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How Generative Artificial Intelligence Supports Human Application in Brand Visual Identity Design

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Abstract

Generative Artificial Intelligence (Generative AI, GenAI), as a powerful set of technologies capable of generating new information across multiple modalities including text, images, audio, and video, is permeating and reshaping various creative industries at an unprecedented pace. In the field of brand design, GenAI has attracted significant attention due to its immense potential to accelerate creative iteration and expand the design space. However, empirical research on the specific division of roles, collaboration patterns, and the impact on design outcomes between human designers and GenAI in the Brand Visual Identity (BVI) design process remains relatively scarce, leaving a notable research gap for understanding human–AI collaboration mechanisms and optimizing future design support systems.

To address this gap, this study aims to systematically examine the specific contributions of different GenAI technologies—text-generative (e.g., ChatGPT) and image-generative (e.g., Midjourney)—in supporting humans throughout the BVI design process through a rigorously controlled experiment. Twenty junior designers with comparable design backgrounds were recruited as participants and randomly assigned to four experimental conditions, with or without GenAI assistance: the ChatGPT group, the Midjourney group, the hybrid group, and the human-only group. Participants completed two representative brand design tasks.

The results reveal that GenAI provides significant support to human designers primarily during the Brand Core Value Definition and Visual Element Generation stages, greatly enhancing efficiency and creative diversity in these phases. However, stages requiring high contextual understanding and aesthetic judgment, such as Consistency Evaluation and final solution decision-making, remain predominantly

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human–led. Notably, with GenAI assistance, the selection and evaluation of design solutions are further strengthened and optimized, resulting in higher design quality and improved brand consistency.

Based on these empirical findings, this study discusses the role positioning, complementary advantages, and potential challenges of GenAI in human–AI collaboration for brand design. It further provides practical recommendations and theoretical insights for leveraging GenAI to construct more efficient and intelligent brand visual design support systems in the future.

Keywords: Generative Artificial Intelligence; Brand Visual Identity; Human–AI Collaboration; Design Process; Creative Generation; Empirical Study

1. Introduction

1.1. Research Background and the Importance of Brand Visual Identity

In an increasingly competitive market, brands have become a critical component of a firm's core competitiveness. Brand Visual Identity (BVI) serves as a bridge between a brand and its consumers, systematically translating a brand's core values, personality, culture, and promises into tangible visual symbols such as logos, color systems, typography, auxiliary graphics, and layout guidelines [1]. A successful and distinctive BVI design not only helps a brand stand out among competitors and establish a unique market presence but also effectively conveys brand messages, enhancing consumers' brand awareness, loyalty, and emotional connection [2]. For instance, Apple's minimalist logo and Coca–Cola's iconic red typography have become visual carriers of their brand value, profoundly influencing consumer purchase decisions and brand experiences. Therefore, BVI design occupies a pivotal role in brand development, and its quality directly impacts a brand's market performance and long–term growth.

However, BVI design is far from straightforward. It is a highly complex and challenging creative process, requiring designers to possess not only solid aesthetic literacy and visual communication skills but also the ability to accurately perceive market trends, understand the psychological needs of target audiences, and concretize abstract brand concepts into innovative and executable visual solutions [3]. For novice designers, distilling core brand values from vast amounts of information, balancing creativity with business objectives, and producing high–quality visual solutions within limited time frames often imposes a substantial cognitive load and challenge. As a result, the BVI design process is frequently time–consuming and

demanding, placing high requirements on the comprehensive capabilities of designers.

1.2. The Rise of Generative Artificial Intelligence and Research Questions

In recent years, generative artificial intelligence (GenAI) technologies based on deep learning have achieved breakthrough advancements. Large Language Models (LLMs) such as OpenAI's ChatGPT and image generation models such as Midjourney and Stable Diffusion demonstrate remarkable capabilities in text comprehension, content generation, and image synthesis [4][5]. The emergence of these tools has the potential to revolutionize the creative design field, sparking extensive discussions in both academia and industry regarding the role of AI in the design process. In particular, in the context of BVI design—a domain that demands high levels of creativity and professional expertise—GenAI has the potential to significantly enhance design efficiency and quality by automating repetitive tasks, providing creative inspiration, and accelerating iterative processes [6].

Although the capabilities of GenAI in image generation and text creation have been widely validated, its specific application mechanisms, support effectiveness, and impact on human–AI collaboration in the highly interdisciplinary and complex domain of BVI design remain underexplored. Specifically, the following core questions have yet to be empirically addressed:

- At which stages of the BVI design process can GenAI provide the most effective support?
- How do different types of GenAI tools (text–generative vs. image–generative) perform in the BVI design process?
- How does the introduction of GenAI affect human designers' creative processes, decision–making patterns, and the quality of final design outputs?
- What new paradigms of human–AI collaboration emerge in BVI design under GenAI assistance?

1.3. Current Research Status and Existing Gaps

Currently, brand design support tools primarily focus on providing asset libraries, color matching suggestions, font selectors, or simple template–based logo generators [7]. While these tools can simplify certain aspects of the design process, they often lack a deep understanding of specific brand contexts and are unable to produce holistic BVI solutions with strategic depth and cultural significance. When using these tools, designers still need to perform extensive cognitive translation and reasoning between generic assets and specific brand strategies, which limits their effectiveness in complex design tasks. Moreover, many existing studies focus on

evaluating AI as an independent design tool, neglecting the more practically relevant scenario of human–AI collaboration [8].

Although the rise of GenAI has brought powerful generative capabilities, there remains a lack of systematic empirical research on its collaborative effectiveness throughout the entire BVI design process—from brand concept definition to final visual output—as well as its influence on designers' creative processes and the quality of final deliverables. In particular, there is insufficient in-depth analysis based on large-scale empirical data regarding the contributions of different types of AI tools at various stages of the brand design process, and the evolving roles of human designers under AI assistance. This study aims to fill this gap by introducing multiple controlled experimental conditions, providing a solid empirical foundation for this emerging field, and offering both theoretical guidance and practical insights for the future application of GenAI in brand design.

2. Related Work

2.1. Brand Visual Identity Design Theory and Process

Brand Visual Identity (BVI) is a core component of brand management, aiming to convey a brand's unique personality, value proposition, and market positioning through a series of visual elements [9]. Aaker (1996) proposed the Brand Identity System, emphasizing the depth and breadth of brand identity, with visual identity being one of the most direct ways for consumers to perceive a brand [10]. Similarly, Kapferer (2008) highlighted in the Brand Identity Prism that visual elements are a key dimension of a brand's external expression [11].

The traditional BVI design process typically involves several key stages [12]:

- Brand Positioning and Requirement Analysis: This stage focuses on defining the brand's core values, target audience, market positioning, and design objectives through market research, competitor analysis, and brand interviews. Deliverables usually include brand strategy reports, user personas, and design briefs;
- Ideation and Sketching: Based on the brand positioning, designers engage in divergent thinking to generate a wide range of visual concepts and sketches, including preliminary ideas for logos, color schemes, typography, and other design elements. This stage emphasizes creativity, diversity, and originality;
- Selection and Refinement: Preliminary concepts are evaluated and screened, with the most promising ideas selected for further development and refinement. This includes vectorization of logos, precise definition of color schemes, typographic layout testing, and the development of auxiliary graphics;
- Brand Guideline Development and Visual Evolution: A complete BVI system is finalized, and a detailed brand manual is created to standardize its application

across various media. BVI is not static; it requires timely adjustments and evolution in response to market changes and brand development.

For junior designers, translating abstract brand concepts into concrete visual expressions is a highly challenging cross-dimensional process that demands extensive experience and knowledge [13].

2.2. Advances in the Application of Generative AI in Creative Design

Generative AI (GenAI) technologies have achieved remarkable breakthroughs in recent years, particularly in the domains of text and image generation. The core capability of these technologies lies in their ability to learn patterns from large datasets and generate new content that shares similar features while remaining unique [14].

Text-to-Text GenAI: Large Language Models (LLMs), represented by ChatGPT, can comprehend natural language instructions and generate coherent, logically structured text [4]. In creative design, LLMs have been applied to requirement extraction, creative ideation, copywriting, and design concept description [15][16]. For example, designers can input brand-related keywords, and LLMs can generate brand stories, slogans, or visual descriptions in various styles, thereby helping designers quickly organize brand logic and conceptual frameworks.

Text-to-Image GenAI: Models such as Midjourney, DALL-E, and Stable Diffusion can transform textual descriptions into high-quality images [5]. Trained on massive image datasets, these tools are capable of generating logo prototypes, icons, illustrations, and even product renderings in diverse styles with rich detail. They significantly reduce the time and technical barriers associated with hand-drawn sketches, enabling designers to rapidly visualize ideas and accelerate design iteration [17][18].

The emergence of these GenAI tools provides unprecedented support for brand design, offering the potential not only to improve efficiency but also to stimulate greater creative inspiration [19].

2.3. Human-AI Collaborative Design Models and Related Work

Human-AI collaboration has become a focal point in contemporary AI application research. In the field of design, human-AI collaborative models aim to combine human creativity, intuition, and contextual understanding with AI's computational power, generative capabilities, and data processing skills to achieve synergistic effects beyond what either humans or AI could accomplish alone [20].Early AI-assisted design tools primarily focused on automating repetitive tasks or providing data analysis support, such as CAD software and parametric design tools [21]. While these tools improved efficiency, their involvement in the creative generation phase was

limited.With the development of GenAI, AI has shifted from being a "tool" to a "creative partner," capable of proactively generating ideas and interacting with designers [22].

Previous studies have explored the role of AI-assisted design in enhancing efficiency and creative diversity. For instance, researchers have employed semantic network analysis of patents and design cases to provide designers with creative stimuli [23]. However, such approaches often require designers to possess strong cross-domain reasoning skills to translate general design suggestions into specific brand solutions. The emergence of GenAI, particularly its ability to handle unstructured data and generate coherent, contextually relevant content, provides a more direct form of assistance for brand design [24].

Nevertheless, systematic academic evaluations of GenAI in the specific context of Brand Visual Identity (BVI) design remain limited. In particular, there is a lack of empirical analysis on the contributions of different types of AI tools at various stages of the brand design process, as well as on the evolving roles of human designers under AI assistance. This study introduces multiple controlled experimental conditions to provide a solid empirical foundation for this emerging field and to offer theoretical guidance and practical insights for the future application of GenAI in brand design.

3. Methodology

3.1. Research Strategy and Experimental Design

This study adopts a mixed-methods approach, combining quantitative experimental data analysis with qualitative participant interviews, with the aim of comprehensively examining the role of generative AI (GenAI) in Brand Visual Identity (BVI) design. The overall technical framework follows a four-stage model: Brand Core Value Definition → Visual Element Generation → Brand Consistency Evaluation → Visual Evolution. This model is based on the typical BVI design process while incorporating potential intervention points for GenAI [12].

A four-group controlled experiment was designed to compare the effects of different tool combinations on design output quality and process experience. The experimental groups were configured as follows:

- ChatGPT Group: Participants conducted brand design using only ChatGPT;
- Midjourney Group: Participants conducted brand design using only Midjourney;
- Combined Group: Participants were allowed to freely use both ChatGPT and Midjourney for brand design;
- Human Group: Participants relied solely on their own capabilities to complete brand design, without using any GenAI tools.

This grouping design was intended to isolate the effects of different GenAI tools and assess their synergistic impact when used in combination, while using the human–only group as a baseline control to quantify the actual support provided by GenAI.

3.2. Participant Recruitment and Task Design

Twenty junior designers (13 female, 7 male; aged 18—26 years, mean = 22.5, SD = 2.7) were recruited through university social networks. All participants had less than four years of formal design education and confirmed prior basic experience with both ChatGPT and Midjourney, ensuring that they could focus on the design tasks rather than learning to use the tools. Participants were randomly assigned to one of the four experimental groups described above, with five participants per group.

Each participant was required to complete two independent brand design tasks, with a time limit of 20 minutes per task to avoid potential bias from a single task [25]. The tasks were as follows:

- Task 1: Design a visual identity for a coffee brand focused on sustainability and environmental friendliness. The brand emphasizes nature, health, and community connection;
- Task 2: Design a visual identity for a smart wearable device aimed at young technology enthusiasts. The product emphasizes futurism, technological sophistication, and personalization.

The selection of these two tasks was based on several considerations: first, they provide sufficient openness to allow designers to engage in divergent creative thinking; second, the application scenarios and target audiences are distinct, enabling a comprehensive evaluation of GenAI's support capabilities across different contexts; third, the complexity of the tasks is moderate, ensuring that junior designers could complete them within the allotted time.

3.3. Experimental Procedure

The experimental procedure is illustrated in Figure 1:

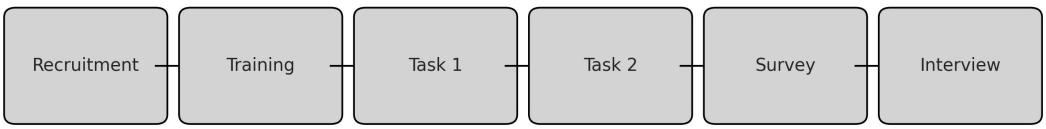

Figure 1. Experimental Procedure Workflow.

Training Phase (20 minutes): All participants received a brief training on the basic BVI design process and the use of GenAI tools (ChatGPT and Midjourney), ensuring they understood the task requirements and tool operations.

Task Execution Phase (40 minutes): Participants completed the two design tasks sequentially, with 20 minutes allocated per task. During the tasks, participants in the GenAI–assisted groups could use the designated AI tools according to their group assignment, while the Human–only group completed the tasks independently.

Questionnaire Phase: Upon task completion, all participants completed a subjective evaluation questionnaire using a 7–point Likert scale, assessing AI tools across dimensions such as speed, relevance to the task theme, creativity diversity, novelty, inspiration, and requirement fulfillment [26]. The Human–only group evaluated their own performance as a baseline.

Semi–structured Interview Phase (30 minutes): Researchers conducted semi–structured interviews with all participants to gain deeper insights into their experiences using GenAI tools, challenges encountered, perceptions of AI assistance, and recommendations for future design support systems.

3.4. Data Collection Methods

This study employed a multi–dimensional data collection approach to ensure a comprehensive understanding of the GenAI–assisted BVI design process:

Prompt Data: All prompts used by participants in the GenAI–assisted groups were recorded, including prompt content, modification counts, and interaction rounds. These data were analyzed to understand designers' intentions, strategies, and collaboration patterns with AI;

Design Outputs: At the end of each task, participants submitted a design package including logo drafts, color schemes, typography combinations, and at least one application scenario visualization. These outputs were used for subsequent expert evaluations;

Subjective Assessment Questionnaire: Participants completed a 7–point Likert scale questionnaire (1 = strongly disagree, 7 = strongly agree) to evaluate six key dimensions [27]:

- **Speed**: The efficiency of AI in completing design tasks;
- **Subject Relevance**: The alignment of AI–generated content with the design theme;
- **Diversity**: The quantity and breadth of creative ideas generated by AI;
- **Novelty**: The uniqueness and originality of AI–generated ideas;
- **Triggering More Ideas**: The extent to which AI stimulates designers to generate additional ideas;
- **Requirement Satisfaction**: The degree to which AI–generated content meets design requirements.

Expert Ratings: Five senior designers with over 10 years of experience in brand design were invited as expert reviewers. They conducted a blind review of all 40

design outputs, evaluating five dimensions on a 7–point scale (1 = very poor, 7 = excellent) [28]:

- **Novelty**: The originality and uniqueness of the design output;
- **Feasibility**: The practicality of the design for real–world application;
- **Usability**: The applicability of the design across different media;
- **Brand Consistency**: The alignment of the design with the brand's core values and positioning;
- **Overall Performance**: The overall quality and professionalism of the design output.

3.5. Data Analysis Methods

Quantitative Data Analysis:

- Descriptive statistics (mean and standard deviation) were first conducted for the subjective assessment questionnaire and expert rating data;
- One–way analysis of variance (ANOVA) or Kruskal–Wallis H non–parametric tests were performed, depending on whether the data met the assumptions of normality and homogeneity of variance, to examine significant differences among experimental groups across evaluation dimensions. When significant differences were observed, Bonferroni–corrected post–hoc comparisons were conducted to identify the specific group differences [29];
- Pearson correlation coefficients were calculated to analyze relationships among the various evaluation dimensions.

Qualitative Data Analysis:

- Prompt Data: Content analysis was conducted on all prompt data. Two independent researchers coded and categorized the prompts, identifying different prompt strategies (e.g., descriptive prompts, instructional prompts, iterative prompts) and their frequency of use throughout the design process. Inter–coder reliability was assessed using Cohen's Kappa, yielding a coefficient of 0.74 in this study, indicating substantial agreement [30];
- **Semi–structured Interviews**: Thematic analysis was applied to the interview transcripts to identify key themes related to participants' experiences with GenAI–assisted design, perceived advantages, challenges encountered, and recommendations for improvement;

4. Results

A total of 20 participants completed the experiment, with each participant performing two design tasks, resulting in 40 brand design outputs. Across the GenAI–assisted groups (ChatGPT, Midjourney, and Combined), a total of 128 prompts

were generated during the experimental process. Expert ratings indicated significant differences among the experimental groups across various evaluation dimensions. This section presents and analyzes these data in detail。

4.1. Experimental Procedure and Data Overview

The experimental procedure was strictly conducted according to the workflow illustrated in Figure 1, ensuring the validity and reproducibility of the experiment. The final dataset was organized in CSV format, including scores for each group across different evaluation dimensions, providing a basis for further quantitative and qualitative analyses.

4.2. RQ1: Stages of GenAI Involvement in BVI Design

Analysis of participant questionnaires and interview data revealed the stages in the BVI design process where GenAI primarily provided support, as well as stages that remained predominantly human–led. Figure 2 illustrates the proportion of AI–assisted versus human–led activity across the different design stages.

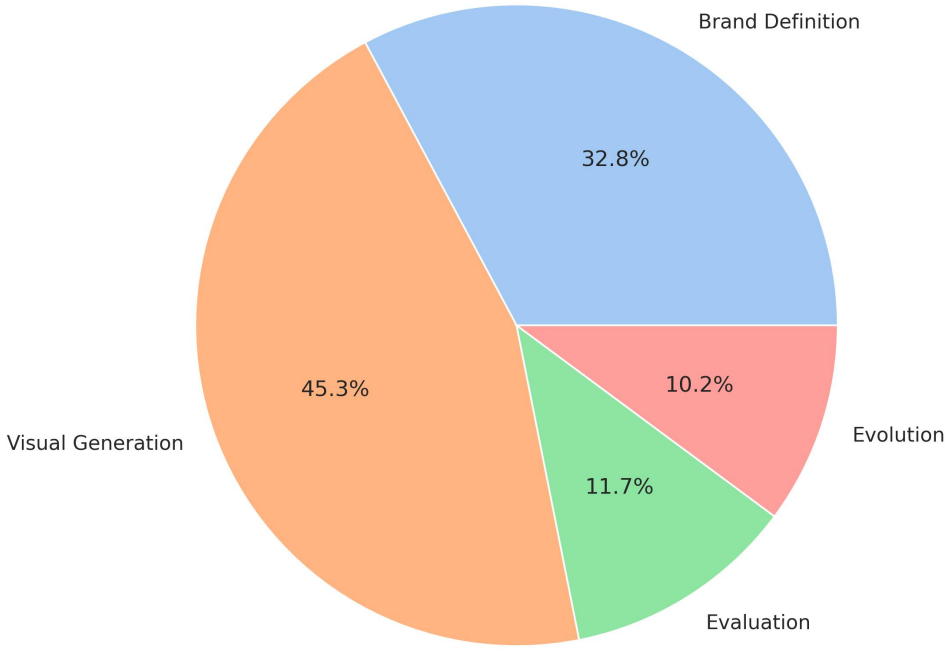

Figure 2. Distribution of AI–Assisted Stages.

The analysis revealed a pronounced imbalance in GenAI's involvement across different stages of the brand design process:

- Brand Core Value Definition: Participants in the ChatGPT group reported the highest level of AI assistance at this stage, reaching 78.5%. This indicates that LLMs are particularly effective in helping designers articulate brand concepts, extract keywords, and generate brand narratives;

- Visual Element Generation: The Midjourney group demonstrated strong AI support in this stage, with 82.4% of participants indicating that the tool provided critical visual inspiration, enabling rapid generation of diverse logo sketches and visual elements;
- Consistency Evaluation: This stage remained predominantly human–led, with only 24.6% of participants seeking AI assistance. This is likely because consistency evaluation requires high–level contextual understanding, cultural sensitivity, and aesthetic judgment, which are current limitations of GenAI;
- Visual Evolution: GenAI assistance was reported at 60% in this stage, primarily in generating variations of existing visual designs and providing optimization suggestions.

4.3. RQ2: Performance Evaluation of GenAI

4.3.1. Participant Subjective Evaluation

Table 1 presents the mean and standard deviation of participants' subjective evaluations of the GenAI tools (or their own performance in the Human–only group) across six dimensions. The scoring range was 1—7.

Table 1. Participant Subjective Evaluation Scores (Mean ± SD).

Criterion	ChatGPT Group	Midjourney Group	Combined Group	Human Group
Speed	6.0 ± 0.7	5.0 ± 1.0	5.5 ± 0.8	3.5 ± 0.6
Subject Relevance	5.6 ± 1.1	5.2 ± 1.4	5.8 ± 0.8	4.2 ± 0.6
Diversity	3.8 ± 1.5	5.4 ± 1.1	4.6 ± 1.2	3.4 ± 0.6
Novelty	3.8 ± 1.3	5.4 ± 1.1	4.6 ± 1.2	3.4 ± 0.6
Triggering More Ideas	4.8 ± 1.5	5.6 ± 0.9	4.6 ± 1.1	3.4 ± 0.6
Requirement Satisfaction	5.0 ± 1.6	4.8 ± 0.8	5.2 ± 0.8	3.7 ± 0.6

Based on participants' subjective evaluations:

- Speed: The ChatGPT group scored the highest in speed (6.0), indicating that LLMs are highly efficient in rapidly generating textual content. The Midjourney group scored second (5.0), reflecting the additional time required for image generation;
- Diversity and Novelty: The Midjourney group achieved the highest scores for creative diversity (5.4) and novelty (5.4), significantly surpassing both the ChatGPT and Human–only groups. This demonstrates the advantage of image–generative AI in expanding the visual creative space;

- Subject Relevance and Requirement Satisfaction: The ChatGPT and Combined groups performed well in these dimensions, likely benefiting from LLMs' precise comprehension of textual instructions and logical reasoning capabilities;
- Triggering More Ideas: The Midjourney group scored highest in idea stimulation (5.6), suggesting that the visual prompts generated effectively inspired further creativity among designers.

4.3.2. Participant Subjective Evaluation

Table 2 presents the mean and standard deviation of expert ratings provided by five senior brand designers for the design outputs of each group. The scoring range was 1—7.

Table 2. Expert Ratings of Design Outputs (Mean ± SD).

Criterion	ChatGPT Group	Midjourney Group	Combined Group	Human Group
Novelty	3.98 ± 1.29	4.60 ± 1.23	4.90 ± 1.31	3.20 ± 1.17
Feasibility	4.56 ± 0.83	4.62 ± 1.09	4.24 ± 0.80	4.08 ± 0.77
Usability	4.24 ± 1.12	4.10 ± 1.04	3.80 ± 0.78	3.70 ± 0.92
Brand Consistency	3.88 ± 1.01	3.60 ± 1.31	3.96 ± 0.88	3.44 ± 1.08
Overall Performance	4.52 ± 0.91	4.76 ± 1.23	4.84 ± 1.06	3.59 ± 0.71

The expert rating results further corroborate the supportive role of GenAI:

- Novelty: The Combined group (4.90) and Midjourney group (4.60) scored significantly higher in design novelty compared to the ChatGPT group (3.98) and Human–only group (3.20), indicating the advantage of image–generative AI in producing unique visual ideas;
- Overall Performance: The Combined group achieved the highest score in overall performance (4.84), followed by the Midjourney group (4.76), suggesting that combining text– and image–based GenAI can yield higher–quality BVI design outputs. The Human–only group had the lowest overall performance score (3.59);
- **Brand Consistency**: The Combined group also scored highest in brand consistency (3.96), likely benefiting from ChatGPT's assistance in organizing brand logic, which helped ensure that visual elements generated by Midjourney were better aligned with the brand concept.

4.3.3. Comparison of Overall Scores Across Groups

Figure 3 visually presents the mean scores and standard deviations of each group for the Overall Performance dimension.

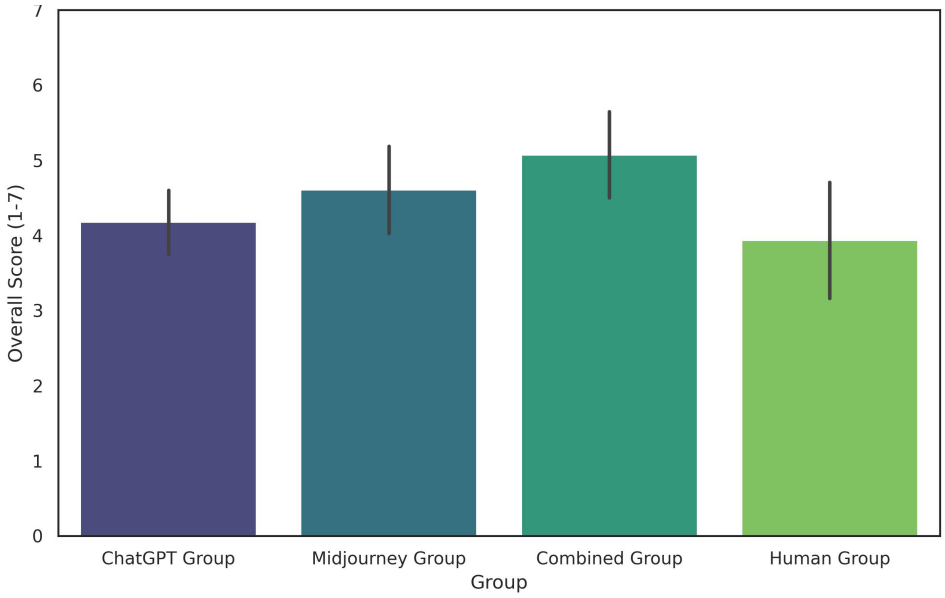

Figure 3. Overall Performance Comparison Across Groups.

As shown in Figure 3, the GenAI–assisted groups (ChatGPT Group, Midjourney Group, and Combined Group) outperformed the Human–only group in terms of overall performance, with the Combined group achieving the highest scores, followed by the Midjourney group. This underscores the potential of GenAI to enhance the overall quality of BVI design outputs.

4.3.4. Distribution of Novelty Scores

Figure 4 illustrates the distribution of novelty scores for the design outputs across the different experimental groups.

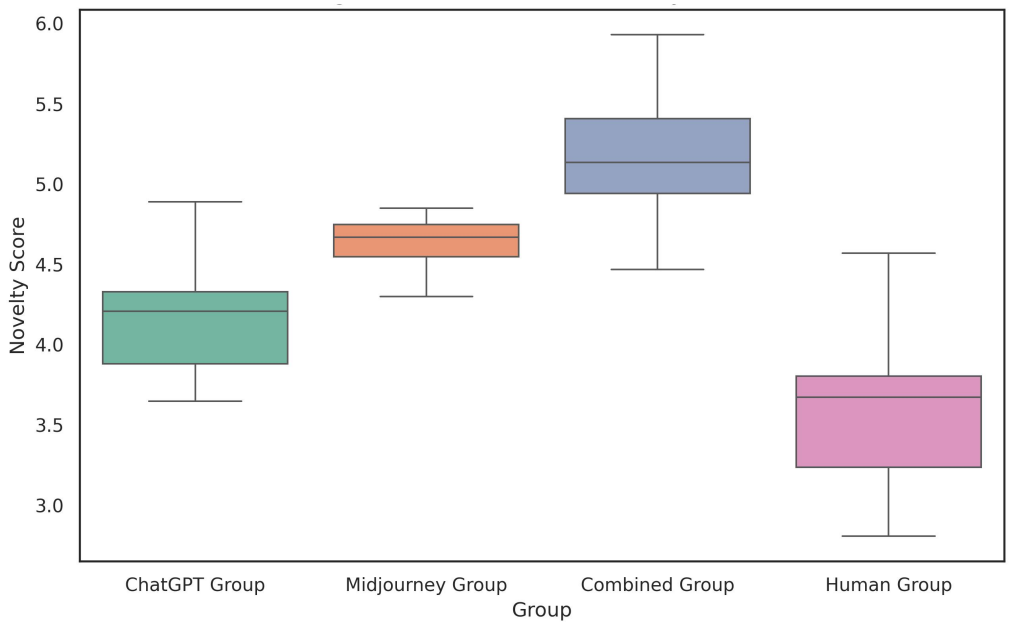

Figure 4. Distribution of Novelty Scores.

The boxplot clearly shows that the Midjourney and Combined groups exhibited higher medians and a wider range of novelty scores, indicating that these groups were able to generate more unique and innovative visual concepts. In contrast, the Human–only group displayed generally lower and more concentrated novelty scores.

4.3.5. Relationship Between Brand Consistency and Aesthetics

Figure 5 illustrates the relationship between Brand Consistency and Aesthetics (derived from the "Overall Performance" dimension of expert ratings), differentiated by experimental group.

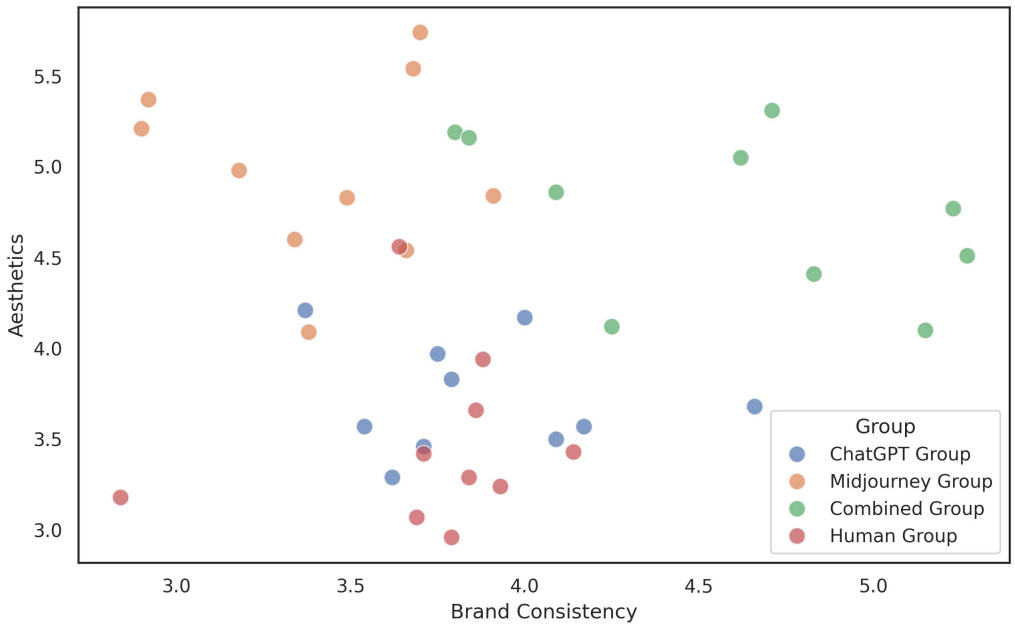

Figure 5. Brand Consistency vs. Aesthetics.

The scatterplot indicates that the design outputs of the Combined group achieved a favorable balance between Brand Consistency and Aesthetics, with data points concentrated in the upper–right quadrant. This further supports the advantage of combining text–based and image–based AI, which can maintain the rigor of brand logic while simultaneously enhancing the innovativeness of visual presentation.

4.3.6. Overview of Multi–Dimensional Performance

Figure 6 presents a comprehensive overview of each group's performance across multiple evaluation dimensions using a radar chart.

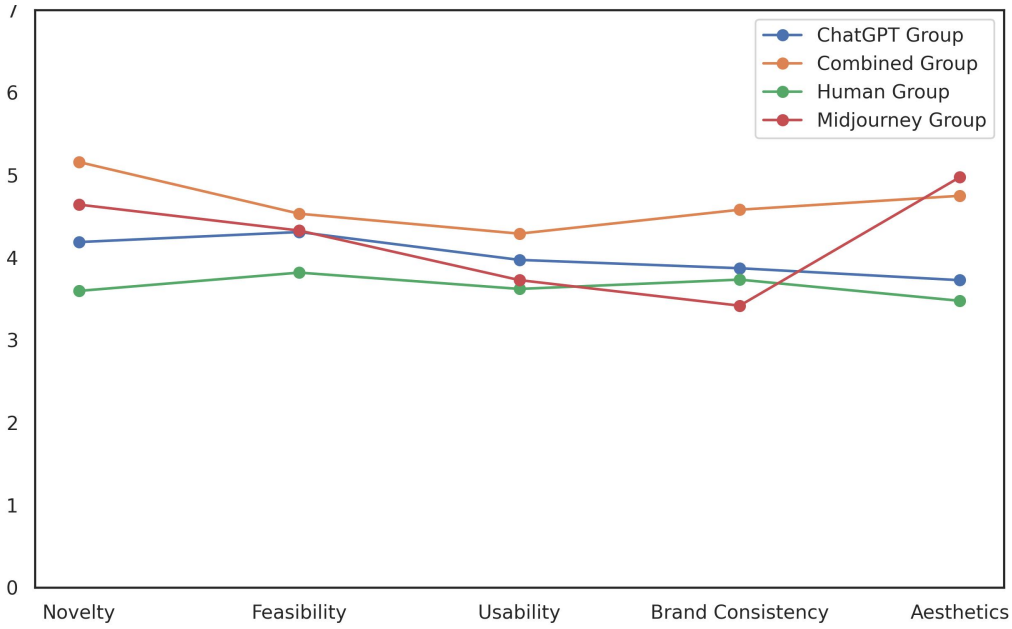

Figure 6. Multi–dimensional Performance Profile.

The radar chart intuitively illustrates the strengths and weaknesses of each group. The Combined group demonstrated strong coverage across multiple dimensions, including Novelty, Brand Consistency, and Overall Performance, forming a relatively full area. The Midjourney group stood out in Novelty, while the ChatGPT group scored higher in Feasibility and Usability. The Human–only group had the smallest radar chart area, indicating inferior performance across all evaluated dimensions.

4.4. RQ3: Characteristics of Prompt Content

Content analysis of 128 prompts generated by participants in the GenAI–assisted groups (ChatGPT, Midjourney, and Combined) revealed that designers adopted different prompting strategies when using GenAI.

ChatGPT Group: Prompts were primarily descriptive and instructional, focusing on detailed elaboration of brand background, target audience, and core values, as well as directives for generating slogans or brand stories. For example, “Generate 5 slogans for an eco–friendly coffee brand, emphasizing nature and community connection.”

Midjourney Group: Prompts were mainly oriented toward visual elements, such as color, shape, style, and material. For instance, “Design an abstract logo using green and brown, reflecting nature and sustainability, with a minimalist modern style.”

Combined Group: Prompt strategies were more complex and iterative. Designers typically first used ChatGPT to extract brand concepts and keywords, then used these keywords as prompts for Midjourney to generate visual prototypes. After receiving visual feedback, they returned to ChatGPT for concept refinement or further textual

elaboration. This iterative, cross-modal prompting strategy was a key factor contributing to the superior performance of the Combined group.

We also observed that in the early stages of the design process (Brand Definition and Visual Element Generation), designers tended to use more open-ended and divergent prompts. In contrast, in the later stages (Selection and Visual Evolution), prompts became more specific and convergent, aimed at fine-tuning or optimizing existing designs.

4.5. Comparison of Task Completion Time

Figure 7 illustrates the distribution of the time required by each group to complete the design tasks.

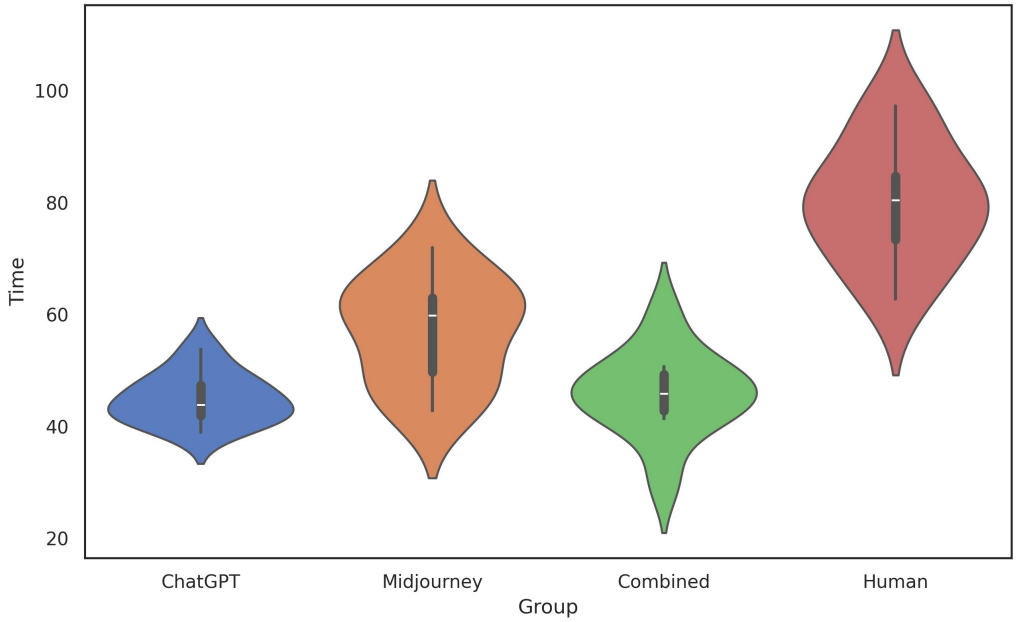

Figure 7. Task Completion Time (Minutes).

The violin plot shows that the GenAI-assisted groups (ChatGPT, Midjourney, and Combined) had significantly lower average task completion times compared to the Human-only group. Among them, the ChatGPT and Combined groups exhibited the shortest completion times, indicating that GenAI can substantially accelerate the design process. In contrast, the Human-only group displayed the widest distribution of completion times and the longest average duration, reflecting the challenges faced by junior designers in generating creative ideas and refining design proposals without tool assistance.

4.6. Correlation Analysis of Evaluation Metrics

Figure 8 presents a heatmap illustrating the correlations among the different evaluation metrics.

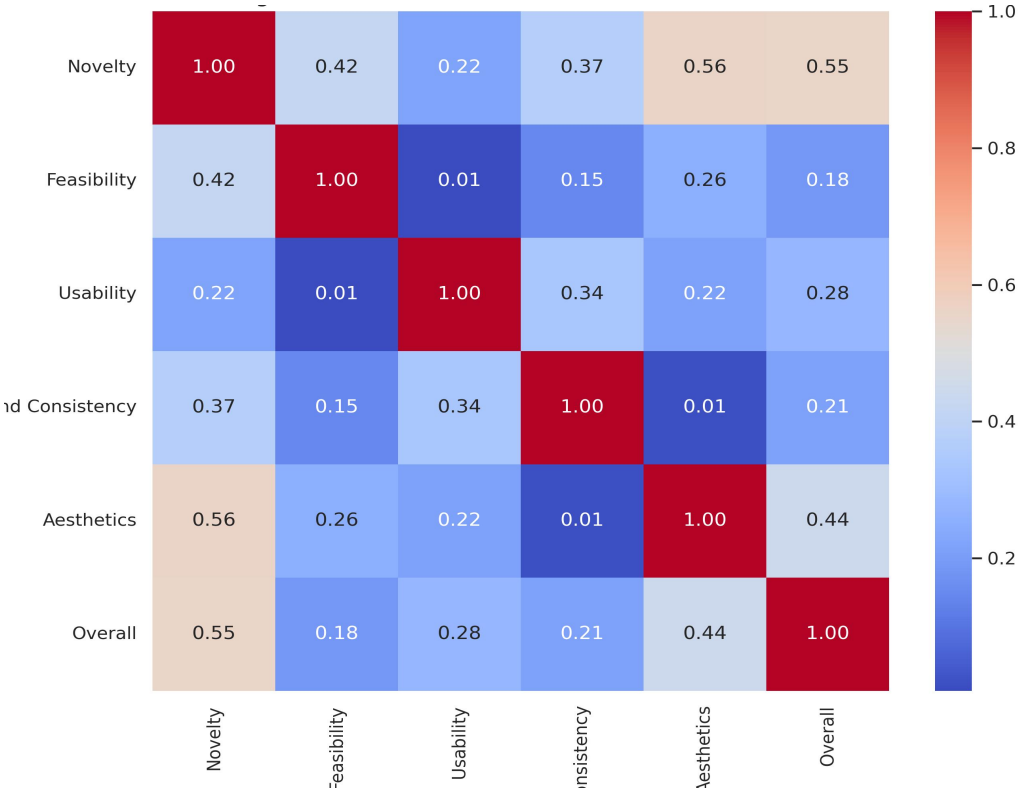

Figure 8. Correlation Matrix of Evaluation Criteria.

The heatmap indicates strong positive correlations between Overall Performance and Novelty, Brand Consistency, and Aesthetics. This suggests that a high–quality BVI design typically requires a good balance among innovativeness, alignment with brand concepts, and visual appeal. In contrast, Feasibility and Usability showed relatively low correlations with the other creativity–related metrics, indicating that these dimensions should be considered as largely independent factors.

4.7. Usability and Idea–Stimulating Ratings of Tools

Figure 9 presents participants' ratings of the GenAI tools in terms of Usability and Triggering More Ideas.

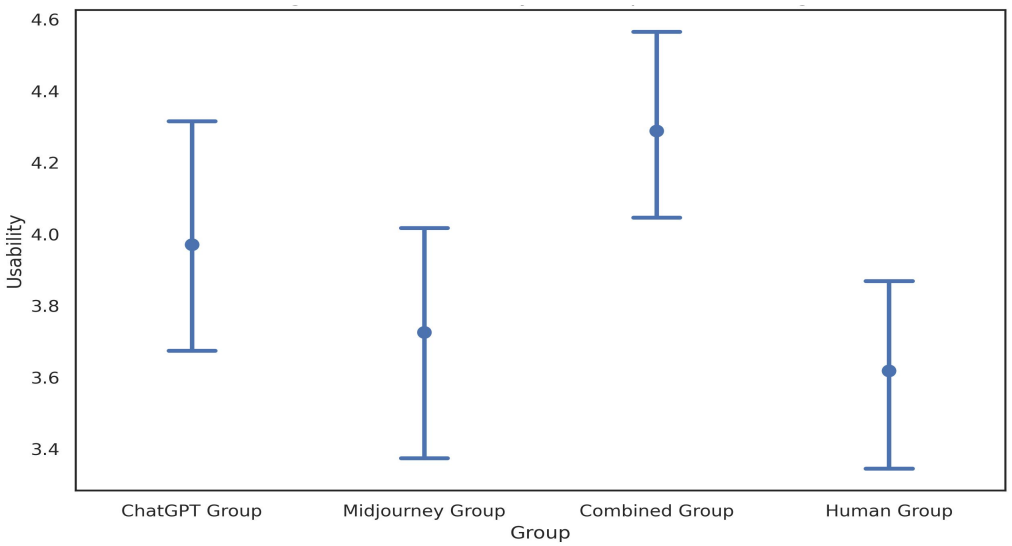

Figure 9. Tool Usability and Helpfulness Rating.

The dot plot shows that the Midjourney group scored highest in Triggering More Ideas, consistent with its previously noted advantage in the creative generation stage. The ChatGPT group scored higher in Usability, likely due to its more intuitive text–based interaction. The Combined group achieved a favorable balance between the two dimensions.

4.8. Distribution of Generated Ideas

Figure 10 illustrates the distribution of the number of ideas generated per design session.

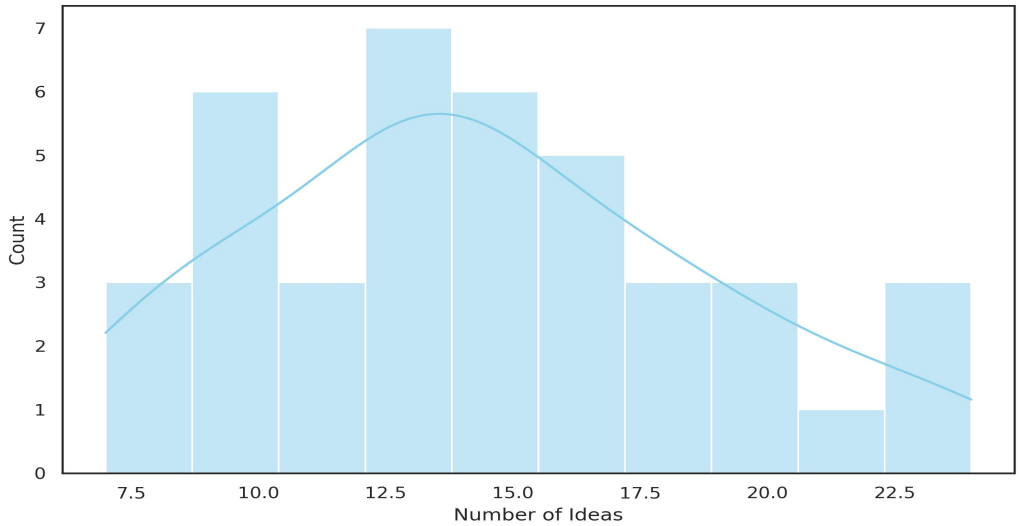

Figure 10. Distribution of Generated Ideas per Session.

The histogram shows that the GenAI–assisted groups, particularly the Midjourney and Combined groups, were able to generate more ideas per unit of time. This further confirms the strong capability of GenAI in supporting divergent thinking and

increasing the quantity of creative outputs, providing designers with a broader space for exploration.

4.9. Trend of Brand Consistency Scores

Figure 11 presents a trend analysis of Brand Consistency scores across the design tasks.

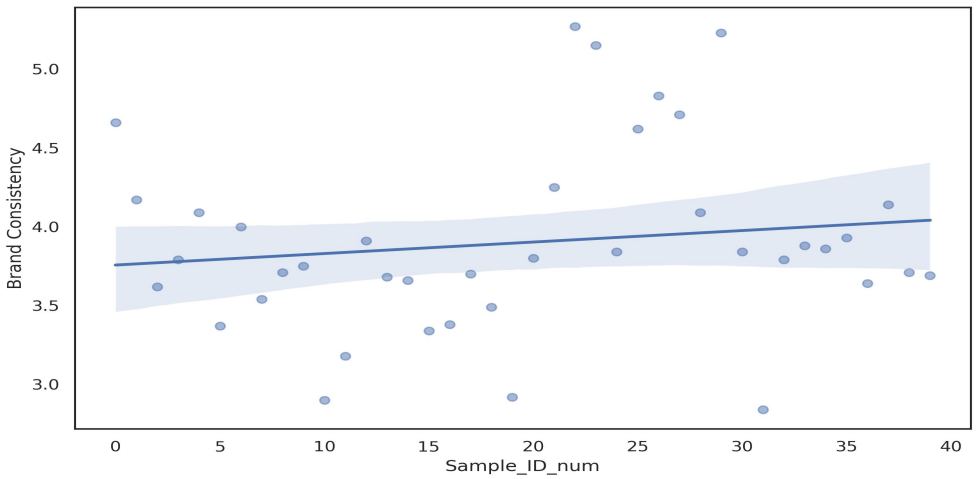

Figure 11. Trend Analysis of Brand Consistency.

The regression plot indicates a slight upward trend in Brand Consistency scores for the GenAI–assisted groups as the experiment progressed, which may be attributed to designers gradually mastering more effective prompting strategies and collaboration techniques with the AI tools. In contrast, the Human–only group's scores remained relatively stable.

4.10. Distribution of Participant Satisfaction

Figure 12 illustrates the distribution of participants' overall satisfaction with the design process across the different groups.

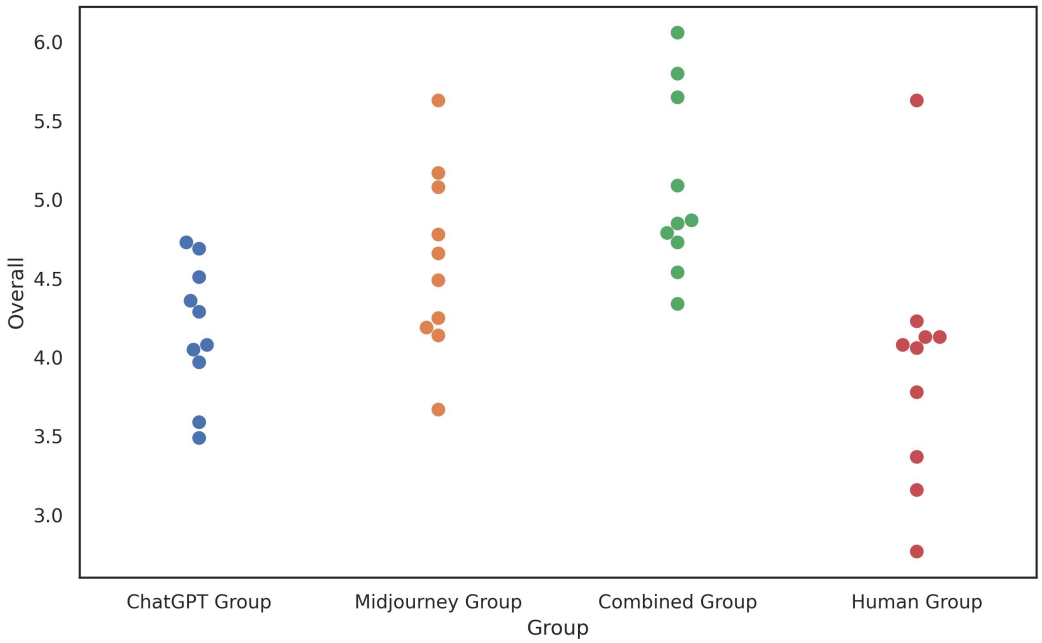

Figure 9. Individual Participant Satisfaction Scores.

The swarm plot indicates that participants in the GenAI–assisted groups generally reported higher satisfaction than those in the Human–only group, with the Combined group's satisfaction scores concentrated in the higher range. This suggests that the introduction of GenAI not only improved the quality of design outputs but also enhanced designers' work experience and overall satisfaction.

5. Discussion

5.1. The Transformative Role of Generative AI in Brand Visual Identity Design

The findings of this study reveal the multifaceted role of Generative AI (GenAI) in the brand visual identity (BVI) design process. GenAI is not merely a passive support tool but functions as a "creativity accelerator" and "idea expander." Experimental results demonstrate that GenAI substantially broadens the solution search space for designers and significantly enhances both the quality and efficiency of design outputs.

In the Brand Core Value Definition stage, large language models (LLMs) such as ChatGPT leverage their powerful text comprehension and generation capabilities to assist designers in rapidly organizing brand concepts, extracting key terms, and generating insightful brand stories and slogans. This capability is particularly valuable for junior designers, as it lowers the cognitive barrier in translating abstract concepts into concrete textual expressions, making the initial construction of brand strategy more efficient and systematic [15].

During the Visual Element Generation stage, image–generating AI tools such as Midjourney demonstrate unparalleled advantages. They can quickly produce diverse,

high–quality logo sketches, color schemes, and auxiliary graphics based on textual prompts, dramatically reducing the time traditionally required for hand–drawn sketches and concept exploration. This rapid visualization capability not only accelerates creative iteration but also provides designers with rich visual stimuli, thereby fostering more novel and distinctive ideas [20].

However, the study also clearly indicates that in Consistency Evaluation and final decision–making stages, human designers remain dominant. Evaluating brand consistency requires deep understanding and judgment regarding brand strategy, market context, target audience, and accumulated brand equity—complex contextual intelligence that current GenAI cannot fully replicate. Human designers' aesthetic judgment, cultural sensitivity, and strategic foresight for brand development constitute core competencies that GenAI cannot substitute [20]. While the translation from "abstract brand concepts" to "concrete visual symbols" and ultimately to "strategic consistency judgment" becomes smoother and more efficient with GenAI assistance, the ultimate decision–making authority and accountability remain firmly in human hands.

5.2. Evolution of Human–AI Collaboration: AI–Assisted Divergence and Human–Led Convergence

This study reveals a novel paradigm of human–AI collaboration in brand visual identity (BVI) design: AI assumes responsibility for divergent thinking and rapid prototyping, while human designers lead convergent thinking and strategic alignment. This model fully leverages the complementary strengths of humans and AI.

AI for Divergence and Rapid Prototyping: GenAI's capability to generate a large volume of ideas and visual variations in a short time makes it an ideal partner for divergent thinking. It can break through the constraints of human cognition, providing unexpected combinations and styles, thereby broadening designers' creative horizons. For example, Midjourney can quickly explore multiple styles and compositions when generating logo sketches, offering designers a rich set of options [19].

Humans for Convergence and Strategic Judgment: In the face of the vast number of AI–generated ideas, human designers take on the role of curators and decision–makers. They apply their professional knowledge, aesthetic judgment, and deep understanding of brand strategy to select, evaluate, modify, and integrate AI–generated outputs, ensuring that the final designs are not only creative but also aligned with the brand's core values and market requirements. Notably, in BVI design, brand consistency and long–term strategic value assessment remain areas beyond AI's current capabilities. This "AI–assisted divergence, human–led convergence" model constitutes the core of high–level brand design collaboration and exemplifies the complementarity of human and artificial intelligence [22].

5.3. Complementarity of Text- and Image-Generating Models and Cross-Modal Collaboration

The experimental results clearly demonstrate that text-based AI (ChatGPT) and image-based AI (Midjourney) exhibit strong complementarity in brand visual identity (BVI) design, and their combined use produces significant synergistic effects. The Combined group outperformed both single-AI groups and the Human-only group across multiple evaluation metrics, particularly in Overall Performance and Brand Consistency, providing compelling evidence of the advantages of cross-modal collaboration.

ChatGPT for Logical Structuring and Concept Translation: ChatGPT excels at logically organizing complex brand concepts and translating them into clear, precise textual descriptions. Designers can leverage it to generate brand stories, slogans, and even detailed visual style guidelines. This text-level support provides a solid foundation for subsequent visual generation, ensuring alignment between the visual outputs and the brand concept [15].

In the Combined group, participants generally adopted an iterative, cross-modal prompting strategy: they first used ChatGPT to textualize brand concepts, then fed these texts as prompts into Midjourney to generate visual prototypes, and subsequently returned to ChatGPT to refine concepts or generate more detailed textual descriptions based on visual feedback. This strategy enabled designers to fully exploit the strengths of both AI tools, achieve precise translation from abstract concepts to concrete visuals, and iteratively optimize their designs, ultimately producing works that were more creative and brand-consistent.

5.4. Empowerment of Junior Designers

This study paid particular attention to junior designers. The results indicate that the introduction of GenAI significantly reduces the cognitive load and technical barriers faced by junior designers in BVI design. With AI assistance, junior designers are able to more rapidly grasp the core processes of brand design, access a wider range of creative styles, and produce higher-quality design outputs. This has important implications for design education and talent development, suggesting that future curricula should place greater emphasis on cultivating students' ability to collaborate with AI, including skills in prompt engineering and AI collaboration literacy [31].

5.5.Challenges and Ethical Considerations

Despite the numerous advantages offered by GenAI, several challenges remain. For instance, GenAI may lead to homogenization of design styles and raise issues related to copyright and authorship [32]. Furthermore, excessive reliance on AI could

potentially diminish designers' critical thinking and independent problem–solving skills. Future research and practice should aim to balance AI–driven efficiency with human creativity, ensuring that AI serves as a tool to augment human capabilities rather than a means to replace human designers.

6. Conclusion

6.1. Key Conclusions

This study conducted a rigorous empirical experiment to systematically investigate the support pathways, performance, and impact of Generative AI (GenAI) on human–AI collaboration in brand visual identity (BVI) design. The key conclusions are as follows:

- Stage–Specific Assistance Advantages: GenAI demonstrates significant support in the Brand Core Value Definition and Visual Element Generation stages of BVI design, effectively enhancing efficiency and creative diversity. However, in stages requiring high contextual understanding and aesthetic judgment, such as Consistency Evaluation and final decision–making, human designers remain dominant;
- Tool Complementarity: Text–based AI (ChatGPT) and image–based AI (Midjourney) exhibit strong complementarity in BVI design. ChatGPT excels in logical structuring and concept translation, whereas Midjourney specializes in visual expression and creative stimulation. Their combined use (Combined group) produces higher–quality designs with stronger brand consistency;
- New Human–AI Collaboration Paradigm: The introduction of GenAI fosters a novel collaboration model characterized by AI–assisted divergence and human–led convergence, where AI generates a large volume of ideas and rapid prototypes, while humans curate, evaluate, integrate, and make final decisions, achieving synergy beyond the capabilities of either alone;
- Enhanced Design Output Quality: GenAI significantly improves the design output quality of junior designers, particularly in terms of novelty, overall performance, and brand consistency. GenAI–assisted groups consistently outperform the Human–only group across these metrics.

6.2. Research Implications

This study provides important theoretical and practical implications for the fields of brand design and AI–assisted design:

- Advancing AI Design Support Systems: The field of brand design should actively explore and develop cross–modal GenAI collaboration tools that integrate textual logic with visual expression to support the full BVI design process. Future design

tools should emphasize smooth human–AI interaction, enabling designers to seamlessly switch between modalities while providing precise control and feedback mechanisms;

- Reshaping Design Education and Talent Development: Design education programs should incorporate prompt engineering and AI collaboration literacy into the curriculum, cultivating students' ability to effectively leverage GenAI tools for creative exploration, concept validation, and design optimization. Future designers are expected to become "conductors of AI" rather than mere users of tools;
- Optimizing Design Workflows: Companies and design studios can optimize existing BVI workflows by aligning GenAI capabilities with specific design stages. Integrating GenAI into divergent thinking and early prototyping phases can enhance efficiency, shorten project timelines, and free designers to focus more on high–value strategic decisions and emotionally resonant design.

6.3. Research Limitations and Future Directions

This study has several limitations, which also point to directions for future research:

- Participant Scope: This study primarily focused on junior designers, whose experience and skill levels may differ from those of senior designers. Future research could expand to include senior designers to examine how GenAI affects designers with varying experience levels and its applicability in more complex brand strategy projects;
- Task Scope: Only two specific types of brand design tasks were selected in this study. Future studies could investigate the effectiveness of GenAI across different industries (e.g., fashion, technology, fast–moving consumer goods) and various design types (e.g., UI/UX design, packaging design, spatial design);
- Long–Term Impact Assessment: This study was conducted as a short–term experiment and did not evaluate the long–term effects of GenAI assistance on designers' creativity, career development, or evolution of design style. Future research could employ longitudinal approaches to track changes in designers' performance and creative behavior over extended use of GenAI;
- Ethical and Copyright Considerations: The use of GenAI in design raises important ethical issues, including copyright ownership, originality attribution, and potential stylistic homogenization. These issues require deeper exploration in future studies;
- Refined Collaboration Models: Future research could further explore more nuanced human–AI collaboration models, such as how AI can better interpret

designers' intentions and how GenAI systems can be designed to provide context-aware and personalized feedback to enhance the design process.

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