Visual Analysis of the 12 Animation Principles in Animated "Battle of Surabaya"

Yusi Maelani
Amikom University Purwokerto, Jl. Letjen Pol. Soemarto No.127 Purwokerto, Indonesia
Email: yusimaelani25@gmail.com*
Corresponding author

Abstract Animation is a moving image consisting of a series of images arranged in sequence. Twelve principles of animation are used during the production process to create more realistic and appealing movements. Disney animators Frank Thomas and Ollie Johnston developed these twelve principles of animation in 1981. The purpose of this study is to examine how the twelve principles of animation are applied in the animated film Battle of Surabaya and how well they improve visual realism. This study uses a descriptive qualitative approach with data collection through visual observation, literature study, and documentation. The results show that the application of the twelve principles of animation in the film Battle of Surabaya can make the animation more lively and interesting overall by improving the quality of movement, character expression, and visual realism.

Keywords. Animation, 2D Animation, 12 Principles of Animation, Battle of Surabaya

INTRODUCTION

Animation, derived from the English word *"animate,"* meaning *"to bring to life and give movement to inanimate objects,"* refers to a form of moving imagery consisting of a sequence of visual objects arranged systematically to follow predetermined motions over specific time intervals. Animation serves various purposes, including entertainment and the communication of messages (Lingga et al., 2022).

Compared to traditional manual methods, the use of modern technology has made the process of producing animated films significantly easier. However, animators are not always able to create animations that are both high-quality and engaging. Frank Thomas and Ollie Johnston, two Disney animators who introduced the twelve principles of animation, stated that an understanding of these principles is essential for animators who aim to produce high-quality animation. This is because these principles enable animations to appear more lifelike and appealing (Tambun et al., 2022).

Frank Thomas and Ollie Johnston described the twelve principles of animation in their book *The Illusion of Life: Disney Animation*, published in 1981. These principles serve as the fundamental foundation in animation production, as they help create movements that appear lively, natural, and easily understood by audiences. *Squash and Stretch* is a principle used to demonstrate how an object can compress and stretch, making it appear more elastic and have a sense of weight. *Anticipation* refers to a preparatory movement that occurs before the main action, helping the audience predict what will happen next. *Staging* relates to the arrangement of character positioning and visual composition within a scene to ensure that the narrative focus is clearly conveyed (Zega & Hidayah, 2023).

The principles of *Straight Ahead Action* and *Pose to Pose* determine how movements are drawn, either spontaneously or in a planned manner, resulting in animations that appear dynamic yet well controlled. *Follow Through* and *Overlapping Action* are used to depict continuous motion between different parts of a body or object. *Slow In* and *Slow Out* assist in regulating the speed of movements in characters and objects so that they appear more natural (Anggara & Yusa, 2024). The *Arc* principle emphasizes the use of curved motions to achieve more natural and less rigid movement. *Secondary Action* refers to additional movements that support the primary action, thereby enhancing character expression and depth (Hendra et al., 2024).

In addition, the *Timing* principle is used to determine how fast or slow a movement occurs and how long it lasts, thereby influencing the perception of weight, lightness, and the emotions conveyed (Widadijo, 2021). *Exaggeration* is applied to enhance expressions or movements by emphasizing them beyond realism while maintaining clarity. *Solid Drawing* emphasizes an understanding of form, volume, and perspective in character design. Lastly, *Appeal* relates to the visual attractiveness of a character, making it engaging and memorable for the audience. Overall, these principles complement one another and play a crucial role in producing animations that are not only visually appealing but also effective in conveying narrative.

Figure 1 Battle of Surabaya Animation Poster
(Source: Wikipedia)

Battle of Surabaya is an Indonesian 2D animated film released on August 20, 2015. The film poster is in Figure 1. The film was directed by Aryanto Yuniawan and produced by MSV Pictures. It features fictional characters and a fictional storyline set against the historical backdrop of the Battle of Surabaya in 1945, depicting the struggles of Indonesian youth fighting for independence by defeating and driving colonial forces out of Indonesia.

Previous studies have examined various technical and aesthetic aspects of animated films. These include studies on the application of animation principles, character analysis in animated films, and the aesthetic impact of animation on audience appeal. For example, a study by Nurhalimah (2024) discusses the application of the twelve principles of animation in the animated film *Ponyo*. Another study by Setiyawan et al. (2023) analyzes character values in the animated film *Battle of Surabaya*. Similarly, research by Hastuti and Ahmad (2022) explains the influence of Japanese visual language on the animation *Battle of Surabaya*. However, studies that specifically analyze the application of the twelve principles of animation in the animated film *Battle of Surabaya* remain very limited. Most previous

research has focused primarily on narrative or cultural elements, without comprehensively examining how animation principles are applied in the film's production.

Thus, there is an opportunity for research that comprehensively analyzes the application of the twelve principles of animation in two-dimensional historical animated films, such as *Battle of Surabaya*. This is important because the film emphasizes animation techniques in addition to educational and patriotic values, which require an appropriate animation approach to effectively convey its message.

The aim of this study is to fill this gap by providing a comprehensive analysis of the twelve principles of animation used in the film *Battle of Surabaya*. This research will examine how these principles are applied and how they impact both the quality of the animation and the storytelling. The study is novel because it focuses on two-dimensional animation with a historical theme of the national struggle, an area that has not been extensively explored in Indonesia. Therefore, the results are expected to serve as an important reference for animators, academics, and the local animation industry in producing high-quality animated works.

METHODS

This study employs a descriptive qualitative method with a visual analysis approach to examine the application of the twelve principles of animation in the animated film *Battle of Surabaya*. This method was chosen because the research aims to provide a detailed explanation of how each animation principle is applied through direct observation of the visual elements in the film. The analysis focuses on character movements, changes in position, facial expressions, visual composition in each scene, timing of movements, and animation effects appearing in specific scenes. Each animation principle is identified based on its visual characteristics and then described narratively to demonstrate its role in creating realistic motion and supporting the narrative of the story.

The data sources for this study consist of primary and secondary data. The primary data consist of selected scenes from the animated film *Battle of Surabaya*, chosen purposively based on how they illustrate animation principles such as *squash and stretch*, *anticipation*, *staging*, *timing*, and *exaggeration*. Scenes were selected based on visual clarity, relevance, and the presence of motion, allowing for a comprehensive analysis of the animation principles. Secondary data were obtained from various supporting literature sources, including books, journals, and articles discussing the theory of the twelve principles of animation, two-dimensional animation production techniques, and relevant previous studies.

Data collection was conducted systematically through three stages: visual observation, literature review, and documentation (Khairani et al., n.d.). Visual observation involved directly examining the animated film *Battle of Surabaya* to identify and record the application of each animation principle in specific scenes. The literature review aimed to strengthen the theoretical foundation and analytical framework through relevant references. Documentation was carried out by collecting screenshots of scenes and notes from the observations as supporting materials for the analysis.

The data analysis technique used in this study is interactive data analysis. According to Miles and Huberman, qualitative data analysis is conducted repeatedly and continuously until a deep understanding is achieved (Islam & Yusuf, 2023). The stages of analysis include data reduction, data presentation, and drawing conclusions. Data reduction involves selecting scenes that are relevant to the application of animation principles. Data presentation is organized in the form of visual and narrative descriptions to explain the analysis results for each animation principle. In the final stage, conclusions are drawn to identify and formulate patterns of the application of animation principles in the film *Battle of Surabaya* comprehensively.

RESULTS AND DISCUSSION

After analyzing and directly observing the 98.47-minute from animated film "Battle of Surabaya", it was discovered that twelve animation principles had been effectively applied. The application of these principles not only enhanced the visual quality but also enhanced the narrative and emotional expression within the film. The following scenes will be explained in detail to demonstrate how the animation principles were applied to the visual narrative of Battle of Surabaya.

Squash and Stretch

Figure 2 Applying the Squash and Stretch principle when Musa changes positions
(Source: Personal documentation)

Figure 2 illustrates Squash and Stretch is one of the basic principles of animation that functions to show the elasticity, weight, and volume of an object so that the movement looks more alive and natural. This principle focuses on changing an object's shape without losing its original volume, so the character remains realistic and doesn't appear stiff when moving.

An example of the Squash and Stretch principle can be seen when Musa moves from a sitting to a standing position. At the beginning of the movement, Musa's body appears to contract (squash), especially in the torso and legs, reflecting the weight of his body as it prepares to stand. Then, when Musa stands, his body appears to stretch, giving the impression of energy and upward thrust in his movement.

This change in shape not only gives the character an added dimension, but also makes the movements look more natural and visually convincing. With Squash and Stretch, Musa's movements don't look stiff or too mechanical, but instead show the weight and force acting on the character. This aligns with animation theory, which states that this principle is crucial in creating the illusion of weight, energy, and life in character movement.

Anticipation

Anticipation is an animation principle that serves as a preparatory movement before the main action takes place and this principle is illustrated in Figure 3. This principle aims to provide visual cues to the audience regarding upcoming changes in movement, so that transitions between movements can be understood more clearly and don't feel abrupt.

The application of Anticipation is seen in the scene where the character Yumna is about to sit down. She makes an initial movement by lowering her body as preparation before carrying out the main action, namely sitting down. This movement is important because it provides a visual cue to the audience that Yuma's character will change position from standing to sitting. This creates a continuity of position and makes it easier for the audience to understand that Yuma is about to sit down.

Figure 3 Applying the Anticipation Principle when Yumna is about to sit down
(Source: Personal documentation)

The presence of Anticipation in this scene makes Yumna's position changes look smoother and more planned, and helps the audience understand the character's movement flow intuitively. In this way, the movements do not appear stiff or abrupt, but rather flow naturally. This implementation aligns with animation theory, which emphasizes the importance of anticipation in clarifying action and enhancing the readability of movement in animation.

Staging

Staging is a principle in animation that relates to how to arrange the visual layout of a scene, such as character positioning, camera use, and various other supporting elements. The goal is to keep the audience focused on the main action being conveyed. This principle is crucial for ensuring the visual message is clearly understood without being distracted by irrelevant elements.

Figure 4 The application of the Staging principle, where the camera focuses on Moses.
(Source: Personal documentation)

The application of the animation principle of staging can be seen in Figure 4, where Musa is running through a crowd. During this scene, the camera consistently maintains the audience's focus on Musa's movements as the center of the main action, even though the background simultaneously displays many supporting elements and other activities. Furthermore, Musa's character is strategically positioned within the frame, enhancing the clarity of movement and the audience's gaze.

The effective application of staging in this scene not only emphasizes the main character but also helps establish narrative context through the presence of background elements that support the atmosphere without distracting from the main action.

Straight Ahead Action and Pose to Pose

Straight Ahead Action and Pose to Pose are two methods of creating animated movement related to creating flow and planning character movements. Straight Ahead Action is done by drawing or

animating movements from start to finish sequentially, resulting in a more spontaneous and dynamic appearance. Meanwhile, Pose to Pose focuses on movement planning by first determining the main poses, then filling them with transitional movements, so the movement feels more controlled and structured.

Figure 5 The application of the Straight Ahead Action principle as Musa prepares to climb the board
(Source: Personal documentation)

Figure 6 Applying the Pose to Pose principle as Musa gradually climbs the board.
(Source: Personal documentation)

In the film, these two approaches are applied to the scene where Musa feels threatened and attempts to escape by running and climbing a wooden plank. The Straight Ahead Action technique is seen in Figure 5 when Musa's initial movements as he prepares to climb the plank , where each of his body movements is animated sequentially, creating a sense of spontaneity and heightening the tension of the scene.

Next, the Pose to Pose technique is used as Musa gradually climbs the plank, illustrated in Figure 6. In this section, key poses, such as when Musa steps onto the plank, maintains his balance, reaches the end of the plank, and finally falls, are clearly displayed. This approach helps maintain fluidity and clarifies the character's action flow. The combination of these two techniques produces movements that are not only dynamic, but also easy for the audience to understand and support the intensity of the story in the scene.

Follow Through and Overlapping Action

Follow Through and Overlapping Action are two animation principles that help create continuity and overlapping movement between body parts or objects after the main action is completed. Follow Through aims to ensure that movement doesn't stop abruptly but continues naturally. Meanwhile,

Overlapping Action occurs when different body parts move at different times, making the movement appear more realistic and lifelike.

Figure 7 Implementation of Follow-Through and Overlapping Actions
when Musa and Yumna chase each other
(Source: Personal documentation)

In the film (Figure 7), this principle is clearly visible in the scene where Yumna runs and is followed by Musa. As Yumna runs, her hair and clothing move with the direction and speed of her running, even though the main body movement has changed. This is an example of the application of Follow Through, making the movement appear more natural and smooth.

On the other hand, the principle of Overlapping Action is also evident when Musa runs after Yumna. In this scene, Musa's arms, legs, and other body parts do not move simultaneously, but follow each other with a certain time lag. This difference in movement timing creates a more lifelike and convincing illusion of movement. The combination of Follow Through and Overlapping Action in this scene helps enhance the realism and dynamics of the chase scene in the animated film.

Slow In and Slow Out

Figure 8 Applying the Slow In and Slow Out Principle in Car Scenes
(Source: Personal Documentation)

Slow In and Slow Out are animation principles that regulate the acceleration and deceleration of an object's motion to make the transitions appear more natural and realistic. This principle emphasizes that objects do not move at a constant speed, but rather experience gradual changes in tempo at the beginning and end of the movement.

Figure 8 show us that in one scene, where a car, initially moving fast, gradually slows to a stop, this demonstrates the use of the Slow In, Slow Out animation principle. The car's movement is shown as a gradual change in speed, starting from a fast car to a slowdown, indicated by a steady decrease in

momentum. The animation displays details such as the movement of the tires slowing down and the emphasis on the front of the car, creating the impression that the object is truly decelerating naturally.

This application makes the car's movements feel more convincing and less abrupt or stiff. Thus, Slow In and Slow Out play a crucial role in creating the illusion of realistic physics and enhancing the overall visual quality of the animation.

Arc

Figure 9 The application of the Arc principle during the scene where Danu swings a gun
(Source: Personal documentation)

The Arc principle is an animation principle that emphasizes the use of curved motion paths, as most natural movements of living creatures and objects in the real world follow curved patterns, rather than straight lines. The application of this principle aims to avoid a stiff and mechanical impression in animated movements.

Figure 9 is the application of the Arc principle, it is clearly visible when the character Danu, holding a pistol, appears to swing the pistol from top to bottom in a natural curved path. This curved pattern creates a smooth and relaxed effect. By applying the Arc principle, the animation looks more engaging because the curved path followed by Danu's pistol creates a natural impression, enhancing the realism of Danu's movement.

Figure 10 Application of the Secondary Action Principle When Yumna performs two actions
simultaneously
(Source: Personal documentation)

Secondary Action

Secondary Action is an animation principle that functions as a supporting movement that complements and reinforces the primary action without distracting from it. This principle aims to add depth to the expression and enrich the visual dynamics of a scene.

The application of Secondary Action can be seen at Figure 10, whereis in the scene where Yumna attacks an enemy with a knife while hanging from a rope. In her primary action, Yumna swings the knife at the enemy. However, simultaneously with the supporting movement (Secondary Action), Yumna's body lifts and moves with the pull of the rope.

The presence of this supporting movement enriches the scene by emphasizing the tension and danger of the situation. This Secondary Action does not distract from the main action, but rather enhances the illusion of more natural and lifelike movement. Thus, the application of this principle contributes to the visual realism and intensity of the fight scenes in the film.

Timing

Timing is an animation principle related to the tempo and duration of an object's movement, which influences the perception of weight, speed, and emotion within a scene. This principle emphasizes that varying the speed of movement can convey different visual meanings and help establish a specific mood within the animation.

Figure 11 Application of the Timing Principle to a Passing Airplane Scene
(Source: Personal Documentation)

The animation principle of timing states that objects move at a specific tempo. In one scene, at Figure 11, when Musa is seen gazing at a swarm of planes passing overhead. Each plane is animated at a different speed; some appear to be moving quickly, while others move more slowly than the previous planes. In this scene, it is clear that the planes are moving at a specific tempo.

The varied timing in this scene not only enriches the visual dynamics but also enhances the sense of space and depth of the scene. Thus, the application of the timing principle helps create a more realistic illusion of movement and supports the narrative atmosphere conveyed in the film.

Exaggeration

Exaggeration is an animation principle used to emphasize certain movements or expressions through exaggerated depictions, without losing clarity of form and visual meaning. This principle aims to strengthen emotion and characterization so that the intended message can be more clearly understood by the audience.

The application of the Exaggeration principle is clearly visible in Figure 12. In the scene, one of the supporting characters, Cak Soleh, appears to be struggling to use his weapon. His facial expression is exaggerated to emphasize his condition. His wide-open eyes, raised eyebrows, and open mouth indicate that he is out of breath. This use of exaggerated expressions clarifies the character's emotional state and helps the audience understand the situation without the need for additional verbal explanation.

Figure 12 The application of the principle of exaggeration to Cak Soleh's expression
(Source: Personal documentation)

Solid Drawing

Solid Drawing is an animation principle that focuses on understanding shape, volume, size, and perspective when drawing characters or scenes. This principle aims to create a sense of three-dimensional space in two-dimensional animation, so that objects and characters appear to have depth and a consistent appearance.

Figure 13 Application of Solid Drawing principles during the scene where Musa and Yumna part ways
(Source: Personal documentation)

In the film, we can see from Figure 13, the application of Solid Drawing principles can be seen in the scene where Yumna walks away from Musa. Although Yumna is depicted as taller than Musa, the two characters appear to be the same height when standing at different distances. This demonstrates the adjustment of character size and proportion based on perspective principles, allowing the audience to clearly perceive differences in distance and position in space.

Furthermore, Solid Drawing principles are also applied in drawing the background, a path that follows a perspective line with a single vanishing point. Background elements such as the road, poles, fences, and trees appear smaller as the distance increases. This use of perspective enhances the sense of spatial depth and makes the image appear more realistic. Thus, Solid Drawing principles play a crucial role in ensuring visual consistency and enhancing spatial realism in animation.

Appeal

Appeal is an animation principle related to the visual appeal of a character, whether in terms of design, expression, or movement, so that the character appears attractive, easily recognizable, and able to build an emotional connection with the audience. This principle does not necessarily mean that the

character must be beautiful, but rather must have a visual uniqueness that supports their role and personality in the story.

Figure 14 The application of the principle of appeal when the scene of Musa and
Yumna is in the same frame
(Source: Personal documentation)

Figure 14 is the application of the Appeal principle, is seen in the scene where Yumna and Musa are in the same frame against the backdrop of a sunset sky. In this scene, the visual designs of both characters display different yet complementary appeals. Yumna is depicted with a soft facial expression and subtle hand movements as she smooths her windswept hair, giving the impression of calm and maturity.

In contrast, Musa's character is depicted with an innocent and friendly expression, conveyed through a small smile and simple clothing style. These differences in design and expression approach strengthen the characterization of each character and help the audience visually distinguish their personalities. Thus, the application of the Appeal principle in this scene plays a role in enhancing the character's appeal and strengthening the emotional connection between the characters and the audience.

CONCLUSIONS

Based on the visual analysis of the animated film "Battle of Surabaya," it can be concluded that the consistent application of the twelve basic principles of animation plays a crucial role in supporting the visual quality and narrative delivery. Animation principles such as "Squash and Stretch," "Anticipation," "Staging," "Follow-Through and Overlapping Action," "Slow In" and "Slow Out," "Arc," "Secondary Action," "Timing," "Exaggeration," "Solid Drawing," and "Appeal" have been proven to create more natural, dramatic, and expressive movement in both the main characters and supporting characters, as well as other animated elements.

Beyond technical aspects, the film also demonstrates the harmony between the application of animation principles and an emotional design approach. This combination helps build an emotional connection with the audience through visual design that aligns with the storyline and historical context. Thus, "Battle of Surabaya" is not only visually appealing but also serves as a means of conveying values of struggle, patriotism, and moral messages to the audience.

This research contributes to developing an understanding of the use of classical animation principles in the creation of two-dimensional animated films with historical themes in Indonesia. The research findings are expected to serve as a guide for animators, filmmakers, and academics in creating high-quality, meaningful animation works that foster emotional engagement among viewers. Furthermore, this study opens up opportunities for further research focused on developing visual styles,

animation techniques, and image composition strategies that can enhance the identity of Indonesian animation both nationally and internationally.

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