A Study on the Adaptability of Interactivity Freedom Under Different Narrative Perspectives

Zhuochen Han *

The HBU-UCLan School of Media, Hebei University, Baoding 071000, China

* Corresponding Author Email: ZHan2@uclan.ac.uk

Abstract. With the deepening application of VR technology in the field of animation, the narrative methods of VR animation have undergone significant changes compared to traditional animation. However, the relationship between narrative perspective and interactivity freedom has not yet been systematically explored. Addressing this research gap, this paper proposes a study on the adaptability of interactivity freedom under different narrative perspectives, aiming to reveal the adaptation patterns that exist between narrative perspective and interactivity freedom in VR animation. The article first analyzes the differences between VR animation and traditional animation, pointing out that VR animation achieves identity reconstruction for the audience in the virtual world through interactive narrative. Subsequently, this paper elaborates on the dynamic coupling relationship between narrative perspective and interactivity freedom, and further proposes adaptation principles for interactivity freedom under different narrative perspectives. Finally, the article concludes that narrative perspective and interactivity freedom are interdependent; designers need to flexibly combine and adjust presets to create animation works, providing theoretical reference for VR animation creation.

Keywords: Virtual Reality; VR Animation; Interactive Narrative; Narrative Perspective; Interactivity Freedom.

1. Introduction

With the rapid development of Virtual Reality (VR) technology, its application in the field of animation is gradually moving from experimental attempts to systematic integration. The focus of VR animation creation has also shifted from the early expression of panoramic spectacle to the construction of specific narrative content. The interactivity brought by VR technology to animation has greatly innovated animation's narrative methods, causing a transformation in the narrative perspective constructed by designers. Simultaneously, the audience completes a shift in narrative identity from "viewer" to "participant" through interaction, acquiring a narrative perspective unlike any before in animation. It is evident that a dynamic coupling relationship exists between interactivity freedom and narrative perspective in VR animation. However, recent research on VR animation has primarily focused on discussions about VR animation narrative mechanisms and aesthetic characteristics. Exploration of the relationship between narrative perspective and interactivity freedom remains insufficient. Questions such as "Do different narrative perspectives affect the audience's interactivity freedom?", "How does the audience's interactivity freedom influence their perception of the overall narrative?", and "What is the relationship between narrative perspective and interactivity freedom in VR animation?" have not yet been systematically answered. Consequently, this study is dedicated to exploring the adaptation patterns between narrative perspective and interactivity freedom in VR animation, revealing how different narrative perspectives affect the audience's interactive experience and how this influence further maps onto their role experience, thereby providing theoretical reference for creators.

1.1. Differences and Connections Between VR Animation and Traditional Animation.

VR animation, an animation form constructed with VR technology at its core, featuring panoramic and interactive characteristics, differs significantly from traditional animation in terms of media properties and narrative methods. VR animation uses 360° three-dimensional panoramic space as its

medium, breaking the limitations of the two-dimensional screen imagery of traditional animation. In traditional animation, the story unfolds on the screen; there is no direct interaction between the audience and the animation content, only emotional resonance is possible. In VR animation, however, the audience can adjust their line of sight and interact with the animation content through bodily movement, even changing the depth of the scene through displacement, thereby transforming animation from a two-dimensional screen medium to a three-dimensional panoramic one. Rather than saying VR animation is a completely new form of animation, it is more accurate to say it is a new medium. The narrative methods of VR animation also differ significantly from traditional animation. VR animation is no longer a traditional one-way narrative but has become a new narrative method co-constructed by designers and the audience. As Zhu Junyu stated in Research on Interactive Action Narrative in VR Imagery Based on Perceptual Phenomenology[1], the VR medium empowers the audience with narrative agency. Before the advent of VR animation, traditional animation consistently used linear frameworks as its narrative method, focusing solely on stories occurring within the frame. The audience could not choose their viewing angle but could only rely on the preset shots made by the designer. In other words, at this stage, the audience merely watched, rather than participated in, a story according to the designer's presets. However, the emergence of VR animation broke this limitation. The audience transformed from passive viewers of the story into active participants, achieving a change in identity cognition. VR animation is not a "soliloquy" by the creator but truly involves the audience, realizing identity reconstruction through interactive narrative.

1.2. The Relationship Between Narrative Perspective, Interactivity Freedom, and Narrative Identity in VR Animation.

Compared to the disconnection between the designer's narrative perspective and the audience's bodily actions in traditional animation, a dynamic coupling relationship exists between narrative perspective and interactivity freedom in VR animation. From 360° panoramic animation shorts like Lost & Found, Henry, and Pearl, to fully interactive digital game VR versions like Half-Life: Alyx, DYSCHRONIA, and Batman: Arkham Shadow, an increasing number of VR animation works exhibit the characteristics of designers handing over narrative power to the audience and co-constructing narrative content with the audience in real-time. This is concretely reflected in the fact that the designer's preset narrative perspective requires the audience's bodily interaction actions for completion, and the audience's bodily interaction actions require the designer's preset narrative perspective for guidance. Thus, a fixed narrative mode of mutual completion and dynamic negotiation between narrative perspective and interactivity freedom is achieved. Rather than solely relying on the designer's shots to tell the animated story, VR animation is more akin to an "adversarial game" between the designer and the audience.

The dynamic coupling relationship between narrative perspective and interactivity freedom in VR animation is constructed through the narrative identity the audience adopts while experiencing the VR animation. The designer initiates the construction of narrative identity based on a pre-established narrative perspective, and then designs specific interactive actions for the audience to participate in the VR animation based on this narrative identity. Subsequently, the designer guides the audience to perform specific interactive actions through preset interaction cues. When the audience physically performs the actions guided by the designer, they autonomously complete the specific narrative identity of the role they are playing. Once the audience achieves identification with the narrative identity through free interaction, they will use this new "virtual identity" to respond to the plot, reflecting this feedback onto the narrative perspective, thereby further understanding the designer's intent. In this process, power within the animation is transferred and passed between the designer and the audience. The designer creates a preset for the animation, and the audience participates through this preset, feeding back the correct identity cognition to the designer, enabling the story to be effectively conveyed. It is evident that a progressive and dynamically integrated relationship exists among narrative perspective, interactivity freedom, and identity reconstruction. Only after confirming the narrative perspective and interactivity freedom can the audience achieve identity reconstruction

within the animation. This identity reconstruction, in turn, consolidates the existence of the previous two, making the animation narrative complete, forming a closed loop from narrative perspective to identity reconstruction, and identity reconstruction back to consolidating the narrative perspective.

2. Narrative Perspective and Interactivity Freedom in VR Animation

2.1. Narrative Perspective in VR Animation

Narrative perspective refers to the angle from which the story is told and observed. Zhang Han emphasizes in Research on Interactive Narrative in Virtual Reality (VR) Animation [2] that the interactive narrative characteristics of VR animation are manifested in non-linearity, diversity, and complexity. Unlike traditional animation, VR animation often does not adopt linear narration; it achieves a narrative method co-constructed by both designers and audiences through interactive narrative. Using traditional narrative person as a standard, narrative perspectives in VR animation can be distinguished as first-person ("I"), second-person ("You"), and third-person ("He/She").

The first-person perspective emphasizes high immersion, requiring high interactivity freedom to support the audience's behavioral narrative. As Zeng Guanlin stated in Narrative Person and Narrative Perspective [3], the narrator of the first-person perspective often narrates not only others but also themselves. Traditional animation uses subjective shots to preset the narrative person, creating a first-person perspective feeling for the audience through changes in scenes or imagery. In this scenario, the audience's body does not actually move. However, in VR animation, the first-person perspective means the audience needs to manipulate their own body, making their bodily actions completely align with the character's actions, enhancing the sense of immersion and identity. The second-person perspective balances freedom and guidance through different levels of interactivity freedom, emphasizing narrativity more, positioning the audience as the "narrated" to watch the story. Under this preset, the character's lines, dialogues, and bodily actions are directed towards the screen. For example, in the animation Henry [4], the little hedgehog protagonist Henry occasionally interacts with the audience. If the audience's gaze is not directed towards the stage, Henry might ask "Are you listening?" to draw attention. In contrast, the third-person perspective emphasizes the audience's role as an observer more, supporting freer exploration of the world, prioritizing exploration over narrative. It might be used in stories with vast worldviews to fulfill the audience's "scopophilia." In Freud's theory, "scopophilia" refers to the impulse to gain psychological satisfaction through secretly observing others' privacy or private behaviors [5]. Lacan, in his "gaze theory," proposed that this is an act where the viewer gains a sense of mastery as the subject, and the observed becomes the object. This aligns with the audience's role as observers in the third-person perspective.

Different narrative perspective presets need to be paired with different levels of interactivity freedom to meet story requirements, and each narrative perspective has its strengths and weaknesses in certain areas. The first-person perspective forces the audience to identify with the character role, directly impacting their psychological sense of identification. The second-person perspective may affect the audience's participation in the story to some extent. The third-person perspective reduces cognitive burden through objectivity but requires interaction design to compensate for the lack of immersion. In summary, different narrative perspectives often need to be paired with different story content and interactivity freedom to maximize the overall presentation effect of the animation, thereby providing the audience with the optimal experience.

2.2. Interactivity Freedom in VR Animation

Interactivity Freedom (Degrees of Freedom - DoF) is a core parameter in VR animation that determines the audience's range of motion and sense of immersion, directly affecting how the audience interacts with the virtual environment and the narrative possibilities. Shan Xiaoxi, in The Body in Virtual Art Experience and Its Theoretical Problems—An Investigation Based on VR Film Body Practice [6], classifies the "freedom" of the audience's body in VR films into "3DoF," "6DoF," and "multi-DoF."

Table 1. Differences in Performance Between Different Degrees of Interactivity Freedom (Source: Author).

Dimension	3DoF	6DoF	Multi-DoF
Interaction Range	Head Rotation	Head Rotation + Full-body Translation	Head Rotation + Full-body Translation
Narrative Mode	Linear Narrative, Passive Observation	Non-linear Exploration, Active Triggering	User-led, Triggering or Even Participation
Typical Application Scenarios	Movie Viewing, Panoramic Display	Games, Educational Simulation)	Experimental Narrative, Open Story Exploration)
User Immersion	Limited (Sense of Spatial Disconnection)	Strong (Increased Interactivity)	Strongest

As shown in Table 1, different Degrees of Freedom (DoF) vary in multiple dimensions such as interaction range, narrative mode, typical application scenarios, and audience immersion.

2.2.1. 3DoF (Three Degrees of Freedom)

3DoF represents the minimum level of interactivity freedom, supporting only rotation around the three axes of the head (pitch, yaw, roll). The audience's position within the virtual scene is fixed; they cannot engage in translational movement. Due to its limited interactivity and clear guidance, 3DoF is often used for linear narrative viewing or information display content. For instance, almost all commercially available 360° panoramic documentaries utilize 3DoF paired with various narrative perspectives. A well-known example is Wan Daming’s documentary 60 Seconds of My Life. This film breaks the purely narrative mode lacking audience immersion in traditional documentaries through panoramic display, immersing the audience while they watch. Additionally, 3DoF frequently appears in contexts requiring guided explanations, such as art galleries and museums. It is evident that 3DoF is often applied in situations requiring strong guidance and weak immersion, making it more suitable for narrative animation.

2.2.2. 6DoF (Six Degrees of Freedom)

6DoF adds translational movement along the X/Y/Z axes (forward/backward, up/down, left/right) to the three rotational degrees of freedom, supporting free movement and physical interaction within the virtual space. It is suitable for first-person narratives requiring deep immersion and spatial exploration, or high-freedom sandbox-type third-person scenarios. Simultaneously, 6DoF is an intermediate level between 3DoF and Multi-DoF, has the widest range of applications, and is the most commonly used interactivity freedom in the market. A common example is narrative animation. For instance, in the animated short Rain or Shine, the audience explores the plot step by step by following the protagonist, forming a "seeing-within-seeing" structure[8]. Furthermore, 6DoF can be considered the classic preset for VR animation. Most VR animation games on the market employ 6DoF for interactive experiences, enabling deep exploration and operation by the audience.

2.2.3. Multi-DoF (Multiple Degrees of Freedom)

Multi-DoF best exemplifies the characteristics of VR animation, representing the shift of the audience from "viewer" to "creator," transferring the initiative within the animation to the audience. It is often used in various high-freedom scenarios and stories. Currently, Multi-DoF frequently appears alongside interactive animations, games, and other animation forms to provide the audience with the best interactive experience. Compared to 3DoF and 6DoF, Multi-DoF offers a greater sense of freedom and immersion, expanding from ordinary operation permissions to full-body operational

experiences. Beyond ordinary VR animation, Multi-DoF is increasingly being applied to more professional animation production and high-end system simulations. Some countries now also utilize Multi-DoF in pilot flight simulator platforms to achieve near-realistic training experiences. For example, Alaska Airlines, the British Aerospace Agency, and Canadian company CAE have incorporated VR flight simulators into pilot training programs.

3. The Dynamic Coupling Relationship Between Narrative Perspective and Interactivity Freedom in VR Animation

3.1. Narrative Identity Derived from Narrative Perspective

Liu Yuhao points out in Research on Interactive Narrative Design for Virtual Reality (VR) Animation [9] that interactive narrative is a "decentralized" narrative method. This means designers need to anticipate the audience's perspective in advance and preset the story framework accordingly. The designer first predefines the narrative perspective through technical means and shot design, granting the audience perspective permissions and identity boundaries to form the initial structure of the narrative identity. The audience then further consolidates this structure through immersion and exploration, achieving identity reconstruction within the animation world during the experience. For example, in Half-Life: Alyx [10], the audience's line of sight is completely synchronized with the character. By prohibiting perspective switching (i.e., disabling the third-person perspective), the sense of immersion is strengthened, leading the audience to gradually accept the designer's preset narrative perspective and narrative identity. The narrative identity derived from narrative perspective generally falls into three categories: the "experiencer" under the highly immersive and high-freedom first-person perspective; the "narrated" under the second-person perspective that balances guidance and freedom; and the exploration-oriented "observer" under the third-person perspective.

Fundamentally, the biggest difference between VR animation and traditional animation is interactivity. Consequently, designing narrative perspective becomes particularly complex. For designers, the key proposition lies in how to balance the design of narrative perspective with interactivity freedom. The audience needs freedom, but excessive interactivity freedom can easily disrupt the story structure and further affect the audience's identity reconstruction. Therefore, before determining interactivity freedom, designers first need to establish the preset for the narrative perspective. The determination of this perspective will combine with interactivity freedom and directly affect the subsequent establishment of narrative identity.

The derivation from narrative perspective to narrative identity is an inevitable, progressive relationship. The designer first presets the narrative perspective, adding a large framework to the entire story. Within this narrative perspective, the audience will inevitably further derive a narrative identity in the virtual world, using this identity to interact with the story. In short, narrative perspective, interactivity freedom, and narrative identity are not three isolated points but three interconnected parts that influence and interact with each other. The confirmation of narrative perspective, as the starting point of animation construction, first affects the designer's preset for interactivity freedom. Designers need to determine the possible interaction methods and levels for the audience within the animation based on the characteristics of the narrative perspective, ensuring the audience can achieve the optimal experience during participation. The interactions performed by the audience subsequently influence their cognition of the virtual identity. Each interaction reinforces and deepens the narrative identity, thereby refining the entire animation structure. This is what can be controlled during the designer's preset phase.

3.2. Secondary Construction of Narrative Identity through Audience Interaction

The secondary construction of narrative identity through audience interaction refers to the process where the audience, within the narrative framework preset by the designer, forms cognition of the narrative identity through interactive behavior, thereby relying on this identity to understand the

creator's intent. If the derivation from narrative perspective to narrative identity stems purely from the designer's perspective, the secondary construction of narrative identity relies entirely on the audience's interaction with the animation through the narrative perspective. This is a process of providing feedback on the animation framework designed by the creator through the preset. High-quality VR animation works can skillfully utilize various constraints and guidance mechanisms to prompt the audience to reconstruct their identity cognition within the story during the immersive experience. Simultaneously, these works can fully leverage the characteristics of free interaction to closely connect the new identity cognition with the narrative perspective, thereby strengthening the audience's understanding and engagement with the story. Through this approach, VR animation works ensure the smooth progression of the story, allowing the audience to deeply feel the immersive experience brought about by identity reconstruction while enjoying the visual spectacle.

However, in some works, confusion or lack of timely visual feedback during the audience's use of interaction to construct identity cognition may lead to identity confusion. For example, in the animated film Help, although it uses a novel combination of narrative perspective and interactivity freedom, creating a strongly narrative, new animation framework, the inappropriate pairing of the first-person narrative perspective with 3DoF makes it highly likely for the audience to experience confusion in identity construction during the viewing process. Consequently, they may fail to correctly perceive the narrative perspective or align their emotional state with the scenario constructed by the designer. This example demonstrates that the result of the audience's "reconstruction" of their own identity through free interaction within the narrative perspective is not entirely fixed. If, during the designer's preset phase, the relationship between narrative perspective and interactivity freedom is not properly managed, it is highly likely that the audience will struggle to accurately grasp the designer's true intent during free interaction. In such cases, the audience may develop an identity illusion due to misinterpretation. In summary, the audience's reconstruction of their identity through interaction may seem like a small part of the overall animation framework, but its supporting role in the entire closed loop from designer to audience and back to designer is immense.

3.3. The Dynamic Negotiation Between Narrative Perspective and Interactivity Freedom

In summary, the dynamic coupling relationship between narrative perspective and interactivity freedom is essentially a process of negotiation formed between the designer's preset and the audience's feedback. The audience constructs a narrative identity through interaction, and this narrative identity, in turn, allows the audience to understand the designer's narrative perspective. Through the designer's construction of the narrative perspective, the audience generates dynamic interaction with the visual content using this perspective. This interaction further produces a narrative identity, which feeds back into the audience's cognition, thereby consolidating the narrative perspective from the audience's standpoint. This further illustrates that the path from the designer's preset narrative perspective to the audience's achievement of identity reconstruction through interaction, and then the feedback from identity reconstruction back to the narrative perspective for consolidation, constitutes a closed-loop relationship of dynamic coupling.

The term "dynamic coupling" indicates that the relationship from narrative perspective to interactivity freedom is not one-way, moving from point A to point B. Instead, a dynamically flowing relationship exists between narrative perspective and interactivity freedom, and then between interactivity freedom and identity reconstruction. Changes occurring between any two points directly affect the third. If we visualize the extension from narrative perspective to interactivity freedom and then to identity reconstruction as a line, the two ends are the designer and the audience. Starting from the designer's end, they guide and regulate the story's focus through the construction of the narrative perspective, initially setting the audience's identity within the animation. Through the establishment of perspective and certain fixed plot directions, they ensure the audience forms a coherent and layered identity cognition during viewing—this is the first step. Within the narrative perspective framework preset by the designer, the audience acts as an active participant, freely choosing their focus, interpretation, and participation methods based on their interests, emotions, and cognitive frameworks,

participating in the plot within the bounds of the available interactivity freedom. This interactivity freedom grants the audience broader space to construct and reconstruct the story world, making each viewing potentially yield unique interpretations and experiences due to individual differences—this is the second step. Although howto interact and whatto interact with is entirely up to the audience's free choice, all choices occur within the framework constructed by the designer. This means that no matter how the audience participates in the plot, the identity they ultimately construct remains within controllable bounds and does not deviate from the main storyline. If we see the narrative perspective as a mold, free interaction is the raw material poured into this mold by the audience. By the audience choosing how to shape this raw material themselves, it ultimately fits perfectly within the framework, achieving the secondary reconstruction of the audience's identity in the virtual world—this is the final step. At this point, perfect information transmission from creator to audience has been achieved. However, the dynamic coupling relationship between narrative perspective and interactivity freedom is not a one-way street. After the designer fully presents their design framework to the audience, the audience needs to complete the closed loop of the framework through participation. Through the identity reconstruction generated within the framework, the audience gains a certain level of cognition about their virtual identity and once again feeds this cognition back into the narrative perspective setting through the same means of free interaction. This creates a dynamic flow among the three, consolidating identity and further immersing in this identity to understand and participate in the plot.

During the dynamic coupling process, narrative perspective and interactivity freedom are interdependent and mutually shape each other. The richness and variability of the narrative perspective provide the audience with initial cognition, while the audience's free interaction, in turn, consolidates this cognition and further shapes the entire story. This is the dynamic relationship generated between narrative perspective and interactivity freedom.

4. Adaptation Principles of Interactivity Freedom Under Different Narrative Perspectives.

Huang Yuheng states in Research on Interactive Narrative Methods for Virtual Reality (VR) Animation: "Compared to traditional narrative texts centered on the creator, the participation and choices of the audience are more important." [11] This means that under different narrative perspective presets, how to grant the audience sufficient power and space for free choice while smoothly advancing the plot is a major challenge in VR animation creation. Different narrative perspectives require different levels of interactivity freedom.

Table 2. Examples of Animation Works Resulting from Different Combinations of Narrative Perspective and Interactivity Freedom (Source: Author) [12].

Narrative Perspective / DoF	3DoF	6DoF	Multi-DoF
First-Person Perspective	Light interactive animated film (e.g. Help)	Action-adventure game (e.g. Half-Life: Alyx)	Interactive narrative animation (e.g. Linglong VR)
Second-Person Perspective	E.g. The Dream Collector, Lost	E.g. Adventures on the Silk Road	E.g. The Book of Distance
Third-Person Perspective	360∘Panoramic Video	Interactive exploration animation (e.g. Monet and ImpressionismVR Exhibition)	Panoramic high-DoF exploration animation

4.1. First-Person Perspective

Under the category of first-person perspective animation, the use of 3DoF is extremely rare. This is because the first-person perspective has the highest level of freedom permission and requires a narrative perspective with similarly high freedom to perfectly integrate with the story. By examining popular VR animation works on the market today, we can summarize adaptation principles for interactivity freedom under different narrative perspectives. The first-person perspective itself is often used in story narratives requiring strong immersion, inherently making 3DoF inadequate for satisfying the audience's immersive experience. A notable example of this pairing is Helpby designer Justin Lin. According to Lu Jun in 360-Degree One-Take—Analysis of the VR Animated Film "HELP", to achieve a 360° perspective, the production team used four cameras uniformly equipped with fisheye lenses to achieve a seamless visual experience.[13] This film's production team pioneered many innovations in VR technology and explored numerous new shooting techniques and methods, providing significant guidance for subsequent creators in VR animation research. However, due to the poor pairing of the first-person perspective with 3DoF, the protagonist's movement is not controlled by the audience; the only action possible is rotating the view. This lack of adaptability easily detaches the audience from the role, hindering immersion. Furthermore, due to the inability to control their "virtual body," many viewers experienced motion sickness while watching. This demonstrates that improper pairing of narrative perspective and interactivity freedom significantly impacts the animation effect. The first-person perspective inherently possesses strong immersive guidance, enabling identity reconstruction while allowing the audience to fully possess their own "virtual avatar" within the animation. This preset dictates that it is more suitable for situations with higher interactivity freedom. Jia Yunpeng, in Research on VR Film Interaction Design Based on Embodied Theory [14], points out through embodied theory that when the actions of the audience's "virtual avatar" synchronize with their real body movements, it triggers a strong "body ownership illusion," thereby deepening their immersive experience. If the audience's interaction under a first-person perspective is restricted, only allowing view rotation or very simple interactions, even though it might provide stronger guidance for the overall plot narrative, the immersion and sense of presence lost by the audience are immeasurable. To enhance audience experience, designers need to ensure the first-person perspective is matched with appropriate interactivity freedom during the preset phase.

Specifically, in VR animation creation, when adopting a first-person perspective, it is advisable to provide higher levels of interactivity freedom. This means the audience can not only freely rotate the view but also control the character's movement and interaction behaviors to a certain extent. This design helps the audience establish a closer sense of identity with the character, leading to deeper immersion in the story. For example, through advanced VR technology and interaction design, the audience can freely explore the animated world, interact with characters, and even influence the story direction. This high level of participation and freedom will significantly enhance the animation's appeal and watchability.

Regarding interactivity freedom design, given the unique immersion and presence of the first-person perspective, the essence of pairing it with free interaction is transferring narrative power to the audience. Therefore, designers need to reserve sufficient space for free exploration while providing the audience with implicit guidance. On this basis, higher interactivity freedom strengthens the audience's identification with their "virtual avatar."

In summary, in first-person perspective animations, the setting of interactivity freedom should primarily use Multi-DoF, supplemented by 6DoF. 3DoF should be used sparingly or avoided, while narrative guidance should be strengthened to dynamically balance story freedom and narrative.

4.2. Second-Person Perspective

Due to the narrative particularity of the second-person perspective, where the audience is positioned as the "narrated," pairings with 3DoF, 6DoF, and Multi-DoF all occur. Among these, 6DoF is the most widely used in the second-person perspective. The second-person perspective positions the audience as the "narrated," enabling "face-to-face" communication with the "narrator" within the

VR animation. It differs from the first-person perspective, where one plays an animated character, and the third-person perspective, which exists outside the narrative plot. Audiences holding a second-person perspective are both within the narrative and somewhat beyond it; they exist within the narrative space of the animation yet possess an identity independent of the plot. The audience can enhance their sense of identity immersion and presence through low-freedom interactive actions like leaning forward or turning their head, thereby strengthening their identity cognition and achieving unique virtual identity reconstruction as the "narrated." In the animated short Lost, the audience is initially fixed at a preset viewpoint, "required" to watch the robotic protagonist search for its arm, creating a third-person perspective cognition. However, at the final moment, the protagonist suddenly turns around and waves goodbye to the audience. The previous identity cognition is completely broken and reorganized; it is only at this point that the audience experiences the epiphany of having been within the story all along. This is the unique charm brought by character interaction under the second-person perspective.

Simply put, the second-person perspective blends the immersion of the first-person perspective with the narrativity of the third-person perspective, placing the audience in a composite identity of participant and observer. The key consideration for designers is how to allow the audience to feel a sense of control over the story space while preserving the integrity of the narrative framework. To better adapt it to different levels of interactivity freedom, the designer's preset regarding the audience's identity and appropriate intervention is indispensable. In summary, the second-person perspective is the most broadly applied narrative perspective by designers. As long as guidance for the audience's identity cognition is provided, pairings with low, medium, or high interactivity freedom can all yield distinct narrative effects.

4.3. Third-Person Perspective

The third-person perspective, also known as the "omniscient perspective" in narrative, is applied in two forms: omniscient narration and limited narration. As the names suggest, the former means the perspective is not restricted to a specific character, allowing the audience to see the expressions and inner thoughts of all characters. The latter focuses on one specific character, primarily observing that character's joys, sorrows, and subjective experiences from the standpoint of an onlooker. When paired with different levels of interactivity freedom, these two forms exhibit more distinct contrasts.

When the third-person perspective is paired with low interactivity freedom (like 3DoF), it often appears as panoramic videos emphasizing spectacle over strong narrative. In this case, the narrative perspective showcases its unrestricted nature, free from fixed viewpoint or person limitations. The purpose of such videos is clear: unlike linear narratives that follow a story framework, they break narrative constraints to exist purely as objects of observation. Additionally, as Yu Jiayue states in Character Shaping in Film Under the Scrutiny of "Scopophilia" Theory, this also fulfills the audience's "scopophilic" psychology [15]. A voyeur is a person or role observing specific sights from a hidden or concealed position, with its meaning evolving over time and across media. The all-seeing nature of the camera lens, combined with the third-person perspective, further positions the voyeur as a privileged entity. VR device passthrough features (like geometric perception passthrough technology) allow the audience to peer into private spaces through virtual walls or obstacles. Stanford University experiments indicate this "wall-penetrating ability" triggers an inhibitory release response in the prefrontal cortex, giving the audience a voyeuristic thrill akin to possessing "superpowers."

If third-person perspective videos paired with low interactivity freedom primarily focus on "seeing," then videos with high interactivity freedom are generated to satisfy the audience's need for interaction. Such videos may have a narrative thread (e.g., VR animation shorts with educational purposes in museums or exhibitions) or may not (e.g., high-freedom panoramic exploration videos). Their commonality is the lack of explicit guidance characteristic of first-person or second-person perspectives. The audience explores the story framework entirely based on their subjective will. In this scenario, the designer's preset for their identity is virtually unlimited. The key difference is that with increased interactivity freedom, designers may place fragmentary content throughout the story

world to fill the framework. Here, the third-person perspective leans more towards focusing on a specific character or object. While still lacking a clear narrative thread, the audience can gather information by collecting this content. However, it's worth noting that pairing the third-person perspective as the narrative perspective with Multi-DoF is still extremely rare in the current market. This is because when the audience observes the story from a third-person perspective, excessive interactivity freedom often disrupts the original narrative rhythm, preventing the audience from fully engaging with every detail of the story, potentially reducing its appeal. Simultaneously, this can cause confusion in the audience's otherwise unrestricted identity cognition. Given that third-person perspective videos often do not adhere to linear narratives, excessive freedom can cause the audience to become completely disoriented, unable to discern the designer's intent.

In summary, the third-person perspective often utilizes 3DoF as the primary interactivity freedom, with 6DoF appearing as an auxiliary option. The animation needs to balance global observation with the audience's free interaction, supporting the audience in achieving scene switching and story exploration simultaneously.

5. Conclusion

This paper systematically explores interactivity freedom under different narrative perspectives in VR animation, revealing the dynamic coupling relationship between narrative perspective and interactivity freedom, and detailing the adaptation principles that exist between them. The research finds that VR animation, with its unique immersive experience, breaks the linear narrative framework of traditional animation and endows the audience with unprecedented narrative agency. Under various narrative perspectives, through different degrees of free interaction, the audience can reconstruct their identity within the story space preset by the designer. This reconstruction, in turn, feeds back to the designer, forming a closed loop within the framework.

Under the first-person perspective, the pairing of Multi-DoF as the primary mode, supplemented by 6DoF, is key to enhancing the audience's sense of immersion and presence. Designers need to carefully balance narrative guidance with space for free exploration, ensuring the audience can closely follow the story threads while enjoying a high degree of freedom, achieving deep integration of identity and story. The second-person perspective, through its unique "narrated" viewpoint, presents a new dimension for VR animation narrative. Designers need to skillfully utilize interactivity freedom to guide the audience in finding a balance between observation and participation, maintaining the integrity of the narrative framework while enhancing the sense of immersion associated with the "narrated" identity. The third-person perspective, with its omniscient or limited narrative approach, offers the audience a broader range of viewing choices. With 3DoF, it becomes a spectacle-oriented panoramic video; with 6DoF, it satisfies the audience's need for interactive exploration, allowing them to perceive their unique identity independent of the animation while watching. Designers need to meticulously handle the relationship between interactivity freedom and narrative rhythm to prevent the audience from becoming disoriented.

In conclusion, narrative perspective and interactivity freedom in VR animation are interdependent and dynamically coupled. Designers need to flexibly employ different narrative perspectives paired with appropriate levels of interactivity freedom based on narrative needs and audience experience, to create animated works that offer both deep immersion and narrative coherence. In the future, with the continuous advancement of VR technology and ongoing innovation in animation creation, we have reason to believe that VR animation will demonstrate even richer possibilities, offering audiences unprecedented immersive experiences.

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