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Research Article

Stylized architecture in 3D animated films: Aesthetic and narrative perspectives

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Abstract
This study explores the stylization of architectural elements in 3D animated films, emphasizing their crucial role in visual storytelling. Using qualitative research methods, 10 films were analyzed, showcasing diverse periods, cultural themes, and aesthetic styles. The findings reveal that architectural elements are not just passive backgrounds but active narrative components that shape emotional and visual dynamics. Real-world architectural references are reinterpreted through historical or futuristic stylizations, manipulating form, texture, material, and lighting to create immersive atmospheres. By exaggerating proportions, simplifying structures, or using abstract forms, stylization visually reflects characters' psychological states and enhances the dramatic flow of the story. The research highlights that stylized architecture enriches the visual experience while reinforcing the narrative structure, drawing viewers more deeply into the animated world. The concept of "hyperreality" helps explain how animated films use stylization to transcend physical realism, unlocking greater creative freedom. This process allows architecture to shape the film's atmosphere, guide audience perception, and establish a cohesive visual language that amplifies storytelling. Ultimately, the study demonstrates that architectural stylization is not merely an aesthetic choice but a powerful narrative device. The findings propose narrative-driven design as a new approach for creating emotionally resonant spaces in both animation and architectural practice.

Keywords: Stylized architecture, 3D animated films, Narrative design, Aesthetic perspectives, Digital spatial storytelling

Extended Abstract

Introduction: 3D animated films have emerged as a dynamic medium where architectural design plays a significant role in shaping visual storytelling. These films push the boundaries of conventional spatial representation, transforming architecture from a static background element into an integral narrative tool. The concept of stylized architecture in animation allows for creative reinterpretations of real-world references, leading to immersive cinematic experiences. Stylization techniques, including exaggeration, abstraction, and simplification, reshape architectural forms to complement character emotions, enhance atmospheric depth, and establish distinctive aesthetic identities within the animated world. Animated films employ architectural stylization not only as a means of artistic expression but also as a strategic tool to reinforce storytelling. Architectural elements are often manipulated to align with the tone and themes of the film, using form, texture, material, proportions, and lighting to evoke emotional responses or highlight symbolic meanings. For example, towering, asymmetrical buildings can represent chaos or instability, while smooth, flowing structures might symbolize harmony or fantasy. Through stylized representation, animated spaces are freed from the constraints of realism, allowing for hyperreal environments that enrich narrative engagement. This study explores how stylized architecture in 3D animation contributes to the emotional, aesthetic, and structural dimensions of storytelling by analyzing its function in a selection of animated films with varied artistic approaches.

Purpose and scope: This study aims to investigate the role of architectural stylization in 3D animated films, focusing on its contributions to visual storytelling, audience engagement, and emotional depth. It examines how stylized spaces interact with character development and how they establish thematic coherence within animated worlds. The research seeks to answer the following questions: How does architectural stylization function as a narrative device in 3D animated films? What visual and structural techniques are employed to create stylized environments? How do exaggerated, simplified, or abstracted architectural elements shape audience perception and immersion? The study encompasses a wide

range of 3D animated films that utilize distinct stylization techniques, including those inspired by historical, futuristic, and fantastical architecture. The findings contribute to both animation studies and architectural theory, offering insights into the interplay between space, aesthetics, and narrative in digital environments.

Method: This research adopts a qualitative content analysis approach to examine the architectural stylization techniques in 3D animated films. Ten films were selected based on their representation of diverse periods, cultural themes, and aesthetic styles, ensuring a comprehensive exploration of different architectural expressions. The selection criteria focused on animated productions where architecture plays a central role in the narrative structure and employs distinct visual stylization. The study evaluates stylized architecture through key parameters such as: *Form and structure:* How buildings are exaggerated, abstracted, or reimagined to convey symbolic meaning or enhance narrative tension. *Texture and materiality:* How surfaces are stylized to reflect thematic moods, character emotions, or cultural symbolism. *Lighting and color palettes:* How light and color are used to reinforce atmospheric tones, guide visual focus, or establish contrasting narrative spaces. *Scale and proportions:* How architectural elements are resized, distorted, or reshaped to intensify the visual and emotional impact of storytelling. Furthermore, the research incorporates theoretical perspectives on hyperreal environments (Bridges & Charitos, 1997) and enabling constraints in design (McDonnell, 2023) to frame how animation balances creative freedom with narrative coherence. This interdisciplinary approach allows for a deeper understanding of how architectural stylization shapes the cinematic experience, revealing the intentional design processes behind animated worlds.

Findings and conclusion: The systematic analysis of ten films demonstrates that architectural stylization in 3D animated films functions as a powerful narrative device. The findings, structured around form, texture, lighting, and scale, reveal how stylized spaces shape emotional resonance, enhance immersive world-building, and actively structure narratives. For instance, contrasting scales can evoke comedy or grandeur, while symbolic textures can define a character's world, as seen in the personified architecture of Monster House, the automotive-scale world of Cars, and the metaphysical realms in Soul. The study establishes that these techniques collectively enable a form of spatial storytelling where architecture transcends its background role to become an active narrative agent. This narrative potency, analyzed through the lens of hyperreality, suggests a move beyond traditional functionalism in design. Consequently, the research introduces "narrative-driven design" as a conceptual framework derived from animation, proposing how its principles can be translated into architectural practice to create more emotionally engaging and meaningful human-centric spaces, both physical and digital. This opens new avenues for interdisciplinary exchange between animation and architecture, particularly for the design of future immersive environments.

Keywords: Stylized architecture, 3D animated films, Narrative design, Aesthetic perspectives, Digital spatial storytelling

INTRODUCTION

3D animated films present creative production processes that push the boundaries of visual storytelling, offering aesthetic approaches with a profound impact on audiences. These films contribute to storytelling not only through characters and events but also through the design of spaces. Architectural elements in such films are stylized to create specific atmospheres, establish connections with characters, or guide the audience toward particular emotional experiences. Stylization involves reinterpreting real-world forms by emphasizing, exaggerating, or simplifying certain features. This process gives animated films a unique visual language while also stimulating the viewer's imagination.

Stylized 3D animation simplifies details, exaggerates proportions, and transforms forms into more dynamic or minimalistic shapes. Bridges & Charitos (1997) describe "hyperrealities" as creatively liberated spaces that transcend physical realism, a concept closely mirrored in how animated films construct visually striking, stylized worlds. These hyperreal environments amplify creative freedom, enabling stylized spaces to evoke immersive narratives. By moving away from realism, stylization highlights the boundless creativity of animation, detaching audiences from reality and making character and space designs more captivating and memorable (Köymen, 2008). Architectural elements, reinterpreted through futuristic or historical themes, provide viewers with fresh perspectives and establish distinctive atmospheres within animated universes (Tulum Okur & Gezer Çatalbaş, 2022). Stylized architectural elements stand out as components that enhance storytelling and enrich the film aesthetically. Symbolic and abstract architectural structures reflect the dynamics and moods of the worlds depicted in the films, becoming integral parts of the visual narrative. Their stylization pushes the audience to the limits of imagination, allowing the film's world to break away from reality and adopt a unique aesthetic understanding. As an expression of graphic design and animation,

stylization aims to offer viewers not only an aesthetic experience but also an emotional impact. Stylized architectural forms provide a visual cohesion that aligns with the characters' world, drawing the audience deeper into the narrative (Winkenbach & Salesin, 1994). Abstraction and stylized design have played a critical role in the evolution of 2D animation into 3D animated films. This process, which brought the artistic forms of 2D animation into the digital realm, has enabled the emergence of more creative, unique, and expressive visual experiences in space design (Bénard et al., 2013). The technical capabilities of 3D animation allow architectural elements to be designed with greater freedom. Stylization is not merely an aesthetic choice but also a strategic tool to enhance the narrative's impact (DeCarlo & Santella, 2002). Particularly, the stylization of architectural elements is used to convey emotional messages and create an atmosphere that transcends the boundaries of time and space (Köymen, 2008).

In this context, the role of stylized architectural elements in storytelling enhances the visual perception of spaces and strengthens the audience's engagement with the narrative. The way stylization highlights relationships between characters and spaces in 3D animated films offers viewers a more profound emotional and aesthetic experience (Çakmak & Karoğlu, 2020). These techniques demonstrate how architecture in animated films functions not just as a background element but as an essential part of the narrative.

Stylization

Stylization is a widely used concept in the realms of art and design, defined as the exaggeration, simplification, or reinterpretation of certain features of an object or form. Its primary purpose is to highlight the characteristic features of real-world forms, transforming them into a medium for artistic expression. Stylization conveys powerful emotional messages to viewers by emphasizing or simplifying forms (Winkenbach & Salesin, 1994; Köymen, 2008). This technique allows the identity of an object or structure to be preserved while integrating the artist's vision. Consequently, the viewer perceives both the original identity of the model and the artist's stylized interpretation simultaneously. In the stylization process, the artist preserves the essential contours of the model while reinterpreting it in a unique way. Etymologically, stylization is defined as "simplifying by removing details and reconfiguring the form" (Barba & Savarese, 2003). This process serves as a tool for reconfiguration, carrying functional and aesthetic significance in many fields, including architecture. Russian director and theater theorist Vsevolod Meyerhold viewed stylization as a process that reveals the internal synthesis of a period or phenomenon. According to him, stylization involves any expressive tool used to uncover hidden features within the style of an artwork and convey them through symbols (Barba & Savarese, 2003). This perspective frames stylization not merely as a visual aesthetic choice but also as a narrative technique and intellectual process. In summary, stylization is a crucial technique that emphasizes the characteristic features of objects, incorporates the artist's creative perspective into the form, and conveys both aesthetic and emotional messages to the audience. In both art and architecture, stylization processes continue to enrich the symbolic and aesthetic meanings of forms.

Examples of Stylization Applications

Stylization, as a versatile technique, appears in various art forms where aesthetic elements are reinterpreted to become more appealing and meaningful. In fashion design, for instance, this technique is frequently employed to enhance the visual appeal of garments and figures (Figure 1a). By exaggerating or simplifying natural forms, both uniqueness and visual impact are highlighted (Barnard, 2014). Stylization allows the redesign of garments' form, color, and details to align with the artist's vision, resulting in more striking aesthetics (Kawamura, 2018). This process fosters original and captivating designs in fashion trends, attracting consumer interest and strengthening the market position of garments.

In the visual and auditory arts, such as painting, music, and sculpture, stylization frequently manifests as a means for artists to reflect their vision by exaggerating or simplifying certain elements. In these fields, objects or sounds are presented not in their natural states but as stylized forms shaped by the artist's creative outlook. For instance, the exaggeration of colors or shapes in painting, the idealization or abstraction of forms in sculpture, and the repetition of specific melodies or rhythms in music represent fundamental examples of stylization (Gombrich, 1995). Similarly, in the performing arts, such as cinema and theater, stylization emerges as a significant technique. Exaggerated gestures and expressions in theater or stylized visuals in cinema are employed to make the narrative more impactful and striking (Laughlin, 1988). Stylization thus serves not only

as an element that enhances visual or auditory aesthetics but also as a tool for delivering a more profound artistic and emotional experience to the audience.

In traditional Turkish arts such as miniature painting, tilework, and ornamentation, stylization involves simplifying and reinterpreting figures and motifs (Figure 1b). These motifs, created through this technique, often feature geometric arrangements, forming a distinctive style (Üçer, 2019). Particularly in Islamic art, where figurative depictions are rare, stylized motifs gain prominence (Grabar, 1987). Flowers such as roses and carnations are drawn in a stylized manner, often depicted from a bird's-eye view (Fikriyat, 2019). Turkish handicrafts, particularly in carpet and kilim weaving, also place significant emphasis on stylization (Figure 1c). Geometric, botanical, and animal motifs used in weaving appear in both naturalistic and stylized forms (Tecir, 2024). The motifs contribute to the unique identity of Turkish art, being rearranged into geometric shapes or simplified botanical patterns through stylization. In graphic design, stylization is most commonly seen in everyday life through pictograms (Figure 1d). Traffic signs, airport symbols, and guidance signs at Olympic venues are examples of stylized symbols (Deniz & Öztürk, 2022). Pictograms simplify the forms of tangible objects into symbols, while abstract concepts are stylized to become more visually comprehensible. Architectural stylization, on the other hand, involves the simplification and exaggeration of forms to imbue them with symbolic and aesthetic meanings. This process preserves the character of a structure while offering viewers a novel visual experience. Art Nouveau is an architectural and artistic movement that emphasizes the stylization of botanical forms inspired by nature. This movement transforms botanical motifs into structural elements, characterized by asymmetrical, flowing lines and curves (Figure 1e). Antoni Gaudi's works (Figure 1f) are among the most prominent examples of this style (Baytar, 2019). Additionally, Art Nouveau structures in cities like Istanbul and Baku reflect concrete examples of this stylization (Burnak, 2021).

Another example of stylization in architecture can be seen in the historic Diyarbakır city walls, adorned with botanical motifs (Figure 1g). These motifs, stylized into semi-naturalistic forms, are carved into stone to enhance the structural aesthetics of the walls. Additionally, the lion figure on the walls serves as another stylized example (Figure 1h), redesigned to convey a sense of movement and dynamism (Yariş, 2024). Architectural presentations and model-making often employ stylization to highlight the aesthetic and functional characteristics of structures in a more simplified and impactful way (Figure 1i). Techniques like watercolor and gouache painting frequently involve stylization, simplifying essential details of structures to express their character. For instance, roof and window details in models of traditional Turkish houses are stylized and simplified (Figure 1j). This approach makes the models more visually appealing and meaningful. Stylization approaches exemplified across various fields are also encountered in 3D animated films, the primary focus of this study. This topic is elaborated upon in detail below with relevant examples.

Figure 1. Examples of stylization across various disciplines
(a) Fashion design with exaggerated silhouettes, (b) Traditional Turkish miniature art, (c) Kilim weaving motifs, (d) Pictograms in graphic design, (e) Art Nouveau architectural details, (f) Gaudi's organic forms, (g) Diyarbakır wall motifs, (h) Stylized lion figure, (i) Architectural watercolor rendering, (j) Simplified Turkish house model.

Stylization in 3D Animated Films

In 3D animated films, stylization elevates architectural elements beyond mere background features, transforming them into aesthetic and narrative tools. The primary goal of stylization is to reinterpret real-world architectural forms, offering viewers a unique and striking experience. Exaggeration of real-world proportions, simplification of forms, and abstraction of structural elements are defining characteristics of stylized 3D architecture (Winkenbach & Salesin, 1994). This approach establishes an aesthetic language where spaces and structures are designed to support the narrative rather than adhere to realism. According to animator Chris Maraffi, determining the style -whether "stylized" or "realistic" (photorealistic)- is a critical step before designing elements such as characters and architectural features. In stylized techniques, characters and environments are exaggerated or simplified, allowing greater creative freedom for the audience. In contrast, photorealistic techniques aim for a high level of detail and closeness to reality, appealing to the viewer's sense of realism (Maraffi, 2003).

In realistic styles, characters and architectural elements are modeled based on real-world references, emphasizing intricate details. For instance, the asymmetry of a human face is carefully modeled in 3D animation to achieve a photorealistic effect. Stylized styles, on the other hand, present architectural elements and characters in simplified and exaggerated forms, offering greater flexibility and creativity to the narrative. When used as a narrative device, stylized architecture helps reflect characters' personal worlds, emotional states, and environments. In animated films, the stylization of spaces and architecture immerses the audience more deeply into the story's world. Films like Chicken Little and Cars use stylized buildings and environments to depict the characters' worlds. Such structures are exaggerated or simplified through aesthetic choices to better convey the essence of the characters and events (Bénard et al., 2013). Stylization emphasizes specific architectural elements to capture the audience's attention and support the narrative.

In this context, stylized architectural elements enhance a film's atmosphere and add new dimensions to the narrative. For example, in Chicken Little, the characters inhabit a fully stylized environment where exaggerated architectural forms directly reflect the film's comedic tone. Similarly, Cars extends this approach by reshaping architectural elements through an automotive lens, creating a cohesive, stylized world. In contrast, the analysis reveals how films like Open Season employ more restrained stylization to maintain a semi-realistic wilderness atmosphere, demonstrating the spectrum of approaches between full stylization and photorealism. This strategic use of architectural stylization allows animated films to create distinctive visual identities that support their unique narrative requirements. Stylized architectural forms in 3D animated films are frequently reinterpreted to contribute to the narrative's visual language. Although architectural elements are carefully designed to remain recognizable, they are often reshaped to align with the characters' worlds. The stylization of real-world buildings and structures allows viewers to engage with the characters' environments in more imaginative and emotional ways (Baxter et al., 2004). This approach ensures that the aesthetic of the architecture complements character designs, creating a unified artistic vision.

This stylization process typically involves exaggeration, simplification, or abstraction of spaces. For instance, colossal buildings or asymmetrical structures can symbolize characters' inner worlds, helping the audience understand their psychological states (Bénard et al., 2013). In particular, fantastical 3D animated films use stylized spaces and structures to provide viewers with visual experiences that are impossible in the real world. These experiences amplify the emotional intensity of the story (Baxter et al., 2004). Köymen (2023) emphasizes that stylized architecture is not only an aesthetic choice but also a powerful tool for understanding the characters' worlds. When stylizing architectural elements, a delicate balance is maintained between realism and abstraction. While real-world references are preserved, these references are abstracted to deepen the audience's connection to the narrative. Stylization aims to enhance the impact of architectural elements on both aesthetics and storytelling (Köymen, 2008). This balance allows architectural elements to remain recognizable while offering the audience a deeper aesthetic experience. For example, in The Monster House, a house is portrayed as both a realistic building and an abstract character. Through stylization, the house's role in the story gains dramatic significance, enabling the audience to recognize and rediscover familiar elements of the real world (Bénard et al., 2013). In this context, stylized architectural forms amplify the visual and narrative power of animated films. By reinterpreting familiar elements, stylization allows viewers to engage more deeply with the characters' worlds. The balance between abstraction and realism ensures that

architectural forms leave both an aesthetic and emotional impression on the audience (Winkenbach & Salesin, 1994; Baran, 2023; Köymen, 2023).

METHODOLOGY

This study adopts a qualitative research approach to explore how architectural stylization influences the narrative structure of 3D animated films. Given that stylization in animated architecture is an artistic and interpretive phenomenon, qualitative content analysis was selected as the primary method to assess how visual elements contribute to storytelling.

Film Selection Criteria

A total of ten films were selected for analysis, representing diverse periods, cultural themes, and aesthetic styles. The films analyzed are: Chicken Little (Dindal, 2005), Monster House (Kenan, 2006), Open Season (Allers et al., 2006), Cars (Lasseter, 2006), Monsters, Inc. (Docter, 2001), Spider-Man: Into the Spider-Verse (Persichetti et al., 2018), Soul (Docter & Powers, 2020), The Mitchells vs. The Machines (Rianda, 2021), Encanto (Howard & Bush, 2021), and Puss in Boots: The Last Wish (Crawford, 2022). The selection criteria were determined based on the following aspects:

- Architectural Prominence: The films had to include architectural elements as an essential component of their world-building and narrative structure.
- Stylization Techniques: The films had to exhibit clear stylization techniques such as exaggeration, simplification, or abstraction in their architectural designs.
- Cultural and Historical Representation: The films were chosen to reflect various cultural, historical, and futuristic interpretations of architecture to provide a broad perspective on stylization.
- Narrative Integration: The architectural elements needed to serve as more than just a backdrop, actively contributing to the narrative, character emotions, or thematic depth.

The selected films were examined in their entirety, including their set designs, environments, and how the architecture interacts with the characters, themes, and storytelling techniques.

Data Collection and Analysis

The primary data for this study were collected through a detailed visual analysis of the films. This process involved a close reading of key architectural scenes and sequences, identifying how stylized spaces functioned within the narrative. Supporting materials such as production design books, director interviews, and animation industry reports were also consulted to understand the artistic intent behind the stylized designs. The content analysis followed a structured approach, focusing on the following key visual parameters:

- Form & Structure: How buildings and environments are exaggerated, abstracted, or reimagined to align with the storytelling.
- Texture & Materiality: The stylization of surfaces, materials, and environmental elements to reinforce the thematic mood.
- Lighting & Color Palette: How lighting choices and color schemes shape emotional engagement and narrative progression.
- Scale & Proportions: The degree to which buildings, interiors, and landscapes deviate from real-world proportions to create a heightened visual effect.

Discussion and Interpretation of Data

Each film was analyzed individually to assess the unique approaches to architectural stylization. The findings were then compared and contrasted across different films to identify common trends, recurring motifs, and distinctive narrative functions of stylized architecture. To ensure a rigorous interpretation, the study integrates theoretical frameworks from both architecture and animation studies. Additionally, narrative theories on spatial storytelling were applied to interpret how architectural stylization enhances dramatic tension, character development, and audience perception.

FINDINGS

Examining the Narrative Contributions of Architectural Stylization in 3D Animated Films

This section analyzes 10 examples of 3D animated films produced at different times, interpreting them with a focus on the stylized approaches used in their architectural designs. These films were specifically selected to understand the impact of architectural stylization in 3D animation and uncover their narrative functions. The selection spans a wide range of periods, cultural themes, and aesthetic styles, demonstrating how architectural design is reinterpreted through animation and presented to audiences. Each film is significant for its distinctive architectural elements, use of unique stylization techniques, and ability to integrate narrative and visuals. In architecture, human ergonomics and proportions play a critical role in design. Le Corbusier's "Modulor" system, based on human body proportions, provides a human-centered approach to functionality in architecture (Ching, 2007). However, in 3D animated films, architectural structures are shaped through stylization processes, often diverging from human scale to align with the exaggerated or simplified characteristics of the characters. This approach reimagines architecture to complement the stylization of characters and enhance the narrative.

In Chicken Little (Dindal, 2005), it is observed that the stylized animal characters reflect a contemporary lifestyle. The architectural structures in the film are presented through exaggerated and simplified forms. Parallel lines are intentionally avoided, and oversized façade elements along with vibrant color tones are employed to create an aesthetic suited to the film's narrative world. To enhance the tactile feel of this world, surfaces are often rendered with smooth, almost plastic-like textures, reinforcing the cartoonish and artificial nature of the environment. This vibrant and consistently bright color palette is complemented by a lighting scheme that avoids harsh shadows, using even, high-key illumination to maintain the film's energetic and comedic tone. This approach aligns with what Furniss (2007) describes as "exaggerated aesthetics" in animation, a technique that immerses the audience in a world that is unrealistic yet visually compelling. Wells (2002) also notes that such stylizations reinterpret architectural elements not merely as visual tools but as integral parts of the narrative. In Chicken Little, adhering to this perspective, visual appeal takes precedence over functionality, resulting in an aesthetic environment that aligns with the exaggerated nature of the characters (Figure 2).

Figure 2. Still images from Chicken Little showcase its stylized architectural forms

In the film, the stylization of architectural structures is achieved through the simplification or exaggeration of structural systems. Columns, arches, and other architectural elements are designed not merely for functionality but to create an aesthetic cohesion that supports the film's narrative. The materiality of these structures is

simplified, featuring smooth, cartoonish surfaces that avoid complex textures, which reinforces the film's non-realistic and playful aesthetic. This is complemented by a lighting scheme that relies on bright, high-key illumination and a vibrant color palette, enhancing the comedic and energetic tone while ensuring visual clarity. This approach demonstrates how architectural forms contribute to storytelling and how structural details can become powerful aesthetic tools. For instance, the exaggerated dimensions and abstracted geometric shapes of buildings in the film reflect its energetic and comedic tone. Such stylizations push the boundaries of architectural design, transforming structures into vital storytelling devices. The stylized structural details captivate the viewer's attention, creating both aesthetic and dramatic effects. Additionally, the nature of these stylized architectural elements serves as a compelling backdrop that enhances the narrative of the characters, immersing the audience more deeply into the world of the film (Desowitz, 2005; Thomas, 1991) (Figure 3).

Figure 3. Examples of stylized structural systems in Chicken Little

In Monster House (Kenan, 2006), the house is stylized as a monster and functions as a character within the narrative. This architectural approach reinterprets the house not merely as a setting but as an active part of the story. The depiction of the house through exaggerated and abstract forms draws the audience into a dramatic atmosphere, transforming it into a narrative tool rather than a simple structure. The materiality of the house is crucial to its monstrous character; weathered wood, peeling paint, and a generally coarse, decaying texture dominate its exterior, visually communicating age, neglect, and a lurking menace. This is amplified by the distorted scale and proportions of the building itself. The house looms over the neighborhood with an unnaturally tall and bulky silhouette, while its windows are asymmetrically placed like scowling eyes and the porch juts out like a gaping maw, directly linking architectural form to monstrous anatomy. The personification of spaces in animated films fosters an emotional connection with the audience, while stylization enhances this bond (Furniss, 2007; Wells, 2013). The stylization of the house as a "monster" serves as a strategy that immerses viewers in the story and highlights the dramatic elements of the space. This design also provides a compelling example of how space can be personified in animation cinema. The house's behaviors and physical features reinforce the emotions of fear and suspense within the story, while its architectural elements add narrative depth. This unique approach in the film demonstrates how animation can strengthen the interaction between space and storytelling (Furniss, 2008; Pilling, 2012; Wells, 2013) (Figure 4).

Figure 4. The "house" character's stylization in Monster House

In Open Season (Allers et al., 2006), the characters are observed to be stylized in a manner closely resembling realistic human forms. The simplified facial features and body proportions of the characters are designed to align with the film's aesthetic structure. Similarly, the architectural structures are shaped with a simplified

aesthetic, presented in harmony with the characters' visual style. The lighting scheme employs a naturalistic and soft color palette, dominated by earthy tones and forest greens, which reinforces the outdoor wilderness setting. The use of warm, diffused sunlight in camp scenes creates a friendly and safe atmosphere, while cooler tones and sharper shadows are occasionally introduced to signal danger or tension during confrontations subtly. Architectural proportions, though simplified, remain grounded and relatable, adhering to a familiar human scale that contrasts with the more exaggerated scales seen in films like Chicken Little. This deliberate choice in scale helps anchor the story in a semi-believable wilderness environment, making the anthropomorphic characters' interactions with human spaces -like the park ranger station or the country store- feel more integrated and narratively coherent. This approach allows simplified architectural forms to function as narrative tools, reflecting the understated nature of the characters. While the buildings in the film resemble real-world architectural products, they are modeled with simplified geometric forms and minimal openings. For instance, materials such as wood and brick are reinterpreted with a pared-down aesthetic, free from intricate details. This process of stylization contributes to the film's world by providing an aesthetic form without compromising functionality (Beiman, 2013; Sunshine, 2006; Thomas & Johnston, 1995) (Figure 5).

Figure 5. Stylized architectural elements from Open Season

In Cars (Lasseter, 2006), the world of anthropomorphized vehicles is meticulously crafted through stylization. The cars are personified with human-like features, such as eyes and mouths, allowing them to convey emotional expressions. This characterization reimagines the automotive world within an aesthetic and narrative framework, offering viewers a unique experience. The architectural structures in the film are similarly stylized to align with the cars' world, creating a distinct narrative that diverges from the traditional human-architecture relationship. The materiality of this world is defined by automotive and roadside aesthetics. Buildings feature sleek, metallic surfaces reminiscent of car bodies, rubber-like detailing that evokes tires, and asphalt-textured elements, creating a visual continuity between the characters' identity and their environment. The lighting and color palette further enhance this theme. Radiator Springs is bathed in the warm, nostalgic glow of neon signs and sunset tones, which fosters a cozy, communal atmosphere. In contrast, the modern highway is depicted with cold, blue-tinged lighting and sterile colors, establishing a visual contrast that underscores the narrative conflict between tradition and progress. For instance, a repair shop is designed to resemble a medical clinic, with car repair processes symbolically associated with medical treatment. The interior features equipment resembling medical tools, further enhancing the stylized analogy to healthcare services. Externally, architectural details inspired by medical buildings serve as symbolic narrative tools (Paik, 2006; Solomon, 2006). Stylized architecture combines functionality and aesthetics, enriching the film's world-building. For example, a gas station is reinterpreted with forms reminiscent of a car engine, presenting a thematic aesthetic that integrates seamlessly into the narrative. The piston-like elements used in its design demonstrate how architecture can merge with the film's characters, reinforcing thematic cohesion. Furthermore, the "Wheel Well" motel exemplifies the integration of landscape and architecture with the car theme, showcasing stylization as a tool for aesthetic and narrative unity. Such design choices highlight how architecture can significantly contribute to storytelling, strengthening the thematic and visual consistency of the animated world (Paik, 2006; Wallis, 2006) (Figure 6).

Figure 6. Stylized architectural examples and concept designs from Cars

In Monsters Inc. (Docter, 2001), columns, beams, and other structural elements are stylized, reinterpreting them in both functional and aesthetic contexts. The architectural components retain their functionality while being presented in an exaggerated and dynamic manner, aligning with the film's whimsical and fantastical tone. The materiality reflects an industrial yet fantastical setting. Surfaces combine cold, metallic textures of factory equipment with brighter, colored plastics and rubberized elements, creating an environment that feels both functional for a large corporation and visually engaging for a world of monsters. The lighting design plays a crucial role in defining spaces within the factory. Vast, high-ceilinged areas are often lit with a cool, functional, and slightly sterile overhead illumination, emphasizing the scale and industrial nature of the work. In contrast, more intimate or secretive spaces, like Boo's bedroom door station, are bathed in warmer, localized pools of light, shifting the atmosphere to one of mystery and emotional connection. For instance, architectural details reflecting the industrial nature of factories are redesigned to complement the film's humorous and imaginative narrative (Bendazzi, 2016). This demonstrates how architectural elements can serve as both aesthetic and narrative tools through stylization. In contrast to real-world architecture, which is typically constrained by structural and functional limitations, Monsters Inc. transcends these boundaries through 3D animation. The construction systems are reimagined primarily as aesthetic devices rather than purely functional ones (Wells, 2002). Through stylization, architectural forms are dramatically reshaped, drawing viewers into the narrative more effectively and elevating architecture beyond a mere visual element. For example, expansive openings and towering columns create an iconic aesthetic (Furniss, 2008) that represents the dynamic world inhabited by the characters (Figure 7).

Figure 7. Stylized use of architectural components in Monsters Inc.

Spider-Man: Into the Spider-Verse (Persichettti et al., 2018) brings together Spider-Man characters from different universes, each with its own distinct stylized architecture under one narrative framework. The film reimagines New York City's towering buildings and neon lights to reflect the unique visual style of each universe. The architecture is shaped with sharp lines and vivid colors, reflecting the comic book aesthetic (Robertson, 2018). The lighting is equally stylized, employing dramatic contrasts and vibrant, often unnatural color glows that emulate the dynamic ink and color palette of printed comics, further breaking from cinematic realism. Cityscapes inspired by comic book panels are frequently employed to enhance the dramatic impact of scenes (Bramesco, 2019). The scale and proportions of the city are manipulated to serve the narrative; buildings often stretch into impossibly tall, elongated silhouettes to emphasize the superheroic scale of the action and the vertiginous experience of swinging through the city, while compressed perspectives in alleyways create a sense of intimate tension. The stylized buildings not only support the characters' actions but also immerse the viewer more effectively into the comic book world (Doğru, 2020). This stylization creates a visually striking yet unreal world that deeply engages the audience in the narrative flow (Figure 8).

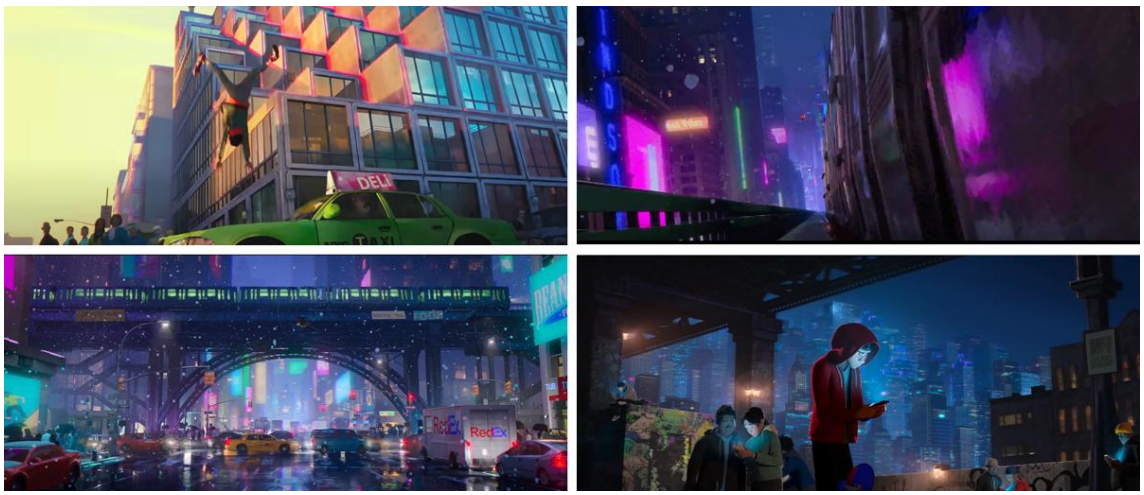

Figure 8. Visuals from Spider-Man: Into the Spider-Verse

The film Soul (Docter & Powers, 2020) visually supports its narrative by presenting two contrasting worlds through architectural stylization. The film highlights two primary aesthetic approaches: the real world and the spiritual world. A detailed, layered, and textured recreation of New York City characterizes the real world. Director Pete Docter and co-director Kemp Powers describe New York as "the heart of jazz," adding spatial dynamism to the story. This realistic depiction reflects the city's complex and vibrant structure, forming a strong connection with Joe Gardner's passion for jazz. In contrast, the spiritual world is defined by minimal, abstract, and fluid forms that create a metaphysical atmosphere. Spaces such as "The Hall of Everything," where new souls gain their personalities, symbolize this ethereal realm. These abstract environments are designed with flowing, soft lines, stripped of rigid geometric shapes. A key distinction lies in the scale and proportions of these worlds. The real world adheres to familiar, human-scale proportions, grounding Joe's story in a relatable reality. Conversely, the spiritual world employs vast, seemingly infinite scales and non-Euclidean geometries, with spaces that shift and expand beyond measurable proportions to evoke a sense of the sublime and the unknowable. Pixar's production designers aimed to visualize the purity and natural essence of souls by incorporating "glowing particles and organic forms" (Pixar Animation Studios, 2020). The aesthetic contrast between these two worlds enhances the film's thematic narrative. The rich textures of the real world align with Joe's tangible reality and passion for jazz, while the spiritual world's fluid design represents a metaphysical dimension that reflects the characters' inner journeys. This stylization enables the spatial representation of a spiritual transformation process, offering viewers both a visual and emotional experience (Arı & Bingöl Öz, 2023). Through this duality, Soul employs architectural elements as a dramatic storytelling tool, juxtaposing the detailed, concrete aesthetics of the real world with the minimal, abstract forms of the spiritual world. This contrast deepens the narrative's spatial layers, inviting the audience into both a tangible urban atmosphere and an abstract spiritual journey (Figure 9).

Figure 9. Visuals from Soul

The Mitchells vs. The Machines (Rianda, 2021) stands out with its absurd humor and strong visual stylization. While telling the story of a family's struggle against a robot uprising, the film creates striking aesthetic contrasts through spatial designs. By combining hand-drawn effects with digital 3D animation, it presents the family's spaces with a warm, chaotic aesthetic, whereas the robots' world is depicted as cold, sterile, and mechanical (Rianda, 2021; Animation Mentor, 2021). This contrast is further emphasized through the manipulation of scale and proportions. The Mitchell family's environments often feel slightly distorted and off-kilter, with exaggerated domestic scales that reflect their chaotic and emotionally vibrant life. In stark contrast, the robot spaces are characterized by vast, impersonal, and repetitively modular scales, designed to dwarf human presence and convey the cold efficiency of a technological takeover. The design of the robots incorporates fragmentation effects inspired by the T-1000 character's transformation sequences from Terminator 2: Judgment Day (The Mitchells vs. the Machines, 2021). This visual contrast enhances the film's comedic and dramatic structure, demonstrating how architectural elements function as aesthetic and narrative tools (De Wit, 2021) (Figure 10).

Figure 10. Visuals from The Mitchells vs. The Machines

Encanto (Howard & Bush, 2021) offers a visually rich narrative that combines magical realism with architectural stylization, drawing inspiration from Colombian culture. The Casa Madrigal functions not just as a structure but as a living entity that actively participates in the story. Architectural elements are enriched with magical rooms that reflect the identities of family members, such as Isabela's nature-filled space and Luisa's stone-themed, robust room, visually emphasizing their personalities and adding depth to the narrative (Grønn & Svenhard, 2023; Alvarado et al., 2024). The lighting and color palette are instrumental in establishing the film's emotional tone. The Casita is typically bathed in warm, golden sunlight and vibrant, saturated colors that enhance its welcoming and magical atmosphere. This warm illumination contrasts with the cooler, flatter lighting and muted color scheme used during the house's weakening and eventual collapse, visually mirroring the family's emotional turmoil and the loss of their magic. Inspired by Colombia's Neogranadian colonial architecture, the film employs vibrant colors and intricate details while carefully crafting contrasts between spaces. The lively and dynamic atmosphere of the Casita contrasts with the natural and static external environment. Furthermore, the disintegration and reconstruction of the house visually symbolize the Madrigal family's unity and conflicts, serving as a metaphor for their emotional journey (Zornosa, 2022). Ultimately, Encanto merges architectural stylization with magical realism, transforming space into a narrative device that invites viewers on both an aesthetic and culturally emotional journey (Figure 11).

Figure 11. Visuals from Encanto

Puss in Boots: The Last Wish (Crawford, 2022) combines classic fairy tale aesthetics with modern animation techniques, offering a visually captivating experience. Inspired by Sony Pictures Animation's Spider-Man: Into the Spider-Verse (Persichetti et al., 2018), the film adopts a storybook illustration style that enhances its magical atmosphere and immerses viewers in an enchanting world (Croll, 2022; Spry, 2022). The film's lighting and color palette are key to its storybook aesthetic. It utilizes a painterly approach to light and shadow, with bold, expressive color zones often taking precedence over realistic rendering. The color saturation shifts dynamically to reflect the narrative's emotional tone, becoming more vibrant and hopeful in uplifting moments and desaturated in moments of danger or despair. Utilizing new technologies, the production team achieved a painterly visual style that sets the film apart from previous Shrek installments, presenting a unique fairy tale world where characters and environments appear more vivid and dynamic (Croll, 2022). The architectural designs reflect traditional elements of European fairy tales, enriched by a distinct color palette and intricate details that give each setting its own unique identity. The scale and proportions of the architectural elements are often exaggerated to evoke a sense of fairy-tale wonder and peril. Structures like the giant's castle employ immense, oversized scales to emphasize the protagonist's vulnerability, while more intimate spaces, such as the home of the Mama Bear family, use distorted, almost caricatured proportions to enhance their thematic resonance and visual distinctiveness within the stylized world. Notably, the diverse realms and structures encountered during Puss in Boots' adventures provide a rich and varied visual journey for the audience (Fleming, 2022). In conclusion, the film effectively blends architectural stylization with innovative animation techniques, successfully capturing the essence of fairy tale aesthetics while delivering both a nostalgic and contemporary experience for viewers (Figure 12).

Figure 12. Visuals from Puss in Boots: The Last Wish

Comparative Analysis of Stylized Architecture in 3D Animated Films

To systematically synthesize the findings across all ten films, Table 1 provides a comparative overview of how the four key parameters of architectural stylization -Form & Structure, Texture & Materiality, Lighting & Color Palette, and Scale & Proportions- function narratively in each film. This matrix not only highlights the diverse applications of stylization but also reveals recurring patterns where similar techniques are employed to achieve distinct narrative goals.

Table 1. Comparative Analysis of Architectural Stylization in 3D Animated Films

Film	Form & Structure	Texture & Materiality	Lighting & Color Palette	Scale & Proportions
Chicken Little	Exaggerated and simplified forms; avoidance of parallel lines; simplification or exaggeration of structural systems.	Smooth, cartoonish, plastic-like surfaces; lack of complex textures.	Bright, high-key illumination; vibrant and energetic color tones.	Oversized façade elements; distorted proportions for comic absurdity.
Monster House	Personified, living structure; abstract and menacing forms.	Weathered wood, peeling paint; decaying, coarse textures.	Harsh shadows, abrupt lighting shifts; suspenseful and ominous atmosphere.	Overly large and dominant silhouette; windows and entrance distorted to resemble facial features.
Open Season	Simplified geometric aesthetic; forms closely resembling realistic references.	Simplified interpretation of natural materials like wood and brick; lack of intricate details.	Natural and soft lighting; earthy, natural color palette dominated by forest tones.	Relatable, human-scale proportions; grounded and familiar.

Cars	Real-world structures reinterpreted through automotive anatomy and perspective.	Metallic, rubber-like, and asphalt textures; surfaces integrated with vehicle identity.	Warm, nostalgic neon lighting (Radiator Springs); cold, blue-tinged sterile lighting (modern highway).	Fully divorced from human scale; shaped to the size and movement of vehicles.
Monsters, Inc.	Exaggerated and dynamic stylization of industrial elements (columns, beams).	Industrial metallic surfaces combined with fantastical details like plastic and rubber.	Cold, functional overhead lighting (factory); warm, localized lighting (private spaces).	Massive, imposing factory interiors; wide openings emphasizing character scale.
Spider-Man: Into the Spider-Verse	Sharp lines, comic-book aesthetic; universe-specific forms.	Graphic textures: halftone dots, bold outlines mimicking printed comics.	Dramatic contrasts, vibrant non-diegetic color glows; dynamic comic-book effect.	Elongated, exaggerated building silhouettes to emphasize heroism and vertigo.
Soul	Real World: Complex, layered. Spiritual World: Minimal, abstract, fluid.	Real World: Rich, detailed textures. Spiritual World: Soft, glowing, non-tactile surfaces.	Real World: Warm, complex, jazz-toned. Spiritual World: Gentle, glowing, serene illumination.	Real World: Human, familiar scale. Spiritual World: Immeasurable, vast, sublime scale.
The Mitchells vs. The Machines	Family: Chaotic, organic. Robots: Cold, geometric, sterile.	Family: Hand-drawn, warm textures. Robots: Smooth, metallic, cold surfaces.	Family: Lively, warm, exaggerated colors. Robots: Cold, blue-toned, uniform lighting.	Family: Distorted, childish, personal scale. Robots: Overwhelming, massive, anonymous scale.
Encanto	"Living", responsive structure; magical rooms reflecting family members' identities.	Vibrant colors; intricate details and textures inspired by Colombian architecture.	Warm, golden sunlight and vibrant colors (magical); pale, cool colors (magic fading).	Inviting scale reflecting family warmth; variable internal scales in magical rooms.
Puss in Boots: The Last Wish	Painterly forms inspired by European fairy tale architecture.	Rich color palette; complex, location-specific detailing.	Painterly, expressive light and shadow; color saturation tied to emotional narrative rhythm.	Exaggerated scales for fairy-tale grandeur and peril; distorted proportions for thematic emphasis.

The following detailed discussion, structured by the four core parameters, elucidates the specific narrative mechanisms behind these stylistic choices as summarized in Table 1.

The narrative function of form and structure: Stylization of form is the most prominent tool for placing architecture at the center of the narrative. The examined films reveal how form can be transformed to serve distinct narrative purposes. Films like Chicken Little and The Mitchells vs. The Machines employ exaggerated and simplified forms to reinforce a comedic and chaotic tone. In contrast, in Monster House, form is distorted to transform a house from a physical structure into a living antagonist, embodying fear and childhood trauma. In Cars, form is adapted to the anthropomorphized world of vehicles; gas stations and motels are reimagined with shapes derived from automotive anatomy, achieving a humorous and thematic coherence. Soul and Encanto, meanwhile, use form as a metaphorical tool. In Soul, the contrast between the complex forms of the real world and the minimal, fluid forms of the spiritual realm visualize existential themes. In Encanto, the "living" and responsive form of Casa Madrigal, which physically reacts to the family's emotional states, turns architecture into a concrete metaphor for family dynamics.

The role of texture and materiality in spatial storytelling: The stylization of surfaces and materials defines the tactile quality of a space, guiding the audience's emotional positioning. Films such as Chicken Little and Open Season use smooth, toy-like, or simplified textures to construct an inviting and comfortable atmosphere distanced from realism. Conversely, the weathered, decaying textures of Monster House evoke a threatening and unsettling feeling. Spider-Man: Into the Spider-Verse utilizes graphic textures like halftone dots and bold outlines that mimic comic book aesthetics, pulling the viewer away from traditional cinematic realism into a graphic universe. Films like Cars and Monsters, Inc. use texture and materiality to ensure the thematic consistency of their worlds. In Cars, metallic, rubber-like, and asphalt textures fuse the architecture with the characters' identities. In Monsters, Inc., industrial metallic textures emphasize the functionality of the factory setting while, combined with fantastical elements, create a unique universe.

The emotional and thematic contribution of lighting and color: Lighting and color are among the most powerful tools for carrying the emotional weight and thematic contrasts of a narrative. The bright, high-key lighting and vibrant colors in Chicken Little perpetually maintain its comedic and energetic tone. Soul exhibits the most pronounced contrast in this parameter: the warm, complex lighting and jazz-infused tones of the real world represent the vibrancy of life, while the soft, glowing, and serene illumination of the "Great Beyond" creates a metaphysical sense of tranquility. A similar contrast is established in The Mitchells vs. The Machines

between the warm, chaotic colors of the family and the cold, sterile, blue-toned lighting of the robots, visualizing the conflict between humanity and technology. Encanto and Puss in Boots: The Last Wish use light and color on a more symbolic and emotional level. In Encanto, the golden light and warm colors of the Casita represent magic and family warmth; as the magic fades, the colors desaturate and cool. In Puss in Boots, a painterly, expressive use of light and shadow is directly tied to the emotional rhythm of the narrative.

The narrative effects of scale and proportion manipulation: Consciously deviating from architectural scale and proportions is a powerful way to emphasize characters' internal states and their position within the story. Films like Chicken Little distort proportions to create a sense of comic absurdity. Spider-Man: Into the Spider-Verse and Puss in Boots: The Last Wish use elongated building silhouettes and colossal structures to convey heroic grandeur and the scale of fairy-tale peril, respectively. The Mitchells vs. The Machines creates a thematic conflict by contrasting the distorted, personal scale reflecting the family's chaotic life with the anonymous, massive scale of the robots that overwhelms humanity. Soul uses scale to differentiate between the physical and metaphysical realms. The real New York City is depicted in a familiar, human scale, while the abstract landscapes of the "Great Beyond" are designed on an immeasurable, vast, and superhuman scale. This prepares the viewer for the magnitude of the character's metaphysical journey.

DISCUSSION AND CONCLUSION

This study has demonstrated through a systematic analysis of ten 3D animated films that architectural stylization is a primary vehicle for narrative construction, emotional engagement, and thematic expression. The detailed examination of key scenes and sequences, guided by the parameters of form, texture, lighting, and scale, confirms that architecture in animation consistently transcends the role of a passive backdrop to become an active narrative agent. The findings align with the concept of hyperreality (Bridges & Charitos, 1997; Kürşad, 2020), where stylized environments are understood not as less real than physical reality, but as perceptually and emotionally intensified spaces that transcend conventional realism. The personified house in Monster House, the automotive-scale world of Cars, and the metaphysical realms of Soul all exemplify how stylization creates spaces that are conceptually coherent and narratively potent, freed from the constraints of physical realism. This creative liberation allows architectural elements to directly mirror character psychology, embody central conflicts, and guide the audience's emotional journey.

The narrative potency of animated architecture revealed in this analysis suggests a move beyond traditional functionalism in spatial design. This approach aligns with the broader recognition of narrative's role in shaping human experience, as seen in other design disciplines where 'narrative-driven approaches' (Lum, 2019) are being integrated to create more coherent and meaningful user journeys. While such approaches have been explored in fields like service design, this study demonstrates how their principles are masterfully employed in animation and can be translated into a tangible framework for architectural practice. The techniques identified—such as symbolic exaggeration, thematic materiality, and expressive scale manipulation—provide a concrete toolkit for architects to operationalize this narrative potential, thereby infusing greater emotional depth and storytelling into real-world projects.

Implications for Architectural Practice and Education

The stylization techniques identified -such as symbolic exaggeration, thematic materiality, and expressive scale manipulation- offer a toolkit for architects and designers to infuse narrative and emotional depth into real-world projects. This suggests a move beyond traditional functionalism towards what can be termed "narrative-driven design," where spaces are conceived to tell stories and evoke specific psychological responses.

In architectural education, these findings advocate for a stronger interdisciplinary curriculum that incorporates principles from animation and cinematic storytelling. Analyzing films like Encanto or Spider-Man: Into the Spider-Verse can teach students how to communicate cultural identity, social dynamics, and abstract concepts through spatial design. This approach equips future architects with the skills to create more experiential and emotionally resonant environments, particularly in the burgeoning fields of digital and virtual design.

Projections: Stylization in the Digital Future

The rapid development of immersive technologies like Virtual and Augmented Reality (VR/AR) presents a direct pathway for applying these animation-derived techniques. The stylization methods explored in this study are not merely illustrative; they are foundational to designing compelling virtual environments. In VR/AR, where user experience is paramount, the ability to use stylized form, light, and scale to orchestrate emotion and narrative will be crucial. The findings of this study provide a theoretical and practical framework for leveraging architectural stylization as a user-experience strategy in these digital realms.

Furthermore, from an art historical perspective, the analysis shows a clear lineage. The stylized, flowing lines of Encanto echo Art Nouveau (Baytar, 2019), while the fractured geometries of Spider-Verse reflect Cubist and contemporary graphic novel sensibilities. This demonstrates that 3D animated films are not creating a new language from scratch but are digitally revitalizing a rich history of stylistic expression within architecture and art.

Concluding Remarks

In conclusion, this research establishes architectural stylization in 3D animation as a sophisticated and intentional narrative device. Through systematic examination of its core components, a framework has been developed for understanding and utilizing stylization beyond entertainment contexts. The potential of these techniques to generate more meaningful, narrative-rich, and human-centric spaces -whether physical or digital- appears considerable. As boundaries between physical and virtual environments continue to blur, the principles of architectural stylization, as refined in animated films, are positioned to play a significant role in shaping the future of spatial design, potentially fostering more expressive dialogues between people and their inhabited spaces.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used OpenAI's ChatGPT-4 to review the text, conduct literature searches, and make structural improvements. The content was subsequently reviewed and edited by the authors, who take full responsibility for the final version of the publication.

Author's Contributions

The article is single-authored. All research was done by the corresponding author.

Competing Interests

There is no potential conflict of interest.

Ethics Committee Declaration

The research does not have a research methodology that would require ethical approval.

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Figure 8: Persichetti, B., Ramsey, P., Rothman, R. (Directors). (2018). *Spider-Man: Into the Spider-Verse* [Film]. Sony Pictures Animation.

Figure 9: Docter, P., & Powers, K. (Directors). (2020). *Soul* [Film]. Pixar Animation Studios.

Figure 10: Rianda, M. (Director). (2021). *The Mitchells vs. The Machines* [Film]. Sony Pictures Animation.

Figure 11: Howard, B., & Bush, J. (Directors). (2021). *Encanto* [Film]. Walt Disney Animation Studios.

Figure 12: Crawford, J. (Director). (2022). *Puss in Boots: The Last Wish* [Film]. DreamWorks Animation.

Author's Biography

Erdem Köymen graduated from Trakya University's Department of Architecture in 2005 and completed his Master's degree in 2008, focusing on "Architecture in 3D Animated Films." He earned his Ph.D. from Yıldız Technical University in 2014 with a dissertation on augmented reality-assisted real-time 3D sketch modeling. Throughout his career, he has contributed to architectural design, 3D animation, game development, and music composition. He has also worked as a graphic designer, art director, and scene designer. Currently, he teaches at Istanbul Zaim University's Architecture and Interior Architecture Departments and continues research in architectural design, modeling, animation, and digital arts.