Master Degree Project

UNIVERSITY OF SKÖVDE

HOW CAN ANIMATED VISUAL LANGUAGE ENHANCE EMOTIONAL STORYTELLING AND PROMOTE PLAYERS' EMOTIONAL PERCEPTION IN NON-LINEAR NARRATIVE GAME

Master Degree Project in Informatics
Two year Level 30 ECTS
Spring term 2025

Qianqian Zhang

Supervisor: Tarja Susi
Examiner: Anna-Sofia Alklind Taylor

Abstract

This study investigates the role of animated visual language (AVL) in non-linear narrative games. This study also examines how AVL can be designed to enhance the player experience in non-linear narrative games. Through case studies and semi-structured player interviews, a preliminary player typology was established to analyze different players' interpretations of AVL. The research reveals that AVL serves to complement textual narration in games, effectively compensating for narrative gaps when textual or mechanical elements are insufficient. Color proved to be a universal tool for emotional storytelling, while techniques like montage and chromatic aberration were effective for players skilled in metaphorical interpretation but potentially confusing for others. The study concludes that AVL is crucial for enhancing emotional perception and narrative comprehension within non-linear narrative structures, with its effectiveness being highly dependent on player type.

Keywords: Animation, Visual language, Emotional storytelling, Non-linear narrative, Game, Player experience, Digital games

Table of Contents

1 Introduction

With the rapid evolution of digital media platforms and the continuous expansion of the game market, traditional linear audiovisual content increasingly falls short of meeting the audience's growing demand for immersive experiences. Interactive narrative animation and story-driven games have emerged as key formats for engaging users. Within this context, Animated Visual Language (AVL) plays a crucial role in enhancing emotional storytelling and fostering deeper connections between players and the game world.

Existing research confirms that visual techniques originating from film—such as composition, camera angles, and lighting design—are widely employed in games to intensify emotional narrative impact. As Zhao (2020, p. 2) states, animation itself constitutes a visual language, composed of elements like color, shape, space, and movement. Hui Qiao (2021, p. 195) similarly emphasizes that audiovisual language in animation is the "'external form' that achieves narrative purpose through the combination of pictures." Block (2020), in The Visual Story, clarifies that the principles of this language can be directly applied to games, and that cinematic visual storytelling techniques can enhance emotional engagement within interactive media. Furthermore, the storyboarding techniques highlighted by Beiman (2015), which aid in planning emotional rhythm and ensuring consistency between visuals and narrative, are equally vital in games for pre-visualizing key scenes and maintaining tonal coherence.

However, although the role of AVL in both linear and non-linear narratives within film and television has been thoroughly demonstrated, its application within non-linear narrative games requires deeper exploration and research. Non-linear narrative is defined by Kim et al. (2018, p. 595) as a method of presenting events out of chronological order. This narrative approach introduces complexity through the disruption of temporal and spatial continuity, which can pose challenges to player comprehension. Techniques like montage, discussed by Luers (2020) in the context of digital writing, can rupture continuity and stimulate imagination, but their specific impact within games is not yet fully understood. Similarly, while the emotional function of color is well acknowledged—for instance, warm colors like red evoke passion or danger, while cool colors like blue suggest calm or loneliness (Block, 2007, p. 45)—its systematic use in guiding player understanding of non-linear storylines remains under-researched. The potential of more stylized color applications, such as "chromatic aberration," in emotional storytelling is particularly underexplored. Chromatic aberration is a form of Glitch art. Visually, it deliberately separates rainbow-like spectral bands at the edges of objects to mimic the effect produced when light passes through a prism in optical dispersion (Marqués Ibáñez, 2019, p. 1185). This visual technique, which separates RGB color channels to create spectral bands at the edges, can produce distorted or glitch-like visual effects. It is often used to convey character psychological turmoil, spatial-temporal distortion, or narratives associated with technical malfunctions, significantly expanding the emotional expressive range of color. Glitch art has been extensively used and its value proven in avant-garde film and video art. However, during the literature review for this study, insufficient evidence was found confirming the emotional function of color in AVL, or the role of chromatic aberration as glitch art, within non-linear narrative games. This research gap is especially pronounced in narrative games, which are designed with the philosophy that mechanics fully serve the story (Kim et al., 2018), and where non-linear structures enhance engagement through spatiotemporal disruption (Dam, 2021).

To address this gap, this study delves into the roles of AVL within non-linear narrative games. The research is guided by the following main question: What are the roles of animated visual language (AVL) in non-linear narrative games? This question can be broken down into three sub-questions:

1. How does AVL help players understand the story in non-linear narrative games?
2. How does the use of color in AVL (including conventional color and stylized techniques like chromatic aberration) and montage enhance the emotional impact of the story in non-linear narrative games?
3. Will different players have different responses to the designed AVL effects, and why?

This study aims to provide game designers with useful insights and practical advice on leveraging animated visual language to enhance emotional storytelling and player experience in non-linear games. Concurrently, the findings will contribute to the academic discourse concerning visual language in game research.

2 Background

2.1 Animated visual language (AVL)

According to Karmakar (2021, p.161), who studied interactive narrative animation software, interactive storytelling is becoming increasingly popular on many digital media platforms. Karmakar (2021, p.161) states that animation is crucial for creating engaging user experiences. When it comes to digital and interactive storytelling, narrative games must be mentioned. The aforementioned literature has already confirmed that visual language techniques from film, such as composition, camera angles, and lighting, are applied in games to enhance emotional storytelling. Digital storytelling in games primarily involves the use of visual and interactive elements to convey narratives. This can include everything from the design of the game's world to the design of characters and the ways players interact with the game. Lambert (2013) discusses how interactivity in digital storytelling enhances immersion. For example, color palettes can be used to symbolize different emotional states or gradually change lighting to reflect narrative progression. This concept can be applied to games, where the use of visual elements can create rich and emotionally resonant narratives. Visual and interactive elements together can create a more immersive and emotionally engaging experience.

When discussing visual storytelling, animation cannot be overlooked, as it plays a crucial role in enhancing emotional engagement. As Zhao (2020, p. 2) states, “Digital animation is a new language of animation, which has its own special artistic style. In terms of image aesthetics, simulation and virtualization, visual language elements such as color, shape, space, and movement have been fully applied. Animation itself is a form of visual language composed of various visual elements. As Qiao (2021, p. 1) points out, "The perfect combination of sound and picture is an important element of movie animation works." In games, the way characters move, express emotions, render environments, and interact with the game significantly impacts players' emotional responses. By leveraging the characteristics of animation, the content in games can create a more immersive experience through the synchronization of visual and auditory elements. This concept can also be applied to games, where animation can be used to create vivid and emotionally rich character portrayals and more immersive and fitting environmental atmospheres. Block (2020) writes that the principles of visual storytelling in film can be directly applied to games. Such practices can create more immersive and emotionally engaging gaming experiences. For example, low-angle shots can make characters appear more powerful, while high-angle shots can make them seem vulnerable. Visual language allows players to resonate emotionally with the game's content, creating an immersive experience. Games on the market already employ visual language. In both animation and linear storytelling in games, events typically occur in a fixed sequence, and the tool used to achieve this is the storyboard.

The study of AVL in games draws heavily from film studies, particularly in the use of cinematic techniques to convey narrative and emotion. AVL is a commonly used tool in both film studies and animation studies. As stated by Hui Qiao (2021, p. 195), “As an audio-visual communication tool, animation needs an 'external form' to form a picture, and multiple pictures are grouped together to achieve the narrative purpose. This external form is what we often call 'audio-visual language.'” Therefore, in simple terms, audiovisual language in animation refers to the use of visual and auditory expressions to convey the narrative content intended by the text through animation. A simple example is the famous thriller director Alfred Hitchcock's movie “Psycho”, which, without relying on text, presents a terrifying and suspenseful experience to the audience through the visual performance of the actors and appropriate sound design. The elements of visual language mainly include lens design, scene scheduling, editing, and more. In addition, montage is also a form of visual language, often used as a means of editing in film and television. As Haryanti (2018, p. 208) states: "Visual Language is a way of 'reading' pictures, from various images." Visual language typically uses visual expression through images to present the effects that designers aim to achieve.

As concluded in the research by Haryanti (2018), audiences process and analyze the rapidly flashing images, or "frames," in animation within their minds, expanding on the information they perceive. As a result, what audiences perceive goes beyond the animation frames themselves, including images extended through their own imagination. These two types of image information processed in the audience's mind are referred to as "Wimba" in their article. As Haryanti (2018) states: "The Genesis method in One Piece anime is arranged so that the audience does not feel bored. This is because Wimba is a part that fills up space and time in the anime frame in a short time." These spaces and times are filled in through the audience's imagination. In their research, it can be observed that the second set of animation frames listed depicts different actions of the same character, with the character's size and proportion varying in each image. This is because the focus is on highlighting different pieces of information. This method of emphasizing different important information shifts the audience's focus, thereby guiding their imagination. This research direction falls under the lens design of the animated audiovisual language, where the composition of the animation (i.e., the proportion of the character within the frame) is used to drive the progression of the story.

Another form is auditory language, which, unlike visual expressiveness, utilizes various sound effects and music to enhance the atmosphere. It often appears alongside visual language, and together, they enhance the viewer's or player's experience through both visual and auditory means. Järvinen (2002) discusses how games like "Max Payne" and "The Matrix" share structural similarities in their audiovisual presentation, using similar audiovisual elements to create a cinematic experience. Since there is previous research on how the style of audiovisual language in games fits different game genres, this proves that audiovisual language definitely has an impact on games. In his research, Järvinen studied how the style of some audiovisual language affects the immersion of different game genres. While this confirms that different visual and auditory styles in audiovisual language affect the gaming experience, there is no clear research content on visual language related to the direction that this research wants to focus on. Hui Qiao (2021, p. 195) mentions, "Elements of audio-visual language include lens design, scene scheduling, editing, sound, and so on." Among these, lens design and scene scheduling are often presented through storyboards.

2.1.1 Storyboard

Storyboards are commonly used in film, television, or comic works as a visual planning tool. They are used to map out the visual sequence of events, primarily focusing on camera angles, transitions, and scene pacing. Beiman (2015) emphasizes that storyboards help plan the emotional rhythm of a story, ensuring that visual elements align with narrative goals. In games, storyboards can be used to pre-visualize key scenes, ensuring that the emotional tone remains consistent throughout the game. Storyboards also help designers organize and present their narrative content more clearly. Additionally, storyboards can influence the audience's emotional experience through different visual designs. This design approach helps designers construct the emotional rhythm of the entire narrative, guiding the audience through the story's climax, conflict, and resolution. However, after viewing the predetermined visuals, audiences will still interpret the content divergently based on their understanding. Therefore, different storyboard rhythms can lead to different interpretations by viewers, as the key emotional nodes emphasized by the designer will influence the audience's focus and, consequently, their interpretation.

Similarly, in games, storyboards can be used to plan what players see, ensuring narrative coherence and emotional richness while sparking players' imaginations. Furthermore, the use of storyboards can help create continuity and immersion. By carefully planning the visual sequence of events, designers can create a more emotionally engaging experience for players. This is particularly important in narrative-driven games, as the core of the gaming experience lies in whether players are captivated by the narrative and develop emotional connections.

2.1.2 Montage

Montage theory is a commonly used theory in film, television, and literary works. Specifically, in Luers' (2020) study, it is mentioned that the theories developed by Eisenstein, Benjamin, and Kluge aim to help people understand visual language and provide a theoretical foundation for how visual language can be used to enhance emotional storytelling. Montage is often applied in the editing aspect of audiovisual language in animation, achieving effects such as jumping timelines, switching perspectives, and more. As Luers (2020, p. 5) points out, "Eisenstein's theory of cinema montage sought a dialectical synthesis in the contrast or collision not just of shots, but also in the juxtapositions of image, sound, and text." This approach can be directly applied to game production, as the deliberate design of visual and auditory elements can enhance the emotional impact of the narrative to a certain extent. Luers (2020, p. 2) emphasizes, "Digital writing draws not only on cinematic montage but also on a long history of literary montage." This indicates that the principles of visual storytelling in literature and film can be effectively applied to the design of narrative games. Luers (2020, p. 3) also discusses how "Digital authors, without the security of a controlled linear sequence that comes to an end, draw on other techniques for the reader’s efforts at cognitive coherence." From Luers' paper, we learn that non-linear narrative structures in digital writing can better enhance players' curiosity about the plot and their emotional investment in the story itself. This can create a more immersive and emotionally engaging experience for players. However, unlike linear narratives, players may become confused due to excessive information, disjointed timelines, and logical inconsistencies. This requires the design of different visual or auditory elements to evoke emotional responses and deepen players' emotional engagement with the story. Players can then use their own associations to fill in the logical gaps in the narrative. Achieving this requires the assistance of visual language.

2.1.3 Color

Furthermore, in today's gaming market, the use of visual language to enhance emotional storytelling and promote players' emotional perception of the game is receiving increasing attention. In addition to the aforementioned visual elements such as lens design, montage, and animation, visual language also employs color and lighting to convey the meaning designers intend to express and evoke players' emotions through visual means. For instance, Block (2007, p. 45) notes that different colors can be used to depict emotions: "Color can be used to evoke specific emotions. Warm colors like red and orange often convey warmth, passion, or danger, while cool colors like blue and green can suggest calmness, isolation, or sadness." Techniques such as designing scene compositions to guide players' attention and using lighting to create atmosphere are borrowed from film. In his research, Zhao (2020) analyzed the use of color in the animated films *Ne Zha: I am the Destiny* and *Jiang Ziya*. (Zhao, 2020, p. 2) “The gold color in the background and the rebellious form of Ne Zha set off each other, making Ne Zha's evil spirit with a hint of warm goodwill.” “The fog, the blue-grey background, and the hands of the protagonist stretching into the fog indicate the confusion and difficulty of the protagonist Jiang Ziya, and also imply the tragic ending.”. This further confirms that color design can subtly influence the audience's perception and emotional response to characters and scenes. Beiman (2015, p. 78) points out that carefully designed visual elements can evoke specific emotions: "Lighting and composition are essential tools for guiding the viewer's emotional response. High-key lighting can create a sense of openness and safety, while low-key lighting can evoke tension or mystery." In Cowan's research (2015), he quotes Schaefer and Salvato (1984, 220–221): “I am trying to describe the story of the film through the light. I try to have a parallel story to the actual story so that through light and color you can feel and understand, consciously and unconsciously, much more clearly what the story is about.” Cowan (2015) validates this perspective by analyzing two works: The Separation and The Sleeping-Mat Ballad.

In The Sleeping-Mat Ballad, Cowan analyzes how the author uses yellow to associate the protagonist with protests. In the setting, yellow is designed as a symbol of protest and appears on notes supporting the protest. This use of color not only reinforces the symbolic meaning of the protest but also subconsciously links yellow with protest in the audience's mind, helping them better understand the protagonist and the story.

In The Separation, Cowan (2015) analyzes how the film uses white and black to symbolize the journey from birth to death. In the general perception, white can symbolize light or birth, while black can symbolize darkness or death. This aligns with common ways of thinking, as people consciously interpret what these colors represent. Therefore, the use of black and white effectively portrays the story from birth to death. Those examples, as Schaefer and Salvato stated, demonstrate that telling a story through light and color allows the audience to feel and understand the film's narrative more clearly, both consciously and unconsciously.

Although there is limited literature on this topic, the examples from existing games demonstrate that this can be effectively applied in gaming. The lack of sufficient literature also underscores the importance of further research into how visual language can be used to enhance visual effects in games. However, the conclusion drawn from the research of Madden et al. (2000, p.101) that "Many intrinsic properties of colors (liking, meaning associations) thus appear to be pancultural. " suggests that colors may carry different associative meanings across cultures, potentially leading to divergent interpretations of the same visual content.

2.2 Narrative Game

Narrative games are a type of game that focuses on storytelling, typically attracting players through complex narrative structures and emotional expression. The term "Narrative games" discussed in this article refers to what is commonly classified in the gaming market as *Visual Novels*. This type of game is generally categorized as a subgenre of *text-based adventure games*. Its core characteristic is narrative-driven gameplay, where game mechanics are entirely designed to serve the storytelling. Typical examples include *Florence* (Annapurna Interactive, 2018), *428: Shibuya Scramble* (Spike Chunsoft, 2018), *Phoenix Wright: Ace Attorney Trilogy* (CAPCOM, 2019), and *Danganronpa: Trigger Happy Havoc* (Spike Chunsoft, 2016). These *Narrative games* share the same defining feature: the entire game is structured around telling a story. Unlike action games, which challenge players with high-difficulty mechanics, or role-playing games (RPGs), which focus on character progression (e.g., levelling systems), Narrative games prioritize the narrative itself.

That said, RPGs often incorporate narrative elements to enhance immersion and facilitate the coherence of game mechanics. However, whether in traditional RPGs or *CRPGs (*computer role-playing games*)*, the core gameplay revolves around role-playing elements, such as character progression and quests. This constitutes the fundamental difference between RPGs and *Narrative games*. In RPGs, narratives primarily serve to justify in-game tasks and explain mechanics that diverge from reality. Additionally, storytelling can enhance interactivity—for example, by unlocking new maps through plot progression, thereby expanding the available quests. In short, RPGs prioritize game mechanics over narrative, ensuring players can complete objectives as designed, while the narrative merely supports this goal. Certainly, games that are not in the type of narrative game may still exhibit story-driven design principles. Like *Persona 5* (P-Studio, 2017) as an example: this title is strictly classified as a Japanese Role-Playing Game (JRPG) rather than a narrative game. The rationale for selecting this case lies in its narrative-driven nature despite being a JRPG that emphasizes gameplay mechanics and character progression systems. It employs cinematic methods and an Animated visual language (AVL) system to implement analepsis (flashback techniques), thereby structuring the introduction of distinct game chapters. However, post-chapter transitions typically shift focus toward player-controlled exploration, character progression, and level completion. This diverges from the core principle that game mechanics must serve narrative purposes, thereby precluding classification as a narrative game. In contrast, Narrative games focus on the story itself, with game mechanics existing solely to facilitate its delivery.

However, within this category of *Narrative games*, some titles exhibit overlapping mechanics with other genres. These games may incorporate high-difficulty level selections akin to action games or feature progression systems similar to RPGs, such as *Super Danganronpa 2: Goodbye Despair Campus* (Spike Chunsoft, 2016). *Danganronpa 2* is a *Narrative game* that blends deduction elements, partial RPG mechanics, and action-game components.

In this game, players must select difficulty levels for both logic (Logic Difficulty) and action (Action Difficulty), as shown in the figure below. Each of these aspects offers three difficulty options: Gentle, Kind, and Mean Mode. The Logic Difficulty setting affects the complexity of in-game deductions, influencing time limits for puzzle-solving and available hints. Meanwhile, *Action Difficulty* determines the operational challenge during gameplay. When *Mean Mode* is selected for Action Difficulty, certain debate sequences against antagonists demand precise player inputs, creating an experience reminiscent of action games.

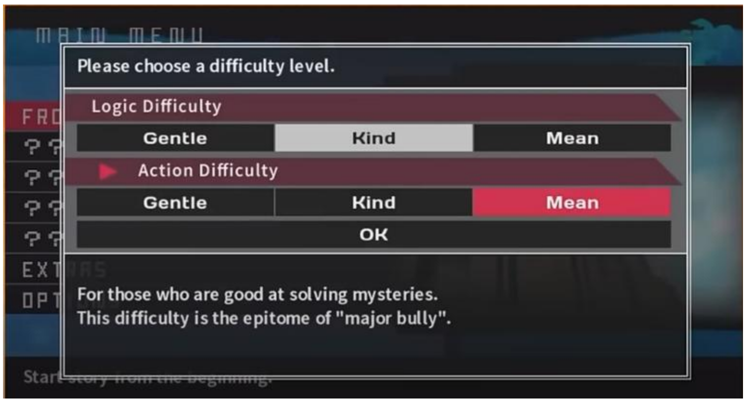

Figure 1 Difficulty selection game interface of *Danganronpa 2*

Additionally, the game includes mechanics where the distance travelled by the player-controlled character contributes to levelling up both the protagonist and their companion creatures. Crucially, however, these mechanics are unlocked progressively through narrative development—reinforcing that the game remains fundamentally story-driven. These gameplay elements are designed to enhance interactivity, thereby deepening player immersion. This is why the title is classified as a *Narrative game* rather than an RPG or action game, despite its hybrid features. The story is always the most important part.

2.2.1 Narrative in Games

Consequently, the theoretical framework differentiating "story" and "narrative" becomes essential for deconstructing how narrative games structurally prioritize storytelling. To ensure narrative primacy and enhance narrative engagement, game narrative structures necessitate flexibility. Thereby, adapting techniques from linear/nonlinear frameworks of literature/film and leveraging AVL systems, games can reshape structural dynamics through interactivity in uniquely transformative ways, fundamentally transforming story experiences. According to Kim et al. (2018, p. 596), "A *story* is content (what is told) consisting of events (actions, happenings) and existents (characters and settings), while *narrative* is the expression (how it is told) concerning how the content is presented to readers (narrative voices, styles, plots)." This narrative-centric design frequently employs cinematic techniques, exemplified by the visual montages in *Florence* (Annapurna Interactive, 2018). *Florence* (Annapurna Interactive, 2018) allows players to understand where the protagonist is, what is happening, why these events are occurring, and what the final outcome is through simple interactions with visuals and animations. Such techniques manifest distinctly in games like *Detroit: Become Human* (Quantic Dream, 2018), which integrates cinematic editing to intensify narrative delivery. In this study, the term "narrative game" refers to games where the entire game serves as a platform for storytelling, with both game mechanics and interactions designed to make the in-game narrative more immersive. As previously mentioned, in literary works and films, the main narrative structures commonly used are linear narrative and nonlinear narrative, in addition to framed narrative and others. As mentioned by Kim et al. (2018, p. 595) regarding narrative content: “A *narrative* specifies the way in which events in a story are told.” Depending on the content of the story, events and the effect desired to be presented to the players, different narrative structures or storytelling methods need to be chosen.

Consequently, this distinction yields two categories: linear narrative games and nonlinear narrative games. Linear narrative games, as established earlier, follow the story's chronological progression. As Dam (2021) said, “Linear narratives follow a defined, chronological path. The player progresses through the game in a straight line by reaching predefined plot points." Conversely, nonlinear narrative games employ a disrupted temporal sequence in their narration. Kim et al. (2018, p. 595) also mention: "A *nonlinear* narrative is a narration technique portraying events in a story out of chronological order, such that the relationship among the events does not follow the original causality sequence." It follows that in nonlinear narratives, story events do not adhere to the original chronological and causal sequence, which can readily lead to player misinterpretation or subjective interpretation. This necessitates targeted design strategies to facilitate player comprehension. To achieve the goal of helping players understand the story content more vividly, the presentation of visual effects is particularly important. Therefore, the design of narrative games inevitably draws directly from filmmaking. Alternatively, it draws upon the well-established narrative processing models found in film and television scripts. For instance, nonlinear storytelling techniques commonly used in cinema—such as the recursive, hypothetical narrative in *The Butterfly Effect (2004)*, where characters repeatedly return to a personal or original starting point to alter events, or the multi-perspective narrative employed in *Rashomon (1950)*, which recounts the same story through the viewpoints of different characters—along with other techniques like flashbacks, have all been widely adopted in games. A detailed analysis of these narrative techniques as applied in games will follow in subsequent sections.

According to Kim et al. (2018, p. 595): "A nonlinear narrative is a storytelling device that portrays events of a story out of chronological order, e.g., in reverse order or going back and forth between past and future events." This is a type of non-linear narrative that employs the technique of flashback. Therefore, *Persona 5* (P-Studio, 2017) is more accurately characterized as a JRPG synthesizing non-linear narrative techniques. In contrast, a linear narrative follows the chronological order of the story, i.e., the cause, process, and outcome of the story, as seen in the game *Florence* (Annapurna Interactive, 2018) mentioned earlier.

2.3 Non-linear narrative Game

2.3.1 Non-linear story structure in Game

In non-linear narratives, the frequent disjunction between the narrative sequence and chronological order often creates challenges for designing coherent narrative content in games. To analyze the degree of discrepancy between the narrative sequence and the chronological order, Kim et al. (2018) introduced the concept of the "story curve," which visualizes the structure of non-linear narratives by comparing the order of events as presented in the narrative with their actual temporal sequence. According to research by Kim et al. (2018, p. 595), "Story curves visualize non-linear narratives by displaying the sequence of events in a film and comparing them to the actual chronological order, resulting in a potentially meandering visual pattern in the curve." In this study, the "story curve" quantifies narrative discontinuity by visualizing the sequence of events in games (narrative order) versus their chronological order, thereby enhancing interpretability. This mathematical model demonstrates that restructuring events from different temporal points into varied narrative sequences, combined with the pacing and rhythm of dynamic storyboards, enables targeted emotional experiences for players. Empirical evidence thus confirms that dynamic storyboards enhance the emotional cadence of game narratives, facilitating the effective integration of nonlinear storytelling.

While conducting research, I found a more intuitive explanation of the "story curve." Dam (2021) states in her study, "A story is typically linear and a game is non-linear." This statement captures the design approach for the vast majority of narrative games on the market today. Although the overall main storyline of a game is linear—meaning the final outcome is predetermined, even if there are multiple possible endings—the game can provide players with different choices and explorable items, allowing them to experience a non-linear story structure within the essentially linear progression.

Referring to the diagram illustrating non-linear story structure in Dam's (2021) paper, specifically Figure 2 below, let's assume it represents the flow design of a game's main storyline. The Events are listed chronologically, starting from the Beginning. The line connecting each circle, i.e., each Event, represents the direction of the game's main storyline flow. From the diagram, we can see that the second Event (Event 2) is positioned second chronologically after the Beginning, but in terms of the gameplay sequence, it is placed fourth. This indicates that the game's flow does not follow the chronological order of events. Instead, after Event 4, an earlier event (Event 2) is inserted before proceeding to Event 5.

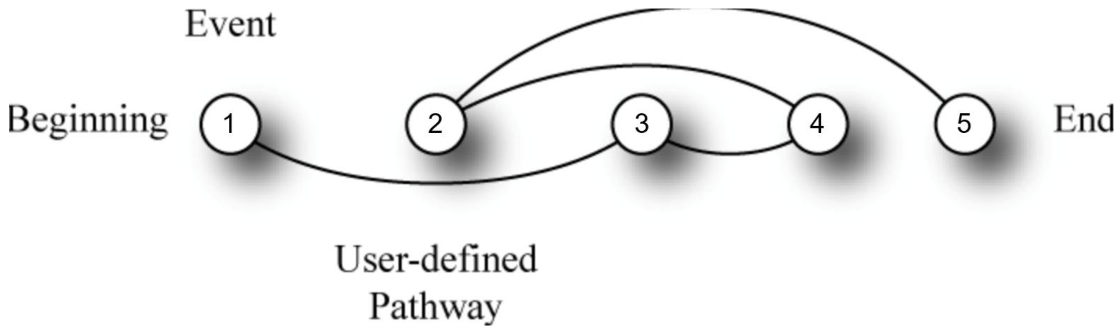

Figure 2 The non-linear story structure of Dam (2021)

This design alters the sequence of originally linear story nodes according to narrative needs, thereby creating a non-linear story structure. When this structure is implemented in a game in various forms, it enables players to experience a non-linear story through the medium of the game. Using a diagram like Figure 2 below to represent the chronological order of different Events follows the same principle as the "story curve" mentioned by Kim et al. (2018). However, this graphical representation demonstrates the difference between the original chronological order and the gameplay sequence more intuitively than a curve format. And clearly illustrating this discrepancy can facilitate designers' reorganization of Events when designing game mechanics. Therefore, the diagram provided by Dam (2021) offers an intuitive model for this study to comprehend the principles of the "story curve" and its application in games.

While such diagrams and curves effectively model the abstract architecture of non-linearity, a critical challenge remains: how is this disrupted spatiotemporal structure conveyed intuitively and emotionally to the player? Based on current research, Dam (2021) on narrative games, linear narrative games tend to have simpler game mechanics. In contrast, non-linear narrative games often use game mechanics or specific techniques to disrupt players' focus on the story, signaling that the upcoming plot is disconnected from previous content.

Unlike linear narrative games, which tend to employ a relatively straightforward story structure. Non-linear games often leverage their story structures and mechanics to deliver diverse storylines tailored to the game's type. However, unlike other types of games. In non-linear narrative games, game mechanics do not dominate the experience. Instead, they are utilized to enhance player immersion while simultaneously creating more possibilities for the narrative content. Consequently, the gameplay narrative—exemplified by Super *Danganronpa 2: Goodbye Despair Campus* (Spike Chunsoft, 2016) referenced above—generates significantly stronger presence and participatory engagement than passive story-viewing in conventional narrative games. Moreover, as the game belongs to the suspense type, its use of non-linear storytelling further intensifies the sense of mystery. For instance, within the setting, most characters suffer from amnesia yet retain awareness of their own abilities—except for the protagonist. This leaves the protagonist in a persistent state of self-doubt. When certain objects appear, fragmented memories suddenly resurface in the protagonist's mind. Neither the protagonist nor the player knows when these memories originated or what they signify. This deliberately amplifies the unresolved enigmas within the story, thereby enhancing the overall suspenseful atmosphere of the game. Based on the above description, it is evident that this game primarily relies on textual descriptions to inform players about events. Subsequently, through gameplay mechanics, players are provided with descriptions of memory fragments after completing certain tasks. However, relying solely on text for game narration can be unfriendly to players who lack the patience to read extensively. Such players may skip crucial plot details and find themselves unable to progress in the game. This necessitates the use of alternative methods to assist in storytelling.

In this context, AVL can play a crucial role. Because this approach of disrupting spatiotemporal continuity in narrative has long been visualized in film and television works through the application of AVL. As Luers illustrates in his paper (2020, p. 9), "In a more recent work of hypertext, *With Those We Love Alive* by Porpentine, an initial spatial continuity gives way to a broken dreamscape." By employing non-linear storytelling to break spatial continuity and introduce intervals, players' imaginations are stimulated, creating new narrative possibilities. Taking the Rashomon (1950) and The Butterfly Effect (2004) as examples:

In Rashomon (1950), director Akira Kurosawa repeatedly filmed the same event—the duel in the bamboo grove as recalled by four different narrators—using multiple camera setups. He employed sophisticated audiovisual language to accentuate the subjectivity of each narrator: stark lighting contrasts reflected the bandit's self-image, hazy visual effects conveyed the wife's sorrowful atmosphere, aligning with her victim narrative, somber tones depicted the deceased husband's ghostly account, while the woodcutter's perspective was presented with neutral visuals to underscore his role as an objective observer.

In The Butterfly Effect (2004), distorted and blurred effects are deployed each time the protagonist traverses timelines, creating visual segmentation during temporal and spatial transitions. The technique makes the protagonist's entire world appear to melt and reconstitute itself. Such stark visual contrasts render the otherwise invisible temporal branches and causal paradoxes more tangible, enabling audiences to comprehend the unfolding events better. This demonstrates that AVL's capacity for presenting non-linear narratives in film has been substantiated, confirming its inherent capability to effectively express non-linear storytelling structures.

If such AVL visual techniques are incorporated into non-linear narrative games and combined with gameplay mechanics, could this reduce player resistance to lengthy text while simultaneously enhancing their emotional experience of the game's narrative?

2.4 Summary

In summary, the background chapter has outlined several core concepts that form the foundation of this research: Animated Visual Language (AVL)—a mature toolkit derived from film studies that is increasingly being applied in game development. Its visual (e.g., framing, color, montage) and auditory elements may effectively guide players' emotional experience and narrative rhythm during gameplay. Narrative games are defined in this study as a type of game where narrative is the absolute core, and game mechanics serve the storytelling experience. Under the broader category of narrative games, there are several subcategories. The main focus of this research is the next core concept: non-linear narrative games, which are defined here as games that employ a non-linear story structure and utilize this narrative approach as a key means of breaking temporal and spatial continuity to enhance player engagement and emotional resonance.

According to the literature reviewed, while the role of AVL in emotional storytelling within film has been well established, and models such as the "story curve" have been introduced to visualize narrative-chronological discrepancy, current research has not yet confirmed whether AVL contributes to player engagement and emotional rhythm in non-linear narrative games. Therefore, investigation in this direction holds significant research value.

3 Problem

3.1 Research Question

Based on the background mentioned above, there is already academic research on the auditory aspects of audiovisual language in games, but there is no specific research on the visual aspects of audiovisual language in games. Currently, based on the literature collected during this research, most studies on the emotional expression of visual aspects in audiovisual language are still concentrated in the fields of film and animation studies. Although many games currently in development or already released on the market incorporate elements of audiovisual language to some extent, these research findings have not been fully applied in the academic direction of games, especially in non-linear narrative games. Moreover, there is currently no systematic academic research focusing on the specific application of visual language in non-linear narrative games and its impact on players' emotional perception.

As discussed in the background, non-linear narrative games are a type of game that focuses on storytelling, with narrative structure and emotional expression being key factors in creating immersion and emotional resonance for players. The primary way to concretize narrative content in games is through visual representation. To present different visual content, it is necessary to draw on other methods, such as Animated Visual Language (AVL). Therefore, studying the impact of visual content in AVL on games is valuable. Since narrative games inherently emphasize visual design to provide players with diverse experiences, research on visual language holds both academic and practical value. Through the use of visual elements such as color, composition, and lighting in animated audiovisual language, emotional storytelling in games can be enhanced. Additionally, techniques like montage in animated audiovisual language can enrich the storytelling methods in narrative games. This study will focus on the application of Animated Visual Language (AVL) in narrative games, aiming to explore its role in non-linear narrative games and its effects on player experience.

The research question of this study is: What are the roles of animated visual language (AVL) in non-linear narrative games?

By analyzing several aspects of the research question, this study will summarize which factors in AVL have a positive impact on non-linear narrative games. The research questions will be subdivided based on the following aspects:

How does AVL help players understand the story in non-linear narrative games?

As discussed in the background, non-linear narrative games require certain techniques and designs to help players better understand the story. This is because non-linear narrative games enhance narrative complexity by breaking chronological order and spatial continuity, thereby better showcasing the rhythm of the story. However, simply breaking the story can confuse players about the timeline and character shifts. AVL includes techniques such as lens design, scene scheduling, and montage, which can significantly alter the temporal structure of the story. According to Genette's (1983) narrative theory, the order, duration, and frequency of narrative events are three critical dimensions of narrative structure (Genette, 1983). Based on Genette's classification, this flashback technique should be categorized as Analepsis. Analepsis refers to a narrative technique where the timeline shifts from its conventional chronological sequence to first recount events from the past, then deliberately returns to the present timeline through logical structuring. This approach retains a strong sense of mystery at the beginning of the game while achieving a logical transition in the timeline, ensuring that players do not feel confused. In nonlinear narratives, it is easy for players to become confused about how the story develops due to unclear transitions in the timeline. However, through designs like those in *Persona 5*(P-Studio, 2017) and the presentation of visual language, this issue can likely be resolved. When it comes to storytelling, the best way to achieve visual representation is through animation. Therefore, in this research direction, the study aims to verify whether animation, lens design, and scene scheduling can help players understand the development of the story despite timeline jumps and fragmented plots.

How does the use of color in AVL (including conventional color and stylized techniques like chromatic aberration) and montage enhance the emotional impact of the story in non-linear narrative games?

AVL not only conveys narrative content but also enhances emotional expression through color, lighting, and character animation. Non-linear narrative games heavily rely on players' emotional resonance with the plot. In AVL, color carries strong emotional symbolism. Different colors evoke different feelings, and various color combinations can convey different emotions and perspectives. In this research direction, the study aims to explore how changes in color, lighting, and other visual elements can express different narrative perspectives and emotional states, thereby enhancing players' emotional perception and narrative understanding.

Montage, as a classic visual storytelling technique in AVL, can switch narrative perspectives and manipulate time or space through lens editing and image splicing, thereby enhancing the rhythm and emotional impact of the narrative. If narrative games also utilize mechanics or AVL visual effects to interrupt and segment the game's storytelling, would this enhance the gaming experience for such players? Assuming this design proves effective for player experience, and that narratively complex non-linear narrative games could also become more comprehensible to players through such design, then players' gaming experience in non-linear narrative games would achieve a demonstrable enhancement. While ensuring that players can understand the development of non-linear narrative stories, this study will also explore whether the application of montage in non-linear narrative games can enhance players' emotional engagement and immersion through the contrast and collision of visual elements.

Will different players have different responses to the designed AVL effects, and why?

As mentioned above, there exists a group of players who dislike lengthy textual narratives yet simultaneously enjoy reading stories and wish to understand the game's narrative content. These players tend to be more attracted to games with complex mechanics, such as RPGs and action-adventure games. This is because such games utilize mechanical interruptions to prevent large blocks of text from appearing all at once, while simultaneously enhancing the game's entertainment value. If this design strategy proves effective, the audience for non-linear narrative games would expand. This increased player base would, in turn, present diverse gaming needs, meaning the factors to consider in this design strategy would also multiply. Therefore, in addition to the two questions above, this study will also focus on whether the effects of AVL in non-linear narrative games are effective across different player types.

3.2 Method

3.2.1 Ethical considerations

Before the testing began, this study included a clear introduction explaining the process and purpose, as shown in Appendix A. This text was placed at the beginning of the questionnaire to confirm that the study adhered to standard research ethics guidelines. All activities were based on participants' voluntary choice, with clear information and no harm, fully protecting their rights and privacy.

The introduction outlined the activities participants would engage in: playing a test game, participating in discussions, and completing questionnaires. It also gave an estimated time for the whole process and made clear that participants could quit at any time without any negative consequences. All collected data would only be used for this academic research.

When participants were interviewed, questions were open and neutral—no leading or uncomfortable questions were asked. All personal details were anonymized during recording, analysis, and writing—names were replaced with codes like A, B, C. Discussions were recorded only with permission, and all audio and text materials were stored securely. Once the research is over, the original data will be permanently deleted.

3.2.2 Research Design

This study adopted a qualitative research approach to investigate players' perspectives on animated visual language (AVL) in non-linear narrative games. The aim was to broaden design perspectives for visual expression in non-linear narratives by analyzing diverse individual viewpoints, ultimately enhancing the emotional impact of visual storytelling in such games. To explore the research questions outlined earlier, this study employed a combined methodology of questionnaires and interviews.

The questionnaire served as a supplementary tool for participant background screening and sample selection, while interviews constituted the primary source of research data. As noted by Campbell et al. (2020), in qualitative research, " In a qualitative study, a relatively small and purposively selected sample may be employed (Miles and Huberman, 1994, cited in Campbell et al., 2020, p. 2), with the aim of increasing the depth (as opposed to breadth) of understanding" (Palinkas et al., 2015, cited in Campbell et al., 2020, p. 2).

The semi-structured interview format was chosen for this study based on established methodological literature, which highlights its effectiveness in exploring participants' subjective perspectives—particularly in complex or emotionally nuanced topics (Kallio et al., 2016, p. 2959). And it was also mentioned in McIntosh and Morse's research(McIntosh and Morse, 2015, p.1),” Participants were free to respond to these open-ended questions as they wished, and the researcher may probe these responses. This framework and flexibility of the responses constitute the semi-structured aspect of this method.” Unlike fully structured interviews, which relied on rigid question sequences, semi-structured interviews allowed for flexible probing, enabling researchers to adapt questions based on participants' unique responses and delve deeper into emerging themes (Kallio et al., 2016, p. 2959). The questionnaire designed for this study is a mixed-method instrument incorporating both quantitative and qualitative questions. Its primary purpose was to investigate participants' reading preferences and gaming narrative experiences in order to screen suitable samples for subsequent interviews. The question types mainly include Likert scale items, single-choice questions, multiple-choice questions, and open-ended questions.

This questionnaire design was adopted primarily because it enabled a preliminary understanding of participants' interests, behaviors, and preferences. Scale items and multiple-choice questions facilitated statistical analysis, while open-ended questions provided response flexibility, allowing for deeper insight into participants' habits. However, since the questionnaire served solely as a screening tool, the number of questions had to be limited. This constraint prevented an in-depth inquiry at this stage. Therefore, semi-structured interviews were employed in the subsequent phase to conduct a more thorough analysis.

To ensure the test content could demonstrate genuinely effective AVL outcomes and productive interview questions, this study analyzed the narrative frameworks and visual presentations of three non-linear narrative games. These analyzes served as the foundation for designing the test content. To more effectively evaluate whether the AVL visual effects aided the game's storytelling, design principles for non-linear content through gameplay mechanics—as discussed in the background section—were incorporated. Additionally, the proportion of textual content in the test game was intentionally minimized.

3.2.3 Research Subjects

Participants for this study were selected through purposive sampling via questionnaires. Some literature has noted that the advantage of purposive sampling lies in its ability to "be used to select respondents that are most likely to yield appropriate and useful information" (Kelly, 2010: 317, cited in Campbell et al., 2020, p. 3), thereby ensuring a high degree of relevance between the sample and research objectives. This approach was adopted precisely to obtain more meaningful data for this study during the interview process. In this study, participants were screened using the Purposive Sampling Questionnaire (PSQ) in Appendix A. The screening criteria were primarily based on PSQ questions 4-13, which assessed participants' reading preferences, attitudes toward game narratives, and patience with in-game text. A composite assessment of participants' responses determined whether they met the necessary criteria for the test—specifically, having an interest in game narratives but limited patience for lengthy text segments. After collecting participants' PAQ data, they were first evaluated against these criteria. Those meeting the requirements proceeded to subsequent questionnaire sections and testing. Participants not meeting the criteria were informed that their data would not be included in the analysis sample, and the process was concluded. If these participants expressed interest in the test content, they were still permitted to proceed. In edge cases where eligibility was difficult to determine, participants advanced to testing, with final determination made through a comprehensive analysis of their interview responses.

The rationale for selecting this group aligned with the research questions: the study aimed to verify whether AVL enhanced players' understanding of game narratives and increased emotional engagement. Perspectives from players less comfortable with narrative games provided clearer insights into whether AVL effectively served these purposes.

3.2.4 Data Collection and Analysis

Questionnaires

The study employed a questionnaire comprising primarily closed-ended questions to screen the target group and gather basic participant information. Responses guided the formulation of more targeted interview questions. The questionnaire was distributed online via Google Forms for convenience and efficient data collection. The complete questionnaires and interview protocols had been included in the Appendix section following the References.

The questionnaire was divided into two main modules: the purposive sampling questionnaire and the pre-game questionnaire. The purpose of the purposive sampling questionnaire was to construct a player sample with both a high interest in the topic of this study and strong suitability for it. The design of the sampling questionnaire was primarily based on its ability to provide effective data for subsequent analysis and to align closely with the research questions of this study.

In this study, gender and age were not essential to the core content. To retain some background information for the sample description, the study chose to replace age and gender with more relevant questions. For instance, Questions 2 and 3 in the sampling questionnaire—" Approximately how long have you been playing games?" (which may be more useful than age for understanding players' familiarity with game conventions) and " Have you studied or been exposed to arts, design, film, literature, or related fields?" (which may help explain if certain players had a higher sensitivity to visual storytelling)—served this purpose. Questions 4 to 6 related to preferences for images versus text, and Question 7, which asked about the types of games participants usually played, aimed to understand if they had experience with text-heavy narrative games. Questions 8 to 13 were designed to gauge participants' level of emphasis on game narrative and visual storytelling. However, in the subsequent data analysis, the study still included details such as racial/cultural background, gender, and age distribution when describing participants. This information provided a deeper understanding of the sample's representativeness and diversity, particularly when the test content involved cultural contexts. These questions served to ensure that participants aligned with the specific user profile required for this study, thereby enhancing the quality of subsequent interviews and the validity of the research findings.

Semi-Structured Interviews

After questionnaire screening, selected participants underwent one-on-one semi-structured interviews conducted online via video conferencing tools (e.g., Zoom), with screen sharing enabled for gameplay observation. Each session lasted approximately one hour, divided into 40 minutes of gameplay and 20 minutes of interview.

During the testing of the game and the interviews, all sessions were conducted offline. Key observations were documented in real-time while monitoring participants' gameplay behaviors. With participants' consent, the entire interview process (including video) was recorded.

Following the interviews, all audio recordings in this study were collected using the Voice Memos application built into Apple iPhones. This software allowed direct connection to external applications for text transcription. In this study, Baidu Cloud—a Chinese software—was utilized for its voice-to-text transcription feature. This tool automatically distinguished between different speakers and generated timestamped transcripts. After transcription was completed, the researcher thoroughly read all transcripts and performed manual crossverification against the original recordings to correct potential errors, ensuring the final transcriptions accurately captured participants' perspectives.

The interview questions were designed to gain in-depth insights into participants' subjective experiences during gameplay from multiple perspectives, with a particular focus on their cognitive processes regarding non-linear narratives and audiovisual language (AVL). The structure was divided into six sections, labeled a through f, while the questions themselves followed a continuous numbering system.

Sections a to c primarily employed open-ended questions, allowing players to freely recall and describe their experiences. This approach helped identify the most spontaneously formed and vivid first impressions participants had of the game, thereby assessing whether the overall narrative and emotional tone aligned with the design intent. It also served to determine whether participants could comprehend the game's story content and emotional undertones, creating a natural transition to the subsequent section.

Section d focused on the game's narrative design and comprehension, forming the core of the interview. The primary objective of this section was to verify whether the visual guidance and environmental storytelling in the game successfully replaced traditional text as the main means for players to understand the story. It began with Question 8, which explored whether players encountered any confusion during gameplay. Since the tested game did not explicitly address non-linear narrative elements, any confusion reported by participants would indicate areas where AVL visual effects could be enhanced to make temporal and spatial transitions more intuitive. This question was primarily designed to inform future iterations and improvements. Questions 9 to 12 inquired whether participants noticed specific visual effects (such as chromatic aberration or distortion), how they interpreted these effects, whether they could associate them with narrative information like temporal or spatial shifts, and if they recognized that these cues were designed for non-linear storytelling. Additionally, these questions aimed to understand participants' interpretation of stylistic visual changes (e.g., black-and-white versus color) within the game. Question 13 shared the same purpose as Question 8.

Section e continued the exploration of visual experiences from Section d. Based on participants' responses to the previous questions, this section asked them to provide examples and elaborate on their most memorable visual experiences. It further investigated whether the elements that contributed to these visual experiences helped them understand the game's story or the emotions of the characters. Rather than directly asking about the AVL-designed non-linear narrative components, participants were encouraged to actively recall and evaluate the visual elements that left a strong impression on them and explain how these elements aided their comprehension of the story and emotions. This approach helped the research uncover unexpected yet effective visual narrative details. Finally, Section f served a similar purpose, gathering constructive feedback to provide direct references for future improvements to the game.

4 Analysis of AVL in non-linear games

Based on the research direction of this study and the aforementioned explanations of non-linear narrative games, the following three games—which are relatively relevant and personally favored—have been selected as examples to concretely and further illustrate what non-linear narrative entails in games, or more specifically, how non-linear narrative games are defined within this research. Similar to the two films mentioned earlier, these examples also employ specific visual treatments through AVL to manipulate elements such as time and space. Therefore, the analysis of how AVL is manifested in non-linear narrative games will be conducted on the basis of understanding what constitutes a non-linear narrative game.

4.1 428: Shibuya Scramble

Based on the preceding content and the game flowchart in Figure 3 below, it can be observed that the narrative approach of *428: Shibuya Scramble* (Spike Chunsoft, 2018) is linear in terms of its chronological structure, as events are arranged in a vertical temporal sequence. However, during gameplay, players are required to switch between different characters at specific time points to advance the story through interaction. This design closely resembles the multi-perspective narrative technique seen in Rashomon.

Yet, unlike the film, the game incorporates interactive design elements that introduce numerous branching paths. For example, failing to make a suitable choice may lead to a "bad ending," as illustrated in Figure 3. This does not necessarily indicate an incorrect choice but rather represents one of multiple possible outcomes. Similar to the protagonist in *The Butterfly Effect* (2004), players can return to a specific point in time. To illustrate, Figure 3 features two characters, Kano and Achi. When progress in Kano's storyline becomes blocked, players must reverse time and switch to Achi's perspective to uncover additional clues that can influence Kano's storyline. As a result, the "bad ending" associated with a particular character may change based on different choices, allowing the game to proceed.

This is precisely why I consider it a non-linear narrative game. As Dam (2021) stated, "A story is typically linear and a game is non-linear." The game exemplifies how the design of game mechanics can transform an otherwise linear story into a non-linear narrative experience, thereby qualifying it as a non-linear narrative game.

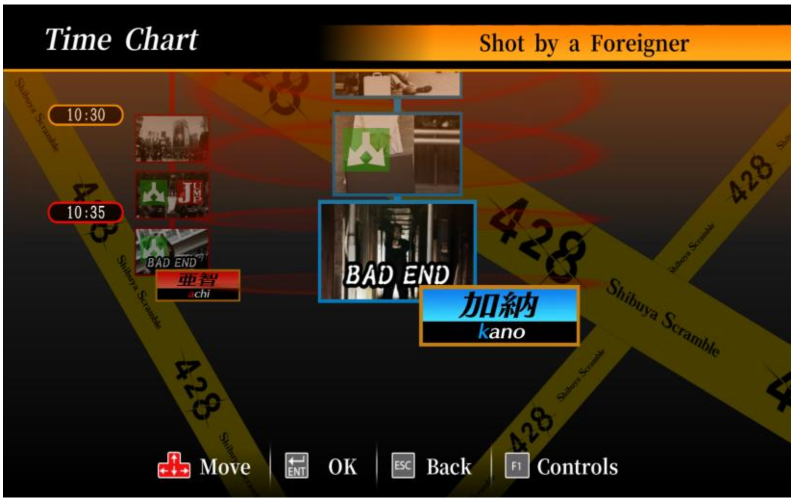

Figure 3 The game story flow interface of *428: Shibuya Scramble*

4.2 STEINS;GATE

The aforementioned game leans more towards interface-driven interactive visual storytelling, representing a new form of "audiovisual language" uniquely suited to the gaming medium. However, a notable issue arises when players resume the game after a long break from a saved point: they often struggle to pick up directly from the save node. This is because players may have largely forgotten the game mechanics, requiring significant time to re-adapt to the gameplay. This challenge is even more pronounced for players who naturally find it difficult to maintain focus on text-heavy explanations.

Therefore, this study aims to leverage visual effects (such as color) and narrative techniques (such as storyboarding and montage) from AVL, combining them to enable players to more intuitively recognize the reasons behind these visual changes.

For instance, in the opening segment of *Steins;Gate* (5pb. and Nitroplus, 2015), there is a scene where the protagonist sends an email to a companion. Following this, distinct visual changes occur: all characters originally present in the scene disappear. Prior to this moment, the game had made no mention of core concepts such as worldline shifts, time reversal, or time travel. Yet, upon witnessing this scene, the immediate reaction is the intuition that the protagonist's timeline may no longer be the same as the one from which the email was sent.

In terms of visual presentation, the moment the protagonist presses the "send" button, the entire visible game interface undergoes a distortion-like effect. Following this distortion, the absence of characters in the scene further underscores the change. These two visual cues strongly suggest to players that something has gone awry, prompting them to form their own hypotheses about the upcoming core plot and better prepare for its developments. Later, even after the narrative explicitly confirms that a worldline shift has occurred due to time reversal, the game continues to employ visual distortions in the environment to signify changes in the protagonist's timeline, as illustrated in Figure 4.

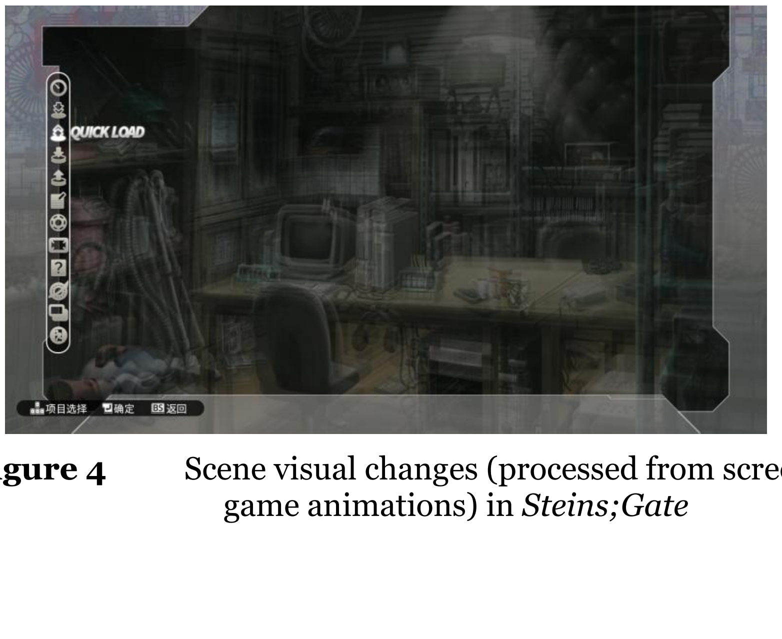

Figure 4 Scene visual changes (processed from screenshots of in-game animations) in *Steins;Gate*

Figure 5 Bananas passing through the time machine (left) and normal bananas (right) of *Steins;Gate*

Furthermore, the game employs color to represent different states of the same object, as illustrated in Figure 5. The leftmost banana, depicted in green with a bubbly texture surrounding it, has passed through the time machine. In contrast, the two bananas on the right remain in their normal yellow state. The use of color differentiation enables players to recognize these as the same object in different states intuitively.

4.3 AI: The Somnium Files

In the game *AI: The Somnium Files* (Spike Chunsoft, 2019), color is also utilized in multiple instances to support non-linear narrative elements related to changes in time and space. As seen in the red outlined sections of the two images in Figure 6 below, the image on the right exhibits a chromatic aberration effect compared to the one on the left.

In visual representation, chromatic aberration is a form of Glitch art. It deliberately separates rainbow-like spectral bands at the edges of objects to mimic the effect of light passing through a prism in optical dispersion. According to Marqués Ibáñez (2019, p. 1185), "Glitch art is created by modifying digital files to produce a technical fault. Files are manipulated through hardware to generate errors in still or moving images." Chromatic aberration incorporates such errors—a visual technique that separates RGB color channels to produce spectral bands at the edges of the frame. Simply put, this technique processes the original image by separating it into red, green, and blue channels based on the RGB color model. These three separate images (red, green, and blue) are then slightly displaced and overlaid back onto the original image, creating an effect that makes the picture appear distorted or faulty.

In this game, chromatic aberration is applied during scene transitions. The effect appears when the player needs to switch from one location to another. This serves a similar purpose to the distortion effect shown in Figure 4 mentioned earlier for representing spatiotemporal changes. It demonstrates that both chromatic aberration and distortion visual effects can, to some extent, represent phenomena that break normal physical laws or indicate a character's unusual psychological or physiological state. For example, the rapid location switch depicted in Figure 6 and the character's dizzy, headache-induced dazed state during spatiotemporal transformation in Figure 4 both utilize glitch art visual techniques to provide psychological cues to the player.

Figure 6 In the red squares is the highlight of Chromatic aberration in game *AI: The Somnium Files*

Figure 7 depicts content from the game where a character uses a device to enter another person's dream and sees elements of that individual's inner world. This presents a clear visual contrast to the vibrant, realistic locations shown in Figure 6 above. In this game, the distinction between the inner world and the game's reality is conveyed by removing color, leaving only black, white, and grey.

Figure 7 Individual's inner world of *AI: The Somnium Files*

Furthermore, color is cleverly utilized to achieve a visual guidance effect, as shown in Figure 8. It can be observed that the content within the red box on the left side of Figure 8, similar to the character within the red box on the right, retains color. This causes these two colored elements to stand out against the surrounding monochromatic environment, thereby guiding the player's gaze. It allows players to recognize that the colored areas are precisely where interaction is required or possible, effectively signaling points of interest or specific interactive actions within the otherwise desaturated dreamscape.

Figure 8 Color contrast of *AI: The Somnium Files* (In the red squares is the highlight of the colored items)

Beyond guiding the player's gaze, the contrast between color and monochrome also serves to support non-linear storytelling. As shown in Figure 9, interacting with colored objects (within the red box on the right side of Figure 9) in this game allows players to access specific memory fragments belonging to the owner of this inner world. By continuously collecting these memories, players can progressively unlock sections that were previously sealed (within the red box on the left side of Figure 9).

Figure 9 In the red squares is the highlight of the Memory unlock interface and the colored item of *AI: The Somnium Files*

The analysis of the aforementioned games primarily aims to understand how current market titles utilize the previously discussed narrative techniques and visual effects within Animated Visual Language (AVL) to design non-linear structures. This ensures that the game content selected for the subsequent case study aligns effectively with the research objectives. Furthermore, these analyze s serve as a reference for evaluating whether the designed questionnaire content and semi-structured interview questions are effectively targeted, thereby safeguarding the validity of the research data.

5 Case Study

5.1 Project

This case study is based on a game project titled "Clear and Bright," which I participated in developing. Clear and Bright tells the story of a young woman with dissociation who returns to her hometown to visit her ailing grandmother. Dissociation can be simply described as a psychological state where individuals under intense stress, anxiety, or trauma feel as if they are observing themselves and their surroundings from a detached perspective. For example, they may perceive themselves seeing the top of their own head or watching all people in a vehicle from an external viewpoint. This creates an unreal, dream-like sense of separation from one's body and environment, often accompanied by emotional numbness, loss of self-identity, and distorted time perception. The game begins during the modern-day Qingming Festival (Tomb-Sweeping Day) in spring—a traditional Chinese holiday centered around ancestral worship, grave-sweeping rituals, and spring outings. The overall tone of the game is melancholic.

A pilot test was conducted prior to the formal study. At that stage, the game program was not yet operational and contained only a single scene. The test was administered using a video of the gameplay flow and a prototype. The primary objectives were to evaluate the questionnaire's validity and to determine whether players could comprehend the intended implications of the blurred effects within that single scene.

The pilot test results revealed that the questionnaire lacked questions regarding players' gaming experience and artistic background. This information was deemed necessary to control for the potential influence of these factors on the perception of AVL design. Additionally, feedback indicated that players' responses to the simple layer-switching technique used for the blurring distortion effect were ambiguous. Consequently, for the formal gameplay test, the blur distortion effect was significantly enhanced and redesigned. Furthermore, three additional scenes with corresponding AVL visual designs were incorporated.

In the game, specific AVL visual expression techniques, informed by the analysis of the aforementioned games, would be employed to design effects that align with the game's plot. The game begins with the protagonist sitting inside a train carriage, as shown in Figure 10. Chromatic aberration combined with screen distortion is used from a first-person perspective to indicate that the protagonist is currently in an abnormal state. The game's setting establishes that the protagonist suffers from dissociative symptoms, leading to episodes of detached self-awareness, blurred consciousness, dizziness, and other similar symptoms. This condition will be explained through text, and the player's objective is to help her regain her sense of self. These visual effects are thus designed as the first visual cue to represent her psychological state.

Players are free to explore the train carriage. Interactive points are marked with cursors. By interacting with these points and gathering information, players work towards the goal of helping the protagonist regain her self-identity. Within this chapter, besides the main carriage scene shown in Figure 10, players can explore two additional areas: an adjacent carriage compartment and the protagonist's own seat.

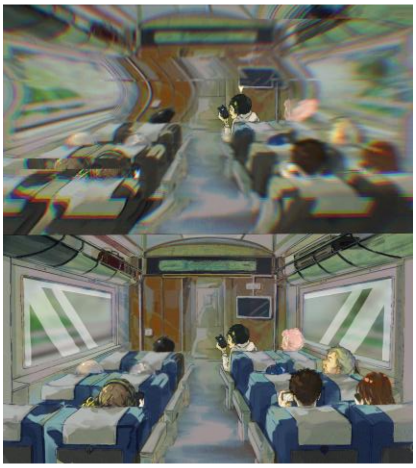

Figure 10 The compartment with dissociative symptoms and the normal compartment

Upon collecting the necessary information and achieving the goal of helping the protagonist regain her self-identity, the scene returns to the protagonist's seat, where she has now returned to a normal state. However, her mother calls, and players can choose whether or not to answer the call based on their own preference. Nevertheless, if the call is declined, the phone will continue to ring repeatedly.

After the phone conversation concludes, a short animation plays, depicting the protagonist hanging up and turning to look out the window. Towards the end of this animation, a second designed visual effect is introduced, as shown in Figure 11. This image represents the final frame of the animation, illustrating the transition between the present (in color) and the past (in black and white). The latter part of the animation features a transition from a fully black-and-white scene to the left half gradually regaining color. Additionally, a blur-to-clear effect is applied.

Beyond simply distinguishing between the present and the past, this visual treatment aims to metaphorically reflect the protagonist's previously dissociative state, suggesting the lingering fragility or overlap of her perception between different states of consciousness.

Figure 11 Present and past performance

The following section constitutes Chapter 2 of the game. While the previous chapter depicted the protagonist returning to her hometown by train, this chapter focuses on the events after her arrival home. Similar to the previous chapter, players can freely explore the environment, as shown in Figure 12.

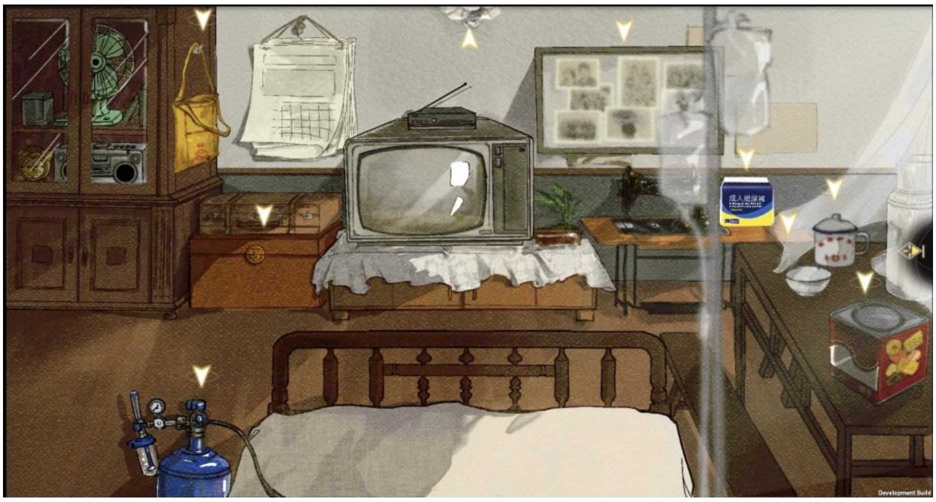

Figure 12 Scene from Chapter 2

When players interact with objects marked with cursors, the items will be enlarged and displayed alongside textual descriptions, as shown in Figure 13. Unlike the previous chapter, progression in this chapter is primarily driven by collecting items, although text still serves an auxiliary function.

Figure 13 Item interface

Figure 14 Item collection interface

Upon completion of the collection process, as shown in Figure 14, players will then proceed to the main task of Chapter 2, illustrated in Figure 15. This task requires players to sequence the collected items in chronological order based on limited textual cues. After completing the sequencing task, the game will return players to the original scene depicted in Figure 12.

Figure 15 The mission interface of Chapter 2

Upon clicking the items again, an animation related to the specific item will be triggered - this constitutes the third designed element. The animation content depicts the grandmother's memory associated with that particular item. Currently, only two animations have been completed, as shown in Figure 16. The visual design employs black and white to represent past events while using color to depict present moments.

Figure 16 Item animation frames

Therefore, this study will analyze participants' responses during the semi-structured interviews conducted after they complete the entire gameplay process. The entire testing process was conducted offline, with researchers documenting participants' gameplay behaviors throughout all stages from questionnaire completion to gameplay sessions. For participants unable to attend in-person testing, the procedure was administered via Zoom meetings. Following participants' consent, these sessions involved screen sharing, screen recording, and audio recording. The objective is to verify whether the three aforementioned design elements effectively fulfill their intended purposes.

Specifically, the analysis in this study will focus on three key aspects during the interviews:

1. Whether participants can recognize the connection between the chromatic aberration/distortion effects and the protagonist's dissociative state.

2. Whether the design of the visual representation successfully conveys the narrative intention of the transition between time and space.

3. Whether the visual representation design effectively realizes the intention of emotional perception through visual content.

6 Analysis

Based on participants' responses to Questions 4-13 in the Purposive Sampling Questionnaire (PSQ) and combined with a comprehensive analysis of interview dialogues, this study ultimately selected five participants who met the criteria as eligible participants for data analysis. To protect participant privacy, this study will refer to these five individuals using the identifiers A through E. During the participant screening process, an additional participant (F) was initially selected as part of the sample, as they largely met the screening criteria. However, the specific reasons for their subsequent exclusion from the final data analysis will be explained in the Discussion section. Here, the focus is on explaining why these six participants were initially identified as eligible for the study sample. Based on the collected data, here is a brief introduction to the backgrounds of the six participants. According to the interview content, all six participants were from China and identified as female. This helped eliminate potential misunderstandings of the AVL color design and game narrative due to cultural differences. Data from PSQ Q2-3 indicated that only Participant C had relatively limited gaming experience (1–3 years). Additionally, C was the only participant without any background knowledge in the arts. Through in-depth semi-structured interviews with these six participants from diverse backgrounds, the study aims to explore the roles of Animated Visual Language (AVL) in non-linear narrative games and identify which aspects of AVL contribute to the storytelling in such games. All participants were selected via purposive sampling. Each of the six participants demonstrated a strong interest in narrative games, as all answered "Yes" to Question 5 in the Purposive Sampling Questionnaire: "Do you enjoy narrative content in games?". In PSQ Q8, all six participants indicated that they enjoyed narrative content in games. An issue arose with PSQ Q11. Participants B and F selected "do not enjoy narrative-driven games." In principle, not enjoying narrative-driven games could indicate a lack of interest in the type of games investigated in this study. However, both participants simultaneously indicated that they enjoyed narrative content within games. This contradictory response made it impossible to determine their potential interest in non-linear narrative games based solely on questionnaire data. Therefore, both participants were included in the sample for further screening through subsequent interviews. In PSQ Q12 - "In narrative games, how frequently do you engage in the following behaviors? (1[Never]-5[Always])" - only Participant A reported a relatively low frequency (3) of skipping in-game text, while the other five participants reported high (4) or very high (5) frequencies of skipping textual content. Therefore, all six participants demonstrated a preference for game narratives while frequently skipping textual content, which aligned with the target user profile in this study (players who are not adept at narrative games). This behavioral pattern confirmed their suitability for the research focus. However, significant differences were observed in their approaches to analyzing and processing complex narratives within games.

6.1 Player classification and analysis framework

This study will utilize questionnaire data and interview content to provide a detailed analysis of the choices and behaviors of the five participants, thereby establishing a player typology framework for narrative-driven games. The player typology framework mentioned in Hamari and Tuunanen's (2014, p.33) research indicated that various player classification systems had been established in prior literature and discussions. As referenced by Hamari and Tuunanen (2014, p.44), Bartle's player type taxonomy, illustrated in Figure 17, included key concepts such as "Achievement," "Exploration," "Sociability," "Domination," "Immersion," and "In-game demographics." However, Hamari and Tuunanen (2014, p.37) noted in their study that Bartle's original player type framework was developed based on observations of player behavior in Multi-User Dungeons (MUDs). Several of these core concepts proved unsuitable for the narrative-driven, non-linear games examined in this research. Specifically, concepts like "Sociability," "Domination," and "In-game demographics" could not be effectively evaluated within the context of single-player, non-linear narrative games.

Concept	BARTLE 1996	LASSARO 2004	WHANG & CHANG 2004	IP & JACOBS 2005	WILLIAMS ET AL 2006	YEE 2006 / 2007 / 2012	DRACHEN ET AL. 2009	HAMARI & LEHDONVIRTA 2010	TSENG 2010	ZACKARIASSON ET AL. 2010	KALLIO ET AL. 2011	STEWART 2011
Gaming intensity and skill *(Hardcore, Committed mentalities, Aggressive gamer, Veteran, Casual, Casual mentalities, Inactive gamer, Pacifist, Avatar level, Amateur)*				✓			✓	✓	✓		✓	
Achievement *(Achiever, Single-oriented player, Guardian/Achiever, Aggressive gamer, Achievement, Progress & provocation, Power & domination, Runner, hard fun, Casual (Stewart), Avatar level, (Semi-) professional)*	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓
Exploration *(Explorer, Solver, Rational/Explorer, Aggressive gamer, Social gamer, Immersion, Exploration & Fantasy, Story & escapism, curiosity)*	✓	✓				✓*	✓		✓	✓		✓
Sociability *(Socialiser, Social mentalities, Community-oriented player, Idealist/Socialiser, Social, Helping & support, the people factor, Friends & Collaboration, (Semi-)professional, Amateur)*	✓	✓	✓		✓	✓			✓	✓	✓	✓
Domination *(Killer, Artisan/Killer, Aggressive gamer, Off-real world oriented player, Progress & provocation, Power & domination, Casual (Stewart))*	✓		✓						✓	✓		✓
Immersion *(Immersion, Committed mentalities, Exploration & fantasy, Story & escapism, Off-real world oriented player, altered states, Hardcore (Stewart))*		✓	✓		✓	✓				✓	✓	✓
In-game demographics *(Avatar class and profession, non-clan member, Amateur, (Semi-) professional, Group centrality, Size of the guild, Type of server, Faction)*					✓			✓				

Figure 17 Concept-centric listing of the player typologies in game research by Hamari and Tuunanen (2014, p.44)

Therefore, this study summarizes and simplifies the classification of players' core drivers based on applicable conceptual content, establishing a classification standard more suitable for narrative-driven games. For instance, "Achievement" aligned with the pursuit of logic, "Exploration" corresponded to deep deconstruction, and "Immersion" related to emotional reception. These three aspects represented the most probable core drivers for players in narrative-focused games.

This analytical approach aims to facilitate understanding of the reasons behind participants' (target users') varying feedback regarding the test game. It also seeks to refine the screening process for key target user groups and refine the focus on potential user demographics.

The data used for analyzing participant backgrounds and constructing player profiles is sourced from the two questionnaires mentioned above:

1. The Purposive Sampling Questionnaire (PSQ), which contains 10 questions designed to assess participants' gaming preferences and narrative focus.

2. The Pre-game Questionnaire (GQ), which contains 8 questions aimed at exploring participants' pre-existing attitudes towards non-linear narratives and audiovisual language.

To facilitate the classification of different player types, this study will categorize players based on their core behavioral drivers when processing game narratives, grouping those with similar driving mechanisms together. According to the GQ questionnaire, the classification framework primarily considers three core drivers: participants' approach to processing narrative information in games, their emotional reception drivers for game narratives, and their gameplay participation patterns. These categories will be further refined by incorporating observations from participants' gameplay processes and interview content.

The analysis of the three driving mechanisms will be conducted as follows:

First, participants' approach to processing narrative information in games (GQ Q4).

4. In games, when you encounter ambiguous or symbolic scenes, you usually: (Single choice)

a. Carefully observe the visuals, lighting, and colors, looking for environmental clues to interpret them.

b. View them as part of the artistic style and do not delve deeper.

c. Feel confused and might lose interest because of it.

Next, participants' emotional reception drivers for game narratives (GQ Q2).

Participants who prioritized visual cues (e.g., character expressions, specific visuals) are identified as visually-driven emotional receivers, relying predominantly on audiovisual stimuli for emotional immersion. Those who emphasized dialogue and text are classified as textually-driven emotional receivers, depending on linguistic narrative construction. Participants who highlighted gameplay mechanics or music/sound design are categorized as mechanically-driven or aurally-driven emotional receivers, respectively. These classifications will be cross-referenced with observed gameplay focus and interview insights to validate alignment between stated preferences and actual behavioral patterns.

2. How do you prefer to experience emotional moments in games? (Single choice)

a. Through dialogue and text

b. Through visual cues (e.g., character expressions, specific visuals)

c. Through gameplay mechanics (e.g., interactive sequences)

Participants selecting option a are classified as textual/logical-driven, those choosing b are categorized as visually-driven, while participants selecting c are identified as mechanically-driven.
The final classification element is participants' gameplay participation patterns (GQ Q7).

7. In narratively complex games (e.g., multiple timelines, unreliable narrator), how do you ensure you understand the story? (Multiple choice)
a. I take notes or pay extra attention to details.
b. If I miss something, I replay sections.
c. I discuss with others or look up explanations.
d. I don't strive to understand everything.
Participants selecting any option from a to c are classified as the Active Construction type, while those choosing only option d are categorized as the Passive Reception type.

Thus, the driving mechanisms are determined based on participants' questionnaire responses. Combined with participants' gameplay behaviors and interview content, the player types to which they belong are defined and categorized. The five participants are divided into four distinct types.

6.1.1 The Logic-Seeker (A)

The Logic-Seeker is primarily driven by the pursuit of clear, rational, and self-consistent narrative content. This indicates that this player type thrives in games where the storyline is inherently well-structured and logical, allowing them to passively comprehend the entire narrative framework through engagement, thereby perceiving the content as coherent. Based on this characteristic, the corresponding behavioral patterns for this type include: an intuitive-perceptive approach to narrative processing, a text/logic-driven emotional reception, and an active-constructive gameplay participation style.

Key traits of such players include: explicitly referencing logic-related aspects (e.g., criticizing "illogical plot development," "unclear storytelling," or "implausible scenarios"); resorting to logical analysis as their first response when encountering confusion; and believing that visual content must convey clear logical meaning—otherwise, it is deemed ineffective information.

By comprehensively analyzing the participants' questionnaire data, gameplay behavior, and interview responses, it is evident that among the five participants, only Participant A aligns with the classification criteria of "The Logic-Seeker." In the questionnaire, A explicitly stated that "draggy pacing or logical flaws in the plot" would lead to frustration and break immersion (GQ Q8). Although A selected option c (gameplay-mechanics-driven) for emotional reception drivers (GQ Q2), considering their repeated emphasis on narrative logic during the interview, this driving mechanism can be interpreted as a pursuit of systemic logic within the game, thus categorizing them as logic-driven. In terms of gameplay participation patterns (GQ Q7), A chose option a, indicating an active-constructive player type, which further corroborates their tendency to proactively analyze story logic despite their focus on game mechanics.

Notably, in narrative processing approaches (GQ Q4), A selected "carefully observe visuals, lighting, and colors to seek environmental clues for interpretation," which fully aligns with the Logic-Seeker's behavior of seeking logical cues through visual elements. During the interview, A's critique of the game's "weird logic" and their ability to precisely identify design elements that resonated with them (such as their insight into "horror rooted in women's social significance," which corresponded to intentionally designed narrative moments) vividly demonstrate this player type's capacity to spot logical inconsistencies while deeply deconstructing the narrative core. Additionally, A's preferred game genre is "action-adventure" (PSQ Q7), which strongly aligns with their inclination toward clear objectives and logical progression, a direct manifestation of The Logic-Seeker archetype.

6.1.2 Deep-Deconstruction Player (B, C, D)

The Active Deconstructor is characterized by a strong affinity for narrative puzzles. This type of player enjoys the process of interpreting, analyzing, and solving narrative puzzles itself. They tend to systematically analyze the content provided in the game, paying closer attention to visual cues compared to other player types, as they require abundant clues to draw conclusions. These players may engage in proactive analytical behaviors, such as "taking notes," "replaying sections," or "discussing with others/looking up explanations." They intensively focus on collecting visual clues they deem potentially useful as material for analysis, indicating that they prioritize actionable clues over purely textual information. They appreciate visual variations in games and analyze the reasons behind them, while also being able to experience emotions through visual storytelling.

Based on these traits, the corresponding driving mechanisms for this type are: proactive-analytical narrative processing, visual/mechanics-driven emotional reception, and active-constructive gameplay participation.

By integrating participants' questionnaire responses, gameplay behaviors, and interview content, it can be concluded that among the five participants, B, C, and D meet the classification criteria for The Active Deconstructor. Although they belong to the same category, their focal points during information analysis differ. These players can be further subdivided into three distinct subtypes based on their analytical logic and deconstructive focus: Logical Deconstructor (B), Practical Deconstructor (C), and Interpretive Deconstructor (D).

Logical Deconstructor (B)

Participant B, identified as an avid reader (rating 4 on PSQ Q4), demonstrates a strong appreciation for narrative itself. However, B frequently skips dialogue (PSQ Q12, 4/5), indicating a focus on core clues rather than textual content alone. Furthermore, B's selection of option b in GQ Q2 suggests a preference for gathering clues through visual presentation, though it's also possible B primarily focuses on gameplay mechanics themselves. B reports frequently playing "action-adventure" games (PSQ Q7) and mentioned during the interview having studied Game Design. As action-adventure games are largely mechanics-driven, this may explain why B, despite enjoying reading and narrative content in games (PSQ Q8: "Yes"), frequently skips dialogue.

To ensure comprehension of complex narratives, B employs multiple proactive strategies: "taking notes or paying extra attention to details," "replaying sections if something is missed," and "discussing with others or consulting explanations" (selected a-c in GQ Q7). These behaviors demonstrate a strong tendency towards deconstructing and analyzing game content, indicating that players like B deconstruct stories through active analysis, replaying, and discussion.

Notably, in narrative processing approaches (GQ Q4), B selected "Feel confused and might lose interest because of it", yet both gameplay behavior and interview responses revealed B's propensity to interpret ambiguously defined visuals independently. Interview content suggests this stems from B's enjoyment of interpretation and analysis, successfully forming their own conclusions during testing, albeit with some uncertainty. While many other participants were in similar situations—facing ambiguity but holding their own interpretations—B was the only one who selected option c. This further confirms B's strong willingness to actively analyze and interpret, even proactively analyzing and forming views on content they themselves might find confusing or potentially tedious.

During the interview, B explicitly stated treating animations as clues requiring analysis: "The animation part currently has no text, no sound; it's my hypothesis. I want to verify my conjecture." B also remarked, "I feel this game is very much like a puzzle game. It contains many puzzle elements that require me to read carefully and observe the text," and "I think a mystery throws a question at the player, making them feel like they understand but also don't, prompting me to explore further." B perceives the gameplay process as solving puzzles and enjoys the reasoning process, even if the game might not strictly be a puzzle game. Consequently, B's interview is filled with vocabulary such as "hypothesizing," "verifying," "exploring," "solving puzzles," "mystery," and "questions."

Thus, players of the Logical Deconstructor type employ a specific logical system during active analysis. B clearly identified a clue requiring decryption, analyzed it, hypothesized its role within the game's narrative structure, and then sought other clues for verification. If the game itself didn't provide verification, B would employ alternative methods to verify, as indicated by their responses in GQ Q7.

Practical Deconstructor (C)

Participant C has relatively limited gaming experience and mentioned never having played emotion-perception type games before (GQ Q3). However, C frequently plays puzzle games (PSQ Q7) and also enjoys reading (rating 4 on PSQ Q4). Furthermore, C frequently skips dialogue (PSQ Q12, 4/5). These points are identical to Participant B.

C tends to focus on the image portion first (PSQ Q6) and selected option b in GQ Q4, indicating an intuitive visual perception style. In GQ Q2, C selected option b, classifying them as visually-driven. Although C's questionnaire response suggested they might interpret meaningful visuals merely as artistic style, the interview revealed that C can indeed perceive the meaning in ambiguous visual representations. C was able to describe in detail the significance and narrative function conveyed by the visual effects.

Regarding the visual effects in the train carriage, C described: "It gave me the feeling that the person involved is in a very fragmented state. Her memories seem a bit blurry. It's as if, like her, the entire environment is distorted and interlaced—a kind of unclear, hard-to-see feeling. I wondered if her memory might be having problems, or if her mental state isn't very good."

In GQ Q7, C selected option b ("If I miss something, I replay sections"), indicating an active-constructive type. During the interview, C expressed a willingness to verify initial ideas through subsequent gameplay: "This is my hypothesis. I want to verify my conjecture." This shows that C views "replaying" as a practical means to confirm guesses and fill in comprehension gaps.

This represents a key difference between C and B. B seeks methods for verification to enable deeper investigation and analysis. In contrast, C's proactivity is reactive—only returning to replay and complete information when they realize they haven't understood something. B's approach is more systematic and sustained.

Interpretive Deconstructor (D)

Participant D selected option a in GQ Q4, indicating a proactive approach to analyzing visuals with ambiguous meanings. In GQ Q2, D chose option b, classifying them as visually-driven. D also consistently tends to focus on images first (PSQ Q6), a preference corroborated during the interview. D was able to perceive an anxious atmosphere from the visual design where "the dialogue box filled the entire screen" without any sound, describing it as "chaotic and noisy, with the mother seeming overwhelmed." Additionally, D directly interpreted emotional undertones of "not a happy feeling" from color tones and character animations.

D selected option d in GQ Q7 ("I don't strive to understand everything"), which categorizes their overall mode as passive-acceptance. However, interview content suggests that what D chooses not to pursue understanding of likely refers to all logical details within the game's narrative, rather than the core themes the narrative intends to convey to players. D actively connected disparate characters into a clear thematic thread: "Grandma, mother, and herself, plus the girl on the train and the mother with a child, and the pregnant woman jumping on the table. I think it might hint at issues related to children and mothers, or perhaps matters concerning female pregnancy." D's deconstruction of the test game focused entirely on the social and emotional connotations of the story. D was also the second tester to indicate sensing the game's thematic concern with women's issues. This highlights the key difference between D and participants B and C: although all three analyze through visual representation, D's analysis lacks B's systematic approach and doesn't share C's desire to replay sections. What drives D's deeper investigation is how the game's visual content resonates with them regarding women's social issues.

Furthermore, like B and C, D shows a high tendency to skip dialogue (selecting 5/5 in PSQ Q12). However, during the interview, D explicitly stated: "I usually don't follow the plot, but now I feel like I understand the story very well. The game forced me to figure out this plot." This might be because the game's overall text volume is quite limited, requiring participants to rely more on other clues. Although the visual presentation sparked their hypotheses, they still needed additional clues to verify their conjectures. Consequently, participants who prefer skipping text might observe the textual content more carefully when it is presented.

In the interview with B, they mentioned: "I'm quite resistant to reading large blocks of text, especially those that are rambling and verbose." B also noted: "The reason I read carefully was that the text was very large, placed in the center of the screen, combined with the black background and white text. Also, the text volume seemed very small, and the reading pace matched my usual reading rhythm." Concise text volume and distinctly different text visual effects might also make it easier for such participants to engage with the text. C did not explicitly mention paying more attention to the text, but during gameplay, C repeatedly examined item descriptions, aligning with their stated willingness in GQ Q7 to replay sections, thus indirectly confirming their attention to the game's textual content.

6.1.3 Mechanism-Engaged Player (E)

The Mechanism-Engaged Player is primarily driven by gameplay mechanics and interaction. For this player type, the narrative experience is mainly shaped by interactive choices within the game. Their criterion for evaluating a game's narrative is not its logical consistency or artistic merit, but rather whether they can, through mechanics and interaction, assume a role capable of exerting influence within the game. When the game fails to meet their "interaction" needs on a mechanical level, they exhibit a high frequency of skipping (e.g., dialogue) and regard non-interactive elements like AVL and other visual presentations as secondary, fallback channels for information. Based on this profile, the corresponding driving mechanisms are: intuitive-perceptive narrative processing, mechanics-driven emotional reception, and an active-constructive gameplay participation pattern.

By integrating the participant's questionnaire responses, gameplay behavior, and interview content, it is evident that among the five participants, Participant E fits the classification criteria for the Mechanism-Engaged Player. In the Purposive Sampling Questionnaire, E indicated a dislike for reading (PSQ Q4 score: 1) and reported a high frequency of skipping dialogue (4/5 in GQ Q11), consistent with their stated preference for visually dominant content (PSQ Q5, Q6). Furthermore, E selected option b in GQ Q4, indicating an intuitive-perceptive narrative processing style. In GQ Q7, E chose option d ("I don't strive to understand everything"), characterizing their overall mode as passive-acceptance. Crucially, in GQ Q2, E selected "c. Through gameplay mechanics" as their preferred way to experience emotional moments, confirming that they do not proactively analyze or deconstruct the narrative based on its logic. E's lack of patience with non-interactive information (like lengthy text) underscores that their primary attention is allocated to game mechanics that allow for interaction. This is a decisive indicator for identifying the Mechanism-Engaged Player type, distinguishing E from Participant A, who, despite also referencing mechanics, remains fundamentally logic-driven.

E's preferred game genre, "Role-Playing (RPG)" (PSQ Q7), further supports this classification. RPGs often use complex mechanical systems to segmentally interpret character growth narratives and build the main narrative through interactions with various characters, precisely fulfilling E's deep-seated need for "narrative serving mechanics." In the interview, E's statement that "the animations helped me understand the narrative more" should be interpreted as E turning to AVL for core information primarily when guidance from game mechanics was weak. Thus, for E, AVL functions as an effective "informational compensation tool," reinforcing that their core driver is indeed gameplay mechanics and interaction. It is worth noting that E also demonstrated an ability to glean emotional resonance from visual presentation, describing the initial blurred train carriage scene which cleared upon mouse interaction: "It gives a feeling... like returning home to commemorate a loved one, a bit sad, then detaching from yourself... watching the people in the carriage felt quite narrative, very rich in narrative flavor."

Both Mechanism-Engaged Player (E) and The Logic-Seeker (A) shared similarities yet demonstrated distinct differences in their approach to AVL comprehension. Both players treated AVL visual design as a secondary option when their primary motivational drivers remained unfulfilled, relying on more accessible visual content for analysis and understanding. However, their core focuses diverged significantly: E placed greater emphasis on whether game mechanics felt innovative and engaging, as evidenced by their expressed preference for the interactive distortion effect where blurred scenes clarified upon interaction. In contrast, A prioritized narrative coherence above all, attempting to construct logical explanations from visual cues within an incomplete game framework. This fundamental distinction was reflected in their respective interviews, where A repeatedly referenced narrative logic while E consistently centered discussions on interactive mechanics.

Based on the analysis of Participants A, B, C, D, and E, it can be concluded that the core drivers and observational/analytical approaches of players like B, C, and D (categorized as Deep-Deconstruction Players) align closely with the target user profile central to this research.

Players of Type A (The Logic-Seeker) could also constitute a target user group, provided the game's script is sufficiently robust. While the core driver of Type E (The Mechanism-Engaged Player) differs from the "mechanics serving narrative" philosophy often central to the study's target users – as evidenced by E's experience – they nonetheless were able to perceive emotional content through visual presentation, suggesting a potential avenue for engagement even for this player type.

6.2 Research Findings and Analysis

Following the classification of participants into distinct player types based on their core gaming drivers, this study will proceed to describe and analyze the responses of these different player types to the aforementioned AVL design issues and research questions.

6.2.1 Analysis of Player Responses to the Design Questions

Based on the established player typology, this study analyzed the responses of different player types to the core Animated Visual Language (AVL) design questions.

AVL Design Question 1: Whether participants can recognize the connection between the chromatic aberration/distortion effects and the protagonist's dissociative state.

Analysis revealed significant differences in understanding across player types. Deep-Deconstruction Players (B, C, D) and the Mechanism-Engaged Player (E) all successfully established the connection. The Logical Deconstructor (B) linked the visual distortion to the protagonist's "mentally unstable" state; the Practical Deconstructor (C) almost perfectly captured the concept of a "dissociative state," describing a "fragmented state," "blurred memories," and poor mental state; the Interpretive Deconstructor (D) interpreted it as "dreaming" or "memory," still grasping the core characteristic of unreality; the Mechanism-Engaged Player (E) provided the most vivid and direct description of the dissociation with "detaching yourself from your own body." Only The Logic-Seeker (A) failed to establish this connection, interpreting it merely functionally as "to focus on the content ahead." This indicates that the symbolic visualization of psychological states is highly effective for player types adept at interpreting metaphors but may not prompt deep reflection from those who are strongly logic-oriented.

AVL Design Question 2: Whether the design of the visual representation successfully conveys the narrative intention of the transition between time and space.

All players understood the spatiotemporal transitions within the narrative, but attributed their understanding to different sources. The Practical Deconstructor (C) and the Mechanism-Engaged Player (E) provided the most precise feedback, explicitly linking contrasts in color and visual style to concepts like "memory" and "different spatiotemporal states." The Logic-Seeker (A) and the Interpretive Deconstructor (D) also perceived the spatiotemporal changes but did not explicitly link this understanding to specific AVL elements; the Logical Deconstructor (B) inferred changes more through shifts in scene content. This confirms that utilizing contrast in visual style and color is one of the most intuitive and successful methods for indicating spatiotemporal changes.

AVL Design Question 3: Whether the visual representation design effectively realizes the intention of emotional perception through visual content.

All five player types could accurately interpret the intended emotions from the game's colors, tones, and visual imagery. The Logical Deconstructor (B) perceived the sadness of a "tragic story" from "black-and-white tones" and specific imagery like "leafless trees"; the Practical Deconstructor (C) experienced "irritability" from the distortion effects and felt terms like "eerie" and "horror" in specific scenes; the Interpretive Deconstructor (D) was highly sensitive to the emotional undertones of color, describing an emotional progression from "normal" to "oppressive" and finally to "overwhelming"; The Logic-Seeker (A) perceived a "horror atmosphere" from the black-and-white visuals; the Mechanism-Engaged Player (E) accurately interpreted the emotional distance (objective/warm) and narrative states (observing reality/memory) conveyed by cool and warm color tones. This solidly affirms that AVL, particularly color representation, is a powerful medium capable of directly evoking emotional resonance across different player types.

The analysis demonstrates that AVL is highly effective in facilitating non-linear narration and emotional conveyance, though its efficacy is influenced by player type. Deep-Deconstruction Players (B, C, D) reaffirmed their status as the core target users for this research, providing profound and detailed interpretive analyze s of the AVL designs. The deep understanding exhibited by the Mechanism-Engaged Player (E) indicates that well-designed AVL can also effectively serve the narrative experience for this player type. The Logic-Seeker (A) showed limited acceptance of metaphorical content, requiring more direct logical connections. Overall, AVL is a potent auxiliary tool for constructing non-linear narrative frameworks and achieving direct emotional communication.

6.2.2 Research Question & Analysis

Based on the analysis of whether participants recognized the AVL design elements in the case study, this research will now delve deeper into addressing the main research questions. The central question is: **What are the roles of Animated Visual Language (AVL) in non-linear narrative games?**

This study concludes that AVL plays a multi-layered and dynamic role in non-linear narrative games. In the case study, the visual design of AVL served as the core framework for players to understand the story beyond the text. However, the effectiveness and specific roles of different AVL components vary significantly depending on the thinking and cognitive patterns of different player types.

How does AVL help players understand the story in non-linear narrative games?

This study posits that AVL can function as a compensatory tool for game narrative and a means for constructing symbolic meaning. When in-game text is sparse or when players need to grasp concepts beyond the literal text, they can rely on AVL design to fill in the narrative gaps. This is particularly suitable for non-linear narrative games, where the deconstructed story often requires additional support, making AVL design highly applicable.

For Deep-Deconstruction Players (B, C, D), the AVL content in the game serves as crucial clues for their in-depth interpretation. B (Logical) treated AVL as "puzzle clues" to be deciphered ("It's my hypothesis. I want to verify my conjecture"). C (Practical) used AVL as a "source of hypotheses" requiring repeated verification, evidenced by their behavior of replaying sections. D (Interpretive) directly interpreted AVL as "symbolic of a theme," such as deriving feminist issues from the visuals. For these players, AVL is not merely auxiliary; it is the core object through which they interact with the story and construct personalized narrative meaning.

For The Logic-Seeker (A), AVL was expected to be a means of assisting in explaining the game's narrative logic, but the game failed to meet this need. A's functional interpretation of the distortion effect ("to focus on the content ahead") did not align with the design intent, possibly relating to A's overall critique that the "logic was very strange". When the symbolism of AVL conflicts with logic-oriented players' need for clarity, its role in aiding understanding fails and can even become a source of frustration.

For the Mechanism-Engaged Player (E), AVL primarily acted as a "channel for information compensation." As the game mechanics were not fully developed, E explicitly stated that "the animations helped me understand the narrative more." When the core driver for these players—game mechanics—fails to provide clear and effective guidance, they turn to rely on AVL as a key means of understanding the story.

How does the use of color in AVL (including conventional color and stylized techniques like chromatic aberration) and montage enhance the emotional impact of the story in non-linear narrative games?

Interview analysis revealed that: B associated black-and-white tones with the sad undertone of a "bad story." C and D explicitly described the emotional shift from the bright train carriage to the gloomy memories as related to feeling oppressed. E perceived cool tones (e.g., blue, green) as objective, calm reality, and warm tones (e.g., yellow, brown) as warm past memories.

Through the analysis of interview content, it can be stated that color is the most easily identifiable, stable, and efficient "emotional grammar" among the AVL elements designed in this study. The analysis shows that all five participants, regardless of player type, could express an understanding of the emotions represented by colors.

Therefore, this study concludes that color, as a linguistic sign within AVL, successfully enabled different player types with different core drivers to directly trigger emotional resonance. It can be said that color is the most reliable tool for constructing narrative atmosphere and distinguishing emotional spaces.

This study found that the positive or negative effects of complex AVL techniques like montage are highly dependent on player type.

For C (Practical) and D (Interpretive) types of Deep-Deconstruction Players who are more inclined to use intuition to perceive visual effects, these techniques can produce a positive emotional impact. In interviews, they could directly feel the emotional impact (e.g., oppression, breakdown) brought by these effects and found it engaging. Based on their questionnaire choices and interview statements, they do not demand immediate logical explanations after visually receiving emotions. This study believes this is why players of this type can be deeply affected emotionally.

For the Logical-Deconstructor (B), it was more like treating it as a puzzle to be solved. This feeling of not fully understanding instead stimulated B's curiosity and desire to explore. When questioned about this, B responded: "I think a mystery throws a question at the player, making them feel like they understand but also don't, prompting me to explore further."

However, for The Logic-Seeker (A), such ambiguous designs can instead cause negative frustration. In the interview, A felt annoyed and dissatisfied due to not understanding, believing the game "didn't explain it clearly." This study suggests that when the repetition and ambiguity of montage fail to provide clear narrative feedback, players who demand logicality may generate negative feedback due to confusion.

Through the lens of player typology, this research reveals that AVL in non-linear narrative games is not a single, fixed tool, but rather a multi-functional, dynamic system whose effects are modulated by players' cognitive filters.

In summary, this study concludes that AVL can act as the "non-textual skeleton" for understanding non-linear stories. Especially when textual and interactive guidance is lacking or unclear, AVL becomes the primary analytical material upon which players, particularly Deep-Deconstruction Players, rely to construct narrative meaning.

Color is the most versatile tool for emotional storytelling within the AVL system. It provides a universal language that transcends differences in core drivers, making it the most reliable means for conveying emotion and establishing the game's emotional tone. Furthermore, it can also serve as a practical tool to hint to players about changes in certain information (emotion, time, etc.) through color variations.

More experimental AVL techniques (like distortion, montage) are challenging to master but can be unexpectedly effective additives. They can create deeply immersive story experiences and intellectual challenges for players skilled at interpreting metaphors. However, they can also become comprehension barriers for players who seek logical clarity.

Through the above analysis, it can be seen that AVL has good compatibility with non-linear narrative games. It can provide supplemental narration through visual means when non-linear content cannot be expressed through text. Simultaneously, it can enhance the playability of non-linear narrative games, as players can make conjectures based on the visual effects.

Will different players have different responses to the designed AVL effects, and why?

The study revealed divergent feedback patterns across player types. The Logic Seeker (Participant A) demanded strong narrative coherence and demonstrated the lowest acceptance of metaphorical AVL effects (e.g., chromatic distortion representing psychological states), frequently interpreting them as technical flaws rather than narrative devices. These players explicitly stated that ambiguous visual metaphors disrupted immersion and caused frustration.

Deep Deconstruction Players (Participants B, C, D) treated AVL effects as core narrative clues requiring interpretation. They actively constructed meaning from abstract visuals, accurately identifying effects like chromatic aberration as representing "fragmented memory" or "mental instability." They showed strong exploratory interest in non-continuous techniques like montage, viewing the interpretive process itself as essential to gameplay enjoyment. Their subtypes exhibited distinct characteristics: Logical Deconstructor (B) maintained focus on mechanical systems, Practical Deconstructor (C) sought narrative logic, while Interpretive Deconstructor (D) prioritized emotional expression.

The Mechanism Engaged Player (Participant E) decoded AVL primarily through its relationship with game mechanics. When AVL effects were integrated with interactive mechanics (e.g., screen clarification upon clicking), they understood their narrative function effectively. However, when AVL served purely as a visual presentation, they treated it as a secondary information channel.

These differences originated from variations in players' core motivational drivers. The classification system analyzed participants' dominant tendencies through three dimensions: narrative processing modes, emotional reception pathways, and interactive participation styles. While each player type had a primary driver, all participants demonstrated blended motivational patterns.

Therefore, the analysis confirmed that AVL effectiveness in non-linear narrative games depends not only on design quality but crucially on its alignment with target players' cognitive patterns.

7 Conclusions

7.1 Summary

This study aims to explore the role of animated visual language (AVL) in non-linear narrative games. By integrating data from purposive sampling questionnaires, pre-game questionnaires, and in-depth semi-structured interviews, the research first establishes a player typology framework to explain the fundamental reasons behind the varied feedback from five participants regarding the same test game. It then delves into analyzing how different player types responded to three specific AVL design elements within the game. Ultimately, through qualitative research, it systematically addresses core research questions concerning how AVL aids in understanding story content, conveying emotions, and enhancing impact in non-linear narrative games.

Based on collected and validated questionnaire information, this study screened and ultimately analyzed the core drivers of the five participants. According to three core drivers, participants were categorized into three types: The Logic-Seeker (A), Deep-Deconstruction Player (B, C, D), and Mechanism-Engaged Player (E). The Deep-Deconstruction Player type was further subdivided into three distinct orientations: the more systematic Logical Deconstructor (B), the practical Practical Deconstructor (C), and the insightful Interpretive Deconstructor (D). Analysis of the gameplay behaviors and interview responses of these five participants revealed that the Deep-Deconstruction Player type (B, C, D) most readily comprehended the AVL content designed within the non-linear narrative game.

Furthermore, this study designed specific AVL content within the test game used for the case study and verified the design intent through participant interview responses. It was discovered that the visualization of psychological states (distortion/chromatic aberration effects) could be recognized by most players. Analysis showed that this technique is highly effective for players adept at interpreting metaphors but fails to penetrate a purely logical analytical filter. The visualization of spatiotemporal transitions (color/style shifts) was confirmed as an effective design by all participants. Similarly, all participants could accurately interpret the intended emotions (sadness, oppression, irritation, horror) from the visualization of emotional perception, such as colors (e.g., the sadness of monochrome tones, the objectivity of cool tones, the nostalgia of warm tones) and visual imagery (e.g., decaying city walls).

Consequently, this study analyzed and summarized the research questions, ultimately finding that AVL can function as a multi-functional narrative framework in non-linear games. It serves not only as an auxiliary narrative tool but also as a primary medium for emotional and symbolic communication when textual or mechanical guidance is limited. Color is the most universal and effective component within AVL, capable of transcending player type differences to convey emotional tones, signal spatiotemporal shifts, and establish narrative atmosphere. Experimental AVL techniques (e.g., montage, distortion, chromatic aberration) are highly effective for players inclined towards metaphorical interpretation and active deconstruction but may confuse or frustrate logically-driven players who prioritize clarity and coherence.

In conclusion, the core contribution of this research lies in revealing that the role of AVL in non-linear narrative games is not a singular construct but a complex, multi-layered, dynamic system. Deep-Deconstruction Players (B, C, D) represent the ideal target audience for this study; by treating AVL as puzzles, hypotheses, and symbols, they actively and multidimensionally excavate its narrative potential, fully demonstrating the diverse roles AVL can play. Color forms the emotional cornerstone of the entire AVL system and is the optimal choice for achieving emotional communication across player types. More experimental AVL techniques serve as selective tools that can significantly enhance the experiential depth for specific player groups, but designers must be acutely aware of the comprehension barriers they might create for other players.

Therefore, successful AVL design for non-linear narratives hinges not only on the visual presentation itself but, more critically, on a profound understanding and precise adaptation to the cognitive patterns of the target players.

7.2 Discussion

This study reveals that the role of AVL in non-linear narrative games is not fixed but operates as a dynamic, multi-layered system. Its effectiveness is deeply dependent on players' cognitive processing patterns and core drivers. In this research, participants were categorized into player types to better analyze how AVL produces different effects on various kinds of players.

Although B, C, and D all belong to the Deep-Deconstruction Player type, their subtypes (Logical, Practical, Interpretive) demonstrate three distinct cognitive pathways for deconstruction despite sharing a deep analytical approach: treating AVL as analyzable clues, verifiable hypotheses, and interpretable symbols, respectively.

This proves that the value of AVL lies not only in "conveying information" but also in providing "raw material for meaning construction" for proactive players. The existence of this player type greatly enriches the interpretive possibilities of non-linear narratives. Furthermore, players of this type also showed a reduced frequency of skipping textual reading due to the inclusion of AVL design.

Player A's frustration stemmed from their cognitive mode, which seeks clear logic. This is incompatible with the current test game's expressive style (symbolic, stream-of-consciousness). This indicates that "logical consistency" exists on two levels: the narrative content layer and the audiovisual expression layer. For logic-oriented players, excessive ambiguity in the latter can directly undermine the credibility of the former. However, this issue might be mitigated if the game's narrative itself is more robust and receives support from AVL visual means, or if the game provides clearer "visual logic anchors"—for example, offering a clear, logical explanatory opportunity after a distortion effect.

Player E's case is highly instructive. It shows that even when the core driver is mechanics, well-designed, intention-clear AVL can still penetrate the player's primary preferences and be effectively decoded. This breaks the stereotype that "mechanism-focused players don't care about narrative." The key lies in whether the AVL provides core information that they deem "worth" processing. Concise, powerful, and intuitive AVL (such as clear color transitions) can also serve them effectively.

This study has several limitations. It involved only five participants, allowing for in-depth qualitative analysis but insufficient for quantitative generalization. The distribution of player types requires validation with larger samples.

During data collection, another participant, F, was initially prepared for analysis but ultimately excluded from the paper. The primary screening criterion for target users was whether they enjoyed narrative content in games. All participants, including F, selected "Yes." A subsequent filter asked if they enjoyed narrative-driven games. At this stage, B and F selected "No." However, considering both had previously indicated they enjoyed reading, the decision was made to interview them both. The result was surprising. Although B selected "No" for narrative-driven games, they actually turned out to be part of the target audience for such games. F, despite selecting enjoyment of reading and having a habit of mixed text-image reading, showed during the interview that they paid no attention to the visual content whatsoever. When asked about visual effects, F mentioned "didn't notice them at all" and provided no reason for this. Therefore, this study excluded F's data from the analysis. This raises a question: why did F not attend to the visual content? Based on the player typology discussed in the analysis, F selected "through dialogue and text" for emotional experience in GQ Q2 (an option no other participant chose), "intuitive visual perception, won't delve into the meaning of visual effects" in GQ Q4, and the passive acceptance mode "I don't strive to understand everything" in GQ Q7. These three choices indicate that F's gameplay behavior pattern is completely opposite to the focus of this research. Combined with the interview content, it can be determined that F is simply not part of the target audience for the type of game used in this test. However, it remains worthwhile to increase the sample size for deeper analysis to refine the player typology, thereby enabling more precise identification of the target group and its needs.

Furthermore, the conclusions of this study are based on research of a game with a specific style (stream-of-consciousness, feminine themes, Chinese aesthetics). Their generalizability needs further testing in non-linear narrative games of different genres and themes. Participants may share certain cultural backgrounds, influencing their interpretation of specific symbols. Since the game used in this study's case study was an incomplete demo that lacked sufficient logical structuring in its narrative content, this limitation affected the judgment of Participant A, who prioritized game logic. Although Participant A was able to grasp the general story content through the AVL design despite not fully understanding the game's narrative logic, their feedback might have differed in a complete and logically coherent game. Furthermore, as the game content was related to Chinese culture, testing was conducted only among players from China. Consequently, this study could not verify whether cultural differences would impact the effectiveness of the AVL design.

In summary, this study developed a preliminary player typology framework, offering an in-depth explanation of how different player types understand the role of AVL in non-linear narratives. The research confirms that the success of AVL depends not only on its own design quality but, crucially, on its alignment with the target players' "narrative minds." Future narrative game design should adopt a more inclusive and anticipatory approach, viewing the diversity of player cognition as an opportunity to enrich the narrative experience.

7.3 Future Work

Future research should focus on validating the proposed player typology questionnaire across larger and more diverse player populations. Expanding the sample size would enable quantitative verification of the preliminary player classifications established in this study. Building upon this foundation, the player typology framework can be further developed and refined, potentially leading to more robust models for personalized narrative design.

Subsequent investigations could apply this framework to a wider variety of non-linear game genres (such as science fiction and mystery) to test its broader applicability. Longitudinal studies examining how AVL perception evolves over time, alongside cross-cultural comparisons of visual narrative interpretation, could yield valuable insights into both universal and culture-specific aspects of visual storytelling.

More targeted research on specific AVL techniques, such as montage or chromatic aberration, would allow for precise quantification of their emotional and cognitive impacts. As these investigations become more concrete and experimental, this research could ultimately contribute to the development of practical AVL design guidelines or checklists for game developers. Such tools would help designers systematically consider diverse player needs during the early stages of game development.

References

Åstedt-Kurki, P. and Heikkinen, R.-L. (1994) 'Two approaches to the study of experiences of health and old age: the thematic interview and the narrative method', *Journal of Advanced N ursing, 20*, pp. 418–421. doi:10.1111/j.1365-2648.1994.tb02375.x.

Barriball, K.L. and While, A. (1994) 'Collecting data using a semi-structured interview: a disc ussion paper', *Journal of Advanced Nursing*, *19*(2), pp. 328–335. doi:10.1111/j.1365-2648.19 94.tb01088.x.

Beiman, N. (2015). *Prepare to board! Creating story and characters for animated features and shorts*. CRC Press.

Block, B. (2020) The Visual Story: Creating the Visual Structure of Film, TV, and Digital Media. 3rd edn. New York: Routledge. doi:10.4324/9781315794839.

Campbell S, Greenwood M, Prior S, et al. Purposive sampling: complex or simple? Research c ase examples. *Journal of Research in Nursing*. 2020;25(8):652-661. doi:10.1177/1744987120 927206Cowan, P. (2015). The democracy of color. Journal of Media Practice, 16(2), 139–154. https://doi.org/10.1080/14682753.2015.1041806

Genette, G. (1983). *Narrative Discourse: An Essay in Method*. Cornell University Press.

Haryanti, P., 2018. Visual Language in Japanese Animation. *Advances in Social Science, Edu cation and Humanities Research*, 225, pp.280-282.

Hamari, J. and Tuunanen, J. (2014) Player Types: A Meta-synthesis. *Transactions of the Digital Games Research Association*, 1 (2). doi:10.26503/todigra.v1i2.13.

Järvinen, A. (2002). Gran Stylissimo: The Audiovisual Elements and Styles in Computer and Video Games. *Proceedings of Computer Games and Digital Cultures Conference*. Tampere U niversity Press.

Kallio, H., Pietilä, A.-M., Johnson, M. and Kangasniemi, M. (2016) 'Systematic methodologic al review: developing a framework for a qualitative semi-structured interview guide', *Journal of Advanced Nursing*, *72*(12), pp. 2954–2965. doi:10.1111/jan.13031.

Karmakar, A. (2021) Design and Development of Animation Software for Interactive Storytelling. *NATURAL VOLATILES & ESSENTIAL OILS*. doi:10.52783/nveo.5494.

Kelly, S. (2010) 'Qualitative interviewing techniques and styles', in Bourgeault, I., Dingwall, R. and de Vries, R. (Eds.) *The SAGE handbook of qualitative methods in health research. Lo ndon: SAGE, pp. 304-331.*

Kim, N. W., Bach, B., Im, H., Schriber, S., Gross, M., & Pfister, H. (2018). Visualizing Nonline ar Narratives with Story Curves. *IEEE Transactions on Visualization and Computer Graphic s, 24*(1), 595-604.

Lambert, J. (2013). *Digital storytelling: Capturing lives, creating community*. Routledge.

Luers, W. (2020). Making and Breaking Space: Rethinking Montage in Digital Writing. *Rhizo mes: Cultural Studies in Emerging Knowledge,* (36). doi:10.20415/rhiz/036.e07

Hamari, J. and Tuunanen, J. (2014) Player Types: A Meta-synthesis. *Transactions of the Digital Games Research Association*, 1 (2). doi:10.26503/todigra.v1i2.13.

Karmakar, A. (2021) Design and Development of Animation Software for Interactive Storytelling. *NATURAL VOLATILES & ESSENTIAL OILS*. doi:10.52783/nveo.5494.

Madden, T.J., Hewett, K. and Roth, M.S. (2000) Managing Images in Different Cultures: A Cross-National Study of Color Meanings and Preferences. *Journal of International Marketing*, 8 (4): 90–107. doi:10.1509/jimk.8.4.90.19795.

McIntosh, M.J. and Morse, J.M. (2015) Situating and Constructing Diversity in Semi-Structured Interviews. *Global Qualitative Nursing Research*, 2: 2333393615597674. doi:10.1177/2333393615597674.

Miles, M.B. and Huberman, A.M. (1994) *Qualitative data analysis: An expanded sourceboo k*. 2nd edn. Thousand Oaks, CA: SAGE.

Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N. and Hoagwood, K. (2015) 'Purposeful sampling for qualitative data collection and analysis in mixed method implement ation research', *Administration and Policy in Mental Health and Mental Health Services Re search, 42*(5), pp. 533-544. doi: 10.1007/s10488-013-0528-y.

Qiao, H. (2021). *Research on Audio-visual Language of Movie Animation in Contemporary Context*. Department of Film and Animation, Zhejiang Shuren University.

Schaefer, D. and Salvato, L. (1984) *Masters of Light: Conversations with Contemporaneous Cinematographers,* pp. 220–221. Univ of California Press.

Zhao, C. (2020) 'Brief analysis of the visual language of digital animation', *E3S Web of Confe rences*, 236, p. 05015. doi:10.1051/e3sconf/202123605015.

Appendix A -

Introduction

Hello, thank you for participating in this test today. We have invited you to help test a game currently in development and to collect your feedback on certain aspects of the gameplay experience. The entire testing process will take approximately **one hour**.

Before the trial gameplay session, you will need to fill out a brief questionnaire about yourself. Afterwards, you will play the game on a computer. Once the gameplay concludes, we will ask you to answer a few short questions about the game. Please respond based on **your genuine thoughts and feelings**—there are no right or wrong answers.

During the game testing session, we will be recording all content displayed on the computer screen. With your consent, we may also record via webcam. Questionnaire and interview responses will be documented in written form. Please be assured that none of the questions involve personal privacy, and all testers will remain anonymous in any reports or academic papers. Your **name will only be used internally to match questionnaire data with interview responses** and will not be disclosed publicly, so you need not worry about information leakage.

For the gameplay experience segment, we have allocated **40 minutes** for testing. However, you are free to stop playing and end the test at any time if you wish. Conversely, if you would like to continue playing after 40 minutes, you are very welcome to do so. During the test, I will not provide any hints or correct your way of playing—please simply play naturally according to your own preferences.

Purposive Sampling Questionnaire

1. **Name**: *(Note: This information is for internal data matching only; all reports will use anonymous IDs)*
2. **Approximately how long have you been playing games?**
   ◯ Less than 1 year
   ◯ 1-3 years
   ◯ 3-5 years
   ◯ More than 5 years
3. **Have you studied or been exposed to arts, design, film, literature, or related fields?**
   ◯ Yes
   ◯ No
4. **Do you usually enjoy reading?**
   (Scale: 1=Strongly Dislike; 5=Strongly Like)
   ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5

5. **Which format of reading material do you prefer?** (Single choice)
   ◯ Text-only (e.g., novels)
   ◯ Mixed text and images (e.g., comics)
   ◯ Visually dominant (e.g., picture books)
   ◯ Other _________
6. **When encountering mixed text and image content, you tend to focus first on:** (Single choice)
   ◯ The text portion
   ◯ The image portion
   ◯ No particular order
7. **What types of games do you frequently play?** (Multiple choice)
   ◯ Action-Adventure
   ◯ Role-Playing (RPG)
   ◯ Walking Simulator / Narrative Exploration
   ◯ Visual Novel
   ◯ Puzzle
   ◯ Simulation / Management
   ◯ Art / Experimental Games
   ◯ Other _________
8. **Do you enjoy narrative content in games (e.g., text stories/CG animations)?** (Single choice)
   ◯ Yes
   ◯ No
9. **Your level of focus when experiencing game narratives:**
   (Scale: 1=Not focused at all; 5=Completely focused)
   ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5
10. **How would you rate the importance of visual storytelling techniques in games (e.g., specific use of color, camera language, visual effects) for your understanding of the story and emotional immersion?**
    (Scale: 1=Not important at all; 5=Extremely important)
    ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5
11. **Do you enjoy narrative-driven games (e.g., visual novels)?** (Single choice)
    ◯ Yes
    ◯ No
12. **In narrative games, how frequently do you engage in the following behaviors?**
    (Scale: 1=Never; 5=Always)

    Rapidly skip dialogue
    ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5

13. Forget key plot points
    ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5

Pre-game Questionnaire

(These new questions explore deeper narrative interactions and emotional engagement, bridging to the interview.)

1. **Which narrative styles in games appeal to you the most?** (Multiple choice)
   ◯ Linear narrative (fixed plot)
   ◯ Branching narrative (player choices influence the story direction)
   ◯ Environmental storytelling (e.g., background stories in item descriptions)
   ◯ Non-linear timeline (e.g., flashbacks, time loops)
   ◯ Other __________
2. **How do you prefer to experience emotional moments in games?** (Single choice)
   ◯ Through dialogue and text
   ◯ Through visual cues (e.g., character expressions, specific visuals)
   ◯ Through gameplay mechanics (e.g., interactive sequences)
3. **Have you ever felt a deep emotional resonance with a game's story? If yes, please briefly describe what deeply moved you.**

   ---
4. **In games, when you encounter ambiguous or symbolic scenes, you usually:** (Single choice)
   ◯ Carefully observe the visuals, lighting, and colors, looking for environmental clues to interpret them.
   ◯ View them as part of the artistic style and do not delve deeper.
   ◯ Feel confused and might lose interest because of it.
5. **In games, do you notice special visual effects (like color shifts, screen distortion, filter changes, etc.) during scene transitions, flashbacks, or perspective changes?**
   (Scale: 1=Never notice; 5=Always notice)
   ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5
6. **If a game uses different visual styles (e.g., black & white vs. color) to distinguish different states (e.g., reality/memory/fantasy), do you think this helps you understand the story?**
   (Scale: 1=Not helpful at all; 5=Very helpful)
   ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5
7. **In narratively complex games (e.g., multiple timelines, unreliable narrator), how do you ensure you understand the story?** (Multiple choice)
   ◯ I take notes or pay extra attention to details.
   ◯ If I miss something, I replay sections.
   ◯ I discuss with others or look up explanations.
   ◯ I don't strive to understand everything.

8. **In narrative-driven games, which aspects most easily cause you frustration or break your immersion?** (Open-ended)

9. **If a game's narrative includes slightly varied repeated scenes (e.g., memories, parallel timelines), how would you typically react?** (Single choice)
   ◯ I find this interesting and pay attention to the differences.
   ◯ I become impatient and skip the repeated content.
   ◯ I don't notice unless the differences are very obvious.
10. **What factors make you more invested in a game's story?** (Open-ended)

Interview

a. Overall Impression

1. How would you describe your overall feeling about this game in a few sentences?
2.What emotions are you feeling right now, after finishing the game?

b. Plot & Narrative
3. What do you think the main story of the game is about? (You can briefly recount the plot.)
4. Which parts of the story were most engaging to you? Why?
5. Was there a specific moment that made you particularly want to keep playing? What was it?

c. Characters & Emotions
6. What emotional journey do you think the protagonist went through?
7. During gameplay, when did you feel the strongest emotions? Why?

d. Narrative Design & Comprehension
8. Were there any parts of the game that you found confusing or hard to understand?
9. During scene transitions (e.g., changing locations, entering special states), did you notice any special visual transition effects (like screen distortion, chromatic aberration/color separation, flickering, etc.)? Please describe them.
10. What do you think these visual effects (e.g., chromatic aberration, distortion) were trying to communicate? For example: character state, spatiotemporal changes, or just stylistic decoration?
11. Did the visual style (colors, lighting, etc.) in the game change noticeably? What do you think these changes signified? (If the player mentions black & white/color, ask: What role do you think this black & white/color design played?)

12. During your exploration and deduction of the story, which elements in the game provided you with the most crucial clues? (e.g., visual cues in the environment, items, or dialogue?)
13. What was the most difficult part of the game for you to understand?

e. Visual Experience & Comprehension
14. Which visual experiences (colors, lighting, special effects) in the game impressed you the most? Why?
15. How do you think the visual elements in these experiences helped you understand the story, character emotions, or the game's world?
16. Was there any moment where you understood a key plot point or a character's internal state purely through the visuals (not through text or dialogue)? Please provide an example.

f. Feedback
17. If you could suggest one improvement to the developers, what would it be?