Research article

Emotional Expression of AI-generated Artistic Design: A Case Analysis Approach

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Abstract

This study investigates the capabilities and constraints of artificial intelligence (AI) in creating art for emotional conveyance and its influence on art's evolution. Anchored in Riegl's concept of "Kunstwollen", a case analysis method is applied to assess *Théâtre D'opéra Spatial*, an AI-generated artwork, in terms of emotional engagement, interactive experience, and inventive design. The findings suggest AI art transcends conventional visual limits but struggles with complex emotions' nuanced portrayal, especially in simulating profound emotional resonance. Nevertheless, a collaborative approach between humans and AI emerges as a promising avenue for AI in emotional artistry. This research underscores AI's role in broadening artistic horizons and spotlights the intricate balance between technological progress and the emulation of emotional cognition. Future work should enhance AI algorithms for more accurate emotion detection and articulation, striving for equilibrium in human-AI interaction. Such advancements in AI art would not only foster creative productivity but also precisely mirror and evoke human emotions, offering empirical support and strategic insights for seamlessly merging technology and art.

Keywords: AI; Artistic Will; Emotional Expression; Art Design; Generative Art

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1. Introduction

The swift progression of artificial intelligence (AI) technology has broadened its impact across various artistic domains, including music, painting, and literature (Agudo et al., 2022). This

evolution is transforming the conventional paradigms of art creation and spurring significant dialogues on innovating emotional expression within artworks. Particularly in art design, where emotional resonance is paramount, the authenticity and depth of emotions serve as vital connectors between the artwork and its audience (Sundar, 2020). Consequently, a pressing question arises: Can AI-created art design pieces replicate and convey deep emotional meanings akin to those crafted by human artists? This study endeavors to methodically examine AI's capacity to express emotional nuances in art design's creative process by analyzing specific instances of AI-generated art. It aims to assess if AI artworks can induce comparable emotional reactions in viewers to those elicited by human-made art and to uncover the mechanisms through which AI manages emotional expression during creation. The ultimate objective is to enhance understanding of these phenomena and to inform the constructive application and sustainable advancement of AI in art.

2. Theoretical Foundation and Literature Review

2.1 Riegl's Theory of "Kunstwollen"

Riegl's theory of "Kunstwollen" offers a distinctive theoretical framework for analyzing emotional expression in AI-generated art designs. According to this theory, the evolution and transformations of art are not solely influenced by the socio-historical context but originate from a collective unconscious force among artists, termed the "artistic will". This force shapes the artwork's form, style, and thematic orientation, reflecting the artist's inherent perceptual framework and emotional impetus (Riegl, 2018).

In the realm of AI-generated art, "Kunstwollen" theory has sparked new perspectives on creation's subjectivity and the creative process. Despite AI's lack of emotional intuition and subjective experiences characteristic of human artists, the art it generates can still encapsulate human designers' aesthetic preferences and emotional nuances through algorithmic logic and programming. The established algorithmic rules and training datasets fundamentally represent human insights into and constructs of artistic form and emotional expression laws. Thus, when AI produces art under these guidelines, it acts as an indirect manifestation of a "programmatic Kunstwollen".

Furthermore, in the utilization of artificial intelligence (AI) for art design, human creators intervene and guide the generation results by adjusting input parameters and optimizing model outputs, which also reflects a new dynamic operation of "Kunstwollen" Even if AI cannot experience emotions, the visual language of its artistic output can still trigger empathetic responses in viewers, just as Riegl emphasized the role of artworks as a medium for emotional expression. The visual elements such as color combinations and structural layouts in AI art design, although not derived from individual emotional experiences, may still create an emotional atmosphere that can touch the human heart through algorithmic logic (Agudo et al., 2022).

In summary, Riegl's concept of "Kunstwollen" offers an insightful theoretical framework for the analysis and appraisal of emotional expression within AI-generated art designs. This theory illuminates the underlying motivations, mechanisms of emotional conveyance, and the

responses of audiences to AI art, offering a fresh perspective. It also deepens our comprehension of the ways in which AI artworks establish their aesthetic value and cultural significance. Through the juxtaposition and synthesis of the traits inherent in human and AI artistry, a more nuanced understanding of the evolving boundaries of art and emotional expression emerges in this era of burgeoning technological engagement with the arts.

2.2 Literature Review

2.2.1 Generation Mechanisms of AI Art Design

The progression of AI in art design is underpinned by the evolution of deep learning algorithms and related technologies. Convolutional Neural Networks (CNNs) are crucial for understanding the complex structural attributes of images, showcasing superior performance in image recognition and processing. Recurrent Neural Networks (RNNs) excel in handling sequential data, thus being exceptionally suited for art elements with temporal dynamics, like dynamic graphics or sequential imagery creation. Generative Adversarial Networks (GANs) are at the forefront of AI art innovation, employing a competitive dynamic between the Generator, which aims to create increasingly realistic artworks to deceive the Discriminator, and the Discriminator, which improves at distinguishing between real and generated artworks. Through intensive training, the Generator enhances the quality of art it produces, resulting in images that closely mimic real-world scenes or adhere to particular artistic styles. Variational Autoencoders (VAEs) are pivotal for generating new images that capture the essence of the input data, making them invaluable for stylized and abstract art designs. Furthermore, Natural Language Processing (NLP) technology is vital in converting text descriptions into visual representations, utilizing deep learning and sophisticated pre-trained models to convert complex verbal instructions into tangible visual outcomes. Additionally, style transfer technology plays a key role, allowing AI to adopt stylistic elements from existing artworks and incorporate them into new works, thereby promoting the fusion and innovation of various artistic styles.

Despite significant advancements in AI-driven art design, its fundamental limitation lies in a possible over-reliance on existing artistic styles, which may undermine genuine originality. Early AI systems tended to mimic specific historical art movements, such as Baroque or Cubism (Wang, 2023), closely. However, modern AI art generation platforms like Midjourney and DALL-E have leveraged advanced algorithms to overcome these limitations, enabling the creation of unique and highly personalized artwork. For instance, Midjourney harnesses large language models and diffusion techniques, allowing users to generate distinct images through concise text prompts, with further customization available via parameter adjustments.

Concurrently, human-machine collaboration has emerged as a crucial direction in AI art creation. The synergistic partnership between human artists and AI systems, which marries AI's automated generative capabilities with human creativity and aesthetic judgment, has led to the production of profoundly innovative and unique artworks. This interdisciplinary melding not only underscores AI's vast potential within the realm of art but also forges new avenues for artistic expression, bridging technology and artistry while significantly broadening the scope and methodologies of future art development.

2.2.2 Emotionality and AI-Generated Art Design

Emotional expression represents a critical facet in art design, with artworks serving as vessels

for the creators' emotional narratives. The capacity of AI-generated artworks to accurately convey emotional intentions is contingent upon the audience's pre-existing knowledge and subjective attitudes towards AI's creative prowess (Hong et al., 2020). Empirical evidence indicates that, regardless of whether the origin of the artwork is discernible, audiences exhibit a preference for human-generated art, deriving more positive emotions from it (Samo & Highhouse, 2023). This implies that despite AI's ability to produce visually compelling pieces, the disparity in the source of creativity might lead to the audience's undervaluation of the emotional significance inherent in AI-generated art. Emotional interaction, characterized by the dynamic exchange of emotions between the audience and the creator facilitated by the artwork, is crucial to art design. Yet, the transition of the creator role to AI alters this dynamic, potentially modifying the emotional exchange. Chamberlain et al. (2018) caution that in assessing AI-created art, audiences may factor in the algorithmic genesis, influencing a diminished perception of the artwork's emotional depth and complexity. Moreover, the symbiotic relationship between emotion and creativity in art cannot be overlooked, as emotion is simultaneously a product and a catalyst of artistic creation. While AI has shown proficiency in emulating human creative processes, its capability to genuinely comprehend and manifest emotional depth remains a subject of debate (Sundar, 2020).

Emotional expression in AI art design is multifaceted, encompassing the audience's experience, creative intent, emotional interactions, and the intrinsic link between emotion and creativity. Contemporary research underscores that the emotional appeal of AI-generated artworks is not solely determined by the artworks' characteristics but is also significantly affected by the audience's anticipations and preconceptions about AI's creative capabilities. These insights are instrumental in fostering a nuanced appreciation of the complexity and diversity of emotional expression in AI art design and in establishing a theoretical groundwork for further investigation in this domain.

3. Case Analysis: *Théâtre D'opéra Spatial* (Space Opera Theater)

3.1 Selection of the Case

This study meticulously selected *Théâtre D'opéra Spatial* (Figure 1) for an in-depth examination as a paradigm of AI-generated art, driven by four pivotal reasons:

(1) High Attention and Controversy: The artwork has garnered significant interest and sparked debate within and beyond the art community, highlighting the cutting-edge advancements of AI in artistry while provoking fundamental inquiries into AI's creativity, copyright ownership, and the nature of art itself.

(2) Recognition of Aesthetic Value: Demonstrating compliance with the aesthetic criteria of both fine arts and illustration, this piece has earned accolades from both professional adjudicators and the public. Its visual sophistication and inventive concept stand on par with traditional art, making it an exemplary subject for investigating AI's potential in emotional and aesthetic expression.

(3) Breakthrough Victory in Art Competitions: Securing the top prize in the "Digital Art/Digital Manipulated Photography" category at the Colorado State Fair, *Théâtre D'opéra Spatial*

challenges established art evaluation norms and underscores the emerging prominence of AI artwork in the modern art landscape, particularly in terms of emotional articulation.

(4) The Role of the Creator and Social Impact: Jason Allen, employing the AI art tool Midjourney, crafted this piece, urging a reassessment of the artist's role, the shifts AI technology introduces to the creative process, authorship, and art commerce. The controversy surrounding its accolade has illuminated societal apprehensions regarding new technology's effect on traditional sectors and unveiled complex perceptions of art's future and AI's role in creative endeavors. *Théâtre D'opéra Spatial* with its multifaceted characteristics and profound influence, serves as an exemplary case for analyzing the emotional and aesthetic valuation of AI-generated artworks, aiming to uncover AI's novel trajectories in artistic creation and foster substantial dialogue on ensuing ethical, legal, and societal ramifications.

Figure.1 Jason M. Allen, *Théâtre D'opéra Spatial*, **2022**

3.2 Overview of the Artwork

The artwork *Théâtre D'opéra Spatial*, translating to "Space Opera Theatre" in English, represents a significant milestone in digital art. Created by Jason M. Allen with the generative AI tool Midjourney, it clinched the first prize, accompanied by a $300 reward, in the Digital Art/Digital Manipulated Photography category at the Colorado State Fair in the United States in 2022. This victory underscored a pivotal moment for AI-generated artworks, showcasing their ability to rival creations by human artists.

The piece, rendered in a high-definition resolution of 3,840 x 5,120 pixels, envisions a fantastical future of space opera theater. Its composition, marked by structured balance, centers around three figures in flowing robes, gazing towards a star-filled sky, imbuing the scene with a profound sense of cosmic poetics. The focal point is a luminous circular stage, encircled by stars, offering a stark visual contrast against the dark backdrop and lending depth to the tableau. The color palette skillfully marries expansive areas of warm hues—yellow and

red—with the cool tones of black, blue, and white, fostering a simultaneously warm, mysterious, and vibrant ambiance. The white attire of the central figures against the red of the attendants accentuates this visual harmony through contrast. Moreover, the piece adopts Impressionist painting techniques, with AI-generated texture and brushwork elevating its artistic allure.

The reception of Allen's award-winning entry sparked intense debates around artistic creativity and evaluative criteria, with some accusing him of undermining the competition's integrity through AI use, while others lauded the innovative integration of technology and art. Crucially, Allen's omission of the AI tool's involvement in his submission sparked a discourse on the fairness and future acceptance of AI-assisted creations in art exhibitions and competitions, highlighting the evolving challenges at the intersection of art and technology.

3.3 Analysis of the AI-generated Creative Process

Allen employs Midjourney, an artificial intelligence (AI)-based drawing tool available on the Discord platform, to generate artistic images via textual commands. This innovative service leverages deep learning technologies, including diffusion models and Transformer architecture, enabling the translation of complex textual prompts into visual art. The efficacy of image generation significantly relies on the user's input, which dictates crucial aspects of the resultant image such as content, style, perspective, color, and emotional tone. To construct effective prompts, the following strategies are essential:

(1) Precision and Detail: Ensuring prompts are detailed and specific enhances the model's ability to accurately interpret the user's intentions. For instance, "a golden mechanical phoenix soaring beneath a starry night sky" precisely outlines the subject, action, setting, and color palette.

(2) Artistic Style and References: Directing the model towards specific art styles or movements, including Impressionist depictions or references to Van Gogh, can yield stylized outcomes, as in "Render the Empire State Building in the Impressionist style."

(3) Technical Specifications and Perspective: Midjourney accommodates various perspectives, enabling users to dictate the viewpoint ("front", "left", "rear") and aspects such as image ratio or subject posture ("a robot standing upright within a 16:9 frame").

(4) Emphasis and Keyword Weighting: By prioritizing certain elements through weighting or keyword arrangement, users influence the image's realism or abstract quality, adjusting for a "realistic" or "dreamy" effect.

(5) Reproducibility and Optimization: Utilizing parameters like "-seed" allows for consistent reproducibility, enabling iterative refinement of the image based on initial outcomes and subsequent prompt adjustments to achieve the desired aesthetic.

Ultimately, Midjourney's prompt-handling process resembles a decoding mechanism, translating textual sequences into a latent visual space and iteratively refining images via reverse diffusion. This sophistication relies not only on the model's training quality but also on the richness and accuracy of user-provided context. Allen, like many creators, meticulously polishes the images produced by Midjourney to realize his artistic vision.

3.4 Analysis of Emotional Expression

3.4.1 Analysis of Sentiment and Emotion in Prompt Words

Table. 1 Prompt word analysis

	Vocabulary or Phrases	Functions
Figure.1	Cinematic、dramatic、magical portal	Hints at emotive storytelling; expresses nostalgia, thoughtfulness, contrasts past/present, sparks audience connections, and fosters feelings of marvel, awe, and romantic time transcendence. Builds a mysterious, reverent, anticipatory mood.
Figure.3	Grandeur、splendor、beautiful royal dresses、flowing robes billow as they move	Suggests awe from the space station's grandeur, inspiring grandeur, sophistication, passion for tech and cosmos, and romantic futurism; conveys a complex emotion merging solitude and beauty; triggers thoughts of freedom, ethereality, and dreaminess in viewers.
Figure.4	Epic、fantasy、wondrous mystery、gracefully、Realistic photography, cinematic、beautiful、different historical eras、swirling galaxies、celestial light	Guides viewers into grand, novel, romantic, and adventurous realms; suggests wonder, curiosity, and the quest for the unknown; awakens admiration, calm, or awe; crafts an evocative atmosphere blending grandiosity, nostalgia, and existential reflection.

The preceding discussion elucidates that the generation of images by AI hinges on the input of prompt words. Considering Allen's consistent refusal to reveal the prompt words he utilizes, this study endeavors to employ the "/describe" command within Midjourney for the reverse-engineering of the prompt words associated with three artworks, aiming to scrutinize the lexicon pertinent to sentiment and emotion. The findings suggest that in Allen's oeuvre, the conveyance of emotional expression is predominantly facilitated through the nuances of semantic suggestion and guidance, as opposed to direct articulation (refer to Table 1).

3.4.2 Emotional Communication

In the development of *Théâtre D'opéra Spatial*, Jason M. Allen exemplified profound engagement and emotional conveyance through intricate and careful manipulations of the AI tool Midjourney, distinguishing his method from mere automated processes. He devoted considerable time and effort to experimenting with various text prompts and refining inputs, ultimately selecting images that aligned with his emotional and aesthetic vision. This rigorous process not only showcases his unique artistic vision and dedication but also resonates with the concept of Kunstwollen, as articulated by art historian Riegl, which signifies the artist's inherent drive and sustained endeavor.

Figure.2 Compare the image before and after modification.

Notably, Allen enhanced the artwork's expressiveness by printing it on canvas, merging the tactile essence of traditional painting with contemporary AI technology, thus bestowing the piece with a distinctive allure in both visual and tactile dimensions. As a game designer lacking a formal art education, Allen charted a novel path to articulate his innermost sentiments through AI tools like Midjourney. His initial creative impulse, merging a Victorian-era female figure with a space helmet, serves as a symbolic representation of his emotions and imagination, bridging the past and future, reality and fantasy (Drew Harwell, 2022). *Théâtre D'opéra Spatial* transcends the bounds of AI's automatic outputs, embodying the essence of Allen's creativity and emotion, facilitated by advanced tools. The piece's success and ensuing debate underscore the evolving partnership between artists and technology in the AI epoch, simultaneously prompting discussions on the limits of artistic creation and authenticity.

3.4.3 Emotional Experience and Interaction

Upon Jason M. Allen's announcement of his award victory on social media, the ensuing online buzz and commentary proliferated rapidly. A tweet detailing Allen's competition triumph amassed over 86,000 likes and approximately 3,200 comments, reflecting widespread engagement. Commentators praised the work for its immersive qualities, likening it to being in a fictional future space opera theater, with its dreamlike color palette and enthralling shifts in lines and geometric shapes contributing to a surreal visual experience. Others compared it to scenes from science fiction films, noting its mysterious aura and dynamic composition, which engenders a sense of presence. Juror McKinley lauded Allen's piece for its resemblance to the creative ethos of the Renaissance, highlighting its artistic merit and innovation. Despite Allen's transparency about utilizing AI, the jury recognized the value and significance of his contribution, affirming the award as deserved. In contrast, contestant Jessica Hair, who practices traditional manual digital painting, offered an alternate perspective on AI in art, without disputing the validity of Allen's accolade. She acknowledged that both AI and manual creation demand time, effort, and subjective discernment, as exemplified by Allen's project. （Odell. Isaac, 2023）

Additionally, the piece inspired AI art aficionados to emulate its visual style using similar techniques, thereby testing both AI's technical prowess and its aptitude for artistic interpretation. This effort not only served to validate the technology but also allowed for a personalized reimagining of the work's thematic and emotional depth. The discourse

generated by Allen's achievement has significantly contributed to societal contemplation on AI's role in art, fostering a broader dialogue among creators regarding the practices of artistry and the limits of technological intervention.

3.4.4 Emotion and Creativity

In the development of *Théâtre D'opéra Spatial* Allen showcased the potential for human-machine collaborative artistic innovation through AI tools. Dedication to the project was evident as he devoted more than 80 hours to experimentation and revision, undergoing over 900 iterations. This process emphasized his deep engagement and meticulous approach to leveraging AI in artistic creation. Through the strategic use of evocative keywords such as "magnificent" and "luxurious", Allen subtly directed the AI software Midjourney to achieve the desired emotional resonance and visual aesthetics. While Allen may not possess formal artistic training, his exploration with Midjourney unlocked novel avenues for emotional expression, satisfying his creative demands and fuelling his artistic fervor. During the exploration phase, Allen experimented with various artistic styles, drawing inspiration from Leonardo Da Vinci's timeless aesthetic and Alex Grey's contemporary psychedelic art. His aim was to seamlessly blend classical and modern elements within his creations.

Operationally, Allen employed a multifaceted approach to creation, incorporating various technologies. He refined his prompts to Midjourney, steering the AI towards images that aligned closely with his vision, and performed further enhancements in Photoshop. This included correcting imperfections, adjusting compositions, and personalizing elements such as facial features. Additionally, Allen utilized machine learning tools like Gigapixel AI to improve image resolution. The culmination of his efforts was the printing of three chosen artworks on canvas (Figures 3 and 4).

Figure.3 Jason M. Allen, Space opera 1，2022

Figure.4 Jason M. Allen, Space opera 2，2022

Through a meticulously orchestrated and refined series of processes, Allen transformed selected digital images into tangible artworks. This endeavor vividly illustrated his capability to imbue the works with his unique emotions, perceptions, and creativity, leveraging artificial intelligence. Consequently, he established a deeply personal creative practice that harmoniously melds technology and art.

4. Discussion

4.1 Characteristics of Emotional Expression in AI-Generated Art Design

AI-generated art design has exhibited notable strengths and advantages in emotional expression. Specifically, Allen's work on *Théâtre D'opéra Spatial* exemplifies how AI tools such as Midjourney can interpret user instructions and emotional inclinations, skillfully simulating and recreating specific emotional tones and visual ambiances via keyword inputs. This capability enables even those without professional artistic backgrounds to produce works that carry significant personal emotional resonance, thus pushing the frontiers of artistic exploration. AI's rapid iterative functionality further allows artists to swiftly experiment with and refine the intensity and orientation of emotional expression to achieve the desired artistic outcomes. Through ongoing feedback and adjustments, artists can precisely manage the work's emotional ambiance, endowing it with distinctive emotional depth and complex thematic nuances, such as blending classical with modern, and reality with fantasy.

Moreover, AI-generated art design facilitates the amalgamation of diverse artistic styles and techniques, incorporating attributes from various artists or even amalgamating cross-era artistic elements into a singular creation. This results in a unique emotional and experiential realm. For instance, during the early phases of his project, Allen endeavored to emulate the

artistic styles of Leonardo Da Vinci and Alex Grey, thereby enriching the emotional depth and dimensional complexity of his work.

4.2 Limitations of Emotional Expression in AI-Generated Art Design

Despite the remarkable potential of AI-generated art design for emotional expression, its inherent limitations cannot be ignored. Current AI algorithms lack the capacity to fully grasp or spontaneously produce the intricate and profound emotional experiences characteristic of humans. While AI can replicate established modes of emotional expression by analyzing extensive datasets, it falls short in terms of originality and the depth of emotional engagement, unable to generate the unique and deep emotional expressions that human artists derive from personal life experiences and introspection. Moreover, AI-generated art is often constrained by the limitations and biases inherent in its pre-programmed models and training datasets, restricting its ability to achieve truly creative breakthroughs and individualized emotional expressions.

In a specific instance, when Allen sought copyright for his AI-created *Théâtre D'opéra Spatial* he faced legal hurdles. In 2023, the U.S. Copyright Office determined that the artwork did not qualify for copyright protection because of its non-human origins, underscoring the distinctive challenges faced by AI art within the existing legal paradigms.

4.3 The future development of AI-generated art design.

The future of AI in art design is fundamentally anchored in two pivotal elements. From an algorithmic perspective, fostering emotionally resonant art necessitates the ongoing refinement and expansion of training datasets. These datasets must not only encompass a broad and profound spectrum of human emotions and expressions but also be intricately aligned with visual element collections that mirror these emotional lexicons. Furthermore, from the standpoint of a designer's expertise, the nuanced application and accurate transmission of emotional language gain increased significance. In the AI-generated art era, this paradigm shift demands that artists and designers not merely acquire traditional design competencies but also develop exceptional emotional intuition and innovative capacities. This evolution introduces novel challenges and expectations for their personal development and professional standards.

In summary, while AI-generated art design exhibits significant potential for emotional expression, it also reveals clear limitations in fully supplanting human emotional creativity. As technology evolves, future advancements in AI may lead to more significant achievements in capturing and expressing human emotions. However, at this juncture, a collaborative approach between humans and machines is optimal, leveraging AI's strengths while valuing the irreplaceable contribution of human emotional insight.

5. Conclusion

This study aims to investigate both the potential and constraints of AI-generated art in emotional expression, alongside the significant influence of this nascent art form on future art development. Through a case analysis methodology, this research delves into the celebrated piece *Théâtre D'opéra Spatial* to examine AI art's distinctive contributions in transmitting

emotional content, shaping viewer emotional experiences, and pioneering design innovations. Findings suggest that *Théâtre D'opéra Spatial* exemplifies the ability of AI-generated art to transcend traditional artistic boundaries, potentially exceeding them in visual aesthetics. However, AI encounters notable hurdles in capturing and replicating the depth and complexity of human emotions, especially in evoking profound emotional connections and personal interpretations. The partnership between human and machine in co-creation emerges as a promising avenue for AI in art to advance emotional expression. AI-generated art is undeniably forging a new artistic domain, substantially enhancing art's diversity and creative capacity while underscoring technological challenges in emulating the intricate mechanisms of human emotional understanding.

However, this does not imply an irreconcilable contradiction between AI and emotional artistic expression. On the contrary, there is a vast space for cooperation and complementarity between the two. Looking to the future, ongoing research should focus on optimizing the AI algorithm system to enhance its accurate recognition and nuanced expression of emotional characteristics. At the same time, it is necessary to deeply explore how to properly integrate AI technology and human emotional communication in human-machine interaction scenarios, so that AI-generated art design can not only maintain its efficiency and innovative qualities, but also truly and profoundly reflect and activate the emotional world deep within the human heart.

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Figure 2
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