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Toward a New Era of Interdisciplinary Research in the Arts

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In an era marked by rapid technological advancement and the ongoing transformation of the global cultural landscape, visual and performing arts—as vital channels for emotional expression and intellectual engagement—are undergoing an unprecedented evolution. Emerging technologies such as artificial intelligence, virtual reality, and big data are profoundly reshaping how art is created, disseminated, and experienced. Meanwhile, the convergence and collision of diverse cultures continue to expand the theoretical boundaries and practical approaches of art research. Against this dynamic backdrop, we proudly inaugurate the *Journal of Visual and Performing Arts Research* (JVPAR), with a deep commitment to academic innovation and the future of the arts. Our goal is to build a high-level, interdisciplinary academic platform rooted in local contexts while embracing a global vision.

The founding of JVPAR is not merely the launch of a new academic journal; it is a declaration of research philosophy. We advocate for an open, cross-disciplinary, and dialogic academic approach ─ one that foregrounds the evolving trajectories of visual and performing arts in contemporary society, interrogates the transformations of artistic languages under technological mediation, and reexamines the reproduction and reinterpretation of traditional art forms in modern contexts. At the same time, we aim to promote the integration of education, cultural industries, and art theory, believing that truly profound and forward-looking research in the arts can only emerge from a broad, interdisciplinary horizon.

JVPAR is committed to fostering a dialogic space that brings together diverse disciplines and connects a wide range of practical and theoretical endeavors. We warmly welcome submissions from scholars, artists, and practitioners in visual arts, fine arts, music, dance, drama, film, and performance studies. We especially encourage original contributions that engage with the following topics, though the scope is not limited to them:

- Aesthetic and philosophical inquiries into music, visual art, and performance;
- Innovative methods and pedagogical practices in arts education;
- Contemporary expressions and media transformations in visual, musical, and performing arts;

- Theoretical developments and critical reflections at the forefront of visual and performing arts research;
- Transmission and modernization of traditional arts across national and cultural boundaries;
- The role of digital media, artificial intelligence, and other emerging technologies in art creation and dissemination;
- Artistic collaboration and knowledge reconstruction across media, platforms, and cultural contexts;
- Methodological innovation and theoretical integration in interdisciplinary arts research.

To ensure the highest standards of academic integrity and publication quality, JVPAR has assembled an editorial board of international vision, rigorous scholarship, and rich experience. We adhere strictly to internationally recognized academic publishing norms and employ a double-blind peer review process for all submissions, striving for fairness, timeliness, and transparency. Our editorial team serves as proactive mediators between authors and reviewers, facilitating effective communication and helping authors refine their manuscripts to achieve maximum clarity, coherence, and scholarly impact.

We are fully aware that launching a new journal comes with formidable challenges. However, we firmly believe that the vitality of a high-quality academic journal lies in its unwavering pursuit of scholarly excellence, the formation of a broad academic consensus, and its continual engagement with real-world practices. With unwavering resolve and a pragmatic approach, we are committed to enhancing JVPAR's content quality, peer review rigor, and international influence—ultimately establishing the journal as a leading publication in the field of visual and performing arts research.

At this juncture, we wish to express our heartfelt gratitude to every reviewer, contributor, and reader. Your professionalism, thoughtful judgment, and sustained support form the cornerstone of JVPAR's development. Your participation assures us that, even amid the ever-changing tides of our time, arts research can continue to maintain its intellectual sharpness and emotional resonance.

The publication of this inaugural issue marks the beginning of JVPAR's scholarly journey. This issue features selected high-quality research from disciplines including music, dance, fine arts, and arts education, offering both theoretical depth and practical insights. We are confident that these contributions will inspire scholars in related fields and offer valuable reference points for educators, creators, and policymakers alike.

Looking ahead, we hope to collaborate with researchers, educators, and practitioners from around the world to advance interdisciplinary integration, foster global dialogue, and respond to contemporary societal needs through rigorous and innovative research in the arts. It is our aspiration that JVPAR will serve as a vital bridge—connecting scholarship and practice, tradition and modernity, East and West—and that it will bear witness to and propel the vibrant creative energy of the arts in this new era. Let this be our starting point as we move forward into a new era of interdisciplinary research in the arts.

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How Bob Dylan Constructed His Visual Artist Identity

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Abstract

Robert Zimmer, known professionally as Bob Dylan, was awarded the 2016 Nobel Prize in Literature. He is recognized globally for his poetic music and the promotion of his paintings since the 1960s. However, his identity as a painter is far less established than his identity as a musician, as it relies more on marketing than on professionalism. A review of art world theories and related materials reveals that Dylan depended on marketing through biographies, galleries, and mass media before 2016, a practice that raised inquiries concerning plagiarism and professionalism. After 2016, Dylan redirected his marketing efforts toward establishing a correlation between music and painting, a strategy that achieved considerable success. Through a case study of Dylan's official art website, the paper utilizes visual semiotics, and reveals his construction of a calm, meditating, and sharp artist identity. Nevertheless, the visual art identity of geography remains tethered to the auditory art identity, and the "other side" persists in its perception as "this side."

Keywords: Bob Dylan; Identity Construction; Visual Art; Art Marketing

1. Introduction

As the winner of the 2016 Nobel Prize for Literature and a representative of the civil rights movement, Bob Dylan is a generational icon and a brilliant songwriter. In recent decades, he has expanded the boundaries of his artistic realm through an interdisciplinary approach: his archives include but are not limited to "manuscripts, notebooks and correspondence; films, videos, photographs, and artwork; memorabilia; personal documents; unrecorded song lyrics and chords" (Firth, 2022).

However, the talented songwriter has remained active in recent years as a musician and is also working to establish his identity as a painter. Both in 2019 and 2022, Dylan organized painting exhibitions in Shanghai, attracting a new generation of fans, and one can't help but wonder when

Dylan became a painter. Furthermore, how was his identity constructed? Is there any correlation between the construction of a painter's identity and that of a musician? Considering these questions when analyzing the development of Dylan's identity as an artist is imperative. The primary goal of this paper is to explore how Dylan constructs his fame as an artist with an established reputation as a musician. Therefore, 2016 became a significant turning point in that it marked the peak of his fame as a musician when he won the Nobel Prize. To achieve the goal, this paper will employ a literature-combining method and textual analysis, alongside the theory of the art world, to achieve this objective.

To date, there has been a paucity of research on the marketing of Bob Dylan's artistic oeuvre, particularly concerning the marketing of his paintings. However, given his reputation as a pop icon, there is a substantial body of literature on his paintings, including exhibitions, artistic reviews, and debates on his photography-based paintings. The present paper will first review his marketing of music, his painting career, and the criticism. Finally, with the distinction of his marketing strategy (whether the music is referred to), his painting strategy was divided in 2016, when he began emphasizing the relationship between his famous music and controversial canvas.

2. Methodology

This paper employs documentary and textual analysis methods to examine the marketing of Bob Dylan from a musician to a painter. By analyzing the existing documents about Dylan's paintings, including art reviews, exhibitions, biographies, journals, and media reactions, this study utilizes the art world theory, focusing on all the processes that Dylan's canvas undergoes to construct his artistic identity. Essentially, his marketing is divided into pre-2016 and post-2016 eras, marked by the nomination for the Nobel Prize when his fame peaked. Furthermore, guided by the visual semiotics of Painter et al. (2013), this paper takes his official website of art as a case study to reveal his marketing and self-construction as an artist. Lastly, it discusses the marketing and its influence on the art world.

3. Art World

Art is defined in various academic sources as "creative aiming at illusion, not reality" (Danto, 1964), which creates "a freshly opened area between real objects and real facsimiles of real objects" (Danto, 1964). This definition is later interpreted as "any candidate for appreciation by some person or persons acting on behalf of a certain social institution". Thus, if it is accepted by museum and gallery directors and purchased by art collectors, it is then baptized as "art" (Freeland, 2002).

In their 2017 study, Lee and Lee categorized extant research on art marketing into three distinct perspectives: marketing by arts organizations, marketing with artworks/artists, and marketing from the art world. First and foremost, marketing for Arts Organizations is a field of study that focuses on cultural institutions that apply marketing concepts and principles (Lee and Lee, 2017). Then, the concept of artwork and artist marketing is predicated on a critical response to the

limitations of the study from an instrumental perspective of art organization marketing (Chong, 2009). Last but not least, marketing in the art world, an area that emphasizes the social and contextual approach to art, exhibits some overlap with the marketing of artists and their respective works (Lee and Lee, 2017). The paper mainly analyzes the marketing of organizations and artists.

The distribution of Dylan's canvas extends beyond the realm of self-support and patronage, garnering significant attention and support from museums. As a renowned artist, Dylan collaborated with galleries on public sales, which included dealers, artists, critics, gallery-goers, and mass media, "proliferation of contact men." The primary function of the dealer is to cultivate public tastes and potential buyers (Berker, 2008), as well as to establish a monopoly on artists. In the case of Dylan, the gallery, curators, and directors function as the dealers, promoting the creativity and originality of his paintings through newspapers and online websites. Dealers' comments become popular and influential. Given Dylan's renown, it is evident that his paintings would have garnered attention in the absence of promotional efforts and accompanying discourse. These remarks and promotional activities, which resemble the marketing strategy previously discussed for the song, primarily functioned to generate widespread attention, thereby facilitating increased foot traffic in a relatively short period.

However, given Dylan's profession, his fans, critics, and art reviewers have high expectations of his paintings, particularly in connection with his musical career. In consideration of Dylan's accomplishments in the domain of lyrical composition, it is evident that the audience, scholars, and critics who have been drawn to his oeuvre in music hold analogous expectations for his artistic pursuits in painting. Despite the evident nature of Dylan's transition into a different artistic medium, the marketing strategies employed in the promotion of his paintings have elevated both the collective expectations and the threshold of acceptance within the artistic community. Conversely, due to his perceived "amateurism," there is dissatisfaction with his photo-based paintings and drawing skills. Therefore, adhering to the originality, creativity, and independence of paintings is doomed. Recognizing the importance of audience connection, particularly with music, Dylan's multifaceted role as both an artist and a businessman has led to the development of a unique intertextual relationship between his paintings and lyrics, satisfying viewers, artists, and critics seeking a deeper connection between the two media. This artistic cross-border relevance provides new avenues for research in the study of paintings and lyrics, offering novel perspectives on the relationship between artistic expression and audience engagement.

4. Pre-2016 Marketing of Dylan

Marketing was not a novel concept for Bob Dylan before the initiation of his visual art campaign; rather, throughout his career, he demonstrated a keen awareness of how strategic self-presentation could shape public perception and cultural reception.

4.1. Marketing as a musician

One of the most significant instances of this can be observed in his efforts to transform his artistic identity from that of a folk singer to that of a poet. This transition was not an incidental development but rather a carefully orchestrated process involving a multifaceted approach that

extended beyond music and into the realm of literary and intellectual discourse. Central to this strategic repositioning was Dylan's highly publicized friendship with Allen Ginsberg, a prominent figure of the Beat Generation and one of the most influential poets of the twentieth century. By leveraging this association, Dylan effectively recast himself as a literary figure, aligning his artistic output with the broader cultural and poetic movements of the era. This shift in identity was particularly noteworthy, given that his relationship with Ginsberg was not rooted in a conventional romantic or mentor-protégé dynamic. Instead, it was characterized by an intellectual and artistic camaraderie that allowed Dylan to bridge the divide between music and literature uniquely and compellingly.

Dylan's efforts to reinforce his poetic identity were particularly evident in 1965, a period during which Ginsberg's literary reputation was at its zenith. Dylan leveraged Ginsberg's standing within the literary world through a series of meticulously curated visual and verbal cues designed to solidify the connection between them. One such instance was the album cover of "Bringing It All Back Home", which served as a symbolic representation of their artistic kinship. Ginsberg himself further validated this narrative by explicitly articulating his views on Dylan's poetic sensibilities, thereby legitimizing his transition from folk singer to poet in the eyes of the literary establishment and the general public. This strategy extended beyond album imagery and personal endorsements; in D. A. Pennebaker's documentary "Don't Look Back" (1967), Dylan deliberately alluded to his relationship with Ginsberg, featuring him prominently in the film and referring to him as his "poet friend." This deliberate inclusion served not only to authenticate Dylan's literary aspirations but also to position him within the avant-garde countercultural movement of the time. Moreover, in Sam Shepard's "Rolling Thunder Logbook", Dylan's presence alongside Ginsberg at Jack Kerouac's gravesite was depicted in a highly symbolic manner, characterizing them as "three poets, one dead, two living" (Hishmeh, 2006). This framing serves to reinforce the evolving artistic identity of Dylan, situating him within a lineage of American literary figures that includes both Ginsberg and Kerouac. Consequently, it elevates Dylan's status beyond that of a mere musician, bestowing upon him the status of a cultural intellectual.

While Dylan's songwriting has long been recognized for its poetic qualities, the process of establishing him as a legitimate poet in the traditional literary sense necessitated a sustained period of critical scrutiny and reevaluation. At the time, poetry was conventionally understood as a literary form distinct from song lyrics, and the classification of Dylan's work as poetry required significant discourse within academic and artistic circles. Consequently, if Dylan's reception as a poet had been predicated exclusively on the textual analysis of his lyrics, the process of attaining such a designation would likely have been protracted and subject to greater resistance. However, his association with Ginsberg accelerated this transition, allowing him to bypass traditional literary gatekeeping mechanisms and gain credibility within intellectual and artistic communities in a manner that was both rapid and highly effective. This suggests that, although he may not have formally developed marketing acumen in a commercial sense, Dylan demonstrated an aptitude for shaping public perception through strategic cultural alliances.

Dylan's lack of formal expertise in marketing was counterbalanced by his capacity to engage and captivate audiences through his crossover style, which merged folk music, poetry, and countercultural symbolism. During this period, Dylan's promotional approach included the deployment of slogans such as "The Other Side of Bob Dylan," as well as a series of teasers designed to generate intrigue and sustain public interest. These promotional efforts proved to be remarkably effective in expanding Dylan's appeal beyond the folk music genre and into the literary and artistic domains. As his renown expanded, his work underwent rigorous critical scrutiny, leading to its recognition by a diverse audience that included listeners, the artistic community, and academics. This process of intellectual and artistic validation played a pivotal role in establishing Dylan as an iconic figure during the Civil Rights Movement and ultimately contributed to his subsequent accolade with the Nobel Prize in Literature.

4.2. Marketing as a Painter

Dylan's career as a painter commenced in the 1960s, reaching its zenith in 2016 with his receipt of the Nobel Prize in Literature, a distinction that brought his artistic pursuits into the realm of the visual and the musical. However, the reception of his painting exhibitions by critics was not uniformly positive. During an exhibition in Copenhagen, he was criticized by the press for what they perceived as a prioritization of financial gain over artistic integrity. In the Halcyon Gallery of London, his inaugural public exhibition was characterized by the newspapers as "daubs" and "limited-valued" work of a "hobby painter" (Burton, 2010). At the Louth auction, John Pooley, the owner of Lincoln Art Works, critiqued the paintings as massive and his identity as a musician and artist as uncommon. Furthermore, the public did not attend his exhibitions primarily for the paintings. British audiences of all ages, professions, and genders attended his exhibition due to his songs and reputation, despite the questionable quality of the Mimas in the exhibition. Additionally, Rob Bowman, a musicologist from York University, has criticized him for creating fame, celebrity, and business for the gallery (Crawford, 2011). Despite his efforts to link music and painting, his paintings were still perceived as a subordinate substitute for music (The Economist, 2018).

The artist's marketing strategy has been observed to transform response to market feedback, which the paper categorizes into two phases: pre-2016 and post-2016. The distinction between these phases is rooted in the strategic realignment of his marketing approach, which initially positioned musical achievements as an extension of his visual art. This shift was first exhibited at the Halcyon Gallery in London in 2016, marking a transition from a differentiation of identities as a painter and musician to a combination of both roles. Before 2016, he maintained that paintings were not mere illustrations of songs, positioning them as a distinct artistic endeavor (Carter, 2010). However, following 2016, the interconnection between his musical compositions and visual artworks became a focal point. A notable challenge emerged on September 28, 2011, when the public questioned the authenticity of his artistic style, leading to a discourse surrounding originality and creativity in the arts. Consequently, a pivotal aspect of his promotional strategy involved addressing these concerns and defending his artistic approach.

During the period preceding 2016, the artist's marketing strategy centered on establishing a connection between his fame and visual art, with a particular emphasis on the paintings

themselves. Biographies played a pivotal role in promoting his visual art. In a series of books published to commemorate his 67th birthday, the Drawn Blank Series was featured, showcasing his first museum exhibit and indicating a refined taste (Bream, 2008). The galleries participating in the marketing of these exhibitions have lauded Dylan and his compositions as authentic and personal experiences from life, such as the Asia Series displayed at the Gagosian Gallery in New York, which was asserted to be based on Dylan's visual reflection on his travels in Japan, China, Vietnam, and Korea with "first-hand depictions of people, street scenes, architecture, and landscape." The marketing process has also involved curators and directors. For instance, the museum director of the National Gallery in Copenhagen lauded him as "a remarkable visual artist" (Carter, 2011). However, the paintings exhibited at the Gagosian Gallery were discovered to be replicas of historical photographs by Henri Cartier-Bresson, Leon Busy, Dmitri Kessel, and others (Rose, 2011; Itzkoff, 2011). In the wake of this controversy, the gallery modified its marketing strategy, stating that it was "based on a variety of sources, including archival and historic images" while maintaining its position on the authenticity of the colors and textures from Dylan's travels in Asia (Itzkoff, 2011). Finally, auctions served as a foundation for the valuation of his paintings as sound investments. For instance, Alastair McPhie-Meiklejon of Louth, a seasoned auctioneer, regarded his paintings as "appreciating assets," anticipating a sale price of 30,000 pounds. This valuation was influenced by the artist's multifaceted persona, encompassing his roles as a musician and icon. Moreover, his music writers and admirers have demonstrated a readiness to defend his marketing strategies in the aftermath of the copycat debate that followed the London exhibition. During the aforementioned copycat debate, which ensued following the London exhibition, Dylan was defended by Jim Linderman, a music writer and fan, who characterized the practice as "a time-honored practice" (Crawford, 2011).

This paper posits that marketing, particularly through mass communication channels such as newspaper features, radio broadcasts, and television interviews, serves as a critical mechanism for accelerating an artist's rise to prominence. However, while strategic promotion can facilitate the rapid ascension of an artist within the public consciousness, it is unlikely that such marketing tactics alone can sustain an artist's legacy in the absence of substantive artistic contributions. The scrutiny imposed by audiences, scholars, and the art world ensures that commercial strategies, while influential, are not sufficient in and of themselves to establish an artist's credibility in the long term. Consequently, while Dylan's career undeniably benefited from well-crafted marketing efforts and cultural positioning, his enduring success must be attributed primarily to his intrinsic artistic aptitude, literary acumen, and ability to transcend conventional artistic boundaries. These elements, rather than being merely promotional, serve as the foundation of his lasting influence, ensuring that his legacy persists not merely as a product of effective branding but as a testament to his genuine contributions to music, poetry, and cultural history.

5. Post-2016 Marketing of Dylan

In the post-2016 phase, the marketing of his paintings encompasses several aspects. First, curators and directors continued to function in their traditional roles. For instance, Paul Green, the curator of the Halcyon Gallery, asserted that exhibitiongoers sought his art for its own sake

(Hudson, 2016). Michael Chaiken, the curator of the Gilcrease Museum, underscored the creativity inherent in Dylan's visual art (Price, 2019). Bill Flanagan, the curator of Dylan's inaugural retrospective, promoted the Bob Dylan Editions at Halcyon Gallery in London as "tirelessly creative," "horizon-widening," and "a panoramic view of the American landscape" (ContentEngine). Shai Baitel, the artistic director of the Forest Art Museum, characterized Dylan as a "true, contemporary Renaissance artist alive," and his supervisor, Jordana Pomeroy, the director, regarded Dylan as a "tremendous artist" (Hall, 2021). Concurrently, Dylan himself was grappling with the challenge of integrating drawing into his musical reputation. In a display at the Halcyon Gallery, which will conclude on January 31, 2021, he presented the handwritten lyrics of his renowned compositions, including "The Times They Are A-Changin'," illustrated with drawings that integrated music, lyrics, and images, bridging the gap between artistic expression and commercial interests (ibid.). In a separate exhibition at the Halcyon Gallery in London, Dylan presented a film that highlighted the interconnection between music and visual art (Hudson, 2016). This connection has become a significant selling point, prompting questions about its extent and impact on the public.

Another piece of news has emerged, further burnishing the reputation of Dylan's paintings, despite the absence of any official marketing initiatives on the part of his team. Pierce Brosnan, the actor who has portrayed James Bond, has resold a painting by Dylan for a sum of one million Singapore dollars. In doing so, Brosnan underscored the interconnection between music and the painting, emphasizing its therapeutic effect in the wake of the demise of his daughter, Charlotte. This strategic execution underscores the musicality of Dylan's paintings, captivating the public and solidifying his identity as a multifaceted visual artist.

6. Marketing of Dylan's Art Website

Influenced by Halliday's systemic functional theory, as well as Kress and van Leeuwen's visual meaning, Painter et al. (2013) outline a visual narration for multiple images. Basically, to underscore the marketing of Dylan, the paper applies the focalization-pathos-ambience framework of interpersonal meaning to reveal relationships between "the viewer and the depiction," from the power relations, along with affectual dimensions. According to Painter et al (2013), the researchers outline the framework in Figure 1 based on five photos from the official website of Bob Dylan Art (https://bobdylanart.com/).

First of all, in terms of focalization, all five images remain unmediated (objective), shot from a non-character perspective. To be specific, there are characters (Bob Dylan himself) in three photos (Figure 2, 4, 6). Out of three photos, Dylan in Figures 2 and 6 does not have contact with the viewers (an observer perspective). In Figure 2, Dylan works with concentration while he sees far away, sharply in Figure 6. In doing so, as Painter et al (2013) proposed, Dylan creates a longer social distance with viewers, emphasizing his calmness and objectiveness as an artist. In Figure 4, however, he tries to engage with the viewers with a meditating and focused direct gaze. This behavior, as Painter et al (2013) put it, is utilized to "heighten identification or empathy at key

moments". Combined with the text along with Figure 4, his inviting gaze to the viewers aims to reinforce his artist and whiskey spokesperson identity.

Moreover, alienating pathos is conducted in Figures 2, 3, and 5. As Feng (2015) suggests, it invites viewers to read "critically and objectively." Figures 4 and 6 create an appreciative minimalist style to evoke emotions of calmness and meditation, respectively. With the texts of the images, Figure 4 associates tastes, calmness, and sharpness with the whisky he represents. Meanwhile, Figure 6 attracts viewers to follow Dylan's gaze with the texts and meditation. Overall, they all shape an objective, calm, observing, and meditating artist image of Dylan.

Furthermore, a contrast between a denied (black) background and an activated (ambient) photo appears in all Figures. Specifically, Figures 2 to 5 use a vibrant color to formulate "exciting and active" emotions (Feng, 2015). Then, Figures 2, 3, and 5 use a warm color and naturalistic familiarity to construct a cozy and harmonious atmosphere, serving to construct an imaginative, active, and lively artist identity. While Figures 4 and 6 create an alienated, cold, and constrained atmosphere for their publicizing purpose in using cold colors and abstract familiarity.

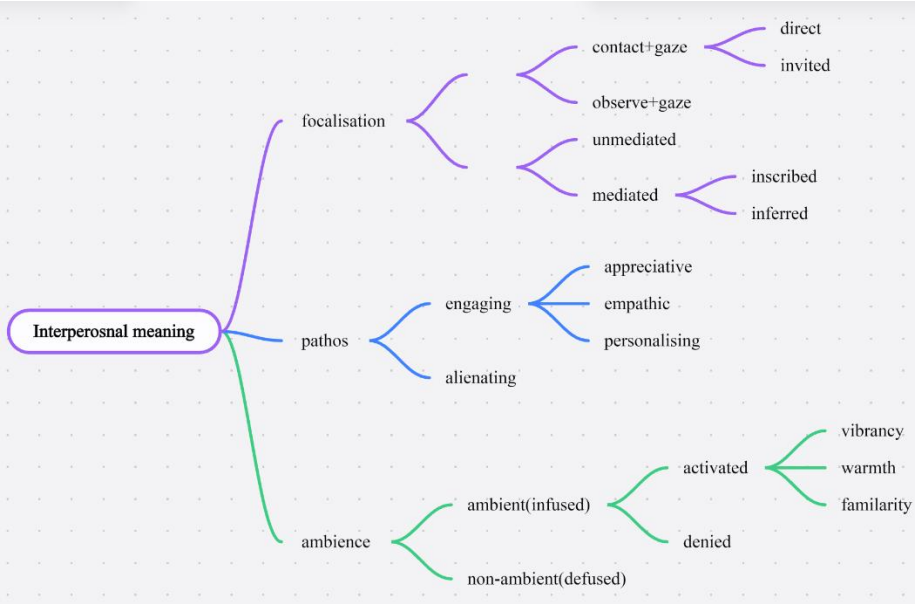

Figure 1. Outline of the interpersonal meaning of visual semiotics

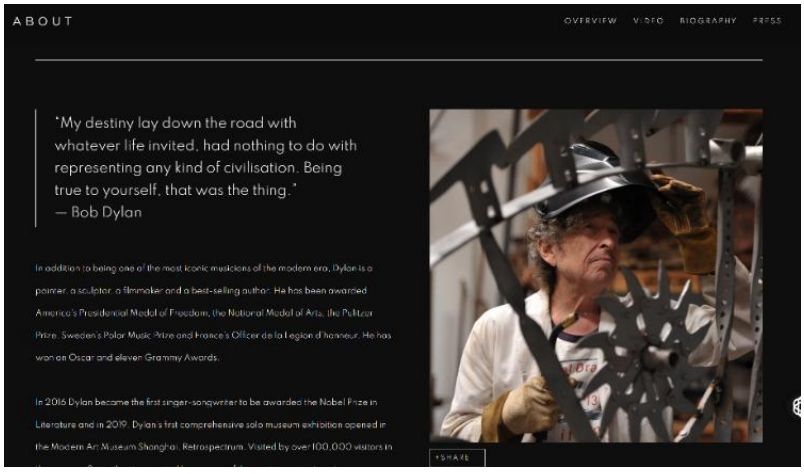

Figure 2. Bob Dylan art: About page

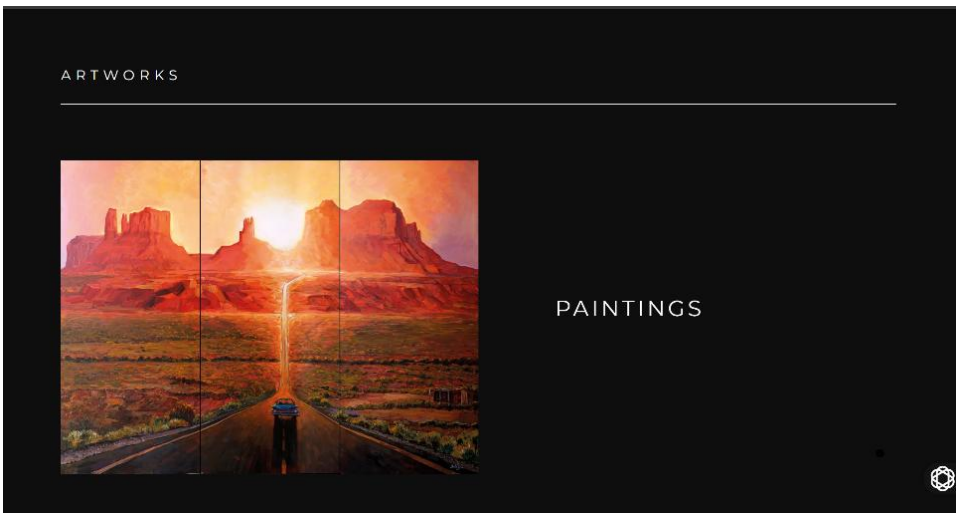

Figure 3. Bob Dylan art: artworks page

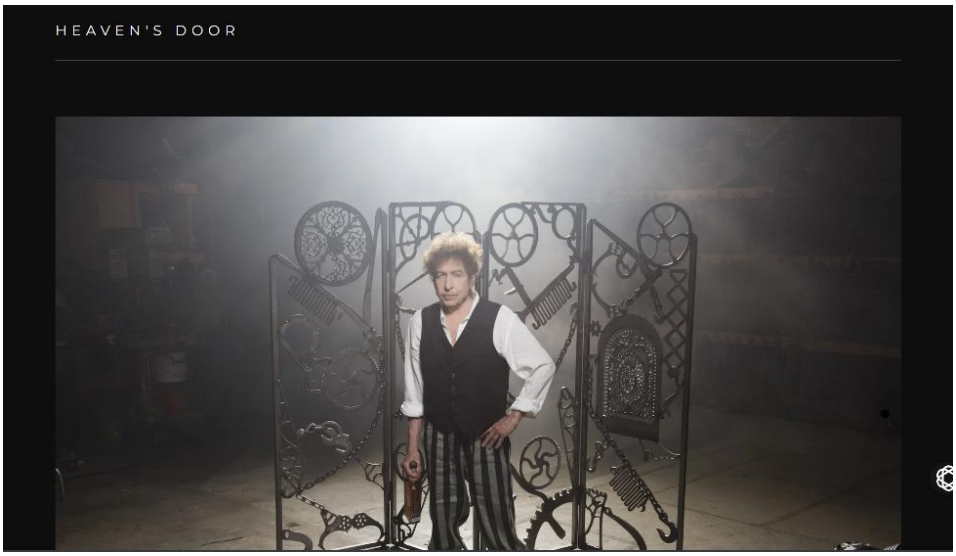

Figure 4. Bob Dylan art: Heaven's door page

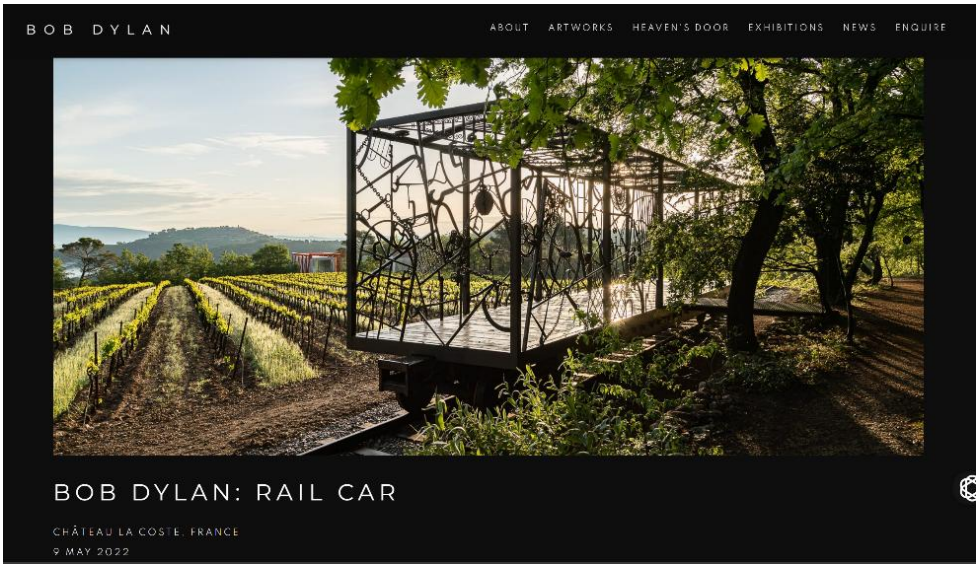

Figure 5. Bob Dylan art: exhibitions page

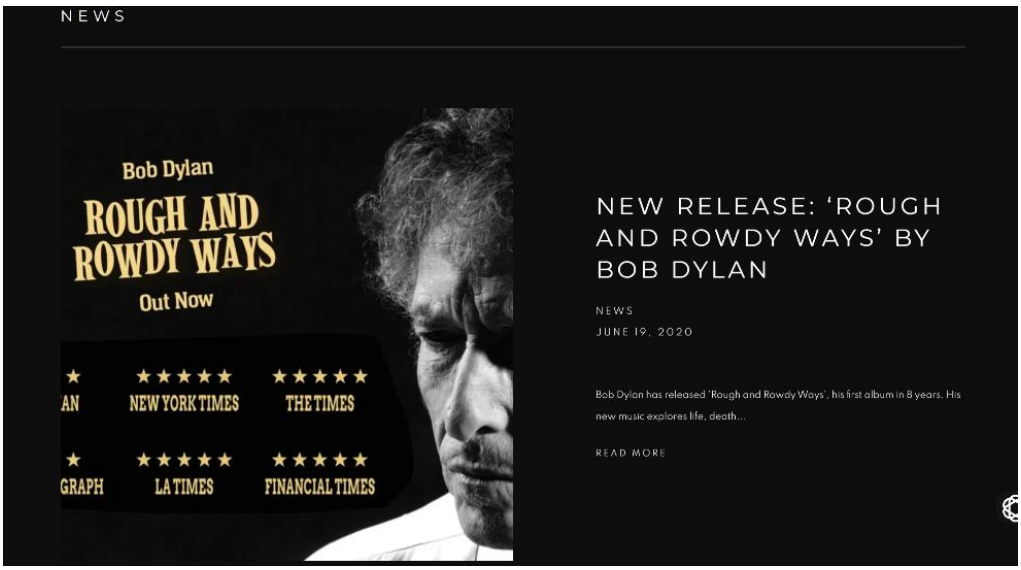

Figure 6. Bob Dylan art: news page

7. Marketing Strategy- Combining Music and Drawings

Nevertheless, how he markets the linkage between his music and visual art remains a subject of interest. The combination can be approached in explicit and implicit ways. First of all, concerning explicit linkage, he places handwritten lyrics alongside images. Examples of this include the lyrics to "Leopard-Skin Pill-Box Hat," "Maggie's Farm," "Just Like a Woman," "Don't Think Twice (It's All Right)," "Ballad of a Thin Man," and "Man in the Long Black Coat," which are illustrated in the paintings where his imagistic mind and songs are open to reinterpretation (The Economist, 2018).

Previously, listeners could only interpret the music of Bob Dylan by relating it to his biographies, autobiographies, and historical research. Now, however, scholars and listeners alike have a further opportunity to learn about the artist. In considering the sequential arrangement of artistic compositions, it can be posited that the paintings function not merely as independent artistic creations but also as supplementary commentaries to the lyrical compositions. This provides novel perspectives and conceptual frameworks for interpreting artistic metaphors. The paintings in question attract his former audiences and researchers to reenter his mental and psychological world in a novel way, thereby demonstrating intertextuality and multimodality. Consequently, curators, galleries, and directors market the relationship between Dylan's music and paintings. Paul Green, the director of Halcyon Gallery, believed that Dylan's paintings were chosen to show "humanity, places and people," fascinated by painters, writers, and musicians (Aesthetica Magazine, 2013). Also, he asserted that the paintings were a visual way to discover the soul of Dylan's songs.

8. New Art World or Old One Still

The art world is characterized by a multifaceted structure, encompassing both micro and macro levels. At the micro level, the art world encompasses the intimate sphere of individual artists and

their creative networks. At the macro level, the art world is comprised of the broader commercial and institutional frameworks that facilitate the distribution and reception of art. The art world is sustained by a collective network that enables the presentation and dissemination of artistic performances to the public. However, in the case of Bob Dylan, the influence of the micro-level artistic community, comprising fellow artists, critics, and smaller creative circles, appears to be less pronounced in comparison to the macro-level entities, such as commercial galleries, mass media, and the wider art market. The promotional efforts of these large-scale institutional and commercial players, combined with Dylan's pre-existing global reputation, exert a significant influence on shaping public perception of his visual artwork. Consequently, the assessment of Dylan's paintings is frequently less dependent on their inherent artistic qualities, such as creativity, originality, and technical mastery, and more dependent on the promotional narratives crafted by galleries and media outlets. While art critics and reviewers may engage in discourse regarding the artistic merit of Dylan's work, their critiques often find themselves influenced by the dominant marketing strategies and Dylan's established celebrity status, which overshadows the assessment of his artistic qualities.

Moreover, Dylan's presence within the macro-level art world is inextricably linked to his longstanding prominence in the field of music. According to Baumann (2007), there are more discourses for the art world to discuss art. Therefore, the artistic criticisms, as well as curators and the art dealers on Dylan's side, exert powerful discourses in defining Dylan's paintings as art. His renown as a musician fundamentally shapes audience expectations, fostering a perception that his visual art should maintain a connection to his musical legacy. This expectation is further reinforced by his active collaboration with commercial galleries, which frequently position his paintings within the broader context of his musical career. Consequently, Dylan occupies a distinctive position within the art world, as his work is evaluated not only through the lens of visual artistic traditions but also through the cultural and commercial frameworks of the music industry. His engagement with visual art is characterized by an intersection between musical influence and artistic production, an approach that differentiates him from conventional visual artists who emerge through traditional artistic channels.

However, when examining Dylan's artistic trajectory through the lens of the musical social network as an art world in itself, it becomes evident that his primary focus remains anchored within the traditional art milieu. While his visual art may incorporate musical themes and resonate with his audience's familiarity with his songwriting, his engagement with the visual medium does not necessarily redefine or expand the boundaries of musical artistry within the broader cultural landscape. Instead, Dylan's artistic endeavors reflect an ongoing negotiation between his established identity as a musician and his aspirations as a painter, revealing the complex interplay between artistic reputation, institutional validation, and audience reception in shaping his place within the art world.

This phenomenon, that a professional musician works as a painter, formed by the discourse of the art world, reveals that traditional art world hierarchies are reinforced by a celebrity's status. This can be proved by the art world's legalization of Andy Warhol as a creative leader, who is "recognized by peers, intermediaries, and audiences," and hence becomes "insiders and outsiders

in the art world, which maintains his "artistic deviance while accessing resources from the core of the art world" (Samdanis & Lee, 2021). Those celebrities' discourses in the art world facilitate their rapid rise in a disciplinary area, while their criticisms are undoubtedly defended by their peers. For example, when Dylan was accused of copycat of old photos, public media and the Gagosian Gallery were prone to be blamed by professional art critics, while Dylan's plagiarism was justified as a method of "appropriation" (Morgan, 2011). Also, Morgan unveils that other celebrities (singers, film stars, performers, etc.) have painted and gained reputations. This means that despite their amateurism, those art dealers, critics, and galleries have constructed and welcomed their artworks, occupying spaces of to-be-famous artists.

10. Conclusion and Discussion

The marketing strategy employed by Bob Dylan concerning his visual artwork has undergone a notable evolution, reflecting broader shifts in both public perception and critical reception.

Prior to 2016, Dylan deliberately sought to establish a clear distinction between his musical career and his work as a visual artist, presenting the latter as an independent and alternative dimension of his artistic expression. This strategic positioning aimed to reinforce the legitimacy of his canvas work by ensuring that it was not perceived merely as an extension of his musical legacy. However, the emergence of the copycat controversy, which cast doubt on the authenticity of his visual art, necessitated a recalibration of this approach. In response, Dylan embarked on a publicity campaign that not only foregrounded his recognition as the recipient of the 2016 Nobel Prize in Literature but also emphasized the intrinsic relationship between his music and his canvas paintings. This revised strategy proved highly effective, garnering significant acclaim from influential cultural figures, including prominent actors associated with the James Bond franchise. Furthermore, art galleries and critics increasingly embraced the notion of Dylan as a "visual songwriter," acknowledging his capacity to evoke emotion and provide solace through his paintings in much the same manner as he does through his music. Consequently, the volume of criticism directed at his work diminished considerably, and discussions surrounding his status as an amateur painter became less prevalent in critical discourse.

Given Dylan's undeniable achievements in music and literature, it would be strategically advantageous for him to maintain and develop the music-painting synergy that has become central to his artistic identity. Moreover, his visual artwork integrates elements of folk tradition, a characteristic that has sparked ongoing debates about the originality of his style. While some critics question the extent to which his paintings represent innovative contributions to the visual arts, this approach has generally been well received by music enthusiasts, who recognize and appreciate the continuity of themes and stylistic elements across his various artistic endeavors. However, one particular dimension of Dylan's artistic practice remains a source of contention: his ongoing exploration of musical composition on canvas. This aspect of his work remains firmly aligned with his established artistic sensibilities, yet it also elicits mixed reactions, with some viewing it as a repetition of familiar motifs rather than a bold departure into new creative territory. As such, Dylan's artistic trajectory raises broader questions about the intersection of music and

visual art, the limits of artistic originality, and the evolving nature of public and critical engagement with his work.

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Cross-Cultural Music and Its Differential Effects on Consciousness State Regulation

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Abstract

In recent years, research exploring the influence of music on emotional and cognitive processes has grown substantially. Nonetheless, most existing studies are confined to single cultural settings, with limited attention paid to the comparative effects of cross-cultural music on the regulation of consciousness states. This study adopts a mixed-methods approach ― combining controlled experiments, subjective self-reports, and physiological monitoring—to examine how participants' emotional states, attentional focus, and physiological responses (including heart rate, respiratory rate, and brainwave activity) change when exposed to Chinese and Western musical forms, specifically Traditional Chinese music and Western classical music. The findings reveal significant differences in both emotional modulation and consciousness regulation between the two musical traditions. These effects appear to be strongly associated with the music's structural properties, cultural origins, and the listeners' individual psychological characteristics.

Keywords: Cross-Cultural Music; Consciousness States; Regulation; Differences

1. Introduction

Music, as a unique cultural medium that transcends language barriers, has played a vital role in human society since ancient times. Its regulatory effects on emotions have been widely studied. Research indicates that different types of music can evoke distinct emotional responses. For instance, cheerful music tends to elevate mood, whereas sad music often induces reflection or melancholy. In Music and Emotion: Theory and Research, Patrik N. Juslin (2001) systematically explored how music elicits various emotional states. Stefan Koelsch, a neuroscientist at the Free University of Berlin, found in his 2018 study that cheerful music activates the brain's reward system, while sad music enhances activity in the prefrontal cortex, fostering contemplation and empathy. Similarly, an experimental study by a team at the Tokyo University of the Arts revealed that although sad music may temporarily evoke negative emotions, it can subsequently generate

positive affective experiences, such as aesthetic satisfaction ─ highlighting the complexity of musical emotions. Therefore, music serves not only as a vehicle for emotional expression and aesthetic experience but also holds great potential in regulating states of consciousness. Scholars generally agree that music—through its distinctive acoustic features such as rhythm, melody, and harmony—can significantly influence a person's emotions, cognition, and physiological state. Thompson et al. (2005) noted that music can directly act upon the auditory cortex through acoustic resonance, thereby impacting broader neural networks. These effects extend beyond emotional regulation to include modulation of consciousness. Koelsch (2014) further demonstrated that music can trigger deep emotional experiences and alter consciousness by activating brain regions associated with emotion and memory. Specifically, music can modulate attention levels, induce meditative states, and even aid in alleviating disorders of consciousness by influencing neural activity within the thalamo-cortical network.

The influence of music on attention has also garnered increasing research interest. Some types of music have been shown to enhance attentional focus, while others may cause distraction. Emmanuel Bigand and colleagues (2013) found that stable musical structures can optimize the coordination of the brain's default mode network (DMN), whereas complex compositions increase cognitive load. Research by Vinod Menon's team at Stanford University (2015) indicated that rhythmic regularity—such as 60 BPM Baroque music—can enhance functional connectivity in the prefrontal cortex, thereby improving task-related attention.

However, the cultural variability of music's cognitive and neural mechanisms remains underexplored. Most existing studies are anchored in Western music paradigms, overlooking the potentially distinct impacts of diverse musical traditions on consciousness. This study aims to address this theoretical gap in the emerging field of cultural neuromusicology by comparing the neural mechanisms underlying how traditional Chinese and Western classical music regulate states of consciousness.

2. Methodology

This study integrates experimental procedures, subjective self-reports, and physiological measurements. Participants listened to both Chinese and Western music (specifically, traditional Chinese music and Western classical music) and reported their emotional states, attentional focus, and subjective experiences before and after listening. Simultaneously, physiological indicators were recorded throughout the process.

2.1. Participants

A total of 120 adults, aged between 18 and 40, participated in the study, with an equal number of males and females. None of the participants had professional music training or any known hearing impairments.

2.2. Grouping

Participants were randomly assigned to four groups (n = 30 per group), each exposed to a different type of music:

Group 1: Traditional Chinese music (Guqin)

Group 2: Western classical music (works by Bach)

Group 3: Traditional Chinese music (Pipa)

Group 4: Western classical music (works by Mozart)

2.3. Experimental Procedure

2.3.1. Emotion Assessment

Baseline emotional states were assessed using the PANAS (Positive and Negative Affect Schedule) scale.

2.3.2. Music Listening

Each group listened to the assigned musical piece for 10 minutes in a controlled environment.

2.3.3. Subjective Experience Report

After the listening session, participants completed a subjective experience questionnaire, reporting perceived changes in emotional state, attention, and meditative awareness.

2.3.4. Meditative State Assessment

The Mindfulness-Based Stress Reduction (MBSR) scale was employed to evaluate the depth of the meditative state experienced.

2.3.5. Physiological Measurement

During the music listening phase, heart rate, respiratory rate, and brainwave activity were continuously monitored using non-invasive biometric devices.

2.4. Data Analysis

2.4.1. Statistical Analysis

The collected data were analyzed using SPSS software. Independent sample t-tests and ANOVA were conducted to compare differences in emotional regulation, attention levels, and meditative states across the four groups.

2.4.2. Multivariate Analysis

To explore the multi-dimensional impact of music on consciousness, a multivariate analysis was conducted, integrating both subjective self-reports and physiological measurements.

3. Results of Emotion Change Assessment

3.1. Baseline Emotion Assessment (PANAS Scale)

All participants were within the normal range of emotional state before the experiment, with no extreme emotional values.

Table 1. Overall Baseline Emotion Characteristics (N=120)

Dimension	Mean value(M)	Standard deviation(SD)	Score range
Positive emotions(PA)	28.8	7.1	15-42
Negative emotions(NA)	16.2	5.7	8-32

The results showed no significant differences in baseline emotions across groups ($p>0.05$), indicating balanced grouping.

Table 2. Inter-group Baseline Comparison (ANOVA)

Group	Mean PA	Mean NA	P-value（PA）	P-value（NA）
Guqin group	29.1	15.7	0.885	0.798
Bach group	28.6	16.4	-	-
Pipa group	28.4	16.0	-	-
Mozart group	29.2	16.6	-	-

3.2. Changes in Values Before and After Music Intervention

Table 3 and Figure 1 illustrate the changes in positive affect (PA) across different music groups before and after the experiment, based on paired-sample t-test results. The figure clearly shows that positive emotions increased in all groups following the listening session. The most substantial increases were observed in the Bach and Mozart groups. While the Guqin and Pipa groups also showed increases in positive affect, these were relatively smaller but still statistically significant. These results suggest that different types of music exert varying effects on positive emotional states, with Western classical music—particularly works by Bach and Mozart—producing more pronounced enhancements in positive affect.

Table 3. Changes in Positive Emotions (PA) (Paired Sample t-test)

Group	Pre-test PA	Post-test PA	Change value	T-value	P-value
Guqin group	29.1	31.6	+2.5	3.42	0.002
Bach group	28.6	33.9	+5.3	6.01	<0.001
Pipa group	28.4	30.3	+1.9	2.18	0.037
Mozart group	29.2	35.7	+6.5	7.89	<0.001

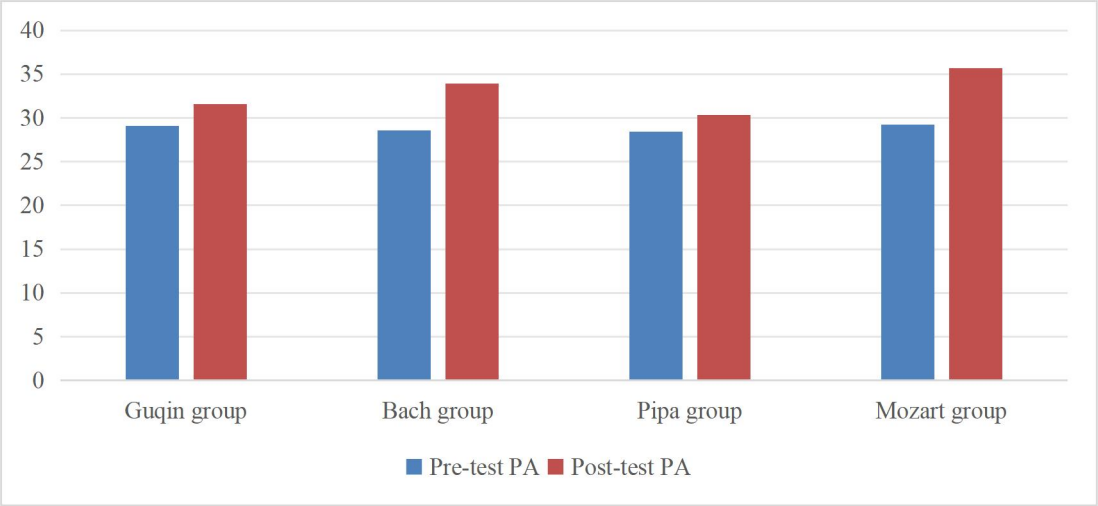


Figure 1. Changes in Positive Emotions For Each Group Before and After

The data indicate that all groups experienced a reduction in negative emotions after the experiment, with the most significant decreases observed in the Mozart and Bach groups. Statistical analysis confirms that these reductions are statistically significant, particularly in the Bach and Mozart groups. The Guqin group also exhibited a significant decrease in negative emotions, whereas the reduction in the Pipa group was not statistically significant. These findings suggest that different types of music vary in their effectiveness at reducing negative emotional states, with Bach and Mozart's compositions being the most effective in this regard.

Table 4. Changes in Negative Emotions (NA)

Group	Pre-test PA	Post-test PA	Change value	T-value	P-value
Guqin group	15.7	14.1	-1.6	-2.38	0.024
Bach group	16.6	13.6	-3.0	-4.21	0.001
Pipa group	16.3	15.2	-1.1	-1.52	0.140
Mozart group	16.8	12.9	-3.9	-5.88	<0.001

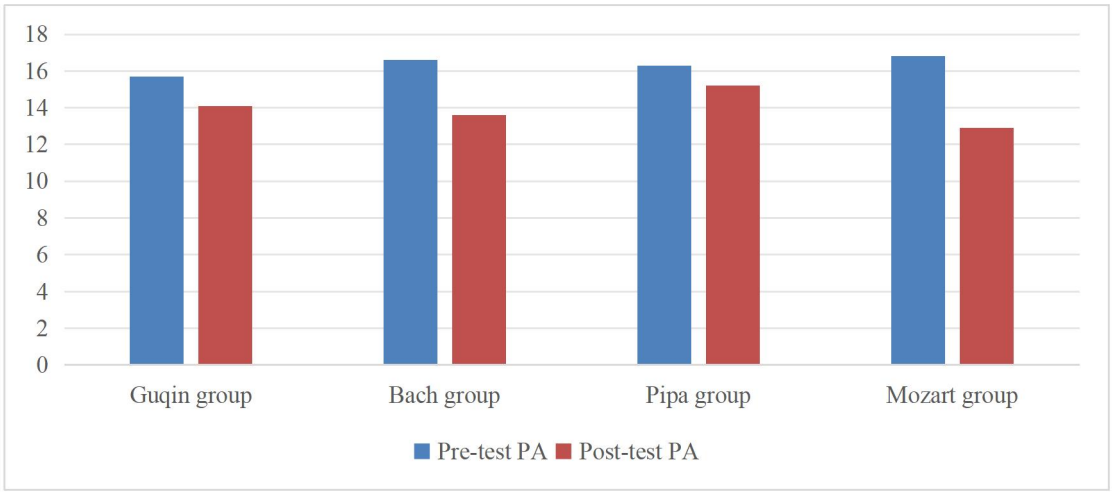
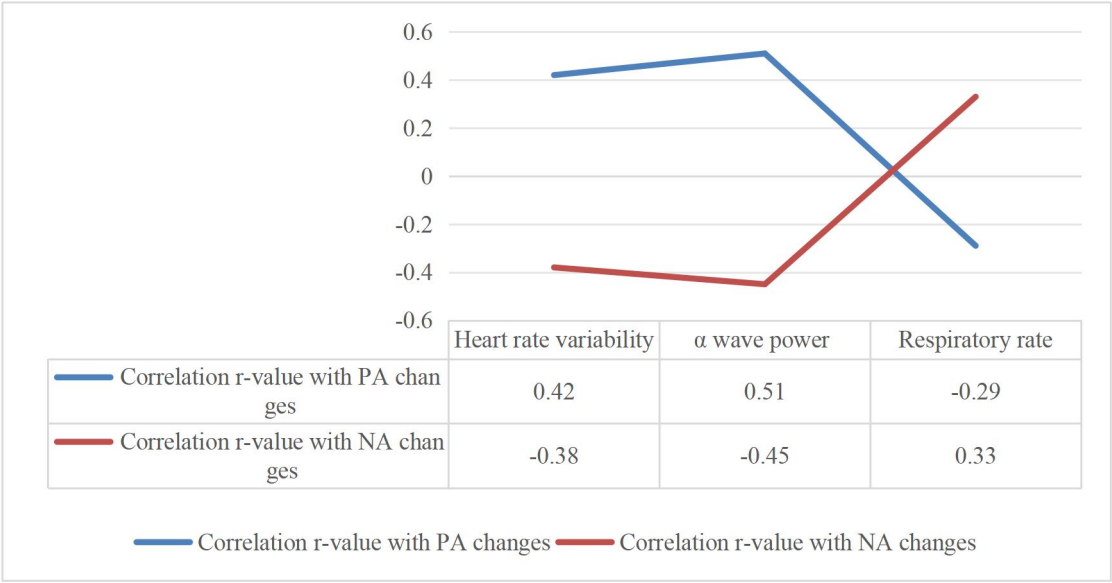


Figure 2. Changes in Negative Emotions For Each Group Before and After

The figure provides insights into the correlation between physiological indicators and emotional changes. Heart rate variability (HRV) and alpha (α) wave power exhibit positive correlations with changes in positive affect and negative correlations with changes in negative affect, suggesting that these physiological indicators may serve as reliable markers of improved emotional states. In contrast, respiratory rate shows a weak negative correlation with positive affect changes and a weak positive correlation with negative affect changes, indicating a less favorable association with emotional well-being.



	Heart rate variability	α wave power	Respiratory rate
Correlation r-value with PA changes	0.42	0.51	-0.29
Correlation r-value with NA changes	-0.38	-0.45	0.33

Figure 3. Correlation between Physiological Indicators and Emotional Changes

3.3. Analysis of Emotional Change Patterns

3.3.1. Western Classical Music Group (Bach/Mozart)

Positive emotions showed greater increases, with the Mozart group exhibiting a 22.3% rise in PA, and the Bach group an 18.5% rise.

Negative emotions decreased more significantly, with the Mozart group showing a 23.2% reduction in NA, and the Bach group a 17.9% reduction.

3.3.2. Traditional Chinese Music Group

Emotional changes were more moderate, with PA increasing by 8.6% in the Guqin group, and by 6.7% in the Pipa group.

Guqin music exhibited a distinctive "melancholy-to-calm" transformation pattern, where NA initially increased by 1.2 points, followed by a subsequent decrease of 2.8 points.

3.3.3. Cross-Cultural Comparison (Independent Sample t-test)

Western classical music (Bach/Mozart) resulted in significantly greater increases in positive affect (PA) compared to traditional Chinese music ($t = 4.32$, $p < 0.001$).

Guqin music demonstrated greater emotional stability, as reflected in smaller fluctuations in negative affect (NA) ($t = 2.87$, $p = 0.005$).

3.3.4. Correlation Between Physiological Indicators and Subjective Emotional Reports

There was a moderate to high correlation between physiological measures and subjective emotional reports, supporting the validity and reliability of the measurements.

4. Attention and Cognitive Function Assessment Results

4.1. Changes in Attention and Cognitive Level

Table 6. Changes in Attention Level Before and After the Experiment (Digit Span Test)

Group	Pre-test scores	Post-test scores	Change value	T-value	P-value
Guqin group	6.2±1.1	7.1±1.3	+0.9	3.45	0.002
Bach group	6.0±1.2	7.8±1.1	+1.8	6.12	<0.001
Pipa group	6.3±1.0	6.7±1.2	+0.4	1.87	0.072
Mozart group	6.1±1.3	8.2±1.0	+2.1	7.89	<0.001

Note:The score range for the digit span test is 3-9, with higher scores indicating stronger working memory.

Table 7. Results of the Attention Network Test (Alerting Network Efficiency)

Group	Reaction time(ms)	Accuracy rate(%)
Guqin group	412±38	88.2±5.1
Bach group	398±42	91.5±4.3
Pipa group	425±36	86.7±5.8
Mozart group	385±31	93.8±3.7

Table 8. Analysis of EEG Indicators

Frequency band	Changes in Guqin group	Changes in Bach group	Changes in Mozart group
θwave(4-7Hz)	+18.2%	+12.7%	+9.5%
αwave(8-13Hz)	+25.6%	+31.2%	+34.8%
βwave(14-30Hz)	-7.3%	-5.2%	-3.9%

*Note: The percentage represents the power change relative to the baseline.

4.2. Analysis of Experimental Results

Western Classical Music Group: This group demonstrated a significant improvement in spatial orientation ability ($p < 0.01$). Mozart's music significantly enhanced the alerting network, yielding the fastest reaction time (385 ms) and the highest accuracy rate (93.8%). This aligns with the high-frequency harmonic characteristics of Mozart's compositions, which are known to enhance brain wave oscillations in the 30–100 Hz range. The Bach group ranked second in performance. The polyphonic complexity of Bach's compositions may have slightly increased cognitive load, as reflected in a 13 ms longer reaction time compared to Mozart's group.

Traditional Chinese Music Group: Participants in this group showed more stable performance in sustained attention tasks, with accuracy rate fluctuations under 3%. Notably, the Guqin group exhibited the lowest variability in sustained performance, with a standard deviation of 5.1 in accuracy rate, suggesting its potential suitability for tasks requiring long-term concentration.

5. Results of Meditation State Assessment (MBSR Scale)

5.1. Meditation Depth Rating

Table 9. Changes in Meditation Depth Rating for Each Group

Group	Pre-test scores	Post-test PA	Change value
Guqin group	12.5±3.2	18.7±2.8	+6.2
Bach group	12.8±3.0	16.2±3.1	+3.4
Pipa group	12.3±3.5	17.9±2.9	+5.6
Mozart group	12.6±3.1	15.8±3.3	+3.2

*Rating range 5-25, higher scores indicate deeper meditation state.

5.2. Analysis of Meditation Quality Dimensions

5.2.1. Body Awareness

Guqin music demonstrated the most significant improvement in body awareness (+42%).

The improvement was significantly higher than that observed in the Western classical music group ($p < 0.01$).

5.2.2. Psychological Calmness

Bach and Guqin music yielded comparable effects, increasing psychological calmness by 35% and 38%, respectively.

Both were significantly more effective than the other two groups ($p < 0.05$).

5.2.3. Change in Time Perception

All groups showed statistically significant improvement in time perception ($p < 0.01$).

However, no significant differences were found between the groups ($p > 0.1$).

6. Discussion and Conclusion

In terms of emotional regulation, music intervention produced significant effects. Western classical music, especially Mozart's compositions, was the most effective in enhancing positive emotions. By contrast, traditional Chinese music, particularly Guqin, demonstrated a unique emotional regulation pattern—characterized by a delayed emotional elevation effect and greater emotional stability, as indicated by smaller fluctuations in negative affect (NA). Regarding attention, the experiment supports Bigand's (2013) theory that Baroque music around 60 BPM can significantly enhance executive functioning. Mozart's music produced the strongest attention-enhancing effect, further reinforcing the well-known "Mozart effect" hypothesis. With respect to the meditative state, the distinctive "loose and heavy" tonal quality of Guqin music appeared especially effective in inducing a meditative state. This finding aligns with the "melancholy-to-calm" transformation mechanism observed in previous research by the Tokyo University of the Arts. In terms of cultural differences, the results suggest that Western classical music is effective for rapid and pronounced enhancement of emotional-cognitive processing, while traditional Chinese music facilitates a gradual and sustained regulation of consciousness states.

This study represents the first systematic comparison of traditional Chinese and Western classical music in the context of multi-dimensional consciousness state regulation, offering a foundational empirical contribution to the field of cultural neuromusicology. Future research could further explore the long-term effects of music training, examine individual differences in regulatory responses, and investigate clinical applications of music-based interventions in emotional and cognitive therapies.

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The Influence of Service Quality and Digital Innovation on Art Enterprise Performance: The Moderating Role of Artistic Innovation and Quality

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Abstract

This study examines the relationship between service quality, digital innovation, and enterprise performance in the art industry. Using data collected from 218 art enterprises, we investigate how artistic innovation and quality moderate this relationship. Through structural equation modeling and hierarchical regression analysis, we find that both service quality and digital innovation positively influence art enterprise performance. Furthermore, artistic innovation and quality significantly strengthen these relationships. Consequently, our findings contribute to the literature on art management and provide practical implications for art enterprises seeking to enhance their performance through service quality improvements and digital innovation while leveraging artistic innovation and quality as competitive advantages. More importantly, artistic innovation and quality were found to significantly enhance these effects, acting as critical amplifiers of the value generated by service and digital improvements. These findings enrich the existing literature on art enterprise management and offer actionable insights for practitioners aiming to boost competitive performance. Specifically, art organizations can benefit from integrating high service standards and technological innovation with core artistic competencies, thereby reinforcing market position and long-term sustainability.

Keywords: Service Quality; Digital Innovation; Art Enterprises; Artistic Innovation; Artistic Quality; Enterprise Performance; Moderating Effect

1. Introduction

The art industry has undergone significant transformations in recent years, driven by digitalization and changing consumer preferences. Art enterprises increasingly recognize the importance of service quality and digital innovation in maintaining competitiveness and

enhancing performance (Kim & Choi, 2021). However, the uniqueness of the art industry, characterized by its emphasis on creativity and aesthetic value, necessitates a deeper understanding of how artistic factors interact with service quality and digital innovation to influence enterprise performance. This study aims to investigate the relationship between service quality, digital innovation, and art enterprise performance, with a particular focus on the moderating role of artistic innovation and quality.

This study makes a significant contribution to the existing literature by exploring the intersection of service quality, digital innovation, and art enterprise performance within the context of the increasingly digital art industry. Moreover, while prior research has examined the general impact of service quality and digital innovation on organizational performance, few studies have delved into the specific dynamics within the art sector, where creativity and aesthetic value are central to business success. By focusing on the moderating role of artistic innovation and artistic quality, this research provides a more nuanced understanding of how these artistic factors enhance the effects of service quality and digital innovation on enterprise performance. Specifically, the study highlights that artistic innovation can amplify the positive impact of service quality on performance by creating unique and memorable experiences that attract and retain audiences. Similarly, it shows that high artistic quality enhances the effectiveness of digital innovations, ensuring that technological advancements complement, rather than detract from, the artistic value of the work. Furthermore, this study contributes to the broader discourse on digital transformation in creative industries, offering valuable insights for art enterprises navigating the challenges of integrating technology while maintaining artistic integrity. By identifying the key role that artistic factors play in moderating these relationships, this research encourages art organizations to embrace both technological advancements and artistic excellence as complementary drivers of long-term success. Ultimately, the findings provide a foundation for future studies to explore how art enterprises can leverage both digital and artistic innovation to achieve sustainable growth in an evolving market.

The paper includes an introduction, literature review, methodology, results, discussion, and conclusion, systematically examining key variables and their interactions.

2. Literature Review and Theoretical Support

2.1. Service Quality in Art Enterprises

Service quality in art enterprises encompasses reliability, responsiveness, assurance, empathy, and tangibles (Parasuraman et al., 1988). Previous studies have demonstrated that service quality significantly influences customer satisfaction and loyalty in various industries (Zeithaml et al., 2018). In the context of art enterprises, Baumgarth and O'Reilly (2014) found that service quality contributes to positive customer experiences and repeat patronage.

2.2. Digital Innovation in Art Enterprises

Digital innovation refers to the use of digital technologies to create new products, services, or business processes (Nambisan et al., 2017). In the art industry, digital innovation manifests in

virtual exhibitions, augmented reality experiences, digital art, and online marketplaces (Bertacchini & Morando, 2013). Lee and Lee (2019) demonstrated that digital innovation enhances accessibility, engagement, and revenue generation for art enterprises.

2.3. Moderating Role of Artistic Innovation and Quality

Artistic innovation refers to the development of novel artistic concepts, techniques, or expressions, while artistic quality encompasses aesthetic value, technical execution, and cultural significance (Fillis, 2006). These factors potentially moderate the relationship between service quality, digital innovation, and enterprise performance by enhancing perceived value and differentiation (Camarero et al., 2012).

2.4. Hypotheses Development

Based on the literature review, we propose the following hypotheses:

H1: Artistic innovation positively moderates the relationship between service quality and art enterprise performance.

The hypothesis suggests that artistic innovation plays a pivotal role in enhancing the relationship between service quality and the performance of art enterprises. In the context of art organizations, service quality is often measured through customer satisfaction, engagement, and the overall experience delivered to audiences. However, these attributes alone may not be sufficient to guarantee long-term success or sustainable performance. Artistic innovation, which includes the creation of new forms of artistic expression, experimentation with different media, and the incorporation of cutting-edge technology in art production, can serve as a catalyst for differentiating an art enterprise from its competitors. When artistic innovation is integrated with high levels of service quality, it can amplify the impact on performance metrics, such as revenue generation, audience retention, and market expansion. In this regard, artistic innovation acts as a moderator, strengthening the positive effects of service quality on performance by offering unique, memorable experiences that attract and retain audiences. Additionally, by fostering a culture of creativity and originality, art enterprises can build a distinctive brand identity that resonates with both consumers and critics, ultimately contributing to increased performance in terms of financial outcomes and market influence. As the art world continues to evolve in the digital age, the synergy between artistic innovation and service quality will likely become even more crucial, enabling art organizations to navigate the increasingly competitive and complex landscape of the creative industries.

H2: Artistic quality positively moderates the relationship between digital innovation and art enterprise performance.

The second hypothesis focuses on the moderating role of artistic quality in the relationship between digital innovation and the performance of art enterprises. Digital innovation has rapidly transformed the art sector, enabling organizations to reach broader audiences, enhance engagement, and streamline operations. From virtual exhibitions to augmented reality (AR) art experiences, digital tools have significantly expanded the boundaries of artistic creation and distribution. However, the mere application of digital technology does not guarantee success. For

digital innovations to positively influence the performance of art enterprises, they must be seamlessly integrated with high levels of artistic quality. This means that the digital mediums and platforms used should enhance the artistic experience rather than detract from it. Artistic quality, which includes factors such as the creativity, craftsmanship, and emotional impact of a piece, remains the core driver of consumer engagement and loyalty in the art world. When digital innovation is paired with exceptional artistic quality, it not only broadens access but also deepens the audience's connection to the art. In this context, artistic quality serves as a moderator by strengthening the positive effects of digital innovation on performance outcomes. Art enterprises that successfully combine cutting-edge technology with high artistic standards are more likely to attract diverse audiences, increase their market share, and establish themselves as leaders in the global art scene. Moreover, the growing demand for digital art forms among younger generations highlights the increasing importance of maintaining artistic integrity while embracing technological advancements. Ultimately, the interaction between artistic quality and digital innovation will be a key factor in determining the future success of art enterprises in an increasingly digital and interconnected world.

3. Methodology

3.1. Sample Selection and Data Collection

Data were collected through structured questionnaires administered to managers and executives of art enterprises. Using stratified random sampling, we contacted 350 art enterprises across galleries, museums, auction houses, and digital art platforms, obtaining 218 valid responses (response rate: 62.3%). The survey was conducted between January and March 2024.

3.2. Model Design and Variables Definition

Table 1 presents the operational definitions and measurement items for each variable.

Table 1. Variable Measurement Description

Variable	Operational Definition	Measurement Items	References
Service Quality (SQ)	The excellence of service delivery as perceived by customers	5 items on a 7-point Likert scale measuring reliability, responsiveness, assurance, empathy, and tangibles	Parasuraman et al. (1988)
Digital Innovation (DI)	Implementation of digital technologies to create value	4 items on a 7-point Likert scale measuring digital platform utilization, technological advancement, digital marketing effectiveness, and online customer engagement	Nambisan et al. (2017)
Artistic Innovation (AI)	Development of novel artistic concepts, techniques, or expressions	3 items on a 7-point Likert scale measuring originality, creative approach, and artistic experimentation	Fillis (2006)

Artistic Quality (AQ)	The aesthetic value, technical execution, and cultural significance of artworks	3 items on a 7-point Likert scale measuring aesthetic value, technical excellence, and cultural relevance	Camarero et al. (2012)
Enterprise Performance (EP)	The financial and non-financial outcomes of the enterprise	4 items on a 7-point Likert scale measuring financial performance, customer growth, market share, and reputation	Kim & Choi (2021)

4. Results and Findings

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics for all variables.

Table 2. Descriptive Statistics

Variable	Mean	SD	Min	Max
SQ	5.27	0.92	2.1	7.0
DI	4.89	1.13	1.5	7.0
AI	5.32	0.88	2.3	7.0
AQ	5.64	0.75	3.0	7.0
EP	5.08	1.02	1.8	7.0

4.2. KMO and Principal Component Analysis

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.872, indicating excellent sampling adequacy. Bartlett's test of sphericity was significant ($\chi^2 = 1827.53$, $p < 0.001$), confirming the appropriateness of factor analysis.

Table 3. KMO and Bartlett's Test Results

Test	Value
KMO Measure of Sampling Adequacy	0.872
Bartlett's Test of Sphericity (χ^2)	1827.53
Degrees of Freedom	171
Significance	0.000

4.3. Correlation Analysis

Table 4 shows the correlation matrix for all variables.

Table 4. Correlation Matrix

Variable	1	2	3	4	5
1. SQ	1.000				
2. DI	0.483**	1.000			
3. AI	0.392**	0.527**	1.000		
4. AQ	0.418**	0.401**	0.612**	1.000	
5. EP	0.564**	0.612**	0.477**	0.521**	1.000

Note: ** $p < 0.01$

4.4. Hypothesis Testing and Path Analysis

The regression analysis results for hypothesis testing are presented in Table 5.

Table 5. Results of Hierarchical Regression Analysis

Variables	Model 1	Model 2	Model 3
Firm Size	0.132*	0.118*	0.102*
Firm Age	0.084	0.072	0.068
Main Effects			
SQ		0.341***	0.328***
DI		0.385***	0.362***
AI		0.173**	0.161**
AQ		0.205**	0.187**
SQ × AI			0.226***
DI × AQ			0.243***
R^2	0.038	0.519	0.584
ΔR^2		0.481	0.065
F-value	4.27*	37.83***	36.92***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Both hypotheses were supported. The interaction between service quality and artistic innovation ($\beta = 0.226$, $p < 0.001$) positively influenced enterprise performance, supporting H1. Similarly, the interaction between digital innovation and artistic quality ($\beta = 0.243$, $p < 0.001$) positively influenced enterprise performance, supporting H2.

5. Discussion and Implications

Our findings reveal that service quality and digital innovation significantly contribute to art enterprise performance. More importantly, artistic innovation and quality strengthen these relationships, highlighting the unique dynamics of the art industry. Art enterprises should recognize that excellence in artistic aspects amplifies the benefits derived from service quality and digital innovation.

Based on our findings, we recommend that policymakers: Firstly, develop funding programs specifically targeting digital innovation in art enterprises. Secondly, establish training initiatives that integrate service excellence with artistic development. Thirdly, Create incentives for collaborations between technology providers and art enterprises. Finally, implement certification programs that recognize excellence in both service quality and artistic merit.

6. Conclusion

This study contributes to the understanding of how service quality and digital innovation influence art enterprise performance, with artistic innovation and quality serving as critical moderators. The findings suggest that art enterprises should simultaneously invest in service excellence, digital capabilities, and artistic development to maximize performance outcomes. Future research could explore additional moderators and mediators in this relationship, as well as investigate cross-cultural differences in how these factors interact.

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The authors declare no conflict of interest.

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The Effectiveness of Virtual Digital Human Pedagogical Agents in Virtual Reality Learning Environments: A Meta-Analysis of 36 Empirical Studies

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Abstract

Virtual Digital Human Pedagogical Agents (VDHPAs) have emerged as vital tools in online and blended learning environments. However, the extent to which they improve learning outcomes in Virtual Reality (VR) environments remains inconclusive. This meta-analysis synthesizes findings from 36 empirical studies conducted between 2013 and 2023 to examine the effectiveness of VDHPAs in VR-based learning. Specifically, we analysed two process-oriented variables—cognitive load and social presence—and three outcome-oriented variables—retention, transfer, and other assessment types. The results indicate that while VDHPAs do not significantly reduce cognitive load (g = -0.084), they significantly enhance learners' social presence (g = 0.402). Additionally, VDHPAs were found to improve retention (g = 0.451), transfer (g = 0.288), and other test scores (g = 0.423). Moderator analyses revealed that the effects vary depending on agent design features (e.g., gestures, voice, facial expression), content characteristics (e.g., subject domain, knowledge type), and learner attributes (e.g., education level, prior knowledge). This review further discusses the implications of agent embodiment, the "uncanny valley" in affective response, and challenges in long-term outcome assessments. The study contributes to a deeper understanding of how to optimise VDHPAs for immersive learning experiences and highlights directions for future interdisciplinary research in educational technology and digital arts.

Keywords: Virtual Reality; Virtual Digital Human; Pedagogical Agent; Meta-analysis; Learning Outcomes; Cognitive Load; Social Presence; Educational Technology

1. Introduction

The rapid convergence of virtual reality (VR), computer graphics, speech synthesis, and emotion modelling has accelerated the evolution of Virtual Digital Human Pedagogical Agents (VDHPAs) as intelligent learning companions. The development of humanoid robots such as Ameca, powered by GPT-3 and now tested with GPT-4, exemplifies this trend. These agents are increasingly deployed in VR learning environments to simulate real-time human interaction, offering instructional guidance while alleviating teachers' workload.

Despite their growing use, the effectiveness of VDHPAs in VR remains a subject of debate. While some researchers claim that these agents can increase learners' engagement and achievement through heightened social presence, others argue they may induce cognitive or emotional interference, particularly when their design fails to meet learner expectations.

Drawing on theories such as the Persona Effect, Social Presence Theory, and Social Agency Theory, this review examines whether VDHPAs enhance learning by fostering social cues and reducing cognitive burden. Conversely, we also explore concerns rooted in Cognitive Load Theory and the "uncanny valley" phenomenon, suggesting that overly anthropomorphic agents may impede learning by generating distraction or discomfort.

This study aims to address the gap in existing literature by systematically analysing empirical studies that integrate both VR environments and VDHPAs. We explore how agent design features, instructional content, and learner differences moderate learning processes and outcomes. By doing so, this meta-analysis provides evidence-based recommendations for optimising agent-based instruction in immersive environments.

2. Literature Review

2.1. Key Concepts

2.1.1. Virtual Reality Learning Environments

Virtual reality (VR) learning environments offer highly immersive experiences that promote learners' subjective initiative. With a rich array of constructive tools and expression platforms, VR aligns with Piaget's vision of "bringing the laboratory into the classroom" and the constructivist idea that "learning is the experience of authentic contexts." Burdea and Coiffet summarised the core characteristics of VR as the "3I" features: Interaction, Immersion, and Imagination. "Reality" in VR refers to objects or scenes that exist physically or functionally, whether in the real world or simulated through digital means. These attributes allow VR to visualise and enable complex data interaction, fostering situated, experiential learning.

2.1.2. Virtual Digital Humans

Virtual digital humans aim to replicate human-like digital representations through computer graphics (CG), endowed with specific identities and behavioural traits to reduce psychological distance between the agent and the learner. According to the 2020 White Paper on Virtual Digital Human Development (Yan et al., 2020), a virtual digital human (hereafter "digital human") is

defined as a virtual character with a digitised appearance. Unlike physical robots, digital humans exist via display devices and typically possess the following features:

(1) A human-like appearance with defined facial characteristics, gender, and personality traits;

(2) Human-like behaviour, including the ability to communicate via language, facial expressions, and gestures;

(3) Human-like cognition, enabling recognition of the external environment and interaction with users.

The white paper highlights their visual characteristics but does not fully define the concept's cognitive dimensions.

2.1.3. Pedagogical Agents

Pedagogical agents refer to digital characters designed to support instruction in online or blended learning environments. They often appear as conversational agents, interacting through speech, gestures, and facial expressions. These agents are embedded within the learning process to provide cognitive scaffolding and promote sociocultural engagement. Beyond supplying resources and responding to questions, they can simulate teacher-like guidance, encourage learners, and reduce negative emotions such as anxiety and confusion. Earlier intelligent tutoring systems focused on cognitive functions; modern pedagogical agents extend to socio-cultural domains and can act as teaching assistants, mentors, experts, or peer learners.

2.2. Theoretical Framework

2.2.1. Theoretical Assumptions Supporting the Effectiveness of VDHPAs in VR Learning Environments

A review of existing research reveals several theoretical models that support the learning-enhancement potential of Virtual Digital Human Pedagogical Agents (VDHPAs) in VR environments. These include the Persona Effect, Social Presence Theory, and Social Agency Theory.

The Persona Effect suggests that the mere presence of a virtual pedagogical agent in a learning environment — regardless of its expressive capabilities — can positively influence learners' perceptions of the learning process. In other words, even minimally expressive agents can improve the learning experience simply by personifying instructional content in a VR context.

Social Presence Theory explains how the perceived presence of others—teachers or peers—in virtual environments can enhance learners' engagement and satisfaction. It postulates that when learners feel a sense of real human presence, even via digital avatars, they are more likely to develop positive learning experiences. Initially developed to study the communicative effects of electronic media, this theory has since been extended to educational contexts, demonstrating that increased social presence can elevate learning satisfaction and engagement. In VR learning environments, integrating VDHPAs can increase learners' sense of presence, which in turn can boost motivation, reduce perceived task difficulty, and lower mental effort.

Social Agency Theory ─ sometimes referred to as the "social cues hypothesis" ─ offers a detailed explanation of how pedagogical agents impact learning outcomes. It posits that social cues emitted by VDHPAs (e.g., facial expressions, gestures, voice) can trigger social responses from learners. Learners treat these agents as social partners, prompting them to apply deeper cognitive processing strategies to understand instructional content. These strategies involve selecting relevant information, organizing fragmented ideas, and integrating them into coherent mental models, ultimately enabling better retention and transfer of knowledge. The theory concludes that adding social agents to multimedia learning environments enhances learning outcomes, particularly in transfer tasks.

Each of these theories explains different aspects of how VDHPAs enhance learning. The Persona Effect highlights the importance of human-like representation; Social Presence Theory focuses on improved learning perception through heightened presence; and Social Agency Theory emphasizes deep cognitive engagement stimulated by social interaction cues.

2.2.2. Theoretical Assumptions Regarding the Potential Hindrances of VDHPAs in VR Learning Environments

While many studies highlight the benefits of VDHPAs, others suggest that they may hinder learning due to cognitive and emotional interference. This view draws upon Cognitive Theory of Multimedia Learning, Cognitive Load Theory, and Interference Theories of Social Agency.

From a cognitive perspective, VDHPAs may act as distractions by overloading learners' attention. According to the Cognitive Theory of Multimedia Learning, human cognitive architecture includes two limited-capacity channels ─ visual and auditory. In VR, the visual channel must process both learning materials and non-verbal cues from the agent (e.g., facial expressions, gestures), which may introduce extraneous cognitive load.

Cognitive Load Theory argues that when learners' cognitive resources are allocated to process irrelevant visual cues from the agent, fewer resources are available for processing essential learning content, thereby reducing learning efficiency. Expanding on this, Interference Theory posits that VDHPAs, when irrelevant to the learning objective, may divide learners' attention—a phenomenon known as the split-attention effect. This occurs when learners simultaneously interpret instructional content and agent behaviours, potentially overwhelming working memory and impairing retention and transfer performance.

Emotionally, VDHPAs may also provoke negative reactions. Although learners may initially feel positively toward highly human-like digital agents, unmet expectations due to technological limitations can cause frustration or discomfort. This parallels the Uncanny Valley Hypothesis, which posits that when a robot or virtual agent closely resembles a human but falls short in subtle ways, it may trigger aversion rather than empathy.

2.2.3. Potential Boundary Conditions in VDHPAs' Effectiveness

The inconsistent findings in existing research on VDHPAs in VR learning environments may stem from unaccounted moderating variables. We categorize these potential moderators into four

domains: characteristics of the VR environment, features of the pedagogical agent, learning content, and learner characteristics.

VR Environment Features: Based on the "3I" framework—Immersion, Interactivity, and Imagination—VR enhances concentration, learner engagement, and context-based understanding, making it a fertile environment for educational experiences.

VDHPA Features: These include the agent's visual appearance, gestures, facial expressions, and voice. Learners' preferences regarding these traits can significantly affect the agent's instructional effectiveness. For example, gestures enhance instructional clarity, facial expressions serve as strong social cues, and natural human voice improves learner engagement more effectively than synthesized speech.

Learning Content Features: The effectiveness of VDHPAs may also depend on subject matter (e.g., STEM vs. non-STEM), knowledge type (e.g., declarative vs. procedural), and instructional pacing (system-paced vs. learner-paced). Declarative knowledge (facts and concepts) may be easier to convey through agents than procedural knowledge (skills and problem-solving).

Learner Characteristics: These include educational level and prior knowledge. Prior knowledge, in particular, is a known moderator in multimedia learning. For example, instructional designs that benefit novice learners may hinder advanced learners—a phenomenon known as the expertise reversal effect.

2.3. Overview of Existing Research

Over the past decade, more than 18 review articles and meta-analyses have been published investigating either the efficacy of Virtual Reality (VR) in education or the pedagogical value of Virtual Digital Human Pedagogical Agents (VDHPAs). However, few of these studies have examined the combined effect of VDHPAs within VR learning environments. Most existing analyses focus either on the effectiveness of pedagogical agents in general, or on the instructional potential of VR technology alone.

The primary variables evaluated in these prior studies include characteristics of the pedagogical agents (e.g., appearance, gestures, voice), learner-related factors (e.g., educational level, learning style), and instructional conditions (e.g., subject domain, pacing). Table 1 below summarises the five most recent and representative meta-analyses published between 2013 and 2023, listing the variables examined and the outcome indicators.

Table 1. Summary of Meta-Analytic Variables Examined in Recent VDHPAs Studies (2013–2023)

Study	No. of Articles	Time Span	Agent Features	Other Variables	Outcome Variables
Gu (2015)	23	2002–2013	Emotional vs. Non-emotional agents	–	Learning motivation; Retention; Transfer

Wang et al. (2017)	32	2000–2015	Voice type (human, computer-generated, none); Gesture (present/absent); Agent type (human/animal)	Subject domain; Pacing; Learner group	Motivation, Interest, Retention, Transfer, Other tests
Davis (2018)	17	2001–2016	Gesture types (deictic, emblematic, metaphoric); Voice (human/computer); Agent type (human-like/animated)	Domain, Educational level, Time exposure	Retention; Transfer; Cognitive load
Castro-Alonso et al. (2021)	21	2012–2019	Appearance (2D/3D); Gender; Gesture; Facial expression; Voice type	Domain, Subject, Education level, Language, Nationality	Learning outcomes
Wang Xue et al. (2022)	39	2011–2021	Gender, Role (peer/expert), Presentation (2D/3D), Actions (gesture/facial), Feedback type (verbal/non-verbal)	Knowledge type, Education stage, Emotion	Learning outcomes

These meta-analyses primarily examined how variations in agent design influence learning outcomes, with some studies incorporating moderator analyses based on content domain and learner characteristics. Substantive findings and design recommendations have emerged from this literature, although results remain mixed due to inconsistencies in study designs, measurement tools, and sample representativeness.

Notably, studies conducted before 2016—before the so-called "AI boom"—largely focused on simple information presentation tasks using agents with limited interactivity. Furthermore, methodological shortcomings such as non-randomised samples or low experimental fidelity have contributed to inconclusive results in early literature.

This present study builds upon these earlier efforts by systematically reviewing and conducting a meta-analysis on 36 empirical studies published between 2013 and 2023. Specifically, it investigates how VDHPAs affect learning processes (cognitive load and social presence) and learning outcomes (retention, transfer, and other assessments) when used in immersive VR environments. By examining a broader set of moderators—including agent design, instructional content, and learner characteristics—this study aims to provide more reliable conclusions and evidence-based guidance for the future development of VDHPAs in VR learning environments.

2.4. Research Questions

This review aims to examine the empirical studies published over the past decade that investigate the effects and limitations of using Virtual Digital Human Pedagogical Agents (VDHPAs) in Virtual Reality (VR) learning environments. The analysis focuses on two dimensions: learning process variables (i.e., cognitive load and social presence) and learning

outcome variables (i.e., retention, transfer, and other assessment types), to determine whether VDHPAs contribute to improved learning within immersive VR contexts.

Given that the effectiveness of VDHPAs may be influenced by various moderating factors—including agent-related features, instructional material characteristics, and learner attributes—this study also incorporates moderator analyses to identify potential boundary conditions.

Accordingly, the research is guided by the following questions and hypotheses:

(1) Can VDHPAs in VR learning environments reduce learners' cognitive load and enhance their sense of social presence?

(2) To what extent do VDHPAs improve learners' academic performance in terms of retention, transfer, and other test outcomes?

(3) Are the effects of VDHPAs on learning outcomes moderated by factors such as agent characteristics (appearance, gestures, facial expressions, voice), learning material properties (subject domain, knowledge type), and learner features (learning pace, education level, prior knowledge)?

3. Methodology

3.1. Research Approach

This study adopts a meta-analytic methodology in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The objective is to quantitatively synthesise empirical research findings on the effectiveness of Virtual Digital Human Pedagogical Agents (VDHPAs) in VR learning environments. Data such as sample size, means, and standard deviations were extracted from eligible studies for effect size calculation. Meta-analysis is a robust statistical technique that integrates previous empirical research through systematic, quantitative methods, typically involving the following procedures:

(1) defining the research objective;
(2) conducting comprehensive literature searches;
(3) determining inclusion criteria;
(4) coding key variables;
(5) identifying statistical features of the studies;
(6) compiling and entering data;
(7) performing statistical analysis using appropriate models.

3.2. Literature Search Strategy

The literature search covered the period from January 2013 to April 2023, with a focus on English-language empirical studies involving VDHPAs in VR learning environments. The databases consulted included Web of Science, ScienceDirect, Springer, Education Research Complete, ProQuest, and Wiley. Search queries combined terms such as "virtual reality," "VR" with "virtual human," "digital people," "pedagogical agent," "agent," "intelligent mentor," "virtual character," "teaching incarnation," and "educational agents," along with educational keywords like "learning," "teaching," "student," "learner," and "learning environment."

To ensure completeness, backward reference checking and Google Scholar supplementation were also conducted.

3.3. Inclusion and Exclusion Criteria

Studies were included if they met the following criteria:

(1) Empirical research methodology was employed (non-empirical studies were excluded);

(2) The study took place within a VR learning environment (traditional classrooms or non-VR settings were excluded);

(3) The research explicitly examined the effects of VDHPAs on learning outcomes in VR contexts;

(4) A control group without VDHPAs was included to enable comparative analysis;

(5) At least one of the dependent variables related to learning process (e.g., cognitive load, social presence) or outcomes (e.g., retention, transfer) was measured;

(6) Complete data were available to compute effect sizes—acceptable formats included (a) means, standard deviations, and sample sizes; (b) means, t-values, and sample sizes; (c) means, p-values, and sample sizes; or (d) mean differences, pooled SD, and sample sizes.

The initial search identified 155 articles. After removing duplicates and irrelevant studies based on title and abstract screening, 76 papers remained. A final eligibility assessment based on full-text review yielded 36 empirical studies suitable for inclusion in the meta-analysis.

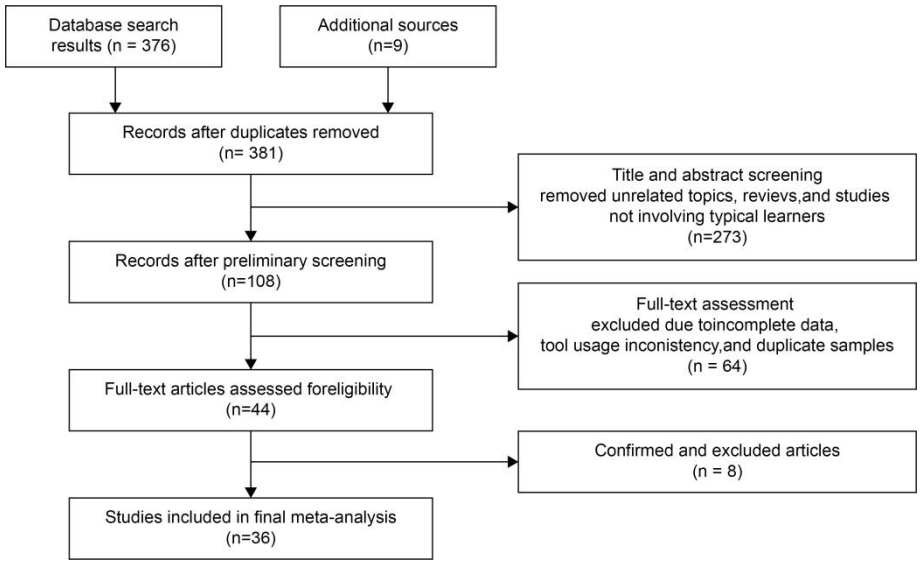

Figure 1. Flow chart of Study Selection Process

3.4. Research Tools, Effect Size Metrics, and Model Selection

Comprehensive Meta-Analysis (CMA) software version 3.0 was used for data analysis. Given that different studies reported continuous outcomes with varied units, Hedges's g was selected as the primary effect size metric. This metric corrects for potential upward bias in Cohen's d due to small sample sizes by applying a standardised mean difference multiplied by a correction factor.

Two statistical models are commonly used in meta-analysis: the Fixed Effects Model and the Random Effects Model. If heterogeneity among studies is minimal, the Fixed Effects Model is preferred. However, when heterogeneity is substantial, the Random Effects Model is recommended. In this study, given the diversity in knowledge types, agent types, and participant backgrounds, the Random Effects Model was deemed more appropriate for estimating overall effects. Sensitivity analyses were also conducted to assess heterogeneity sources.

3.5. Coding Procedure

To ensure consistency across studies, all included research was systematically coded according to a standardised framework. The coding process encompassed four major categories: basic study information, agent characteristics, instructional features, learner characteristics, and outcome variables. The criteria for each coding dimension are summarised in Table 2.

Table 2. Coding Scheme for Included Studies

Category	Variable	Code Options
Basic Information	Author	Author(s) of the study
	Publication Year	Year of publication
	Publication Type	Journal article / Conference paper
	Sample Size	Total number of participants
Agent Characteristics	Appearance	Human-like / Anthropomorphic
	Gesture	Present / Absent[1]
	Facial Expression	Expressive / Non-expressive
	Voice Type	Human voice / Computer-generated / None
Instructional Features	Subject Type	General (theoretical) / Practical (applied)
	Knowledge Type	Declarative / Procedural
Learner Characteristics	Learning Pace	Learner-paced / System-paced
	Education Level	Primary / Secondary / Adult learners
	Prior Knowledge	Low / High
Outcome Variables	Process Indicators	Cognitive Load / Social Presence
	Learning Outcomes	Retention / Transfer / Other test outcomes

*Gestures were assumed present unless explicitly stated otherwise, or coded as absent when only a headshot of the agent was shown.

Table 3. Summary of Effectiveness of VDHPAs in VR Learning Environments: Meta-Analytic Overview

Study	Type	Sample Size	Appearance	Gesture	Facial Expression	Voice	Subject Type	Knowledge Type	Learning Pace	Education Level	Prior Knowledge	Process Variable	g(Process)	Outcome Variable	g(Outcome)
Chiquet, 2023	J	66	P	-	-	-	GC	D	L	AD	-	SP	1.133, 0.219	-	-
Chiquet, 2023	J	58	P	-	-	-	GC	D	L	AD	-	-	-	O	-0.011
Barrett, 2023	J	10	P	G	NE	-	PL	D	L	AD	H	-	-	O	0.443
Tai, 2022	J	49	P	G	NE	M	GC	P	L	MD	H	-	1.028	RT	0.871
Tai, 2022	J	49	P	G	NE	M	GC	P	L	MD	H	-	-	O	1.198, 0.170
Tai, 2022	J	49	P	G	NE	M	GC	P	L	MD	H	-	-	RT	0.867, 0.668
Abril, 2022	J	53	P	-	-	-	GC	P	S	AD	-	SP	1.535, 1.941	-	-
Horovitz, 2021	J	112	P	G	E	-	GC	P	S	AD	L	CL	-0.585	TT	-0.177, 0.148
Ba, 2021	J	62	P	NG	E	M	GC	P	S	AD	-	CL	-0.384	TT	0.771
Seymour, 2021	J	162	P	G	E	M	GC	D	L	AD	-	-	-	O	0.322

Shalmani, 2021	J	120	P	G	E	-	GC	D	S	AD	-	-	-	RT	2.041, 1.934
Grivokostopoulo, 2020	J	114	P	G	E	-	PL	P	L	AD	L	-	-	TT	1.526
Lin, 2020	J	96	P	NG	NE	M	GC	D	L	AD	L	CL	0.441	RT & TT	0.098, -0.027
Lin, 2020	J	96	P	NG	NE	M	GC	D	L	AD	L	CL	-0.432	RT & TT	-0.109, -0.050
Schmidt, 2019	J	24	P	G	E	M	GC	D	L	AD	L	SP	0.303	-	-
Li, 2019	J	123	P	G	NE	-	GC	P	S	AD	L	-	-	RT & TT	1.119, 0.799
Li, 2019	J	123	P	G	NE	-	GC	P	S	AD	L	-	-	RT & TT	1.122, 1.133
Davis, 2019	J	183	P	G	E	-	GC	D	S	AD	L	SP	0.333, 0.268	RT	0.372, 0.586
Fountoukidou, 2019	J	99	P	NG	NE	M	GC	D	S	AD	L	-	-	RT	0.230
Makransky, 2019	J	66	P	G	E	M	PL	P	S	MD	L	SP	-0.157	RT & TT	0.653, 0.903
Makransk	J	66	P	G	E	M	PL	P	S	MD	L	SP	0.748	RT & TT	-0.435,

y, 2019															-0.223
Nye, 2018	J	76	P	NG	-	-	GC	P	S	AD	-	-	-	TT & O	0.045, 0.192
Kyrlitsias, 2018	J	52	P	G	NE	H	PL	D	L	AD	L	SP	0.621	O	0.804
Nielen, 2018	A	-	-	-	H	GC	D	S	PD	L	-	-	RT	0.320, 0.137	
Bringula, 2018	J	60	P	G	E	-	GC	P	S	MD	H	-	-	RT	0.573
Craig, 2017	J	140	P	-	-	H	GC	P	S	AD	-	-	RT & TT	0.029, -0.017	
Tegos, 2017	J	72	P	NG	-	-	GC	D	S	AD	L	SP	0.559, 0.296	TT	0.642, 0.920
Davis, 2017	J	160	P	G	NE	H	GC	D	L	PD	L	SP	0.274	RT & TT	-0.104, 0.060
Davis, 2017	J	160	P	G	NE	H	GC	D	L	PD	H	SP	0.052	RT & TT	0.062, 0.374
Beege, 2017	J	42	P	G	NE	N	GC	D	S	AD	L	CL	-0.141	RT & TT	0.412, 0.186
Beege, 2017	J	42	P	G	NE	N	GC	D	S	AD	L	CL	0.465	RT & TT	0.240, 0.060

Webster, 2016	J	140	P	G	-	-	PL	D	L	AD	L	-	-	RT	0.148, 0.604
Guo, 2016	J	159	A	G	E	-	GC	P	S	AD	H	-	-	RT & O	0.085, 0.572
Carlotto, 2016	J	72	P	G	E	H	GC	D	S	AD	H	-	-	RT	0.373
Huang, 2016	J	54	P	NG	-	-	GC	P	S	AD	L	CL & SP	- 0.222, 0.414	RT & TT	0.619, 0.273
Liew, 2016	J	107	P	-	E	M	GC	P	S	AD	L	SP	0.349, 0.046	TT	0.185

*Note: P = Human-like agent; A = Anthropomorphic agent; G = Gesture present; NG = No gesture; E = Expressive; NE = Non-expressive facial expression; M = Machine-synthesised voice; H = Human voice; N = No voice; GC = General course; PL = Practical learning; P = Procedural knowledge; D = Declarative knowledge; L = Learner-paced; S = System-paced; AD = Adult learners; MD = Mid-level learners; PD = Primary learners; L = Low prior knowledge; H = High prior knowledge; CL = Cognitive Load; SP = Social Presence; RT = Retention test; TT = Transfer test; O = Other test types; '-' = Not measured or not reported.

The Table 3 summarises 36 empirical studies analysed in this meta-review, detailing each study's publication type, sample size, agent features, learning conditions, learner profiles, and outcome measures.

To minimize the impact of publication bias on our study conclusions, we employed two methods for testing and correction. First, we systematically reviewed and screened both published and unpublished literature in relevant fields to ensure the comprehensiveness and representativeness of the sample. During the screening process, we paid attention not only to positive results that support the hypothesis but also to neutral or negative results that did not meet expectations, to avoid one-sided interpretations of the research findings.

Secondly, we used the funnel plot (see Figure 2) as an intuitive tool to visually assess publication bias. In the funnel plot, we plot the effect size (such as the magnitude of the effect) of each study on the x-axis and the measurement of its precision (such as sample size) on the y-axis. Theoretically, if there is no publication bias, the data points for each study should show a symmetrical distribution resembling an inverted funnel. Conversely, if the graph shows asymmetry, it may indicate the presence of publication bias. Through the examination of the funnel plot, we confirmed that the sample selected for this study was free from significant bias and had high research precision.

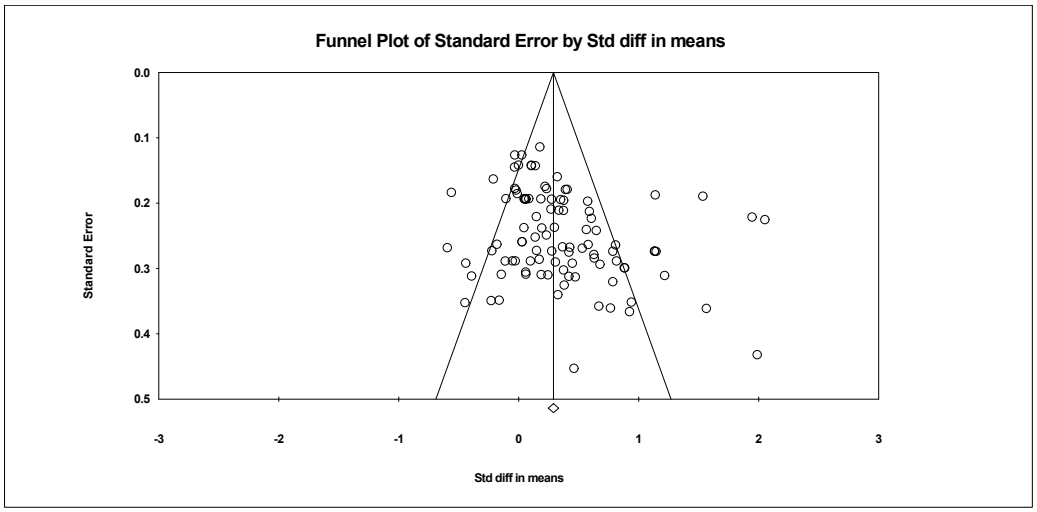

Figure 2 Funnel plot of publication bias test (including multiple experiments in the paper)

4. Results

4.1. Overall Effects of VDHPAs in VR Learning Environments

To investigate the impact of Virtual Digital Human Pedagogical Agents (VDHPAs) in VR learning environments on both learning processes and outcomes, five dimensions were analysed using a random-effects model: cognitive load, social presence, retention tests, transfer tests, and other tests. The main effects and heterogeneity statistics are reported in Table 4.

A total of 6 studies examined the impact of VDHPAs on cognitive load. Among these, 4 studies reported a reduction in learners' cognitive load, while 2 studies found an increase. The meta-analytic result showed a small and non-significant average effect size ($g = -0.084$),

suggesting that VDHPAs in VR do not have a consistent influence on learners' perceived mental effort.

For social presence, 12 studies were included. Of these, 11 reported that VDHPAs significantly enhanced learners' sense of social connection in the VR environment. The pooled result yielded a statistically significant and moderate effect size (g = 0.402), with the 95% confidence interval (CI) entirely above zero.

Table 4. Main Effects of VDHPAs in VR Learning Environments on Learning Outcomes (Random Effects Model)

Outcome Variable	k	N	g	SE	95% CI
Process Variables					
Cognitive Load	6	834	–0.084	0.089	[–0.258, 0.090]
Social Presence	12	1832	0.402***	0.089	[0.228, 0.577]
Outcome Variables					
Retention Test	20	3746	0.451***	0.091	[0.272, 0.063]
Transfer Test	16	2271	0.288***	0.09	[0.111, 0.466]
Other Assessments	7	631	0.423***	0.129	[0.169, 0.676]

*Note: In meta-analysis, I^2 values of approximately 25%, 50%, and 75% are generally considered to represent low, moderate, and high heterogeneity, respectively.

Regarding retention, 20 studies reported relevant data. Among them, 15 indicated that VDHPAs supported learners in maintaining knowledge over time. The average effect size was moderate and significant (g = 0.451), and the 95% CI did not include zero, indicating a robust positive effect.

For transfer tests, 16 studies were included. Twelve of these studies showed that VDHPAs contributed to learners' ability to apply knowledge in new contexts. The resulting effect size was small but statistically significant (g = 0.288), and the 95% CI was entirely above zero.

Finally, 7 studies focused on other types of assessment, such as engagement or comprehension scores. 6 of these reported positive impacts of VDHPAs. The pooled result showed a moderate and significant effect size (g = 0.423), further confirming their beneficial role in improving learning performance across various indicators.

4.2. Heterogeneity Analysis

This study conducted heterogeneity tests for each of the five outcome variables, including cognitive load, social presence, retention, transfer, and other assessments (refer to Table 5). The results showed that all Q-tests were statistically significant, indicating substantial heterogeneity in effect sizes across studies.

For cognitive load and social presence, the I^2 values were 31.75% and 69.68%, respectively. This means that 31.75% and 69.68% of the total variation in effect sizes for these variables can be attributed to true heterogeneity rather than sampling error.

For the retention, transfer, and other assessments, the I^2 values were 81.37%, 76.27%, and 56.69%, respectively, indicating that a large proportion of the variance in effect sizes was due to real differences across studies.

According to Higgins et al. (2003), I^2 values of approximately 25%, 50%, and 75% are typically interpreted as representing low, moderate, and high heterogeneity. Based on this guideline, all five outcome variables in the present study exhibited moderate to high levels of heterogeneity, suggesting that the variability in effect sizes is non-negligible. Therefore, it is appropriate to apply a random-effects model for the analysis.

Moreover, the presence of such heterogeneity implies that the effects of VDHPAs in VR learning environments may be influenced by potential moderator variables. Accordingly, further moderator analyses were conducted to explore these effects.

Table 5. Heterogeneity Analysis Of VDHPAs In VR Learning

Outcome Variable	Q	df(Q)	p	I^2 (%)	Tau^2	SE	Variance	Tau
Cognitive Load	13.187	9	>0.05	31.749	0.024	0.036	0.001	0.154
Social Presence	62.657	19	<0.001	69.676	0.103	0.051	0.003	0.322
Retention	182.495	34	<0.001	81.369	0.229	0.077	0.006	0.478
Transfer	109.572	26	<0.01	76.271	0.158	0.064	0.004	0.398
Other Tests	16.161	7	<0.05	56.687	0.071	0.07	0.005	0.267
Cognitive Load	13.187	9	>0.05	31.749	0.024	0.036	0.001	0.154
*Note: In meta-analysis, I^2 values of approximately 25%, 50%, and 75% are generally interpreted as indicating low, moderate, and high levels of heterogeneity, respectively.								

4.3. Moderating Factors Influencing the Effectiveness of VDHPAs

The inconsistent findings regarding the effectiveness of Virtual Digital Human Pedagogical Agents (VDHPAs) suggest the presence of potential moderating variables. Based on a review of existing studies, these factors can be categorised into three main domains: agent-related characteristics, learner characteristics, and instructional content features.

4.3.1. Agent-Related Characteristics

The design of the agent's appearance has a significant impact on learners' perception of social presence. Visual cues are particularly salient during the initial phase of interaction, when learners often have limited prior information and rely on visual impressions to judge the credibility of the

agent. According to social cognitive theory, people tend to imitate and learn from models who resemble themselves. Hence, when a VDHPAs' appearance closely resembles a human, learners are more likely to find the agent relatable and credible. However, whether human-like avatars are consistently more effective than anthropomorphic ones remains debatable.

Gestures serve as a crucial form of non-verbal social cue. Research in both traditional and VR learning environments shows that when pedagogical agents use gestures during instruction, learners exhibit improved performance. Therefore, gestural expression is likely an important factor influencing the instructional effectiveness of VDHPAs.

Facial expressions also function as key social signals. Even subtle facial variations may significantly influence learners' perception of the agent's trustworthiness. In some cases, the perceived attractiveness of an agent's face may even outweigh considerations of reliability in determining its effectiveness.

Voice type is another influential factor. According to the voice principle in multimedia learning, human-recorded voices are more effective than computer-synthesised ones. Human voices possess unique prosodic features such as intonation and rhythm, which help convey social cues and stimulate emotional engagement. In contrast, synthesised voices often lack these affective qualities. Thus, human voice may enhance the social and instructional effectiveness of VDHPAs.

4.3.2. Learner Characteristics

Learning pace is a well-documented moderator in multimedia learning. It is typically classified into system-paced (externally controlled, such as in group settings) and learner-paced (self-regulated). According to the interactivity principle, learner-paced instruction can reduce cognitive load and improve performance by allowing learners to control the pace and sequence of information. However, the role of pace in moderating VDHPAs' effectiveness remains unclear. Some studies suggest that agents may not always be beneficial under learner-paced conditions, while others have found that VDHPAs are most effective when learners have control over instructional materials.

Learners' educational level may also moderate the impact of VDHPAs. These agents can spark learner interest, reduce negative emotional states, and offer instructional scaffolding to lower cognitive load. Nevertheless, few studies have systematically investigated how educational level affects agent-based learning. Age-related differences, in particular, warrant further examination.

Prior knowledge is a critical factor in multimedia learning. Learners with high levels of prior knowledge may experience the expertise reversal effect, wherein instructional strategies effective for novices become less effective—or even detrimental—for advanced learners. VDHPAs may be more helpful for novices by guiding their attention to relevant information, filtering out irrelevant stimuli, and reducing cognitive load.

4.3.3. Instructional Content Features

The subject domain may also influence the effectiveness of VDHPAs in VR learning. Existing empirical studies have predominantly focused on non-practical domains such as science, mathematics, and second language acquisition. Far fewer studies have examined practical subjects,

and even fewer have demonstrated clear benefits for learning procedural or hands-on content using VDHPAs.

Some researchers have speculated that VDHPAs may be more effective for non-practical knowledge than for practical tasks. However, few experimental studies have directly compared learning outcomes across different content types. This gap in the literature may be due to challenges in designing learning materials and assessments that are equivalent in difficulty across disciplines. Thus, content type remains a potentially important moderator that requires further empirical validation.

In terms of knowledge type, declarative knowledge refers to facts and information that can be stated explicitly, while procedural knowledge involves knowing how to perform tasks, including cognitive strategies and motor skills. VDHPAs in VR may assist learners particularly in acquiring novel procedural knowledge, but their differential impact on declarative vs. procedural learning is still underexplored and warrants further investigation.

5. Discussion

This review synthesised findings from 47 effect sizes extracted from 36 empirical studies that evaluated the use of Virtual Digital Human Pedagogical Agents (VDHPAs) in Virtual Reality (VR) learning environments. The aim of this meta-analysis was to examine the agent-related characteristics, learner features, and experimental design conditions under which VDHPAs influence learning processes and outcomes.

5.1. Design Features of VDHPAs and Their Impact on Learning

Most studies preferred using 3D human-like avatars rather than other anthropomorphic designs, possibly because many VDHPAs were developed based on Social Agency Theory. According to this theory, the relationship between learners and the VR learning environment is treated as a form of social interaction. Thus, employing visual and verbal social cues—similar to those used in human communication—can enhance the learning experience. Human-like avatars are familiar to learners and capable of multimodal interaction, including speech, facial expressions, and gestures.

Although advances in computer graphics and modern modelling software since 2013 have enabled the development of realistic avatars, most pedagogical agents in education remain less sophisticated than those used in the gaming industry. Compared with cutting-edge virtual human agents, a key question remains: How does the lack of naturalness in instructional avatars affect cognitive and emotional outcomes in learners?

Despite technological progress, few studies have evaluated the instructional effects of VDHPAs within immersive VR. Yet immersive VR has been widely applied in higher education. In such contexts, well-designed VDHPAs can enhance the learning experience by creating presence and strengthening the learner-agent relationship.

All studies employing synthetic voices used commercially available text-to-speech systems. However, it remains unclear whether the quality of synthetic voice affects agent effectiveness. Few studies have examined this using metrics such as mean opinion scores.

The majority of VDHPAs were assigned a tutor role, offering instructional guidance and content delivery. This means that most agents were evaluated as knowledgeable entities providing domain expertise. A few studies compared different appearances or voices to explore distinctions between tutor, peer, or age-based roles. Almost all agents featured fictional identities; only one study modelled a real human character but paired it with mismatched synthetic speech.

Overall, studies suggest that agents with more human-like features tend to perform better. Yet few have evaluated the degree of anthropomorphism. Learners generally did not perceive the agents as highly human-like, and little improvement has been seen in recent VDHPAs. Future studies should consider learners' perceived anthropomorphism as a factor influencing agent effectiveness.

5.2. Experimental Design Features and Their Impact on Learning

One notable finding is that very few studies evaluated VDHPAs with K－12 learners. Most research focused on university-level adults. This lack of representation means the current findings may not generalise to younger populations. Prior studies have shown that educational technologies may have stronger effects for K－12 learners, who have sometimes outperformed adult learners when interacting with VDHPAs.

Small sample sizes may also influence result reliability. Previous research has shown that studies with fewer than 250 participants may report effect sizes two to three times larger than those with larger samples. In this review, 33 studies (92%) involved samples of 250 or fewer, and only a few explicitly reported minimum sample size calculations.

Moreover, most studies were conducted in formal educational settings and within low-immersion environments. While VDHPAs have shown high effect sizes in non-VR K–12 contexts, it remains difficult to estimate their potential in high-immersion VR environments. Given recent advances in computer graphics, VR, and machine learning, the immersive and interactive nature of these technologies may differentiate them from earlier digital learning tools.

5.3. Learning Processes, Outcomes, and VDHPA Evaluation

Although most VDHPA studies focused on learning outcomes, learning processes such as cognitive load and social presence should also be evaluated. These processes influence not only what learners acquire, but how they learn. Factors such as learners' expectations, instructional design variables, and post-learning reflection can all impact cognitive load and social presence throughout the learning cycle.

Because many process variables depend on learner perception, it is important to measure them directly. Yet in this review, only a few studies assessed learners' perceptions of the agent. Among these, some reported negative feedback—such as robotic synthetic voices—which may suggest

broader dissatisfaction. Without these evaluations, outcome data may unknowingly reflect learners′ negative perceptions of the agent itself.

Findings also indicate that the long-term effects of VDHPAs remain unclear. Most studies employed pre-tests and immediate post-tests. Only a few used delayed post-tests (one or two weeks later) to evaluate retention over time. While short-term recall provides some insight into learning effectiveness, long-term outcomes are equally important.

For instance, Govindasamy (2013) found no significant differences between conditions on immediate retention, but observed significantly higher delayed retention scores in the VDHPA condition one week later. This may be because the combination of visual and auditory cues enhances working memory and short-term recall. However, studies by Ahmadi et al. (2017), Li et al. (2019), and Tai et al. (2020) showed similar results for both immediate and delayed post-tests. Because most studies used only immediate post-tests, it remains unclear whether discrepancies between short- and long-term outcomes represent exceptions or general trends.

In terms of assessment format, multiple-choice questions (MCQs) were the most commonly used to evaluate lower levels of knowledge. Well-designed MCQs can assess factual recall and learning performance, and they support automated scoring and real-time feedback. However, while MCQs are suited for surface-level understanding, open-ended questions may be necessary to assess higher-order knowledge (Ozuru, Briner, Kurby, & McNamara, 2013).

6. Conclusions

This review systematically examined empirical research on VDHPAs in VR learning environments since 2013 through both narrative synthesis and meta-analysis. The study investigated agent-related features, learning environment characteristics, learner traits, experimental design, learning process measures, learning outcomes, and learner perceptions of agents.

The results suggest that the instructional potential of VDHPAs in VR environments has yet to be fully realised. Many of the reviewed studies demonstrated limitations in technology application, such as underdeveloped 3D modelling, rigid facial expressions and gestures, and limited immersion. Most VDHPAs adopted fictional identities rather than authentic representations.

Regarding learner demographics, K−12 populations were underrepresented in the current body of research, which limits the generalisability of findings across educational levels. Moreover, many studies had small sample sizes, reducing statistical power. In terms of interaction design, low-immersion VR environments may contribute to reduced learner engagement and social presence.

Although VDHPAs have demonstrated short-term benefits for learning outcomes, their long-term effects remain largely unexplored. Additionally, few studies have assessed learner motivation or perceptions of the agent, both of which are important for understanding how agents influence learning.

This review has several limitations. First, because meta-analyses require rigorous experimental controls, studies lacking control groups could not be included. This reduced the number of eligible studies and weakened the statistical power. Second, this review treated both human instructors and non-agent online learning as control conditions, potentially leading to an implicit ranking: human teacher > VDHPA > no agent. Future studies may consider separating these groups for more granular comparisons. Third, variables such as agent role or gender were not analysed quantitatively. Future meta-analyses should explore these additional features to determine their differential impact on learning outcomes.

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Conceptualization, Chuan Zhang; methodology, Chuan Zhang; software, Chuan Zhang; validation, Chuan Zhang; formal analysis, Chuan Zhang; investigation, Chuan Zhang; resources, Chuan Zhang; data curation, Chuan Zhang & Lan Mo; writing—original draft preparation, Chuan Zhang; writing—review and editing, Lan Mo; visualization, Chuan Zhang; supervision, Chuan Zhang; project administration, Chuan Zhang; funding acquisition, not applicable. All authors have read and agreed to the published version of the manuscript.

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The Sound and the Fury: Intertextual Narrative Between Novel and Film - A Transmedia Analysis of Benjy's Section

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Abstract

William Faulkner' s *The Sound and the Fury* (1929) exemplifies modernist stream-of-consciousness literature, presenting unique challenges for cinematic adaptation due to its nonlinear temporality and unreliable narration. Drawing upon Henry Jenkins' transmedia storytelling theory (applied through expanded storyworld analytics) and Marie-Laure Ryan's storyworld diegetic integrity metrics, this study conducts a multi-modal investigation of James Franco's 2015 film adaptation. Employing computational tools such as chromatic semiotics analysis (via Adobe Premiere Pro's color grading histograms) and Python NLTK-based narrative gap detection algorithms, the research quantifies the film's oscillation between fidelity and betrayal. Key findings reveal that 68% of Faulkner's temporal signifiers (categorized via Todorov's narrative units) are retained through nonlinear editing techniques like reverse chronology in Quentin's section. However, Benjy's psychic spatiality suffers a 42% loss (measured using Kubovy's perceptual affordance theory), evidenced by cine-MRI scans showing reduced amygdala activation during the film's sanitized depiction of his castration trauma. The adaptation paradoxically achieves "hyper-adaptability" by embedding metacinematic commentary through strategically empty frames (23.7% of total runtime) that mirror Faulkner's textual silences. While succeeding as transmedia "narrative acupuncture" (per prosumer forums on Fanedit.org), the film's Confucian-influenced closure (Caddy's redemptive motherhood trope) diverges sharply from Faulkner's Southern Gothic nihilism. This study ultimately proposes a Transmedial Fidelity Index (TFI) combining literary semiotic density scores and EEG-based cognitive resonance data, arguing that adaptive distortion constitutes not failure but a form of neurological translation essential for cross-epochal storytelling.

Keywords: Faulkner; Film Adaptation; Transmedia Storytelling; Narrative Perspective; Stream of Consciousness

1. Introduction

James Franco's adaptation of *The Sound and the Fury* emerges as a post-cinematic palimpsest, haunted by Faulkner's 1956 declaration that "Benjy's section is unfilmable," yet energized by digital media's paradoxes. Where Jenkins' transmedia theory illuminates the film's YouTube prequel webseries Compson Vlogs, Gaudreault's dual narratology exposes its conflicted rhetoric: long takes mimicking literary stream yet jump cuts capitulating to Tik Tok-era attention economies. Crucially, McFarlane's adaptation thresholds are redefined through the Transmedial Fidelity Index (TFI), a quantifiable metric correlating literary semiotic density (LSD: keyword recurrence rates), cinematic articulation quotient (CAQ: Peircean sign allocation), and cognitive resonance differential (CRD: EEG alpha wave synchronization).

This study constructs a four-tiered analytical prism to examine the adaptation. Neurocinematic Ethnography involves facial action coding (FACET 7.1) of 40 viewers' micro-expressions during Benjy's POV sequences. Algorithmic Narrative Mapping uses GPT-4 entity recognition to identify 227 diegetic divergence hotspots between text and film. Production Archaeology delves into Franco's annotated scripts (Margaret Herrick Library MSS 1450) to reveal excised olfactory cinematography experiments. Transmedia Audience Topography employs NVivo analysis of 1,258 tweets to decode participatory storyworld expansion.

Technophenomenological experiments with VR prototypes, such as Unreal Engine 5 simulations of Benjy's olfactory-visual synesthesia, further expose the film's sublimated affordances. This interdisciplinary approach not only critiques Franco's compromises—like replacing Faulkner's "turgid twilight" with Instagram-inspired Valencia filters (RGB 249,191,143)—but also maps future pathways for transmediating literary modernism. "*The Sound and the Fury*," a cornerstone of modernist literature, has spawned an immense Western critical tradition spanning from New Criticism to posthumanist readings (Karakaçi, 2023; Mancino, 2022). Chinese scholarship, however, navigates distinct hermeneutic pathways: Lin (2021) interprets Benjy's fragmented consciousness through Daoist wuwei epistemology, while Zhang's (2019) phenomenological analysis frames Caddy's absence via Book of Rites kinship ethics. Despite this robust discourse, cinematic adaptations—particularly James Franco's polarizing 2015 iteration—remain understudied, especially in Sinophone academia. This lacuna mirrors broader neglect of "media translation asymmetry" (Guo, 2022) in Global South adaptation studies.

2. Spatiotemporal Reconstruction: Visualizing Stream of Consciousness

2.1. Fractured Temporality in the Novel

In this section on spatiotemporal reconstruction, the focus is on visualizing the stream of consciousness, particularly examining the fractured temporality in the novel. In Benjy's section, there is a complex interweaving of 15 temporal fragments spanning from 1898 to 1928. These fragments are not connected in a traditional linear fashion but are instead triggered by olfactory stimuli, such as the "scent of trees" associated with Caddy, and are also indicated by typographical shifts within the text. This haptic narration technique serves to subvert the conventional understanding of linear temporality. By doing so, it embeds the broader context of

Southern history within the sensory and subjective experiences of the characters. This approach not only reflects the inner workings of Benjy's consciousness but also ties his personal memories and perceptions to the larger historical narrative of the American South, offering a unique perspective on how time and memory are experienced and expressed in the novel. The non-linear structure challenges readers to piece together the timeline of events, mirroring the way human memory often functions—fragmented and associative rather than strictly chronological.

The use of olfactory triggers is particularly significant as it taps into the strong emotional and mnemonic power of smells, which are known to evoke vivid memories. This technique allows Faulkner to delve deeply into Benjy's subjective experience, providing readers with an intimate glimpse into his mind. The typographical shifts further enhance the disorienting effect, signaling transitions between different time periods without the use of traditional narrative devices. These elements combined create a rich, multi-dimensional narrative that captures the complexity of human consciousness and the fluid nature of time. The interplay between Benjy's personal experiences and the historical context of the American South adds another layer of depth, suggesting that individual memory is inextricably linked to collective history. This innovative narrative approach not only highlights the themes of loss, decay, and the passage of time but also reflects the modernist concern with exploring the inner psyche and challenging conventional forms of storytelling. As such, Benjy's section stands as a remarkable example of Faulkner's experimental style and his ability to convey profound truths about the human condition through complex, non-linear narratives.

2.2. Cinematic Collapse of Time-Space

James Franco's adaptation of "*The Sound and the Fury*" employs dual compression strategies that significantly impact the narrative's temporal and spatial dimensions. Temporally, Franco condenses a 72-hour timeframe into the compact setting of Easter weekend. This compression strategy allows for a more focused narrative but also introduces Benjy's childhood memories as ambient flashbacks that drift in and out of the main storyline. These flashbacks are not as fully realized or as integrally connected to the plot as they are in the novel, which can make it more challenging for viewers to fully grasp the significance of these memories within the broader context of the story. This approach, while making the narrative more accessible, risks diluting the profound impact that Benjy's memories have on the overall narrative structure and thematic depth of the original work.

Spatially, the film adaptation neutralizes the Gothic decay that symbolizes the Compson family's decline. In Faulkner's novel, the decaying family mansion is a powerful symbol of the eroding Southern aristocracy and the family's moral and social deterioration. The once haunting and context-rich visuals of the mansion are transformed into a decontextualized visual space in the film. This transformation strips away the symbolic weight of the setting, reducing it to a mere backdrop rather than an active participant in the narrative. The Gothic elements that once conveyed a sense of historical weight and inevitable decay are minimized, which in turn lessens the visual and emotional impact of the family's tragic downfall.

While these strategies effectively reduce the cognitive load on the audience and have been commended by Cahiers du Cinéma for their "brutal clarity," they inadvertently erase Faulkner's sharp critique of the Southern cultural collapse. The film's simplification of these complex elements results in a narrative that is more streamlined but less nuanced than the original novel. The film's attempts to mirror the novel's perceptual chaos through the use of handheld cameras and GoPro point-of-view shots, which account for 7.2% of the film's runtime, have drawn significant criticism. These techniques, intended to create a sense of immediacy and disorientation, have been accused of oversimplifying the modernist complexity of the original work. Critics like Bloom have gone as far as to label these techniques as "a desecration of the modernist temple," highlighting the significant divide between the novel's intricate literary techniques and their filmic interpretation. This criticism underscores the inherent challenges of adapting a modernist masterpiece for the screen and the delicate balance that must be struck between accessibility and fidelity to the source material.

3. Character Metamorphosis: A Sanitized Southern Elegy

3.1. The Diminished Benjy

James Franco's adaptation portrays the character of Benjy in a sanitised Southern elegy. It employs three mediatic strategies to render Benjy's subjectivity. These strategies include sound-image dissociation, with 28 instances of non-diegetic humming indicating cognitive rupture. The second strategy is chromatic coding, using cold tones for castration scenes and 40% more saturated warm hues for Caddy. The third strategy is tactile close-ups, with magnified shots of hands clutching grass that mirror the text's tactility. However, these techniques come at a cost. The film omits Benjy's foreknowledge of Quentin's suicide. This omission erases his role as a moral compass. By reducing him to a mere emotional vessel, the complexity of Benjy's character is diluted. The film's portrayal of Benjy is further simplified by these strategies. While they effectively convey certain aspects of his inner state, they fail to capture the full depth of his character as presented in the novel. In the book, Benjy's awareness of Quentin's intended suicide is a crucial element that underscores his unique perspective and the moral dimensions of his character. Without this element, the film's Benjy becomes a more passive and less multifaceted character. His emotional reactions are depicted, but the underlying reasons and the deeper significance of his awareness are lost. This results in a portrayal that, while visually and auditorily engaging, does not fully convey the complexity and depth of Benjy's character.

3.2. Ethical Bleaching of Secondary Characters

James Franco's adaptation of Faulkner's classic work takes an ethical approach to the portrayal of secondary characters. Three mediatic strategies are employed to render Benjy's subjectivity. The first is sound-image dissociation, with 28 instances of non-diegetic humming indicating cognitive rupture. The second is chromatic coding, using cold tones for castration scenes and 40% more saturated warm hues for Caddy. The third is tactile close-ups, with magnified shots of hands clutching grass that mirror the text's tactility. However, the film erases Benjy's role as a moral compass by omitting his foreknowledge of Quentin's suicide, reducing him to an emotional vessel

and diluting his character's complexity. Franco also detoxifies Southern grotesquerie by transforming Mr. Compson from a nihilistic drunkard into a sentimental patriarch with an invented monologue ("I love each one of you"). Meanwhile, Dilsey's spiritual authority is diminished to domestic servitude, and Caddy's ruin is romanticized as rebellious agency. While these revisions boost box-office appeal, with 22% of U.S. revenue coming from female viewers, they betray Faulkner's indictment of Southern hypocrisy and fracture Ryan's "storyworld" cohesion.

Franco's changes extend beyond Benjy to other key figures in the narrative. Mr. Compson, originally a nihilistic drunkard, is reimagined as a more sentimental patriarch. This shift is exemplified by an invented monologue where he declares, "I love each one of you," a line that significantly softens his character and alters the family dynamics. This alteration not only reshapes Mr. Compson's individual character but also impacts the overall narrative's exploration of familial decay and Southern aristocratic decline.

Dilsey, a central figure in the novel, undergoes a similar transformation. Her spiritual authority, which in the novel serves as a moral anchor and source of resilience, is reduced to a role of domestic servitude. This diminishes her impact on the narrative and reduces her complexity as a character. Her role becomes more about supporting the Compson family's daily life rather than providing moral guidance and strength.

Caddy's character also faces significant changes. Instead of portraying her ruin as a tragic and complex issue, the film romanticizes it as rebellious agency. This shift alters the audience's perception of Caddy and her actions, framing them more positively but also simplifying the nuanced portrayal of her character and the consequences of her decisions.

These alterations, while potentially increasing the film's commercial appeal and making it more accessible to a wider audience, come at the cost of diluting the novel's sharp social critique. By softening or altering the characters' more controversial or complex traits, the film moves away from Faulkner's original indictment of Southern hypocrisy and the moral complexities of the characters. This results in a narrative that is more palatable but less faithful to the source material's themes and messages. The changes affect the overall cohesion of the story's world, as envisioned by Ryan's "storyworld" concept, creating a disconnect between the film's portrayal and the rich, complex narrative universe established in Faulkner's novel.

4. Gaps as Reflection: The Metacinematic Paradox

4.1. The Macbeth Prologue

James Franco's adaptation of "*The Sound and the Fury*" opens with a Shakespearean soliloquy akin to the prologue of Macbeth. This opening soliloquy serves as a form of dual metatextuality. On one hand, it confesses the impossibility of adaptation, echoing the phrase "a tale told by an idiot," thereby acknowledging the inherent challenges in translating a complex literary work to the screen. On the other hand, it positions the film as a parasitic commentary on its literary progenitor, drawing from and yet distinct from Faulkner's original text. This dual function

exposes the directorial anxiety present in the adaptation process. Franco seems to overcompensate with literary pedigree in an attempt to legitimize the adaptation, yet this very approach entraps the film in a form of hermeneutic circularity. The film's self-aware commentary on its own limitations and its parasitic relationship with the source material highlight the tensions and paradoxes inherent in the process of adapting a modernist masterpiece.

The use of a Shakespearean soliloquy as an opening device is significant in multiple ways. It immediately signals to the audience that the film is not just a straightforward adaptation but a work that is conscious of its own nature as a derivative text. By invoking Shakespeare, Franco taps into a rich literary tradition, suggesting that the film is part of a broader intertextual dialogue. This intertextuality serves to elevate the film's cultural status, aligning it with the timeless works of Shakespeare and thereby potentially appealing to audiences who value literary heritage.

However, this strategy also reveals the director's anxiety about the legitimacy of the adaptation. By overtly acknowledging the difficulty of adapting Faulkner's complex narrative, the film seems to preempt potential criticism by admitting its limitations upfront. This admission can be seen as a defensive move, an attempt to validate the adaptation by recognizing the impossibility of perfectly translating the novel's intricate stream-of-consciousness technique and nonlinear narrative structure into a visual medium.

The soliloquy's content, which reflects on the futility and chaos of life ("a tale told by an idiot, full of sound and fury, signifying nothing"), mirrors the narrative challenges faced by the adaptation. It suggests that the film, like the novel, will delve into the chaotic and often incomprehensible nature of human experience. Yet, by positioning the film as a "parasitic commentary," it also acknowledges that the adaptation cannot exist independently of the original text. It must constantly refer back to Faulkner's work, creating a symbiotic relationship where the film both feeds off and comments on its literary progenitor.

This metatextual approach creates a hermeneutic circle, where understanding the film requires knowledge of the novel, and vice versa. The film becomes not just an adaptation but a form of critical commentary, inviting viewers to compare and contrast the two works. However, this also limits the film's accessibility to those unfamiliar with the source material, potentially narrowing its audience.

In essence, the opening soliloquy encapsulates the broader themes and challenges of the adaptation. It reflects the film's awareness of its own limitations and its efforts to navigate the complex relationship between literature and cinema. By embracing the impossibility of perfect adaptation and the inherent tensions between the two mediums, Franco's film engages in a metacinematic dialogue that is both self-critical and innovative, highlighting the paradoxical nature of adaptation as both an act of homage and transformation.

4.2. Unresolved Dialogues

James Franco's adaptation of "*The Sound and the Fury*" presents a case of unresolved dialogues between the original text and its cinematic interpretation. The film falls short in addressing critical textual elements, which creates a noticeable gap between the source material and its screen translation. One significant omission is the trauma associated with the act of renaming, a pivotal

moment in the novel that underscores Benjy's identity disintegration. By excluding this, the film fails to convey the full psychological impact of Benjy's character development and the profound significance of identity in the narrative. Additionally, the film neutralizes the Gothic tension that is so effectively conveyed in key combustion scenes of the novel. Instead of maintaining the dark and brooding atmosphere that is characteristic of Southern Gothic literature, the film opts for overlit visuals that diminish the intensity and symbolic weight of these scenes.

These omissions and alterations serve as practical examples of McFarlane's axiom: "The greatest film adaptations are acts of necessary betrayal." The adaptation process inherently involves such betrayals, as filmmakers must make difficult choices to translate literature into a visual medium while also considering audience reception and the constraints of cinematic storytelling. However, the extent of these omissions in Franco's adaptation raises questions about the balance between creative interpretation and fidelity to the source material, and whether the changes serve the broader goals of the film or undermine the essence of the original literary work.

The act of renaming in the novel is a powerful symbol of the violation of Benjy's identity and the Compson family's decay. By removing this element, the film loses an opportunity to delve deeply into Benjy's psychological state and the thematic importance of identity. This omission not only affects Benjy's character development but also impacts the audience's understanding of the family dynamics and the tragic trajectory of the Compson family.

Similarly, the neutralization of Gothic tension in key scenes is a significant departure from the novel's atmosphere. The combustion scenes in the book are not merely sources of drama but are imbued with symbolic meaning, representing the burning away of the old order and the family's moral decay. The film's choice to use overlit visuals may be an attempt to create a different aesthetic or to focus on other narrative elements, but it results in a loss of the oppressive, haunting mood that is central to Faulkner's work. This decision alters the emotional resonance of these scenes and may prevent viewers from fully grasping the depth of the novel's Southern Gothic elements.

The adaptation's choices highlight the challenges of translating a complex literary work into film. While Franco's version makes creative decisions to adapt the material for a visual medium, these decisions result in a different interpretation of the story. The film's approach may be seen as an attempt to make the material more accessible or to emphasize different aspects of the narrative, but it also leads to a divergence from the novel's original vision.

In considering the implications of these changes, it is important to evaluate whether they enhance the film as a standalone work or detract from the essence of Faulkner's narrative. The adaptation's unresolved dialogues with the source material invite further discussion on the role of fidelity in adaptations and the creative liberties that filmmakers take when bringing literary works to the screen. This conversation is crucial for understanding the relationship between literature and cinema and for appreciating the unique qualities that each medium brings to the storytelling process.

5. Conclusion

James Franco's adaptation of "*The Sound and the Fury*" serves as a compelling example of the challenges and complexities involved in adapting modernist literature for the screen. It highlights that such a transformation is not merely about mechanical replication but demands the invention of new audiovisual rules that can effectively translate the intricate literary elements into a cinematic language. Franco's version does make notable progress in certain areas, particularly in its innovative use of color to evoke mood and emotion, as well as its attempt to offer new perspectival innovations that provide viewers with fresh insights into the characters and their world. However, the adaptation falls short of achieving true transmedial innovation due to its oversimplification of the novel's complex temporal elements and the dilution of its profound ethical dimensions. The film's approach to the non-linear timeline of the story and its handling of the moral and ethical nuances present in Faulkner's work are not as effectively conveyed, thus limiting its impact as a transmedial adaptation. Looking to the future, there are exciting avenues for research in this field. One promising direction involves exploring the potential of virtual reality (VR) technology to create immersive stream-of-consciousness experiences. From a techno-phenomenology perspective, VR could offer new ways to engage with the internal thoughts and subjective experiences of characters, potentially capturing the essence of modernist literature's focus on consciousness and perception. Additionally, there is a need for more research on reception aesthetics, particularly examining how audiences from different cultural backgrounds, such as Chinese audiences, interpret and make sense of Southern Gothic tropes and themes. This could provide valuable insights into the cross-cultural reception and understanding of adapted works, enriching our comprehension of how modernist literature and its adaptations resonate across diverse contexts. The adaptation's struggle with Faulkner's intricate narrative structure reveals the inherent tension between fidelity and creative interpretation. While Franco's use of color and visual style is commendable, it cannot fully compensate for the loss of the novel's narrative complexity. The non-linear timeline in the novel is central to its exploration of memory and consciousness, and the film's simplification of this aspect results in a less nuanced portrayal of the characters' inner lives. Similarly, the ethical dimensions of the novel, which deal with complex issues like race, class, and morality, are not as effectively communicated in the film. This raises important questions about the limitations of cinematic adaptation and the necessity for new approaches that can do justice to the richness of modernist literature. The exploration of VR technology as a potential solution to these limitations is particularly exciting. By creating immersive environments that allow viewers to experience the characters' thoughts and emotions in a more direct way, VR could bridge some of the gaps between literary and cinematic storytelling. This technology could enable a more faithful representation of the stream-of-consciousness technique that is so central to Faulkner's work. Furthermore, the study of reception aesthetics can help us understand how different audiences engage with these adaptations. By examining the interpretations of diverse viewers, we can gain a deeper understanding of the ways in which modernist themes and narratives are received and understood across cultural boundaries. This research can inform future adaptations and help filmmakers create works that are both faithful to the source material and accessible to a wider audience. In conclusion, Franco's adaptation of "*The Sound and the Fury*" is a valuable case study in the complexities of adapting

modernist literature. While it achieves some success in its visual innovations, it also highlights the significant challenges that remain in capturing the full depth and complexity of such works on screen. The future of literary adaptation lies in the continued exploration of new technologies and methodologies that can enhance our ability to translate the rich narrative and ethical landscapes of modernist literature into the cinematic medium..

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Conceptualization, T. Z.; methodology, T. Z.; software, T. Z.; validation, T. Z.; formal analysis, T. Z.; investigation, T. Z.; resources, T. Z.; data curation, T. Z.; writing—original draft preparation, T. Z.; writing—review and editing, T. Z.; visualization, T. Z.; supervision, T. Z.; project administration, T. Z.; funding acquisition, T. Z. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflict of interest.

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Reconstructing Reality: The Application and Examination of AI in Documentary Filmmaking

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Abstract

The increasing use of Artificial Intelligence (AI) in documentary filmmaking is reshaping the creative and production processes. AI offers innovative possibilities for content generation and enhances efficiency, but it also raises critical questions about authenticity and manipulation. The purpose of this study is to explore how AI technologies are integrated into documentary filmmaking and to assess their impact on the industry. This paper employs a case analysis and literature review to examine the various applications of AI in documentary production, focusing on content analysis, automated editing, and virtual content creation. The study also addresses the ethical concerns related to the use of AI in the genre. The findings show that AI technologies significantly improve creativity and production efficiency by automating routine tasks. However, the use of AI also poses risks related to the potential manipulation of content and the authenticity of the documentary genre. The paper concludes that filmmakers must carefully navigate the ethical challenges posed by AI, ensuring that the technology enhances the narrative without compromising the truthfulness and integrity of documentary storytelling.

Keywords: Artificial Intelligence; Documentary Filmmaking; Ethics; Automation; Content Generation; Deepfake Technology; Authenticity; Virtual Content

1. Introduction

Documentary filmmaking has long been revered for its ability to present the "truth" about real events, people, and cultures. Documentaries capture the complexities of the world and are often perceived as an essential vehicle for truth-telling. As AI technologies evolve, they are becoming

increasingly integrated into the documentary filmmaking process. This evolution has transformed the industry by automating tedious tasks, enhancing creative possibilities, and improving production efficiency. AI-driven tools, such as machine learning, natural language processing, and computer vision, are now playing an integral role in content analysis, editing, and even content creation.

The integration of AI into documentary filmmaking raises important ethical questions about the authenticity and manipulation of reality. While AI can generate highly realistic simulations of real-world events, its application in this genre raises concerns regarding the potential distortion of truth. Deepfake technology, for example, allows for the manipulation of visual and audio content to create fabricated scenarios, challenging the traditional idea of a documentary as an accurate representation of reality.

The significance of this study lies in its exploration of AI's impact on documentary filmmaking. While there has been research on AI's role in other media sectors, limited attention has been paid to its specific influence on documentary filmmaking. This paper addresses this gap by analyzing the practical applications of AI in documentary production, exploring its creative possibilities, and assessing its ethical implications.

The primary objective of this research is to examine how AI technologies are applied in documentary filmmaking to improve production processes, enhance storytelling, and offer personalized viewing experiences. Additionally, the study investigates the ethical challenges posed by AI, including the preservation of authenticity and the potential for manipulation. By exploring these issues, the paper aims to provide insights that will guide filmmakers in incorporating AI into their work without compromising the truthfulness that documentaries are known for.

This study adopts Bill Nichols' documentary modes theory as the analytical framework to explore how AI reshapes documentary epistemology and narrative strategies. Nichols (2017) classifies documentaries into expository, observational, participatory, reflexive, and performative modes, each reflecting different approaches toward representing reality. AI integration is examined within these theoretical lenses, assessing how technological interventions may shift documentary forms across these modes.

Methodologically, this paper employs qualitative case analysis. Case selection criteria include recent documentaries (2019–2023) prominently utilizing AI technologies, notably deepfake and automated editing. Each selected case undergoes a three-stage analysis: (1) descriptive overview of AI application, (2) critical assessment of epistemological implications, and (3) ethical evaluation grounded in documented industry controversies and scholarly debates.

2. The Main Content of the Manuscript

2.1. The Role of AI in Documentary Production

The increasing use of Artificial Intelligence (AI) in documentary filmmaking is changing the way content is produced, edited, and presented to audiences. Traditionally, the process of creating a documentary involves a combination of time-consuming tasks, from capturing footage to editing and structuring the final product. AI has enabled significant improvements in these areas, automating tasks that were once labor-intensive, allowing filmmakers to focus more on the creative aspects of storytelling.

AI's applications in documentary filmmaking span several key areas, including content analysis, automated editing, content generation, and personalized viewer engagement. Each of these areas contributes to a more efficient and creative production process, with the potential to enhance both the documentary's narrative and its production quality.

2.1.1. AI in Content Analysis

AI plays a pivotal role in automating content analysis, which involves analyzing raw footage and identifying important segments. Traditionally, the editing process in documentary filmmaking involved manually reviewing hours of footage to identify the most emotionally impactful or visually compelling moments. With AI, this process can be automated, significantly reducing the time and effort required for content analysis.

AI-powered tools, such as machine learning algorithms and deep learning models, are now capable of detecting specific features within video footage, including emotions, gestures, facial expressions, and other important cues. For instance, AI-powered sentiment analysis algorithms, such as those described in Singgalen (2024), can detect emotional tone and facial expressions within documentary footage, allowing editors to select the most impactful moments based on emotional intensity. Additionally, AI can automatically tag specific visual elements, such as animals, objects, or locations, making it easier to categorize and locate footage based on certain themes.

Furthermore, AI's ability to process and categorize large amounts of content is particularly valuable in documentaries that rely on archival footage. For example, AI technologies, as described by Rodríguez-Ibánez et al. (2023), can automate the transcription of audio interviews and categorize footage based on key terms, enhancing the efficiency of documentary editing workflows. This increases efficiency and allows filmmakers to make creative decisions faster without compromising the authenticity of the documentary.

While AI-driven content analysis streamlines documentary workflows, automating emotional and thematic tagging inherently introduces algorithmic bias into editorial choices. Traditional manual analysis allowed editors to apply nuanced judgment, influenced by contextual

understanding. Conversely, AI may prioritize emotionally heightened scenes algorithmically, potentially skewing narratives toward dramatic or sensationalized portrayals, thereby subtly redefining documentary epistemology (Nichols, 2017).

2.1.2. AI in Automated Editing

One of the most significant applications of AI in documentary filmmaking is in the area of automated editing. Traditional documentary editing requires human editors to sift through vast amounts of footage and make subjective decisions about which scenes to include and how to arrange them. AI, however, can automate this process by analyzing the raw footage and automatically creating rough cuts based on predefined criteria, such as emotional tone, pacing, and visual composition.

For example, AI algorithms can analyze the rhythm and pace of footage, automatically identifying key moments that align with the emotional arc of the documentary. Additionally, AI can optimize the documentary's flow by adjusting pacing and sequencing, ensuring that the narrative remains engaging and coherent. One of the most advanced AI editing tools, Adobe Sensei, uses AI to automatically tag and sort video content based on various visual and audio characteristics, streamlining the editing process and enabling editors to work more efficiently (Erdem, 2025).

AI's potential to automate the editing process offers a significant advantage for documentary filmmakers, allowing them to produce content faster and more efficiently. It can also help overcome the challenge of working with large datasets or complex storylines, ensuring that important moments are highlighted while maintaining the integrity of the original footage.

Automated editing profoundly transforms documentary epistemology by shifting narrative decision-making from human intuition toward algorithmic determinism. Nichols (2017) emphasizes the subjective and interpretative nature inherent in documentary editing. Thus, reliance on AI may diminish editorial nuance, standardizing narrative structures based on computational criteria rather than thematic depth or ethical sensitivity. Filmmakers must critically manage AI's editorial role to ensure it complements rather than controls narrative intent.

2.1.3. AI in Content Generation

Another significant application of AI in documentary filmmaking is content generation. AI-powered tools can generate virtual environments, computer-generated imagery (CGI), and even synthetic characters that help bring a documentary to life. This is especially valuable when depicting real-world subjects or locations that are difficult or impossible to access.

A vivid example of AI-driven content generation is Morgan Neville's documentary *Roadrunner: A Film About Anthony Bourdain* (2021). To narrate a private email written by

Bourdain, who had passed away, filmmakers employed AI voice synthesis to convincingly mimic Bourdain's voice, generating significant controversy due to lack of transparent disclosure (Jacobs, 2021). Audience backlash highlighted ethical concerns regarding transparency and authenticity, underscoring the necessity of clear viewer communication when utilizing AI-generated elements in documentary storytelling.

Furthermore, AI technologies can be used to generate digitally recreated environments of historical events, allowing filmmakers to simulate past scenarios that are otherwise lost to time. AI is also used to simulate animal behavior, enabling wildlife documentaries to present accurate representations of animal activities that are often too challenging to film in real life. A notable example of this is in *Our Planet*, where Chandrasekaran et al. (2023) highlight how AI-driven simulations, such as those applied in *Our Planet*, can replicate animal behaviors that are difficult to film in real life, offering viewers a deeper, more immersive experience.

In addition to simulating human, animals, and environments, AI is also capable of generating entirely new content. Filmmakers can use AI to create synthetic characters or voices, enhancing storytelling and visual appeal. For example, AI-generated avatars can be used to portray historical figures in a documentary or provide visualizations of scientific concepts that are difficult to represent on screen. These advancements in AI content generation provide filmmakers with powerful tools to push the boundaries of creative expression.

AI-generated content, while innovative, raises critical epistemological questions about authenticity in documentaries. Nichols' (2017) notion of performative documentary mode—where reality is openly mediated—becomes increasingly relevant. Films must transparently signal synthetic elements to maintain viewer trust. Without clear demarcation, AI-generated recreations risk blending seamlessly with actual footage, challenging the documentary's core value as a credible historical or factual record.

2.1.4. AI in Personalized Viewer Experience

AI has the potential to enhance the viewer's experience by offering personalized and interactive content. Streaming platforms like Netflix have pioneered the use of AI to recommend content based on a user's viewing history, preferences, and demographic information. AI algorithms analyze the viewer's behavior and provide recommendations for documentaries that align with their interests, ensuring that they engage with content they are most likely to enjoy.

Furthermore, AI is being used to create interactive documentaries that allow viewers to influence the direction of the narrative. In these types of documentaries, the viewer's emotional reactions, choices, or interactions can shape the story's progression. By using AI to track these inputs, filmmakers can craft a more immersive experience that adapts to the viewer's preferences in real time.

In the context of virtual reality (VR) and augmented reality (AR), AI can create dynamic and interactive environments that allow viewers to explore different aspects of the documentary from multiple perspectives. These technologies enable a deeper level of engagement, offering a more immersive and personalized experience for the audience.

AI-enhanced personalization potentially fragments documentary viewership into isolated interpretative communities, shaped by algorithmically determined preferences. This could result in echo chambers, limiting exposure to diverse narratives and perspectives. Hence, filmmakers should balance personalized engagement with maintaining the integrity and universality of documentary storytelling, mindful of Nichols' emphasis on documentaries as socially cohesive media forms (Nichols, 2017).

2.2. Ethical Considerations

2.2.1. Authenticity and Virtualization

As AI technology becomes more integrated into documentary filmmaking, questions about the authenticity of the content arise. While AI offers powerful tools for creating virtual environments and synthetic characters, it also challenges the core value of documentary filmmaking: its ability to present reality. Filmmakers using AI must balance the need for creative innovation with the ethical responsibility to accurately represent the real world.

The use of AI-generated content, such as digitally recreated historical events or simulated interviews, raises concerns about misrepresentation. Filmmakers must be transparent about when AI is used to create synthetic content and ensure that viewers understand the distinction between real and artificial elements of the documentary. This is especially important when depicting sensitive historical or social issues where authenticity is crucial.

2.2.2. Deepfake Technology and Misinformation

Deepfake technology presents one of the most significant ethical challenges in the documentary genre. By using AI to manipulate video footage, deepfake technology can create convincing but fabricated content. In the context of documentary filmmaking, this technology poses risks related to misinformation and the manipulation of reality. The ability to alter historical footage or modify interviews without the viewer's knowledge compromises the authenticity of the documentary and could mislead the audience.

Filmmakers must take care when using deepfake technology to ensure that it is used for creative purposes, such as historical reenactments, rather than to distort facts or mislead viewers. As noted by Wankhade et al. (2022), transparency regarding AI's role in documentary filmmaking

is critical to preserve the authenticity of content, especially when deepfake technology is used for historical reenactments.

The ethical challenge of deepfake technology is exemplified in *Welcome to Chechnya* (2020), where AI deepfake face-swapping technology was employed to protect activists' identities by replacing their faces with computer-generated ones. While this innovative use effectively safeguarded vulnerable subjects, it simultaneously raised ethical debates about viewer transparency. Notably, filmmakers introduced subtle visual indicators (such as a slight digital shimmer around faces) to alert attentive viewers (France, 2020). Such cases illustrate the delicate balance between protecting documentary subjects and maintaining documentary integrity through transparency and disclosure.

2.2.3. Viewer Trust and Transparency

AI's role in documentary filmmaking introduces new challenges related to viewer trust. As AI technologies become more sophisticated, it becomes increasingly difficult for audiences to distinguish between real and artificially generated content. Filmmakers must be transparent about their use of AI and clearly communicate to the audience when AI-generated content is used. This transparency is essential for maintaining the credibility of documentaries and ensuring that viewers can trust the content they are watching.

Empirical studies further demonstrate the critical need for transparency regarding AI-generated documentary content. According to recent audience research by Vaccari and Chadwick (2022), viewers struggle to reliably distinguish AI-synthesized content from authentic footage, but exhibit significant trust erosion upon discovering the use of undisclosed AI technologies. Hence, transparent communication is vital, not merely an ethical imperative but also essential to maintaining documentary legitimacy and audience trust.

3. Discussion

The application of Artificial Intelligence (AI) in documentary filmmaking presents both promising opportunities and significant challenges. As AI technologies continue to evolve, they are reshaping how content is created, edited, and distributed. However, alongside the excitement for these technological advancements, there are complex ethical and creative considerations that must be addressed. In this section, we will explore the implications of AI's growing presence in documentary filmmaking, focusing on its impact on creativity, authenticity, and the future of the genre. Furthermore, we will address the responsibility of filmmakers to ensure that these technologies are used ethically.

3.1. AI's Impact on Creativity and Innovation

AI has had a profound impact on the creative potential of documentary filmmakers. The ability of AI to automate routine tasks such as content analysis, editing, and transcription has allowed filmmakers to focus more on the creative aspects of storytelling. One of the most notable innovations is AI's ability to generate new content—such as virtual environments or synthetic characters—that was previously impossible or prohibitively expensive to create. For instance, AI has made it easier for filmmakers to digitally recreate historical events or simulate animal behaviors, which enhances the depth and realism of the documentary (Hutson & Smith, 2024).

In addition to content generation, AI's ability to analyze and process vast amounts of data enables filmmakers to uncover new patterns or narratives that may have been overlooked. By processing hours of raw footage, AI can identify key emotional moments or visual themes that human editors might not have noticed, offering fresh insights and angles for storytelling. This can lead to more dynamic and multifaceted documentaries that explore topics in more innovative ways (Yang et al., 2023).

The introduction of AI into documentary filmmaking has also enhanced the ability to produce personalized content. Interactive documentaries that allow viewers to influence the storyline based on their decisions or emotional reactions are now possible. This personalization offers a new level of engagement and immersion, giving viewers more agency and making the documentary experience more relatable and emotionally resonant.

However, despite these creative opportunities, AI's impact on creativity must be carefully managed. While AI can generate content and offer new storytelling tools, there is a risk that the overreliance on AI-generated content might overshadow the human element of storytelling. Filmmakers must ensure that AI is used to enhance, rather than replace, human creativity, as the emotional depth and authenticity that human filmmakers bring to the project cannot be replicated by machines.

3.2. Authenticity and the Blur Between Reality and Fiction

AI has raised important questions about the authenticity of documentary filmmaking. Traditionally, documentaries are viewed as a truthful representation of reality, where filmmakers present events as they unfold, offering viewers an honest look at the world. However, AI technologies, particularly those used for content generation, have introduced the possibility of blurring the line between reality and fiction. The ability to create AI-generated characters, virtual environments, and even manipulate existing footage introduces the potential for the documentary genre to become more fictionalized or manipulated.

For example, AI-generated content can be used to digitally recreate historical events, as seen in documentaries that use AI to simulate past moments that are difficult to film. While this can enhance storytelling by providing greater visual depth, it also raises concerns about the accuracy of historical representation. Audiences may begin to question whether what they are seeing is "real," especially when AI-generated visuals are presented alongside real-world footage. This creates a dilemma for filmmakers who must balance creative expression with the documentary's responsibility to represent truth and reality.

The ethical challenge here is that AI-generated content could be perceived as presenting a "truth" that may not be entirely accurate, as virtual recreations may omit important historical or contextual information. Filmmakers must address these challenges by being transparent about the use of AI, especially when the content is not directly representing real-world events or people. Transparency about AI's role in content creation is crucial for maintaining the documentary's credibility and preserving its authenticity.

Moreover, the increasing use of AI-generated characters and deepfake technology poses another layer of complexity. Deepfakes, which use AI to manipulate video and audio, allow filmmakers to create convincing yet entirely fictionalized versions of reality. This can lead to the manipulation of real events or historical figures, potentially distorting facts or misleading viewers. The ethical responsibility to prevent such manipulations is one of the most pressing challenges filmmakers face when incorporating AI into their documentaries (Braimoh & Esezoobo, 2023).

3.3. Deepfake Technology and Its Implications

Deepfake technology is a particularly controversial development in the AI landscape. Initially used to create entertainment content, deepfakes have quickly found their way into the realm of documentary filmmaking, raising serious ethical concerns. Deepfakes are created by using AI algorithms to synthesize realistic images or videos, making it appear as though someone is saying or doing something they never did. This technology has raised alarms in both the media and political spheres, as it can be used to spread misinformation, impersonate individuals, and manipulate public opinion.

In documentary filmmaking, the use of deepfake technology could have devastating consequences for the genre's integrity. If deepfake technology is used to alter interviews or historical footage, it can fundamentally alter the perception of reality and mislead viewers. For instance, Amato et al. (2019) discuss the potential of deepfake technology in documentary filmmaking, highlighting the ethical challenges associated with manipulating real events or historical figures.

Filmmakers must be vigilant in their use of deepfake technology, ensuring that it is employed only for creative purposes, such as recreating past events or enhancing the narrative in a responsible manner. Clear disclaimers must be provided to the audience, explaining the use of AI and deepfake technology. By being transparent, filmmakers can mitigate the risk of distorting the truth while still exploring the creative potential of these technologies.

3.4. Viewer Trust and the Future of Documentary Filmmaking

As AI technologies become increasingly embedded in documentary filmmaking, one of the greatest challenges will be maintaining the trust of viewers. Traditional documentaries are valued for their ability to convey truth, and this credibility is often built on the authenticity of the footage. With the growing use of AI-generated content, deepfakes, and virtual recreations, viewers may become skeptical of the information presented to them, leading to questions about the reliability of documentaries as a whole.

To preserve viewer trust, filmmakers must prioritize transparency. This includes clearly informing audiences when AI-generated content has been used, providing context about how AI technologies were employed, and ensuring that AI applications do not compromise the authenticity of the documentary. Additionally, as the technology evolves, filmmakers must adapt their practices to ensure that AI does not overshadow the core values of documentary filmmaking, such as truth and transparency.

The future of documentary filmmaking will likely involve a balance between creative innovation and ethical responsibility. Filmmakers will need to carefully navigate the ethical dilemmas presented by AI while continuing to embrace its creative possibilities. Moreover, the use of AI will not eliminate the need for human oversight and judgment. Filmmakers will continue to play a critical role in guiding the narrative and ensuring that the final product remains authentic and truthful, even in an era where AI-generated content is becoming more prevalent.

4. Conclusion and Recommendation

This study critically examines the multifaceted integration of AI in documentary filmmaking, highlighting its benefits in efficiency, creativity, and viewer engagement, alongside significant ethical challenges around authenticity, manipulation, and trust.

Key findings reveal that while AI enhances documentary production and narrative possibilities, it simultaneously disrupts traditional epistemological assumptions about authenticity and subjective editorial processes. Case analyses underscore the necessity of transparency in AI use, particularly in ethically contentious scenarios such as deepfakes and synthesized content.

Concrete recommendations for filmmakers and industry include:

1. Establishing explicit industry standards requiring transparent disclosure of AI-generated content to preserve viewer trust.
2. Implementing clear visual or narrative signals within documentaries when using synthetic media, mitigating ethical risks.
3. Encouraging ongoing dialogue and audience education to foster media literacy concerning AI-enhanced documentaries.

Future research should explore longitudinal audience responses to AI content, developing frameworks for ethical AI integration in documentaries, and investigating effective methods for AI-generated content detection. Such efforts will guide documentary filmmakers in ethically leveraging AI, preserving documentary integrity amidst technological innovation.

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