandelier, 2014, a dance scene using the long take technique

3.2 Long Take – Intrinsic & Tricky Invisible Cut

The long take, a cinematographic technique characterized by extended, uninterrupted shots, is a pivotal method in film production [12]. This approach eschews traditional editing paradigms, opting for a continuous visual narrative. Such a technique not only challenges the technical prowess of filmmakers but also enriches narrative depth and viewer engagement [13].

Notable exemplars of this technique include Altman's *The Player* (1992) and the music video for Sia's *Chandelier* (2014). These works demonstrate the efficacy of the long take in fostering a fluid and immersive viewer experience. The technique's potency lies in its dual capacity to enhance

narrative presence and skillfully mask its intricacies, presenting a seemingly effortless continuum to the audience.

First, the opening sequence in *The Player* exemplifies the long take, seamlessly extending for eight minutes without a discernible cut (Fig. 7). This uninterrupted shot ingeniously employs the camera movement to weave together multiple narrative threads within a single tracking scene. Next, in the *Chandelier*, creating a seamless and immersive experience as the camera unceasingly follows Maddie Ziegler's captivating dance performance through various rooms (Fig. 8). This long take technique, highlighting her expressive movements, not only showcases the synergy of cinematography and choreography but also amplifies the narrative and mood of the video. By doing so, it draws the viewer into a continuous,

unbroken flow, mirroring the song's themes of escapism and emotional turmoil.

In situations like these, the use of a long take can create the illusion of seamless transitions that are often imperceptible to the viewer. Such transitions often occur during natural occlusion, for instance, as the camera passes behind an object or during a swift movement within the frame. This methodology aligns with the principles of misdirection used in stage magic, where the audience's attention is so engrossed that the mechanics of the illusion are concealed.

Applying the technical editing methods of long takes to VR could involve seamlessly transitioning the environment by strategically obscuring the view with a smoothly moving object. This approach is reminiscent of portal zone loading, the opposite concept of seamless zone loading in 3D computer games. In essence, moving through an S-shaped passage could be likened to erasing data from the other side, providing a parallel to the concept of making data disappear by passing through a portal in VR transitions.

3.3 Gaze vs. Anti-Gaze of FOV

This section explores how the manipulation of the viewer's field of view (FOV) can be strategically used to guide or distract their attention. This manipulation is key to achieving smoother narrative transitions in virtual reality environments.

3.3.1 Out of FOV

In VR, FOV is an essential concept defining the scope and depth of the user's visual experience. FOV refers to the extent of the observable world visible through a VR Head-Mounted Display (HMD) at any given moment, measured in degrees [14, 26]. The maximum peripheral vision a person can see is about 180 degrees, and an example of each angle is shown in Fig. 9.

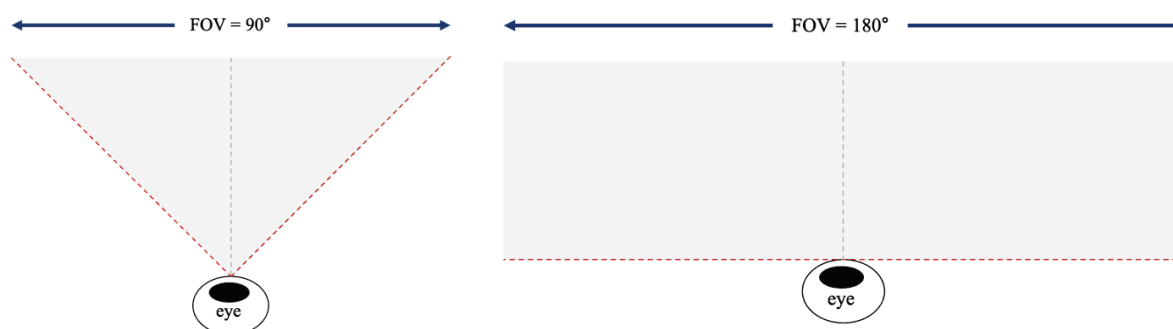


Figure 9 A Comparison of FOV by angle

A human can't see a full 360 degrees in a given situation. Leveraging this limitation to transform the unseen VR world allows natural scene transitions without compromising the user's sense of presence [15]. In such instances, the VR world can be perceived as a coexistence of a single shot and the next. Furthermore, to orchestrate a subtle shift in the virtual locale, one may either divert the user's attention from the target area or imperceptibly manipulate the digital environment itself. In this context, the transformation is induced externally, and the subject of the experience is passively led through the narrative. Such manipulation can engender a mysterious yet coherent sense of spatial progression. By emphasizing the newly introduced elements subtly, viewers are coaxed into accepting a "promised fiction", hence assimilating an illusion of natural spatial continuity. This practice not only harnesses the constraints of human vision to VR's advantage but also broadens the horizon for storytelling within the virtual scape.

3.3.2 Within FOV

The "Within FOV" approach pivots on engaging the viewer directly with the elements within their field of view [14]. Doing so fosters a sense of agency, allowing the audience to actively participate in and shape the unfolding narrative. This methodology significantly reduces reluctance

towards scene transitions, as it is rooted in the viewer's control and interaction [16]. Such an immersive strategy is particularly effective in scenarios that require a more personal or introspective narrative approach, including flashbacks, where the viewer's engagement in the transition process can deeply enhance the emotional impact and authenticity of the experience.

The tactical implementation of this approach can take various forms, each designed to maximize the viewer's sense of involvement and control. Techniques such as zooming in on objects of the viewer's focus, transformative scene shifts, and the use of fantastical elements like particle effects are employed to create a seamless and engaging transition. These methods are reminiscent of traditional theatrical transitions, yet they are reinvented within the VR context to leverage the unique capabilities of this medium. In VR gaming, where user interaction and feedback are integral, these techniques align naturally with the design principles, enhancing the gameplay experience by making the player a co-creator of the virtual world [17]. Extending these methodologies to narrative VR content requires careful and thoughtful design. The director must carefully guide the viewer's gaze and decisions to steer the story along the desired path, creating the illusion of choice.

3.3.3 Out of Focus

While the two FOV methods described above determine the extent of the observable world within VR, "Out of Focus" techniques manipulate the sharpness of that world [18]. In other words, it gradually blurs the current scene before introducing the next, creating a natural flow that mirrors the way our mind processes shifts in attention or changes in environment. In VR storytelling, this method can be particularly effective. When there are changes in the narrative or location, the user may experience a gradual loss and regaining of focus. This can signal to the user that a transition is happening, and help them move smoothly from one scene to another, without abrupt changes.

The gradual transition achieved through the "Out of Focus" method not only aids in visual continuity but also enhances the narrative flow. By softening the edges of the scene before a transition, users are given a cue that the story is moving forward or shifting perspective [19, 23]. This method can be poignant in narrative-driven VR experiences where the flow of the story is paramount. The blur effect can be a storytelling device, indicating flashbacks, dream sequences, or shifts in the character's mental state.

Additionally, the method aligns with how human vision works, focusing and refocusing naturally, making it less taxing on the eyes. This subtle approach to scene transitions contributes to a more comfortable and prolonged VR experience, reducing the risk of visual fatigue or disorientation for the user.

3.4 Others

In addition, borrowing from traditional theater, VR can utilize 'dark changes' for transitions. This method involves momentarily plunging the scene into darkness before revealing the next scene. This can be particularly effective in VR as it gives the user's mind a brief pause, a blank canvas, momentarily free from visual stimuli, before introducing the new environment. This technique can also signify major narrative shifts or the passage of time, similar to how curtains close and open between acts in a theater.

Additionally, dramatic irony and foreshadowing elements, common in theatrical storytelling, can be adapted into VR. Subtle clues or motifs introduced early in one scene can foreshadow events or themes in the next, creating a cohesive narrative thread that guides the user through the VR experience [27].

Lighting, which directs user attention, can also be a subtle yet powerful tool for scene transitions in VR. By strategically altering lighting, such as spotlighting an object or character or gradually shifting the overall lighting tone, users can be guided naturally to the next focal point or scene. For instance, a gradual change from a brightly lit scene to a softer, dimly lit environment can indicate a transition to a more intimate or reflective part of the narrative [28]. This method not only guides the user visually but also sets the emotional tone for the new scene, enhancing the narrative impact.

Lastly, incorporating elements of deception and

distraction offers another layer of depth to VR scene transitions. This approach can involve diverting the user's attention to one area of the scene while making changes in another. When the user's attention returns, they find the environment has transformed, creating a sense of surprise and wonder [29]. This method is akin to a magician's misdirection and can be particularly effective for introducing unexpected elements or shifts in the story. For instance, during an interactive VR experience, subtle changes in the surrounding environment can guide the user into a new narrative chapter. This method not only creates a smooth transition but also adds an element of discovery and playfulness to the VR experience.

4 CONCLUSION

This research has rigorously examined the adaptation of traditional film techniques to Virtual Reality (VR), focusing on scene transitions that are crucial for maintaining narrative flow and enhancing viewer immersion. Our research explored the practical application of cinematic techniques such as the Dramatic Covenant, Long Take, and Field of View (FOV) adjustments, which have proven pivotal in maintaining spatial continuity and enhancing audience engagement in immersive environments. We found that while these traditional techniques provide a solid foundation, the unique demands of VR require a reimagined approach to ensure seamless narrative transitions and to uphold the immersive quality that is signature to VR storytelling.

In particular, our analysis of VR scene transitions suggests that while these techniques can be adapted from traditional film, they must be modified to accommodate the three-dimensional and interactive nature of VR. The findings indicate that successful VR transitions hinge on the ability to not only guide but also manipulate the viewer's perception, which can be significantly more complex than in conventional filmmaking due to the viewer's ability to control their perspective within the virtual environment.

However, it's important to note that our study primarily relied on theoretical frameworks and conceptual analyses, which means the empirical evidence was limited. This lack of extensive empirical data might affect the generalizability of our conclusions, emphasizing the exploratory nature of this research. Future research is required to address this limitation by incorporating user-centered experiments to validate the effectiveness of the proposed VR transition techniques. These research could provide valuable insights into how viewers interact with and respond to these adapted film techniques within VR settings.

Ultimately, the insights garnered from this research contribute to the evolving landscape of VR film, highlighting the need for innovative approaches to integrate traditional film craft into new media forms. By continuing to explore and refine these techniques, filmmakers and content creators can better harness the potential of VR to tell stories in profoundly engaging ways. We hope that our findings will inspire further research and practical applications, advancing the field of VR storytelling and expanding its reach and impact in the media industry.

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