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The use of generative graphics in graphic design: Aesthetics and ethics

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ABSTRACT

Generative artificial intelligence (Gen AI) is reshaping graphic design, offering unprecedented creative possibilities while raising critical ethical and legal concerns. This study explores the role of generative graphics in modern design, analyzing their aesthetic potential and ethical implications. Through a comparative analysis of case studies, industry reports, and experimental applications, the research examines how AI-driven design enhances efficiency and accessibility but also challenges traditional notions of authorship, originality, and intellectual property. Findings highlight the need for ethical AI development, legal frameworks, and structured collaboration models. Specifically, three key areas require attention: (1) ensuring transparency and bias mitigation in AI-generated content, (2) establishing legal protections for artists to clarify ownership of AI-generated works, and (3) developing human-AI collaboration models that position AI as an assistive tool rather than a replacement. By addressing these challenges, the industry can foster a balanced integration of AI in design, ensuring that technological advancements support rather than undermine human creativity. The study contributes to ongoing discussions on AI ethics in design, providing insights for researchers, policymakers, and creative professionals navigating this evolving landscape.

Keywords: Generative graphics, aesthetics, ethics, gen AI, artificial intelligence, graphic design, automation.

1. Introduction

Graphic design has undergone a significant transformation over the past century, evolving from traditional print techniques to a fully digital medium. In 1922, William Addison Dwiggins introduced the term "graphic design" to define the role of visual structuring in communication (Meggs & Purvis, 2006). Over the decades, technological advancements have expanded the field, incorporating photography, illustration, and later digital tools. By the early 21st century, software such as Adobe Photoshop and Illustrator had become industry standards, allowing designers greater control over their creative process.

A major breakthrough in graphic design emerged with the introduction of generative artificial intelligence (gen AI). In 2024, 65% of organizations reported using gen AI in some capacity (McKinsey &

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Company, 2024). Generative graphics enable designers to produce highly detailed, complex, and unique visual objects with unprecedented speed and scalability (Pakhtaeva & Rodionova, 2021; Dehman, 2023). One of the key features of generative AI is its ability to create graphics autonomously or semi-autonomously based on parameters and conditions specified by the author (Tempel, 2017; Cetinic & She, 2021; Pakhtaeva & Rodionova, 2021; Koshman & Gil, 2022).

Despite the advantages of automation and efficiency, the rapid integration of AI into creative fields raises important aesthetic and ethical questions that remain insufficiently explored. This study aims to examine the role of generative graphics in modern graphic design by analyzing both their aesthetic potential and ethical implications. Key questions include: How does generative AI influence the visual language of contemporary design? What ethical dilemmas arise concerning authorship, bias, and copyright? Addressing these issues is essential for understanding the evolving relationship between human creativity and artificial intelligence.

2. The use of generative graphics in modern graphic design: The aesthetic component

In 1922, book designer William Addison Dwiggins introduced the term "graphic design." This term emerged to describe the role of a person who brings structural order and visual form to printed communications (Meggs & Purvis, 2006). Of course, the modern interpretation of graphic design goes far beyond printed communications, but it still relies on typography, photography, illustration, animation, and other components that allow the construction of messages that "attract attention, cause us to think about their meaning, and stay in our memories over time" (AIGA, 2024). These elements shape the aesthetic and semantic characteristics of visual expression.

Nearly 100 years later, in 2023, the world came to widely recognize the possibilities of generative artificial intelligence (McKinsey & Company, 2024). This technology has provided graphic designers with new revolutionary opportunities (MIT Technology Review Insights, 2023). Below, we explore some of the most popular ones.

Automatic color palette generation. Modern tools like Colormind and Khroma leverage generative algorithms to create color palettes based on user preferences. For example, Colormind, a color scheme generator powered by deep learning, can analyze color styles from photographs, movies, and popular works of art to generate harmonious palettes (Colormind, 2024). Another tool, Khroma, uses AI to analyze users' color preferences and generates an endless number of palettes that can be explored, searched, and saved (Khroma, 2024).

Generative AI in graphics and illustrations. Programs like Midjourney, DALL·E 3, and Runway ML utilize artificial intelligence to expand the possibilities of visual creativity. Midjourney and DALL·E 3, as prominent examples of the AI boom, enable the creation of impressive graphic objects based on textual prompts. Users can generate images from simple or complex queries and make adjustments to existing works while retaining usage rights. Another program, Runway ML, offers powerful tools for processing images and videos, making it a versatile solution for designers, artists, and video editors. These platforms showcase how AI transforms the process of creating visual content, providing users with intuitive and efficient ways to bring their ideas to life.

Generative AI in animation and 3D graphics. In animation and 3D design, generative technologies simplify and accelerate the creation of motion graphics and three-dimensional objects. For instance, tools like Runway ML and DeepMotion enable the creation of animations, editing character movements, and adding effects without the need to manually refine each frame, significantly saving time. DreamFusion, on the other hand, can generate 3D models based on textual prompts, opening new possibilities for building more complex virtual worlds in games and applications.

Thus, generative AI is significantly transforming the process of content creation in creative industries, spanning from graphic design to animation and 3D. These technologies allow designers to focus on the conceptual aspects of their work, reducing the time and effort required for technical tasks such as selecting color schemes, generating textures, or creating animations.

We will now explore several examples of generative AI applications in graphic design. This approach bridges the discussion of the ethical and aesthetic aspects of generative graphics from a highly abstract theoretical field to contemporary graphic design practices.

In the article "*10 AI Design Examples That Prove the Power of AI-Enhanced Creative*," the creative team at Superside highlights the case of Independence Pet Group (IPG), one of the leading providers of pet insurance in North America. Superside created a set of branded illustrations, stickers, and virtual

Figure 1. Example of generative graphics usage by Superside.

backgrounds for the company, completing the task 90% faster than would have been possible without the use of generative AI (Martin, 2024).

A notable project in the field of generative graphics was developed by the prominent Russian creative agency Art. Lebedev Studio. In 2020, the studio introduced artificial design intelligence, a system comprising several tools capable of fully replacing humans in creating brand identities (Art. Lebedev Studio, 2024). By 2025, the system had produced over three million logos. Its creators emphasize that the neural network can deliver comprehensive design solutions tailored to client preferences. The system analyzes company information, develops a conceptual core, generates visuals, selects color schemes, resolves compositional challenges, and creates patterns and 3D models, completing the entire process from concept to finished branding.

Interestingly, the neural network operated for a year before its official announcement under the fictional name Nikolay Ironov as an employee of the studio. This "disguise" as a real studio staff member

Figure 2. Example of generative graphics usage by Art. Lebedev Studio. Exhibition of works by the neural network "Nikolay Ironov" in Moscow.

allowed the team to "avoid leaks and obtain objective feedback unaffected by biases toward generative design" (Art. Lebedev Studio, 2024).

AI has made it easier to generate patterns and textures by automatically creating unique designs based on a given concept or style, streamlining the work with graphic elements. A striking example of

this was the 2022 outdoor exhibition "Unmarry Me!", organized by the Nizhny Novgorod Women Crisis Center (NWCC) to raise awareness about domestic violence. For this project, patterns were generated from statements of the exhibition's heroines—women who had survived domestic abuse (SotaPlus,

Figure 3. Example of generative graphics used in the "Unmarry Me!" exhibition, organized by the Nizhny Novgorod Women Crisis Center in collaboration with the SOTA+ startup.

2024). Using a specialized algorithm developed by SOTA+, over 100 variations of pixelated patterns were created, forming the foundation of the exhibition's visual identity.

The use of generative graphics in visual art is actively promoted by cultural and educational institutions, such as the Dubai Future Foundation. In 2023, the Dubai Assembly for Generative AI showcased advancements in generative graphics at the ART x GenAI Exhibition (Dubai Future Foundation, 2024). Participants not only explored the progress in this field but also engaged in collaborative creation with AI, such as designing their portraits using AI tools or expressing their inner artist at an interactive station called Create Your AI-Generated Artwork.

These examples illustrate how AI significantly influences the creation and optimization of various aspects of design, acting as an assistant or a creative "copilot" (MIT Technology Review Insights, 2023). AI-based generative graphics provide tools for enhancing designer productivity, creating highly unique and personalized works, and democratizing design by making these tools accessible to a broader audience, including non-professionals.

However, despite the widespread adoption of generative graphics across various design and art domains, it is premature to assume that generative graphics will fully replace human-created art shortly. A study on the psychological perception of AI-generated art involved an experiment where participants rated artworks based on criteria such as "Liking," "Beauty," "Profundity," and "Worth" (Bellaiche et al., 2023). The researchers randomly labeled the pieces as either "human-created" or "AI-created," even though all the artworks were generated by AI. The results revealed a strong preference for works labeled as human-made over those labeled as AI-made. Further analysis suggested that this tendency stems from a bias against AI, as participants assumed that human involvement in the creative process positively influences the evaluation of artistic works.

Authors of another study reached similar conclusions, highlighting the differences in the perception of human-created and AI-generated works. In their experiment involving 288 participants, Hong and Curran found that human-created artworks were rated significantly higher on criteria such as "composition," "degree of expression," and "aesthetic value" (Cetinic & She, 2021). This supports the tendency for human creativity to be perceived as more valuable and meaningful.

Another study, drawing on ideas from philosopher John Dewey and other thinkers, emphasizes that art is a uniquely human endeavor, deeply tied to human culture and experience (Jiang et al., 2023). An artist's distinctive style emerges from personal experiences, emotions, and interactions with diverse cultural environments. In contrast, image generators, while capable of reproducing the styles of other artists, cannot develop their styles, as they lack the experience and cultural heritage necessary for authentic artistic expression. This underscores a significant distinction in the creative process: human art reflects individual emotional expression, while AI-generated art often mechanically reproduces or imitates such expressions.

In conclusion, generative graphics hold immense potential for transforming creative processes, offering designers and artists new tools for visual creation, including automated color palette generation, unique texture creation, 3D modeling, animation, and visual effects. Despite their functionality and growing adoption, users often exhibit biases against AI-generated works. Research shows that human-created art is perceived as deeper, more meaningful, and aesthetically superior. Audience expectations still align with the notion of the "human touch" in art, where each piece reflects the unique experiences and personal path of its creator.

3. Ethical aspects of generative design

3.1 Authorship of the final product

One of the key ethical issues in generative design is the question of authorship. In traditional graphic design, the final product is seen as the result of human creative activity. However, in the case of generative design, the object is created collaboratively by a human and AI, where the designer often acts as the author of the concept, while AI serves as the technical executor. This raises debates about who should be considered the end author of the work (Cetinic & She, 2021). It can be argued that the designer, interacting with the algorithm, takes on the role of curator, managing the process and the final result.

Zarya of the dawn and the copyright status of AI-generated art

The case of Zarya of the Dawn (Kashtanova v. U.S. Copyright Office, 2023) represents a landmark moment in defining the copyrightability of AI-generated works. The dispute arose when Kristina Kashtanova, the author of the graphic novel, initially received a U.S. copyright registration without disclosing that she had used Midjourney, an AI-powered image generator. Upon discovering her public statements about AI involvement, the U.S. Copyright Office (USCO) launched a review, questioning whether AI-generated images could be copyrighted. Kashtanova argued that her creative input—including writing, editing, and arranging AI-generated images—should qualify the work for copyright protection.

In February 2023, the USCO ruled that while the text and the compilation of elements were copyrightable, the individual AI-generated images were not. The decision reinforced the long-standing requirement of human authorship in copyright law, clarifying that images solely created by AI, without significant human intervention, lack the originality needed for protection. This case set a crucial legal precedent, indicating that AI-assisted works may be protected only if a human creator exercises substantial control beyond simply providing prompts.

The ruling has far-reaching implications for the creative industries, particularly for artists, designers, and publishers leveraging AI tools. It establishes a framework where AI can be used as an assistive technology, but the degree of human input remains a decisive factor in determining copyright eligibility. As AI-generated content becomes more prevalent in visual arts, literature, and entertainment, this case highlights the need for clearer legal definitions and policies regarding intellectual property rights in the age of generative AI.

3.2 Copyright issues

The use of copyrighted materials for training generative algorithms also poses significant ethical and legal challenges. AI models are often trained on massive datasets containing images, texts, music, and other forms of content, many of which may be copyrighted. In most cases, these training datasets are compiled automatically and include materials from the internet, often without the consent of the original authors. Consequently, algorithms may unintentionally reproduce existing works of art or their

elements, leading to accusations of plagiarism and copyright infringement (MIT Technology Review Insights, 2023; Jiang et al., 2023).

The 2023 Lawsuit Against Stability AI, Midjourney, and DeviantArt

In 2023, a group of artists filed a lawsuit against Stability AI, Midjourney, DeviantArt, and Runway AI, accusing them of copyright infringement and unauthorized use of artworks for training generative AI models. The plaintiffs claimed that their works were included in large-scale datasets without consent, allowing AI tools to generate images that closely resembled their artistic styles. A particularly controversial aspect was Midjourney's "Style List", which featured 4,700 artists' names, allegedly misleading users into believing these artists endorsed the technology. The lawsuit also challenged the broader legality of AI training on copyrighted materials without explicit licensing.

The court's ruling was a partial victory for the artists, allowing claims of direct and induced copyright infringement to proceed against Stability AI, while also accepting allegations of trademark infringement against Midjourney. However, the judge dismissed some claims, including those related to the Digital Millennium Copyright Act (DMCA) and DeviantArt's terms of service violations. This case is significant because it addresses fundamental legal questions about AI and copyright, such as whether AI-generated content trained on copyrighted works constitutes derivative works and whether AI model developers should be held accountable for dataset sourcing.

The outcome of this lawsuit could set a legal precedent for the AI and creative industries, shaping future regulations on data usage, fair use interpretations, and compensation for artists whose works contribute to AI training. If the court rules in favor of the artists, AI companies may be required to obtain explicit licenses before using copyrighted content, fundamentally changing the way AI models are developed and trained. Conversely, a ruling favoring AI companies could solidify fair use as a defense and accelerate AI's integration into creative fields. This case highlights the growing tension between technological innovation and intellectual property rights, making it one of the most closely watched legal battles in the AI era (Robertson, 2024).

3.3 Algorithmic biases

AI systems are trained on vast datasets that may inadvertently reflect cultural, racial, or gender biases. One of the primary concerns is that AI algorithms are trained on historical data, which often contains deeply embedded biases. As a result, these algorithms replicate and even amplify existing discrimination (Ferrer et al., 2020).

Jiang et al. (2023) examine how biases embedded in generative design tools can lead to distorted representations and reinforce harmful stereotypes. In their study, the researchers highlight examples of these issues, citing Senegalese artist Linda Dounia Rebeiz, who observed that DALL·E 2 produced highly misleading images of her hometown, Dakar, depicting it as a barren desert with ruins rather than a thriving coastal city. Likewise, US-based artist Stephanie Dinkins describes encountering major inaccuracies when using image generators to create depictions of Black women.

The McDuff, D. et al. (2019) study presents an intriguing overview of systematic biases in facial classification systems, with the error rate for gender classification being up to seven times higher for women than for men and significantly worse for individuals with darker skin tones. Another issue concerns face recognition systems, which misidentify people with darker skin tones, women, and younger individuals at higher error rates.

Thus, models trained on real-world data often inherit biases present in the training datasets. This can reinforce existing systemic human prejudices and ultimately result in unfair treatment of individuals, particularly those from minority groups. To mitigate algorithmic bias, researchers propose conducting regular audits of training datasets and integrating tools for identifying and addressing biases.

3.4 The unpredictability of generative systems

Generative systems often function as a "black box", meaning users have limited control over the internal decision-making process (Koshman & Gil, 2022; Ferrer et al., 2020). This lack of transparency presents challenges in ensuring the accuracy and predictability of results. Because generative art relies on algorithmic processes, randomness is often an inherent feature rather than a flaw. While this randomness can produce unexpected and captivating results, making each work unique, it also

introduces a level of unpredictability in both the creative process and the outcome (Peeters, 2016; Tempel, 2017). This characteristic forces designers and artists to work iteratively, refining inputs and guiding the system toward desirable results rather than directly controlling each step.

3.5 Job losses

Another consequence of the widespread adoption of generative AI, according to some authors, is the devaluation of manual labor due to the automation of routine design processes and the ability to generate numerous variations of images through algorithms (Jiang et al., 2023; Li et al., 2024). This issue leads to another, related problem: the potential displacement of professional designers and artists, positioning AI not as a "copilot" but as a competitor to humans in the creative industry (Dehman, 2023; Jiang et al., 2023).

To mitigate the negative ethical consequences of using generative AI, several measures can be undertaken to protect authors' rights, enhance process transparency, and minimize the risks of unethical use of intellectual labor.

Legal and ethical frameworks for AI accountability

Legal mechanisms play a crucial role in ensuring accountability in the use of AI. Several measures are already in place to protect authors' rights. For example, the European Union has developed the EU AI Act, which classifies AI systems by risk levels and introduces strict requirements for transparency and licensing of generative models (European Union, 2024). Since 2016, the General Data Protection Regulation (GDPR) has protected users' data in the EU, which is particularly important when training AI models on user data. In the United States, the Digital Millennium Copyright Act (DMCA) protects the works of authors, musicians, artists, and other creators in the digital space, preventing unauthorized copying, distribution, and use of their content. However, as the DMCA was enacted in 1998, it does not explicitly address AI-related issues, leaving gaps in regulating challenges associated with generative art.

Another potential solution could be the development of platforms that allow artists to control the use of their works for AI training and receive compensation. From a technical perspective, it is suggested to design algorithms that avoid reproducing artists' works or styles without consent, reducing the risk of losing cultural and artistic identity.

The Creative Commons (CC) international nonprofit organization supports people and organizations in sharing their creative works and knowledge freely and legally. CC has developed special licenses that allow authors to specify how their works can be used—for example, whether they can be copied, modified, used for commercial purposes, or only for personal use (Creative Commons, 2024). With CC licenses, authors can share their content (music, photographs, texts, research, etc.) while retaining authorship rights. This approach simplifies the exchange of ideas, improves access to knowledge, and fosters collaboration worldwide, especially in educational, scientific, and cultural projects where open access benefits many.

Another tool for protecting authors' rights is Content Credentials by Adobe. Content Credentials add additional information to content during export or download, stored in a secure metadata block that accompanies the content throughout its distribution (Adobe, 2024). This information helps authors gain more recognition for their work, connect with others online, and enhance transparency for their audience.

The rise of generative design has introduced transformative possibilities in creative industries, but it also raises significant ethical concerns. Key issues include authorship ambiguity, copyright challenges, algorithmic bias, and the potential displacement of human designers. AI-generated content often lacks cultural depth and originality, as it is based on pre-existing data rather than personal experience or human creativity. The ethical debate surrounding AI in design highlights the need for transparent legal frameworks, licensing mechanisms for AI training datasets, and improved algorithmic oversight to mitigate bias and ensure fairness.

To ensure ethical AI integration, it is essential to position generative design as a collaborative tool rather than a replacement for human creativity. Developing platforms for authors' rights protection, enhancing content attribution technologies, and promoting ethical AI training practices will be crucial in preserving artistic integrity. The future of generative design will depend on balancing innovation with ethical

responsibility, ensuring that technological advancements enhance rather than undermine the value of human artistic expression.

4. Conclusion

Generative design has emerged as a transformative force in the creative industry, offering new possibilities while raising critical ethical and legal challenges. Issues such as authorship ambiguity, intellectual property concerns, algorithmic bias, and the potential displacement of human designers highlight the urgent need for a balanced approach to AI integration in design. As generative tools become more sophisticated, it is essential to position AI as a complement to human creativity rather than a replacement, ensuring that technological advancements enhance rather than diminish artistic expression.

Moving forward, three key areas require further exploration and development:

• Ethical AI development: future research should focus on ensuring transparency in AI-generated content, minimizing algorithmic biases, and upholding authorship rights. AI tools must be trained on ethically sourced data, with clear attribution mechanisms that acknowledge the role of human creators.

• Legal frameworks for AI-generated art: policymakers and industry leaders must work towards establishing clear legal standards that define ownership of AI-generated works, ensuring that original artists retain control over how their creative outputs are used in training datasets and generative models.

• Human-AI collaboration models: AI should be framed as a creative assistant rather than a replacement, with research focusing on hybrid workflows where designers leverage AI for efficiency while retaining artistic intent and decision-making power. This approach would maximize AI's potential while preserving the uniqueness of human creativity.

By addressing these challenges through a combination of ethical development, legal protection, and human-AI synergy, the future of generative design can be both innovative and responsible, ensuring that it serves as a tool for artistic empowerment rather than a disruptive force.

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