MASTERARBEIT | MASTER'S THESIS

Titel | Title

How effective are the logos produced by non-experts with the assist of AI versus logos produced by expert designers.

verfasst von | submitted by

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angestrebter akademischer Grad | in partial fulfilment of the requirements for the degree of

Master of Science (MSc)

Wien | Vienna, 2024

Studienkennzahl lt. Studienblatt | Degree programme code as it appears on the student record sheet:	UA 066 915
Studienrichtung lt. Studienblatt | Degree programme as it appears on the student record sheet:	Masterstudium Betriebswirtschaft
Betreut von | Supervisor:	Univ.-Prof. Christoph Fuchs PhD
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Use of AI in today's life is going to be inevitable. Therefore having the opportunity to assess AI effectiveness in the field of design and creativity was a blessing for me. Here I want to thank Professor Christoph Fuchs who gave me this opportunity and specially thank professor assistant Ms. Catia Alves who was very patient and helpful throughout my journey to write this paper.

Parham Azimi

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Abstract

Diese Studie untersucht den Vorteil der KI-Unterstützung beim Logodesign im Vergleich zu konventionellen, von menschlichen Experten erstellten Logos. Das Aufkommen und die Weiterentwicklung von KI hat zu erheblichen Veränderungen in den Bereichen Grafikdesign und Marketing geführt, da KI-gestützte Technologien die Produktivität und Benutzerfreundlichkeit steigern. Es bestehen jedoch nach wie vor Bedenken hinsichtlich der Originalität, Einzigartigkeit und Qualität der erstellten Arbeiten sowie moralische Bedenken hinsichtlich des Urheberrechts und der Autorenschaft. In früheren Studien wurde die visuelle und emotionale Wirkung von KI-Kunst im Vergleich zu von Menschen erstellter Kunst diskutiert. Menschen betrachten menschliche Kreationen tendenziell als emotionaler als KI-Werke, da Menschen in ihren Werken ein breites Spektrum an intuitiven Ansätzen verwenden. Die Studie vergleicht die Sympathie- und Selektionsraten von Logos, die von Nicht-Experten mit KI-Unterstützung erstellt wurden, mit den von menschlichen Experten erstellten Logos.

Unsere Ergebnisse zeigen, dass Logos, die mit KI-Unterstützung erstellt wurden, im Vergleich zu Logos, die von menschlichen Experten erstellt wurden, beliebter sind und häufiger ausgewählt werden. Dies deutet darauf hin, dass von Nicht-Experten erstellte Logos durch den Einsatz von KI-Tools erheblich verbessert werden könnten. Diese Ergebnisse unterstreichen die Bedeutung der Kombination von menschlicher Kreativität und KI-Effizienz, um bessere Design-Ergebnisse zu erzielen, und unterstützen die Fähigkeit der KI, das Design zu demokratisieren, indem sie die Erstellung hochwertiger Logos auch für Personen ohne professionelle Designkenntnisse zugänglich macht.

Es muss gesagt werden, dass in diesem Artikel KI-Technologien verwendet wurden, um Anweisungen für den Logoerstellungsprozess zu generieren, sowohl für KI-Logo-Generatoren als auch als Briefing für menschliche Designer-Experten.

Abstract

This study investigates the benefit of AI support in logo design in comparison to conventional human expert-created logos. The emergent and advancement of AI has resulted in significant transformations in the domains of graphic design and marketing, as AI-powered technologies boost productivity and ease of use. However, there still exist concerns about the originality, uniqueness, and quality of the generated work, as well as moral dilemmas about copyright and authorship. In prior studies, the visual and emotional effects of AI art compared to human-made art have been discussed. People tend to view human creations as having greater emotional resonance in contrast to works made by AI because of the wide range of intuitive approaches humans tend to use in their works. The study compares the likeability and selection rates of logos made by non-experts with AI support and the logos created by human experts.

According to our findings, logos that have been created with AI assistance are more liked and selected more frequently compared to logos created by human experts. This suggests that logos created by non-experts could be significantly improved by using AI tools. These findings emphasize the significance of combining human creativity with AI efficiency to achieve better design outcomes and support AI's capability of democratizing design by making high-quality logo creation accessible to individuals even without professional design expertise.

It must be said that in this article AI technologies have been used to generate prompts for the logo creation process both for AI-logo generators and also as a briefing for human expert designers.

Introduction

With the vast use of AI in every aspect of businesses nowadays, evaluating if AI technologies are capable of integration into creative fields and examining their performance with human assistance would be a good challenge. It must be said that not only marketing science but also the world of graphic design has witnessed a transformative shift with the emergence of artificial intelligence.

While AI technologies can improve efficiency, there are concerns about the originality and individuality of artworks resulting from them. For instance, it is held that the depth and individuality brought by human intuition and knowledge of cultures are lacking in AI-generated designs (Müller, V.C., Bostrom, N., 2016); besides, there are issues on authorship and copyright of AI-generated content that will have to be resolved (Müller, V.C., Bostrom, N., 2016).

Comparing the aesthetic and emotional impact of artificial intelligence-generated art to human-created art, one of the studies found that viewers could identify whether an art piece is made by AI or humans (Lucas Bellaiche, Rohin Shahi, Martin Harry Turpin, Anya Ragnhildstveit, Shawn Sprockett, Nathaniel Barr, Alexander Christensen, Paul Seli, 2023). The study by (Sun, Yikang, Cheng-Hsiang Yang, Yanru Lyu, and Rungtai Lin, 2022) mentions that human-generated works often evoke more emotions from the viewers. This emotional connection is attributed to the varied and intuitive styles that might have been embodied by human artists naturally into their works (Chamberlain, R., Mullin, C., Scheerlinck, B., & Wagemans, J., 2018). This is further supported by Gangadharbatla in 2021 (Gangadharbatla, 2021).

There is proof of good judgment with regard to human-made art. Previous studies show that participants often prefer artwork labeled by humans as opposed to artworks being labeled using AI, and this preference may suggest that human artwork seems to integrate more human experience and emotion, which is highly valued in aesthetic judgments (Darda, K., & Cross, E. S., 2022) (Gu L and Li Y, 2022). Additionally, a study about how the author, AI and human, affected what paintings can hurt the Chinese audience's sensitiveness found that regardless of the style of the paintings, participants show bias toward AI-generated paintings compared to human-created paintings (Mastandrea, S., Bartoli, G., & Bove, G., 2021).

AI works tend overall to have less value than the human equivalent, on a market basis. One study in 2022 showed constant bias against the AI-generated art as compared to human-made paintings in Western style and Chinese-style with respect to purchase and collection intentions (Gu L and Li Y, 2022). The finding suggests that though AI-generated art can be impressive, technically speaking, the authenticity perceived in human art has made it more appealing for investment and collection (Yuheng Wu, Yi Mou, Zhipeng Li, Kun Xu, 2020).

On the other hand, AI takes care of the routine tasks, producing high-quality visuals (Cousins, 2023). AI supports designers by reducing the time and energy on basic tasks and efficiently helping them to focus more on the creativity aspect of the works (A. Elgammal, L. Bingchen, M. Elhoseiny, M. Mazzone, 2017). But this really falls apart when it comes up against some of the more abstract punctuation and stylistic preferences that people typically insert into their work as humans. This weakness then produces a problem regarding the emotional perception and total enjoyment the viewer might get from such a piece of artwork (Sun, Yikang, Cheng-Hsiang Yang, Yanru Lyu, and Rungtai Lin, 2022).

These discussions delve into two key aspects of AI's engagement: its collaborative ability to work with designers or the eventual replacement of designers where it concerns brand design (Angela Filipa and Oliveira Duarte, 2020). According to research, AI is very collaborative in design, and AI design tools work best when working with a human designer and not as a replacement (Daugherty, P. R., & Wilson, H. J., 2018). Human designers provide the critical aesthetic and contextual judgment that AI, at least for the time being, does not. The changing relationship between AI and the field of design has been the subject of debate from all corners of the world in the past few years. While earlier studies indicated that the speed and inexpensiveness of AI-designed logos are the reasons that most users like, their level of satisfaction may vary depending on how sophisticated and specific their design needs are (HS, 1996). Much as the case may be, since this process is a tailored and collaborative effort, clients that work with human designers often show more satisfaction and, in the real sense, end up with a deeper and more harmonious brand identity (Henderson, P. W., & Cote, J. A., 1998).

According to Lubart, AI is able to revolutionize the creative and logo design industry in terms of effectiveness, accessibility, and affordability. Nevertheless, to enhance the assurance of quality, uniqueness, and ethical duty, AI can best work alongside human designers (Lubart, 2005).

This development has resulted in a very prominent debate within the design community on whether logos designed by professional human designers have an edge over those generated by artificial intelligence. The difference in perception between logos made by artificial intelligence and those by experts makes this a very important area of study.

Previous work has demonstrated that even when AI has the capacity to yield high-quality designs, its creativity is inherently limited by the patterns and data on which it was trained. AI tools can rarely produce very original or innovative designs that are extremely far from the existing styles (A. Elgammal, L. Bingchen, M. Elhoseiny, M. Mazzone, 2017).

In this empirical study, we aim to validate whether AI power and efficiency could be harvested and AI limitation in creativity could be reduced with the help of a non-expert human user. This research investigates the effectiveness in two different aspects: liking and choosing. If non-expert, AI-aided logos are more likable than the logos designed by expert designers (H1), and if non-expert logos created with the help of AI are more likely to be chosen over those designed by expert designers (H2).

According to our data, logos created by non-experts with AI support get more likes (H1) and selection rates (H2) than logos created by professionals. The findings indicate the major impact of AI tools on improving the desirability and quality of logos made by non-professional users.

This research gives solid evidence that AI helps in making better design outputs. This supports the examination of computers as partners in the creative process by Lubert (Lubart, 2005) on how computers can be part of making creative designs. Furthermore, our study highlights how putting AI tools to work in the creative process can move the conversation forward about the chance for computers to be team players in creative projects, just like Lubert in 2005 (Lubart, 2005) talked about.

Literature review

Artificial intelligence (AI)

AI will eventually become an indispensable component of every aspect of each business worldwide (Abid Haleem, Mohd Javaid, Mohd Asim Qadri, Ravi Pratap Singh, Rajiv Suman, 2022). Artificial intelligence refers to machines that simulate human intelligence and are programmed to think and learn like humans (Mehak, Rahul Kumar, Ashima Mehta, 2023).

This gives computers the tools they need to do jobs we think of as smart, like figuring things out, seeing patterns and choosing what to do next. AI has found its way into many areas, including virtual helpers such as Siri and Alexa advancing to the realm of autonomous vehicles and the analysis of vast amounts of data (Janna Anderson, Lee Rainie, Alex Luchsinger, 2018) (Darrell M. West and John R. Allen, 2018).

Artificial intelligence has been one of the game-changing factors in many sectors and has changed the way things are run with the much-needed injection of speed, precision, and new ideas.

In the health sector, machines that think like humans are now trained and being used to figure out what ails a person, tailor treatment plans, and make sense of complex medical images. AI use has brought improved patient outcomes and reduced doctors' errors. Studies by (Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S., 2017), among others, and (Topol, Eric J., 2019) make instances of the roles of AI in medical imaging and personalized medicine.

AI played a central role in fraud spotting, differences in credit scores, and perfecting the science of algorithm-based trading. AI systems in financial sectors could turn out to be ultra-sensitive to the slightest unusual patterns that might represent fraud when analyzing transaction data in real-time. They also surf through market data faster than ever before, fine-tuning trading approaches along the way. In respect to credit scoring, they look wide at financial habits in a manner that ensures more accuracy. While research by (Ahmet Murat Ozbayoglu, Mehmet Ugur Gudelek, Omer Berat Sezer, 2020) is focused on AI's impact on fraud detection, (Amir E. Khandani, Adlar J. Kim, Andrew W. Lo, 2010) explore a variety of its uses in credit scoring.

Stores applying AI find it helpful in letting them offer shoppers custom-tailored buying journeys and better handling of what is in stock. Through the examination of customers' actions, AI systems can sort out items that customers may want, making the shopper happier and more likely to come back. Studies by (Thomas Davenport, Abhijit Guha, Dhruv Grewal, Timna Bressgott, 2020) and (Grewal, D., Roggeveen, A., Runyan, R. C., 2013) investigate the impact of AI in retail sector personalization and inventory management.

Self-driving vehicles and the intelligent traffic control measures are just some symbols of AI integration into the transportation sector. This insight is supported by the work of (Litman,

Todd., 2017). On a more detailed note, in self-driving cars, automobiles drive themselves with the power of artificial intelligence, gathering data from sensors and making sense of it. AI will figure out the best path on the roads and decide how one could drive safely. Meanwhile, AI systems take charge of the traffic lights and the movement of vehicles to cut down on traffic jams and make the roads safer, as noted by Goodall (Goodall, 2014).

AI field applications in manufacturing in the area of forecasting maintenance enable it to foretell equipment failure before it really happens. Forecasting in this respect reduces the cost of maintenance and time related to production lines that are not running. AI also steps up the game in monitoring the quality of production by examining the goods for any flaws, making sure the quality of the product meets higher standards (Wuest, T., Weimer, D., Irgens, C., & Thoben, K. D., 2016).

Artificial intelligence is also harnessed by schools nowadays to make learning for each student personalized and to make administration tasks easier (R. Luckin, W. Holmes, 2016). Artificial intelligence aids in teaching since machines grade work right away. Indeed, (Holmes, Wayne; Bialik, Maya; Fadel, Charles, 2019) stated that if this trend is maintained, then teachers will have more time to teach.

AI-powered chatbots and virtual assistants have put up a new face in the world of customer service by quick and accurate answers to all customer inquiries for better service and happier customers (Adamopoulou, E., Moussiades, L., 2020). Their ability to deal with several interactions simultaneously and the capacity to provide support around the clock make them the most effective tool in customer service (Anbang Xu, Zhe Liu, Yufan Guo, Vibha Sinha, Rama Akkiraju, 2017).

Security is where AI changes the game, making it much easier to identify dangers and recognize faces in general. Keeping track of data movement, AI quickly picks out security threats the moment they pop up and exploits face-matching technology to lock down places and confirm identity. AI's applications in cybersecurity and facial recognition has been discussed by (A. L. Buczak and E. Guven, 2016) and (P. Drozdowski, C. Rathgeb, A. Dantcheva, N. Damer and C. Busch, 2020).

Applications to manage smart grids and to predict energy use patterns enable the energy sector to distribute and utilize energy in the most efficient and optimal way. AI algorithms predict energy demand and adjust the supply based on it (Wang, 2019).

Artificial intelligence has also changed the field of marketing tremendously by reforming strategies and practices. AI helps this field like never before with its ability to go through huge data sets and extract useful insights from them. After the fast growth of social media and online presence, AI mostly takes care of the production of content for marketing campaigns or choosing the right groups as targeting groups for a certain product or service. Digital marketing is powered by AI advertising, which remains most active on platforms like Instagram, YouTube, and Facebook and increases the overall customer experience. These platforms consider the users' interactions and information absolutely before recommending them an offer appropriate to their preferences. Also, AI can help marketers identify and forecast new trends (Abid Haleem, Mohd Javaid, Mohd Asim Qadri, Ravi Pratap Singh, Rajiv Suman, 2022).

Among the applications of AI already discussed in the field of marketing are visual works such as a logo, campaign poster, video, and photo production. In the following manner, AI-powered design tools automate the creative process to quickly come up with quality visual content in line with the requirements and preferences (A. Elgammal, L. Bingchen, M. Elhoseiny, M. Mazzone, 2017). Past research has found that AI-assisted design tools can generate a wide range of creative options in a matter of seconds, which allows designers to search through more possibilities in a shorter amount of time. This is particularly useful in the first steps of the creative design process, like brainstorming and initial concept development (Tang, R., & Werner, L., 2018). Saying that, let's discuss the importance of logos in marketing and branding of businesses.

Logo

It is obvious that the most important part of a brand is the brand logo (Henderson, P.W., Cote, J.A., Leong, S.M., and Schmitt, B., 2003). Proportion, color, symmetry, and angularity of logos are some of the design elements that have been examined and studied by many marketing researchers on consumers' attitudes (Pittard, N., M. Ewing, C. Jevons, 2007). In a world driven by visual content and instant recognition, the importance of a logo cannot be underestimated (Kaur, H., and Kaur, K., 2019). A logo is not just a symbol or a piece of art; it is the brand's visual ambassador and the face it presents to the world (Giberson, R., & Hulland, J., 1995). Logo can be considered a mixture of typeface elements and graphic art (Pamela W. Henderson and Joseph A. Cote, 1998); regardless, here logo refers to the combination of graphic art design with a company name or even without a name that a

company uses to showcase itself. A well-designed and well-thought-out logo is like a face that the brand proudly shows to its audience. It's the first element of the business that people notice, and it's what they mostly remember. Think of the iconic Nike swoosh or the bitten apple of the Apple company. They instantly evoke the brand's identity, core, values, promises, and purposes. There are major financial implications for selecting an effective logo (Pamela W. Henderson and Joseph A. Cote, 1998). The process of creating and choosing a logo may require a large financial investment. This cost includes the first stages of design, when expenses can range greatly, from under ten thousand to potentially hundreds of thousands of dollars (Barnes, Roger, 1989).

A study by Schechter in 2010 breaks down logos into various kinds, such as characters, signs, abstract designs, words, and letter figures. The study delves into the effects these different styles have on how customers see, recognize, and connect with companies. Studies now reveal that logos are a key for a brand to be recognized and remembered. Having a logo that's crafted well makes it easy for people to spot and recall a brand; this is vital for growing the brand's value. Furthermore Logos have the power to arouse feelings in viewers and establish a bond with them. People may be more likely to purchase products from a company when they identify emotionally with it through its logo (Schechter, Alvin H., 2010). This kind of feeling can make customers stay loyal to the brand. Logos have the ability to impact customers by differentiating the brand from it’s rival and give a sense of high quality and trustworthy. A unique and distinctive logo can set a brand apart in a crowded marketplace, making it easier for consumers to choose it over others (Schechter, Alvin H., 2010).

Due to advancements in technology and the existence of artificial intelligence, many companies are now considering using AI for creating logos instead of depending on human professional designers. The reason for this change is the knowledge that AI could greatly cut down on the cost and time required for creating logos (Liu, 2023). Professional designers, because of their expertise and personalized attention, frequently demand greater fees, and this tailored and specialized approach to an individual work makes the higher cost fair (Leech, D. J., & Smart, P. M., 1975). AI-driven technologies for logo creation have several advantages over traditional methods, like a wider range of choices, a simple process, and reduced costs.

Platforms like Looka and Canva, for instance, use AI to generate multiple logo variations in a matter of seconds. Looka AI generator allows anyone to create professional-looking logos without the need for extensive design knowledge. This AI-powered tool generates multiple

customizable logo alternatives based on user input. It is not difficult to say that these tools help with reducing the typical length of time and cost of the brainstorming and preliminary design phases, which can occasionally be expensive and time-consuming when done by human designers.

LogoDesign.net highlights that its AI logo maker creates one-of-a-kind and on-brand logos with an extreme time-saving effect so that small businesses and entrepreneurs can launch their brands easily. This tool reduces learning expensive graphic design skills and hiring professional designers to a minimum; therefore, it saves cost to a great extent. AI logo generators are not just time- and cost-effective but accessible to everyone regardless of the time of the day. Before we dive into the research study at hand, let's describe what is being attempted in measuring the effectiveness of logos designed by human creatives and artificial intelligence.

Logo effectiveness measurement

The effectiveness of a logo is a multi-dimensional process, including both qualitative and quantitative methods that deal with several dimensions of consumer interaction and perception. (Henderson, P. W., & Cote, J. A., 1998) mentioned some of the most critical aspects of a logo design are brand recognition and recall; therefore, logos need to be distinctive, simple, and relevant to the brand in order to enhance consumer memory. (Chris Janiszewski, Tom Meyvis, 2001) discuss consumer perception, where it is shown that the simpler the logo, the more fluent the processing of the information when repeated and spaced appropriately, which in turn creates positive consumer attitudes towards the brand name or logo. Other studies in this field, like (C. Whan Park, Andreas B. Eisingerich, Gratiana Pol, Jason Whan Park, 2013) focus on the emotional appeal of logos, mentioning that logos that evoke positive emotions can highly influence brand loyalty and performance.

The other important aspect of logos is logo's cross-cultural effectiveness, explored by (Tavassoli, N. T., Han, J. K., 2002), where the authors analyze auditory and visual brand identifiers within different cultural contexts. This study suggests that logos should be culturally adjustable so that they do not lose their impact across various markets. Moreover, the aesthetical aspects of a logo, including color and form, are critical to the effectiveness of the logo (Tavassoli, N. T., Han, J. K., 2002). Bottomley and Doyle examine the interactions between colors and products on brand logo appropriateness. This provides information on

how different design characteristics accentuate the effectiveness of a logo or have adverse effects (Bottomley, P. A., & Doyle, J. R., 2006). Neuromarketing techniques, for example, eye-tracking studies, supply data about how logos capture the eyes of consumers and guide visual behavior. Pieters and Wedel (2004) utilize eye-tracking techniques to examine the attention capture and transfer effects of logos within advertising; this research underlines logo placement, size, and its integration with other elements in advertising to maximize its effectiveness (Pieters, R., & Wedel, M., 2004). Another critical factor will be the impact on purchase intention, as seen in Henderson, Cote, Leong, and Schmitt, 2003. The research targets visual elements of logos across Asian markets, and the finding of this study proves that appropriately designed logos may potentially influence consumer purchase decisions (Henderson, P.W., Cote, J.A., Leong, S.M., and Schmitt, B., 2003).

There are several more aspects to measure the efficiency of a logo, but in a first effort to comprehend the most important elements of the design, (Pamela W. Henderson and Joseph A. Cote, 1998) found that there exist three fundamental dimensions of design: elaborateness, naturalness, and harmony. On this note, (Pamela W. Henderson and Joseph A. Cote, 1998) argue that **"**the elaborateness refers to the richness and ability of a design to capture the real essence of an object; natural designs are those that connote commonly experienced objects, while harmony refers to the congruency of patterns and parts of a design. **"** Other key metrics could be quality, affect, and recognition, which may give a better understanding (Kaur, H., and Kaur, K., 2019); (Ralf van der Lans, Joseph A. Cote, Catherine A. Cole, Siew Meng Leong, Ale Smidts, Pamela W. Henderson, Christian, 2009).

These studies all showed that there is much complexity involved when evaluating a logo's effectiveness. To sum up, it could be said that the efficiency of a logo depends on various aspects, but the most important ones are its level of recognition, consumer perception, emotional impact, adaptability to cultures, design elements, and neuromarketing insights. A strategic approach that embodies all these dimensions will lead to desired impacts for the logos of businesses and increase their chance of success.

In spite of all of these important aspects of logo design and logo measurement, a study in 1998 highlighted that there could be a chance that managers responsible for the selection of logos usually select it without depending on scientific criteria or by any established

techniques, due to a lack of research on the topic of logo selection (Pamela W. Henderson and Joseph A. Cote, 1998).

In this regard, we have considered two major metrics for the measurement of logo effectiveness: the first factor is likability or preference, as suggested by (Pittard, N., M. Ewing, C. Jevons, 2007). As presented by the authors, preference reflects the overall favorability that the consumers have over different logo designs, and the second factor is choice, meaning if the respondents opt for a logo over other possibilities.

Methods

In this study, the effectiveness of logos created by non-experts, with the help of AI, will be tested against logos created by expert human designers.

According to (Müller, V.C., Bostrom, N., 2016), although AI-generators improve efficiency and accessibility, there are concerns that AI generators lack creativity and uniqueness. In this research, by adding a non-expert human user, we will try to overcome the creativity and originality issue in AI-created artworks and test whether the outcome is better and more effective than an expert designer's outcome.

We are trying to test the study by Lubert (Lubart, 2005) to see if artificial intelligence can be a good partner to human users and will help in increasing the effectiveness, originality, and creativity of the outcomes in the field of marketing and design.

This part, therefore, explains how we choose our participants, how the generation of logos was conducted, what material was used in this study, and the procedure of the study. Details of the companies are shown in the Appendix, and the time used to generate each logo is reported, respectively.

This study tried to ask the evaluators only simple questions like which logo a person chooses, how much he likes it, and why he has chosen this logo as an open question. Thus, we obtain the quantitative data on the logo chosen and the qualitative data about this choice. Using these simple questions, we want to determine whether evaluators in general simply prefer logos designed by non-experts with the help of AI or logos designed by human expert designers. There would be no prior information in the questionnaire about the source of logo creation, and evaluators would respond to the logos in random order.

Procedure

Three professional visual designers have been invited to design just one logo for each of the companies. Three companies have participated in this study, whereas simultaneously, under the same conditions, I myself and another two non-experts have created one logo with the assist of AI for each of those companies using different AI visual creators. Precisely the same information shared about the background and activities of the company, goals, targeting group, and preferences that I got from the company owners with the hired expert designers and other two non-experts. It must be mentioned that the time spent on the creation process didn't play any role here, and experts could freely spend as much time as they needed.

To increase the validity of the result, in this study I have introduced two groups of evaluators. The first evaluator group included three business owners, and the second evaluator group includes 63 MBA, marketing students, or graduates. To ensure rigors, logos presented in each survey have been shown to evaluators randomly.

Six logos will be presented to an evaluator individually, who will be asked to review them within-subject, that is, in random order. A online questionnaire will be given to answer the questions, and a set of questions will be answered about each logo in the same manner. Evaluators will also view all six logos as a whole at the end of the survey and then respond to their preferred logo.

The independent variable of this research is type of logo creator. This is the factor we manipulate in our experiment and It has two levels: logos created by human expert designers and logos created by human non-experts with AI assistance. Participants will be exposed to one of these two conditions without knowing how this logo is created.

The dependent variable of this research is logo effectiveness. This variable is the outcome that we want to assess to determine which type of logo is more effective. Logo effectiveness would be measured using two metrics: liking as if the participant likes the visual aspect of the logo individually and choosing as if the participant prefers one of the logos over other possible choices.

Controlling variables are logo types (type-logo, mono-logo, combination-logo, and conceptual-logo), size, color, and context that in this study as prompt mentioned and is generated by AI.

Participants

As mentioned in the procedure above, evaluators have been divided into 2 groups . The first group of the logo evaluators were business owners who have already paid for the service of designing a logo pertaining to their own company, six logos in total for each company: three designed by expert designers and three designed by non-experts with the help of AI. In order for this study to be credible in measuring the dependent variable, 63 experienced marketing managers or students have been invited; all had adequate knowledge about marketing and branding and initiated the second group of evaluators.

According to Meyers-Levy and Barbara Lokan (2015), **"**Considering males process data more selectively and females more comprehensively, **"** (Joan Meyers-Levy, Barbara Loken, 2015) and to eliminate any biases regarding the gender and decision making process that may happen, both groups of evaluators consist of both genders and these company owners are also from both genders, paid the exact same amount for the service, and also are coming from 3 different industries. Below is the information for the participants in Group 1 in table form.

Name of the company	**Size of the company**	**industry**	**location**	**gender**	**Age range**
ABR Reinigung	SME	Cleaning service	Vienna	female	30-45
Kimia Bakerei	SME	Bakery	Vienna	male	30-45
AKU	SME	Saffron importer	Vienna	male	45-60

Due to the limited data we were able to gather on the effectiveness of logos in the first evaluator group, we have initiated a second round of evaluation with evaluator group 2.

It was important for the study that the second group of evaluators had at least sufficient knowledge of marketing and branding to get a better overview of the effectiveness of the logos. In this respect, I have used an international survey platform to recruit evaluators in the second group. I have randomly assigned the evaluators in group 2 to our three companies logo sets; this will result in having the ABR company logo survey with 22 participants, the AKU company logo survey with 20 participants, and lastly the KIMIA company logo survey with 21 participants. All test subjects in group 2 have gone through the exact same procedure as our test subjects in group 1. They have been exposed to each logo first individually in order to answer a fixed set of questions, and afterwards they have been exposed to all 6 logos provided in the survey at the same time, asking them which one they prefer.

Material

We have used six logos for each evaluator in Group 1. Three logos designed by human creatives and three logos designed by non-expert users with the help of artificial intelligence.

For designing these logos, three human designers with a minimum of 3 years of experience in logo design and three AI have been selected, and both groups of creators have been given the same exact prompt about the company as stated in the appendix. The three AIs used in this project are Midjourney, Copilot, and Dell-E. The effect of performance and biases in AI performance could be lessened by using three different AI tools when compared to one another and, at the same time, in comparison to our creatives. Finally, the following prompt was shared with the expert designers to create the logos for the first company. Meanwhile, I and the other two non-experts started creating them with the help of AI, using the same words from this prompt generated by AI as our seed:

ABR logo design prompt

ABR Company is a carpet cleaning company, located in Vienna, established in early 2023, providing carpet cleaning, furniture cleaning, and carpet repairing services. The manager of the company is a young lady, and the catchphrase of the company is "Bio Cleaning," whereby they indicate that they use 100 percent biomaterial. It provides free pickup and delivery services in Vienna and has a staff of two employees.

The owner wants a simple type-logo highlighting the company name, which has to symbolize cleanliness, professionalism, and eco-friendliness. Some design elements might be added in order to denote cleaning or washing; these elements cannot dominate design. This logo should show simplicity and cleanliness and use only black and white.

For the second company, KIMIA, prompt generated by AI was:

KIMIA logo design prompt

KIMIA is a young Viennese bakery that deals with traditional Iranian and Afghan bread. The business was founded in late 2023 and is managed by a man with three employees. Here, there is also an offer of traditional food. Their business concept is to combine traditional products in a modern bakery atmosphere. Finally, what the owner wants is a very modern logo representing a loaf of bread. Warm colors like beige, cream, brown, and khaki. The

design must express modernity, friendship, and fun, like the French bakeries' style.

And the last company, AKU, prompt generated by AI was:

AKU logo design prompt

AKU is a start-up from Vienna, founded in the middle of 2023, that imports and sells high-quality saffron from Iran to B2B customers within Austria. The company has four employees working very hard to create an exceptionally modern and creative way of packaging saffron. Their motto is "Schenken Sie blumen mal anderes."
He would like to have a quite modern logo with an image of a saffron flower and the actual red color of saffron. The logo should convey modernity, accessibility, and reliability.

After designing the logos, based on the prompts given, generated by AI and used as seed for the design procedure, the designing of questionnaires started. In the first page of the questionnaire, The company briefing is intended to provide an overview of the company's activities and of the industry in which the company operates to the evaluators, especially in the second group.

Looking at the gaps mentioned in previous studies, the questionnaire focuses on the preferences of the evaluators to test if AI, with the help of non-expert users, can help attain a higher effectivity than that of the expert designers. The questionnaire started with some information about the company and then the demographics part, where we asked about the gender, age, and location of the evaluators; for each of the individual logos, we asked the extent to which evaluators liked this logo on a 1-7 scale. How much they "like this logo", 1= dislike it, 7= really like it, then how likely would evaluators be to choose this logo for the purpose of the company on a scale of 1= not at all to 7=very much, and lastly, do evaluators have any remarks about this logo as an open-end question? At the end of each survey, all of the six logos showed at the same time, and we asked evaluators to choose one of the logos over all other options.

Results

Analysis of the collected data showed that logos created by non-experts with AI support are not only highly liked but also are more frequent to be chosen compared to logos created by expert human designers. To be more detailed, the results showed that the average mean of

liking of the logos designed by non-professional designers using artificial intelligence, which is 4.1717, was considerably higher than the average mean of liking of logos designed by professional designers with a mean of 3.7323.
Furthermore, the mean selection rate of logos created by non-experts with AI support, with a mean of 3.7424, is also significantly higher than those made by expert designers, with a mean of 3.3182. Our findings on the increased likability and selection preference of non-expert-created logos with AI as a collaborator can provide some useful pointers toward answering Lubart's question about whether computers can indeed be fellow creators.
The result confirms that AI tools improve the quality of people's output without professional design training, so that their designs are more appealing and in greater demand by more people.

Discussion

Our findings on increased likability and selection preference of logos created by non-experts with the aid of AI make a contribution to the inquiry by Lubart on whether the computer could be a partner or not in the creative process (Lubart, 2005).

First and foremost, our results act as an empirical proof that computers can actually be robust coauthors of creativity. Our research demonstrates the superior performance of AI-assisted designs over those created by human professional designers; therefore, the problem of using AI in creative fields without having a human touch, which was mentioned before with a non-expert assist, could be solved.

Secondly, our results give insight into the practicality of making AI tools as a part of one's creative workflow. Results suggest that AI use as an assistant can result in more desirable audience reception and selection, demonstrating computational method value in the creative process.

This study also helps to add to the growing discourse on how human-machine relationships can form a core contribution to creative enterprises. Specifically, our findings that clearly demonstrate real benefits from AI collaboration shed light on how technology can become a collaborator in creative pursuits and add value to human creativity, as discussed by Lubart (Lubart, 2005).

Conclusion

The present research focuses on exploring whether the logos designed with the use of AI by non-experts are more effective compared to those designed by professional logo designers. Our findings answer this question positively and show that non-expert AI-assisted logos are better liked and more frequently chosen. Therefore, we confirm these alternative hypotheses: H1 and H2 and conclude that AI assistance significantly improves the effectiveness of logo designs, as reflected in the aesthetic liking and preference of choice.

This study shows that AI tools may democratize the design process so that high-quality and attractive logos are possible to be created even by people who do not have professional training. To this end, it might involve far greater accessibility and affordability of logo design, especially for small and start-up businesses that are not in a position to afford professional designers.

The power of AI as a collaborative tool in creative processes also comes out in the study. While AI is extremely useful in making design processes easier and more efficient, with better quality output, it would need the human element of creativity in the background. A non-expert who makes use of AI could utilize the strengths of both human intuition and AI computational powers in ensuring superior design output.

Despite these promising results, there are a number of limitations in this study that need to be mentioned. First, the sample is small; evaluation in a controlled environment does not capture all the complexities of customer behavior in the real world. It is therefore recommended that future research be done with larger, more representative samples to assess consumer preference in the long run and on the impacts of brands with AI-aided logos.

Furthermore, time could be an important aspect of future studies. By considering only a limited amount of time for a non-experts with AI assistance and expert designers in order to make a logo or visual art, it may present to us a better view about the effectiveness of the outcome.

However, as AI-aided logos proved to be a favorite in this study, the role of context-sensitive and culturally appropriate designs, which are the skills of human designers, remains to be further researched. Future research would then have to be conducted on how AI can be trained to better adapt cultural and contextual elements into designs.

Finally, the rapid development of AI technology forebodes that the abilities of AI in creative processes themselves will be subject to further development. In this respect, research should continue to follow these developments and constantly re-evaluate the relative performance of AI-supported versus human-designed designs.

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Appendix

ABR Company-AI generated prompt and introduction

ABR is a supplier that offers deals in the field of cleaning carpets. It is located in Vienna and was established in 2023. ABR deals in various treatments, which encompass carpet cleaning, furniture cleaning, and carpet repair. The helm of the company is captained by a female manager. The motto of the company is "Bio Cleaning", which means that they are supposed to utilize nothing but 100% bio-material. Apart from the services mentioned earlier, ABR provides free delivery of all the carpets that are purchased through the mail to any location in Vienna. It is an SME with just 2 employees.

ABR Logo prompt

ABR Company requires an Abstract logo with their name focus; please use some design elements which can represent the cleanliness and professionalism as well as eco-friendly; Design element can be about cleaning and washing then its really fine to include for but it's not a compulsion also not emphasizing on design, the logo design should show simple in communication and clean in communication; It should be designed in black and white.Average time spends for non-expert with the help of AI to create logos:

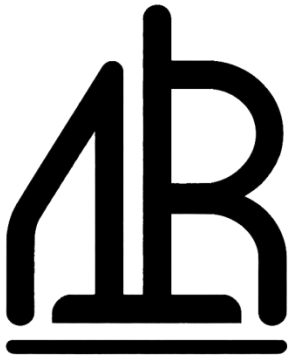
It took an average of 30 minutes to come up with a design that corresponds to the requirements.

Average time spends for expert to create logos:

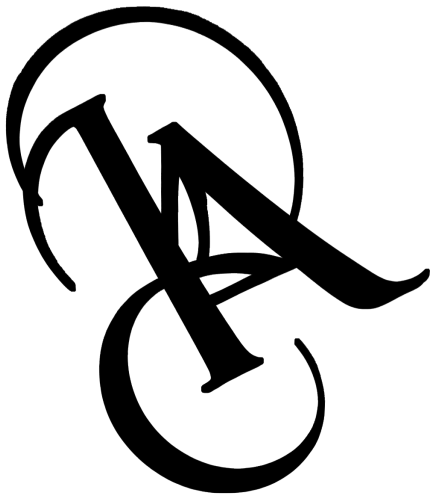
It reported that in average 60 minutes took that the designers created the logos.

*It must be reported that prompts generated with AI were used as seed to start the logo design process with AI logo generators.

ABR logos generated by non-experts with the help of AI



ABR logos generated by professional designers



KIMIA Company-AI generated prompt and introduction

KIMIA is a new founded company located in Vienna which is active as a bakery. KIMIA founded late in 2023 and focus more on traditional Iranian and Afghanistan's breads. The company is founded and managed by a male manager and has 3 employees. They try to provide customers not only with breads but also with some traditional foods. Beside their products, they wanted to be seen as a modern bakery.

KIMIA logo

The owner of the KIMIA Company wanted a very modern logo. Using a loaf of bread in the design was a must to do and using warm colors like beige, cream, brown and khaki was another requirement. It must be modern, friendly, fun and in the style of French bakeries.

Average time spends for non-expert with the help of AI to create logos:

It took an average of 45 minutes to come up with a design that corresponds to the requirements.

Average time spends for expert to create logos:

It is reported that in average 150 minutes took that the designers created the logos.

KIMIA logos generated by non-expert with the help of AI

KIMIA logos generated by professional designers

AKU Company-AI generated prompt and introduction

AKU is a new founded start-up located in Vienna. AKU main activity is importing saffron from Iran and then packaging and selling them in Austria founded in 2023. The company is founded and managed by a male manager and has 4 employees. They try to provide B2B customers with the best quality saffron which is packaged in a modern and appealing way. The company tries to find new market for their products and their slogan is ‘Schenken Sie blumen mal anderes’.

AKU logo

Design considerations: include in the design the reference to the saffron flower and keep the authentic red that saffron stands for. Logo must be modern, warm, and friendly.

Average time spends for non-expert with the help of AI to create logos:

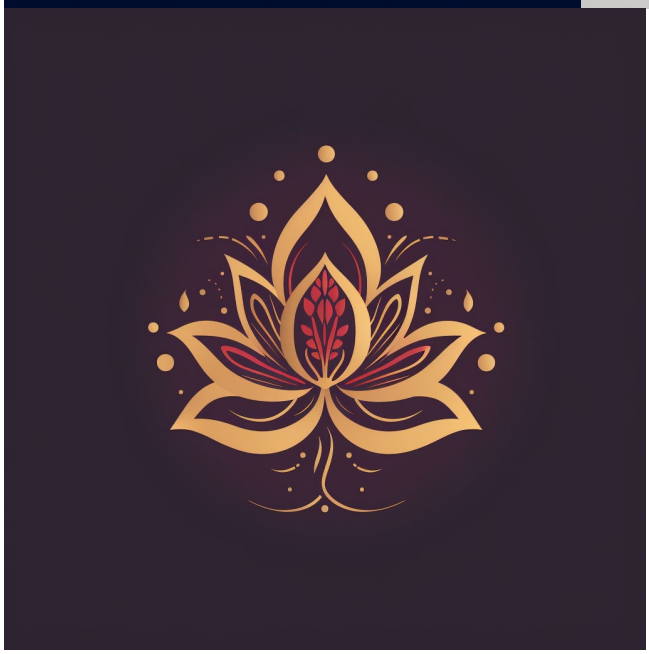
It has taken an average of 40 minutes to come up with a design corresponding to the requirements.

Average time spends for expert to create logos :

An average of 120 minutes were reported for the designers in creating designs.

KIMIA logos generated by professional designers

KIMIA logos generated by non-expert with the help of AI



Hypothesis H1

Null Hypothesis (H_0): There is no significant difference in the liking of logos created by non-experts with the help of AI and those created by expert designers.

Alternative Hypothesis (H_1): The liking of logos created by non-experts with the help of AI is higher compared to those created by expert designers.

Test Statistics

Mean liking of logos by non-experts with AI: 4.1717

Mean liking of logos by expert designers: 3.7323

T-value: 3.277

P-value (two-sided): 0.004

Degrees of freedom: 21

T-value Analysis:

For a two-tailed test with df = 21 and $\alpha = 0.05$, the critical t-values are approximately ± 2.080.

The observed t-value is 3.277, which is greater than the critical t-value.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	LikingAi	4.1717	22	.86116	.18360
	LikingHu	3.7323	22	.60145	.12823

Paired Samples Correlations

				Significance	
		N	Correlation	One-Sided p	Two-Sided p
Pair 1	LikingAi & LikingHu	22	.683	<.001	<.001

Paired Samples Test

		Paired Differences			
					95% Confidence Interval of the Difference
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	LikingAi - LikingHu	.43939	.62899	.13410	.16052

Paired Samples Test

		Paired Differences			Significance	
		95% Confidence Interval of the Difference				
		Upper	t	df	One-Sided p	Two-Sided p
Pair 1	LikingAi - LikingHu	.71827	3.277	21	.002	.004

Paired Samples Effect Sizes

					95% Confidence Interval
			Standardizer[a]	Point Estimate	Lower
Pair 1	LikingAi - LikingHu	Cohen's d	.62899	.699	.224
		Hedges' correction	.65262	.673	.216

Paired Samples Effect Sizes

			95% Confidence Interval[a]
			Upper
Pair 1	LikingAi - LikingHu	Cohen's d	1.160
		Hedges' correction	1.118

Hypothesis H2

Null Hypothesis (H_0): There is no significant difference in the choosing of logos created by non-experts with the help of AI and those created by expert designers.

Alternative Hypothesis (H_1): The choosing of logos created by non-experts with the help of AI is higher compared to those created by expert designers.

Test Statistics

Mean choosing of logos by non-experts with AI: 3.7424

Mean choosing of logos by expert designers: 3.3182

T-value: 2.162

P-value (two-sided): 0.042

Degrees of freedom: 21

T-value Analysis:

For a two-tailed test with df = 21 and $\alpha = 0.05$, the critical t-values are approximately ±2.080.

The observed t-value is 2.162, which is greater than the critical t-value.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ChossingAi	3.7424	22	1.15235	.24568
	ChossingHu	3.3182	22	.76081	.16221

Paired Samples Correlations

		N	Correlation	Significance One-Sided p	Significance Two-Sided p
Pair 1	ChossingAi & ChossingHu	22	.604	.001	.003

Paired Samples Test

		Paired Differences			
					95% Confidence Interval of the Difference
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	ChossingAi - ChossingHu	.42424	.92049	.19625	.01612

Paired Samples Test

		Paired Differences			Significance
		95% Confidence Interval of the Difference			
		Upper	t	df	One-Sided p
Pair 1	ChossingAi - ChossingHu	.83237	2.162	21	.021

Paired Samples Test

		Significance
		Two-Sided p
Pair 1	ChossingAi - ChossingHu	.042

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval Lower
Pair 1	ChossingAi - ChossingHu	Cohen's d	.92049	.461	.016
		Hedges' correction	.95508	.444	.015

Paired Samples Effect Sizes

			95% Confidence Interval[a]
			Upper
Pair 1	ChossingAi - ChossingHu	Cohen's d	.896
		Hedges' correction	.864