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Exploring Swedish Perspectives on Generative AI in Graphic Design: A Qualitative Study on Professional Perceptions

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ABSTRACT (MAX. 200 WORDS):

This study explores the perceptions of graphic designers regarding the impact of generative artificial intelligence (GenAI) on their profession. It aims to highlight practical examples of how GenAI is integrated into the work of graphic designers. To achieve this, qualitative data was collected through semi-structured interviews with six professional graphic designers. The findings reveal that the influence of GenAI varies significantly depending on the specific tasks involved. While GenAI has been adopted for certain repetitive tasks of the design process, respondents do not perceive it as a replacement for human creativity or expertise. Instead, most respondents view AI as a complementary tool that enhances efficiency and expands creative possibilities. This study provides valuable insights into the evolving relationship between GenAI and graphic design. Highlighting the importance of being able to work with, and apart to, technology as it advances.

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1 Introduction

Graphic design, as defined by Merriam-Webster, is “the art or profession of using design elements to convey information or create an effect.” (“graphic design”, Merriam-Webster). This is no new skill, rather, it has ancient roots dating back to prehistoric cave drawings used to communicate essential survival skills (Meggs & Purvis, 2016). As technology advanced over the centuries, graphic design evolved from traditional techniques to modern practices, such as digital media (Meggs & Purvis, 2016). Recently, artificial intelligence (AI) has opened up new possibilities within graphic design, transforming how designers approach their work and enabling them to leverage powerful new tools (Maurya et al., 2024; Roose, 2022).

In order to explore how AI has been integrated into graphic design, one must first define AI. However, a single, finite definition of AI is difficult to present, as it depends on what approach is taken. IBM defines AI as “technology that enables computers and machines to simulate human intelligence and problem-solving capabilities” (IBM, 2024) while McKinsey & Company defines it as “a machine’s ability to perform the cognitive functions we usually associate with human minds” (McKinsey & Company, 2024).

A subset of AI known as Generative AI (GenAI) has truly changed the capabilities of AI and society (Mollick, 2024). It specializes in creating fresh and meaningful content, in the form of text and images (Feuerriegel et al., 2024), but also videos, sound and other forms of fresh content (Mollick, 2024). It has recently gained more popularity, with the releases of tools such as Dall-E 2 and ChatGPT 4, that are capable of creating images from text (Benbya et al., 2024). Advancements in deep learning have fueled GenAI's growth, enabling the creation of images based on textual input (Frolov et al., 2021). The system has the remarkable ability to generate images based on extremely detailed instructions, even if they lack real-world coherence. For instance, no actual photographs exist of a panda baking bread or a dragon fruit wearing a karate belt in the snow, but the system is capable of producing such images nonetheless (Saharia et al., 2022).

Over time, AI has iterated over many hype cycles, but according to IBM (2024), the release ChatGPT has marked the turning point. In the past, GenAI made significant strides primarily in computer vision. However, the current leap forward is happening in natural language processing (NLP) (IBM, 2024). In the 2023 Gartner Hype Cycle, which showcases 25 emerging technologies crucial for enterprise architects and tech innovators to maintain a competitive edge, GenAI was positioned at the peak of inflated expectations. Which means that it is a technology identified as having significant potential to provide a competitive advantage for businesses (Gartner, 2023).

1.1 Problem Formulation

As AI has continued to push the boundaries of technological advancement, and smart machines have become a staple in many households worldwide, the possibility of sentient machines is often regarded with a combination of fascination and fear (McKinsey & Company, 2024). For instance, the rise of automated systems led many to predict the demise of professions like accounting (Higgins, 2023). However, contrary to the public belief in recent years

there's currently a shortage of accountants, which is negatively affecting the financial statements of companies (Maurer, 2023). There has been rapid development in GenAI tools such as Dall-E 2 and Midjourney (OpenAI, 2022; Midjourney, 2023). This raises concerns about whether other occupations, like graphic design, might encounter a similar fate where the rapid development of Dall-E 2 and Midjourney could potentially scare people into not getting an education in graphic design with the fear that their skills could be replaced by AI. In Sweden alone, 7700 people work as graphic designers with an average salary of 37000 sek per month (Arbetsförmedlingen, 2024), while in America 211,890 people work in graphic design with the mean annual wage being \$64,500 (U.S. Bureau of Labor Statistics, 2022). This means that the potential disruption caused by GenAI could potentially affect the occupation of a lot of people.

AI provides the processing capabilities for autonomy that many recent innovative services rely on, leading to significant impacts on businesses as they replace or alter job roles and expectations (Brynjolfsson, 2022; Ågerfalk et al., 2022; Russell & Norvig, 2016). Consequently, employee skill sets will need to adapt in parallel with AI's growth. According to French et al (2021) new job categories such as AI trainers, explainers, and sustainers will emerge, reflecting the need for human expertise to guide these systems to perform tasks with empathy and nuanced understanding (French et al., 2021). The capacity of AI to perform tasks that once required human judgment and creativity raises questions about the potential disruption of traditional roles and its broader impact on the way humans work (Benbya et al., 2024).

Central to our investigation will be the adoption and use of information technology in the workplace, which according to Venkatesh and Davis (2000) remains a central part of information systems research. Within the realm of information systems, Ågerfalk et al. (2022) argue that AI often focuses too much on the technology itself rather than on its interaction with human agents. Instead of automating human tasks, the authors suggest that the emphasis should be on technologies that support and augment human capabilities. Brynjolfsson (2022) shares the same viewpoint as Ågerfalk et al and argues that the community instead should be focused on creating tools that augment human ability instead of automating it. This phenomenon that Brynjolfsson discusses is also discussed by Russel and Norvig (2016) and is described as technological unemployment and is not a new phenomenon. In their book on AI, titled "Artificial Intelligence: A Modern Approach", they state that Aristotle, in 322 BCC, anticipated technological unemployment and then stated the following:

"If every tool when ordered or even of its own accord could do the work that befits it, then there would be no need either of apprentices for the master workers or of slaves for the lords" (Russell & Norvig, 2016 p.983)

In addition to professional graphic designers learning how to integrate GenAI into their work successfully, institutions of higher education in graphic design may draw inspiration from our research to evaluate and potentially update their courses in light of recent advancements in GenAI. Staying current with technological developments is crucial for higher education to maintain its value. The motivation for the paper shall not be seen as criticism of the educational system for graphic designers, which is an area the researchers conducting this study have no knowledge of. Instead, the motivation comes from the belief that the rapid progress in GenAI requires graphic design education, like many other fields, to evolve and adapt.

1.2 Purpose

The main purpose of this study is to determine to what extent recent advancements in GenAI models and tools have impacted the profession of graphic design. The research seeks to provide valuable insights into the impact of emerging technologies in transforming traditional roles and responsibilities of graphic designers in the digital age.

1.3 Research Question

RQ: How do graphic designers perceive the impact of generative artificial intelligence on their profession?

1.4 Delimitation

The research will be limited to the perception of Swedish graphic designers, a country that is highly digitalized. For instance, Sweden was placed third on the European Commission's ranking of digital competitiveness within the EU, after fellow Nordic countries Denmark and Finland (EU, 2021). It is therefore possible that the findings in this study will not be applicable to countries that are less digitized due to different needs or cultural context of graphic design from the companies and individuals in those countries. Furthermore, the research will focus on AI-driven tools utilized for tasks such as image generation as well as smaller, integrated functions embedded in other digital tools used for graphic design. Other applications of AI in design, such as user experience optimization, will be excluded from the study.

2 Literature

This chapter provides supporting literature on the subjects of graphic design and AI, as well as the use of AI within graphic design. It highlights previous research and portrays the current landscape within the field. Large parts of the chapter are structured in a timeline-like manner, starting with previous achievements, and moving forward into present day.

2.1 Graphic Design

This section goes into the history of graphic design, and how the tools used within the profession have evolved from prehistoric times to the present day.

2.1.1 History of Graphic Design

The power to communicate has been essential for humanity's progress from a simple existence to forming communities. While spoken words allowed collaboration, they had limitations by the constraints of the human memory. However written text and images endure. Our ancestors while using charcoal communicated visually and shared hunting and survival practices through drawings of animals and rituals. It was not just art that they created but instead it was a vital form of communication for the progress of the tribe (Meggs & Purvis, 2016).



Figure 1.1: Fremont rock painting from San Raphael Swell c.2000-1000 BCE (Meggs & Purvis, 2016, p.180)

However, hand-drawings had limitations. It is prone to inconsistencies making exact replication challenging (Eisenstein, 2012). Woodcuts were invented which had the function of creating patterns in wooden blocks (Walker, 2005). Combining woodcuts with letterpress, two

separate inventions sparked a communications revolution (Eisenstein, 2012). People from everywhere could now visualize identical pictures, maps, and diagrams for the very first time (Eisenstein, 2012). Additionally, the ability to manipulate light has been an important skill for centuries, dating back to the renaissance period of the 14th century. They used to create visual illusions using a single light source and its shadow (Meggs & Purvis, 2016).

In 1886 Ottmar Mergenthaler invented the Linotype, which started the mechanization of typography. The invention included creating lines of type by pouring metal into molds containing the individual characters selected from the Linotype machine's keyboard. Once the metal cooled and solidified, it formed a solid line of text, ready for use in printing (Meggs & Purvis, 2016). The Linotype machine increased the speed of typesetting which reduced the time and labour required for printing newspapers, books. It played a crucial role in the spread of information during the late 19th and early 20th centuries and contributed to the growth of the printing and publishing industries (Meggs & Purvis, 2016).

Images and books dominated the world until the digital revolution in the 1980s, where companies invested billions in computer power. This led to a significant increase in computer capabilities, accompanied by a substantial decrease in prices (Sichel, 1997). Computers have significantly sped up graphic design projects, reducing timelines from months to days with the help of advanced software (Meggs & Purvis, 2016). In the early 1990s, digital tools like QuarkXPress and Adobe Photoshop emerged. QuarkXPress provided graphic designers with the precise control over element placement on a page, while Adobe Photoshop was proven to be helpful for image creation and also provided the possibility for image manipulation (Meggs & Purvis, 2016). During this period, graphic designers like David Carson emerged and are regarded as a pioneer of the computer revolution in graphic design, known for his unconventional cropping of letters to convey content (Meggs & Purvis, 2016)



Figure 1.2: David Carson is the art director of this piece named “Hanging at Carmine Street” published in the magazine *Beach Culture* (Meggs & Purvis, 2016, p.1656)

In today's graphic design, AI has been integrated into the digital tools provided by software companies such as Adobe known for graphics editors such as Photoshop and Illustrator (Adobe, 2024a). In Gartner's Digital Experience Platforms report (2024), Adobe maintained

its longstanding position as the industry leader, securing the top spot in their Magic Quadrant (Gartner, 2024). Adobe offers a range of products, including Adobe Firefly, which offers capabilities such as generative filling where an algorithm analyzes nearby pixels, textures, patterns, and colors to understand the context of the area to fill (Adobe, 2024b). Based on this analysis, it generates a matching pattern or texture to fill in the selected region. The generated pattern is then blended into the missing area, adapting to its shape, contours, and texture to ensure a natural and consistent appearance within the image (Adobe, 2024b). Adobe firefly also has the capability of generating images from text (Adobe, 2024b).



Figure 1.3: Gartner's Magic Quadrant 2023 (Gartner, 2024)

2.2 Artificial Intelligence

The term artificial intelligence (AI) was introduced in 1956 when John McCarthy hosted a workshop at Dartmouth College in New Hampshire. Ten scientists were selected to address the question: Can machines simulate aspects of human intelligence? This workshop can be seen as the birth of the field and an attempt was made to find out how to make machines use language, form abstractions and concepts, as well as solve problems that were previously only reserved for humans. A statement was made that if a team of carefully selected scientists were chosen, then significant advancements in addressing one or more of the key problems could be achieved (McCarthy et al. 2006).

Over the years, the term AI has evolved into an umbrella term, which encompasses a range of technologies developed to identify some sort of intelligent behavior stretching all the way from machine learning (ML) to conscious robotics (French et al., 2021). The term AI has also been used to describe intelligent machines themselves and their capabilities. Such technologies include ML, logical reasoning, pattern recognition, and natural language understanding

(Burgess, 2018). As has already been established, the definition of AI can vary, depending on what approach is used, for instance, Russell and Norvig (2016) defines AI as systems designed to emulate cognitive functions such as learning, speech and problem solving, which are usually associated with humans (Russell & Norvig, 2016).

Replicating human capabilities holds significant value, not only for its potential in minimizing the reliance on human labor but also for its contribution towards constructing more adaptable forms of intelligence. While specialized technologies may advance swiftly in specific and narrow domains, they often fail when confronted with unpredictable challenges or situations. This is where human-like intelligence demonstrates its superiority, excelling in navigating complex and unanticipated scenarios (Brynjolfsson, 2022).

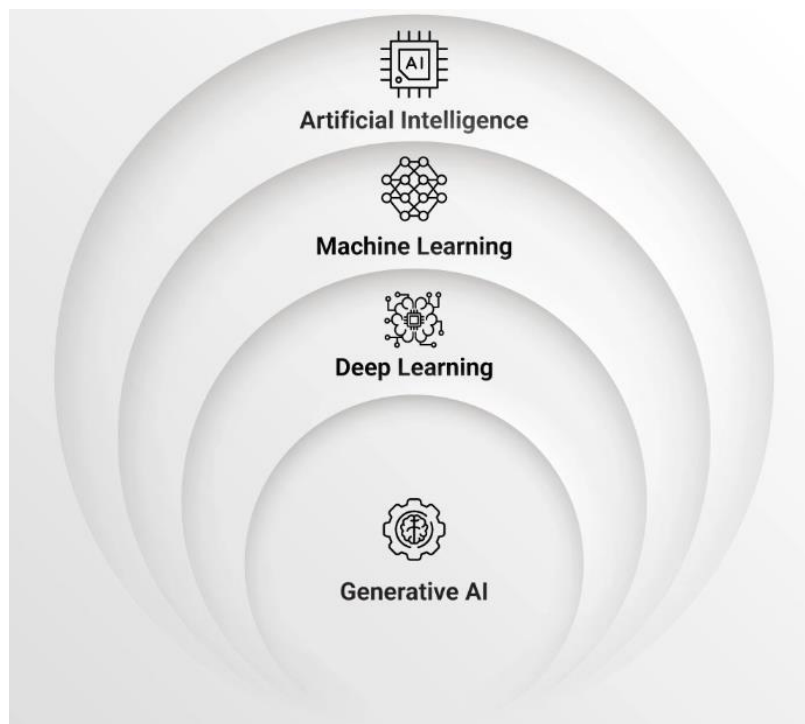


Figure 1.4: Relation between AI, ML, DL and GenAI (Purohit, 2023)

2.2.1 Machine Learning

Machine learning (ML), a subset of AI, is one of the most relevant AI technologies available, and can be defined as “an application of AI that enables systems to learn and improve from experience without being explicitly programmed” (Expert.ai, 2020). Using statistical techniques, ML models are able to train, and learn, using available data. Increasing amounts of data have facilitated the process of training ML models and improving learning algorithms (French et al., 2021). The three most common types of ML algorithms include supervised learning, unsupervised learning, and reinforcement learning. ML models are categorized into one of these three approaches by the nature of the data used to build the model (Russell & Norvig, 2016). ML is largely adopted across a range of different fields including data security, finance, healthcare, fraud detection and retail (Expert.ai, 2022).

Deep learning (DL), which is a branch of ML, imitates neuron layers in the human brain in order to learn and recognize patterns of data. This has successfully been applied in various different fields, including the medical sector, where it has been used to diagnose diseases (French et al., 2021). Additionally, advancements within DL have enabled applications in fields such as industrial automation and forecasting because it can interpret and generate complex data (Mirsky et al., 2023).

2.2.2 *Generative AI*

Generative AI (GenAI) refers to a branch of AI with the ability to generate new and valuable content in the form of text or images, based on training data (Feuerriegel et al., 2024). It has emerged as an innovative branch within ML as it enables the synthesis of complex data. It has already displayed suitable applications in several fields, including natural language processing, computer vision as well as in the music industry (Kaswan et al., 2023). The recent releases of tools such as Dall-E 2 and ChatGPT-4, as well as Google's Bard and Microsoft's Bing, have further brought the interest of GenAI to the spotlight (Benbya et al., 2024).

GenAI involves a collaborative process where a human interacts with an AI system through prompts to create content. Initially, it might seem like the AI system simply follows orders, with the AI interpreting the human's prompts and provides feedback. However, Feuerriegel et al., (2024) argues that the interaction evolves into co-creation as the AI's output influences the human's prompts. This dynamic leads to a collaborative process where both parties contribute insights to guide the design process, resulting in an outcome that has been crafted by human and AI together (Feuerriegel et al., 2024).

Feuerriegel et al. (2024) highlight four fundamental issues with the current generation of GenAI models: incorrect outputs, bias and fairness, copyright infringements, and environmental concerns. For example, GenAI outputs the most probable response, which does not necessarily equal the correct response. This is because the ML models rely on probabilistic algorithms when responding to a prompt. The quality of a GenAI model is heavily dependent on the quality of training data, as three of the four mentioned issues can be derived from the training data (Feuerriegel et al., 2024). Copyright infringement is part of a larger pool of ethical issues surrounding the use of GenAI, which also includes data privacy and security, as well as the possible malicious use of technologies such as deep fakes (Benbya et al., 2024).

2.3 **AI in Graphic Design**

This section delves into the usage of AI within graphic design. It covers image-recognition, image-generation and collaboration between human agents and AI.

2.3.1 *Image-Recognition*

Although not directly related to graphic design, AI has since the beginning been dealing with tasks that are correlated to images. One year after the Dartmouth Workshop Frank Rosenblatt who at the time was working at the Cornell Aeronautical Laboratory, developed the

Perceptron, a machine for automated image recognition. The task given to the perceptron was to learn how to recognize two-dimensional alphabetical characters (Somaini, 2023).

In the 1970s and 1980s there was advancement made in neural networks. Their effectiveness was boasted by the "back-propagation of error" algorithm (Somaini, 2023). This algorithm allows for the identification and correction of errors, such as misidentifying a digit. It works by tracing back through the network, layer by layer and connection by connection, to find the factors causing the error. By adjusting these factors, known as "weights," which control the flow of information between connections, the error can be corrected (Somaini, 2023). Le Cun et al. (1990) used an application of the back-propagation algorithm to identify handwritten digits. In order to train the network Yann Le Cun and colleagues used zip codes that were written by different people with different handwriting that appeared on mail that was sent to a post office in Buffalo, United States and supplemented this by printed digits in different fonts (LeCun et al., 1990). The method used achieved a 1 % error rate and about a 9% reject rate on zip code digits provided by the U.S. Postal Service. The network was made in a way that lets it learn from data without needing an extensive amount of preprocessing. Back-propagation learning had therefore been achieved on a real-world task (LeCun et al., 1990).

In 2009 Deng et al. authored a research paper about the idea that the vast amount of image data now available on the internet has the potential to create models and algorithms that can interact with images and multimedia data. However, they recognized there was an issue with how the image data available on the internet was collected and harvested. The issue was that previously object recognition algorithms had primarily focused on common objects such as pedestrians, cars, and faces due to the extensive availability of images for these categories (Deng et al., 2009). Additionally, even the largest datasets available at that time displayed bias in covering different object types. Therefore, the authors introduced ImageNet that they hoped would become a benchmark dataset and contain a diverse range of images across nearly all object classes, including rare ones (Deng et al., 2009). The images used in the dataset were gathered from the internet and labelled by human labelers utilizing Amazon's Mechanical Turk crowd-sourcing platform (Deng et al., 2009; Krishevsky, et al., 2017).

A statement by Krishevsky et al. (2017) was made that while advances have been made in improving neural network architectures and training methodologies, there is still a significant gap between the performance of artificial neural networks and the capabilities of a human. In 2012 Krishevsky et al. (2017) entered a competition to The ImageNet Large Scale Visual Recognition Challenge (ILSVRC) evaluates algorithms for object detection and image classification at large scale. The network had a top-5 error rate of 15.3%. The key finding of the original paper emphasized the crucial importance of having a deep model (Krishevsky, et al., 2017).

2.3.2 *Image-Generation*

The basic idea of image generation is to generate new images from text-based prompts using DL models (Benbya et al., 2024), referred to as text-to-image models. These models are usually trained on large sets of data (Arikan et al., 2022). Text-to-image models, exemplified by Dall-E 2 and OpenAI, have demonstrated impressive advancements in generating images from prompted text. Notably, these models often deliver high-quality images, correctly depicting what has been described in the prompt, even when it was not included in the training data (Sasaki et al., 2024).

In recent years, Generative Adversarial Networks (GANs) have enabled new applications of ML and DL models (Arikan et al., 2022). GANs utilize a two-player adversarial game, consisting of a generator and a discriminator network. The generator is tasked with producing synthetic data instances that closely resemble real data distributions, while the discriminator's role is to distinguish between real and generated data. During the training process, both networks are optimized in a minmax game scenario. Here, the generator strives to enhance its capacity in generating data that simulates real-world data, thereby effectively fooling the discriminator. This is what enables precise generation of data, which closely resembles its real-life counterpart (Kaswan et al., 2023). Unlike earlier AI-based art, which was based on specific rules and parameters, the algorithms are designed to recognize aesthetics by observing a large number of images. Generated images are then based on the aesthetic styles and patterns it has learned during training (Arikan et al., 2022).

Image-generation has found several applications in recent years. It facilitates all from the creation of photo-realistic images, videos, and animations to content- and deep fake generation. This, however, encompasses a lot of ethical issues (Kaswan et al., 2023), as also mentioned by Feuerriegel et al. (2024) and Benbya et al. (2024). For example, questions concerning authorship, intellectual property rights, and accountability needs to be dealt with. It is a process that involves multiple stakeholders, including programmers and trainers of GenAI models, creators of the original works utilized for training, and users who output content from the system. Establishing clear guidelines is necessary to prevent future issues regarding these questions (Benbya et al., 2024).

OpenAI launched the original Dall-E in January 2021, initially characterized by limited abilities. Dall-E is described by OpenAI as a tool capable of creating “original, realistic images and art from a text description. It can combine concepts, attributes, and styles” (OpenAI, 2022). However, Dall-E has undergone significant improvements very quickly. A year later, the newest version, Dall-E 2 produces images that are not only more realistic but also boast four times the resolution compared to the original Dall-E (OpenAI, 2022).

Similar to Dall-E 2 by OpenAI, Midjourney is another text-to-image tool capable of creating high quality images from a short and descriptive text prompt. It is then possible for users to iterate and improve their selected image to enhance its correlation to the given prompt (Midjourney, 2024). Even though these tools have undergone massive improvements in the past few years, some issues remain. For instance, “The lone banana problem” refers to Midjourney’s inability to generate an image depicting a single banana when specifically prompted to do so (Riemer & Peter, 2023; Hook, 2023). Regardless, the technical advancements that are made for this type of AI makes it possible for people with minimal expertise in graphic design to create photo-realistic artwork just by simply entering text into a designated textbox (Roose, 2022), albeit with some issues.

2.3.3 Creativity & AI

Creativity drives innovation, and as the use and popularity of AI has increased, it has now become able to successfully complete creative tasks and generate creative content (Siemon et al., 2022). However, it is not always a success. According to Mollick (2024), AI’s greatest strength, to make things up, is also its biggest weakness. As large language models (LLM) works by predicting the next word most plausible for the given prompt based on training data,

it does not actually care if the statement is true or meaningful. Hallucination like this occurs because the responses given by the models are based on statistical patterns inside the training data. However, innovative ideas are often based on already existing concepts, or at least draws some sort of inspiration from already existing works (Mollick, 2024).

Over time, a complex relationship has emerged between AI and creativity. This relationship fosters the question of AI being able to replace or hinder creativity. According to Joshi (2023), the answer to this question is no. To come to this conclusion, you have to look at AI as a tool for creative capabilities. Even though ML driven tools are able to generate impressive results, the best results are often derived from an iterative process combined with human intuition and experience (Joshi, 2023). On the other hand, Fabri et al. (2022) argues that unsuccessfully managed exposure to AI-enabled systems runs the risk of decreasing creativity within an organization due to decreased knowledge among human agents. Due to the recent advancement in AI generating art, video and music, researchers have argued that creative tasks may be the ones most affected by the new wave of GenAI (Mollick, 2024).

2.3.4 Co-Intelligence

Mollick (2024) stresses the importance of being the human-in-the-loop as AI tends to function better with the help of a human. To increase the chance of successfully solving a problem with the help of AI, AI needs to actively interact with humans. There are several options for such a role, for instance, AI can act as a mediator to fix issues or work alongside humans to evaluate ideas (Siemon et al., 2022). While working with AI, the human agent can focus on adding value via creative capabilities as well as displaying emotions (Fabri et al., 2022). Leveraging the symbiotic relationship between humans and AI, so-called hybrid intelligence, referred to as co-intelligence by Mollick (2024), will increase performance levels as it will perform better than the two would have done separately (Siemon et al., 2022).

The idea of Centaurs and Cyborgs, two ways of approaching human and AI co-intelligence, was brought forward by Mollick (2023). In the Centaur approach, the line between human work and machine work can be easily distinguished, with tasks separated into AI-tasks and human-tasks. The Cyborg approach instead integrates human and machine tasks. Mollick (2023) argues that while both approaches may be successful for their own purpose, the most natural way to integrate AI would be to start with the Centaur approach and then naturally transition into the Cyborg approach. Brynjolfsson (2022) presents the figure depicted in figure 1.5, as a way to represent the much-needed focus on augmentation rather than automation of human tasks. In line with the Cyborg approach by Mollick (2023), augmenting human capabilities will create countless new opportunities and capabilities. As depicted in the figure, the number of tasks enabled by co-intelligence is far greater than the number of tasks humans or AI, can achieve on their own.

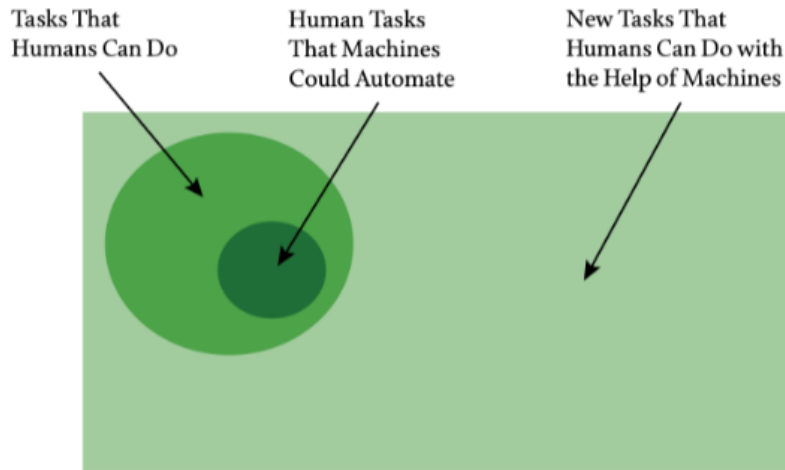


Figure 1.5: Tasks for augmenting human abilities (Brynjolfsson, 2022)

Previous studies have explored how people's attitudes and beliefs affect how well they can work with AI. For example, research has shown that when AI makes mistakes, people lose confidence faster than when people make mistakes. As a result, they are often hesitant to work together with algorithms (Maurya et al., 2024). Focusing on their functional capabilities, GenAI agents are shaking up long-held beliefs about the boundaries between AI and human abilities. It used to be widely accepted that AI excelled only in structured, repetitive tasks, leaving creative or empathetic tasks to humans. But now, according to Maurya et al. (2024), we are seeing a shift. Models like ChatGPT and Dall-E 2, which represent GenAI, are proving themselves in creative fields, such as writing engaging blogs and producing detailed digital art. This challenges the traditional divide between human and AI capabilities. This is because machines can perceive phenomena that humans are unable to and have the ability to grasp concepts that elude the human mind (Brynjolfsson, 2022).

According to Fügner et al. (2022), this symbiotic relationship between human and AI is brought forth by unique human knowledge. However, the authors also discuss the possibility of humans losing their unique knowledge while working with AI, and subsequently starting to act, and think more like AI. If this happens, humans run the risk of losing their ability to improve on what has been generated by AI. Interestingly, one of the major findings in the study conducted by Fügner et al. (2022) was that in larger groups, working with AI proved to be far more efficient than working without AI.

2.4 Summary of Literature Framework

This chapter presents a summary of the collected literature, divided into themes and sub-themes. Each reference is annotated to the subtheme where it was referenced.

Table 2.1: Summary of Literature Framework

Theme	Subtheme	References
Graphic Design	The History of Graphic Design	(Adobe, 2024a), (Adobe, 2024b) (Eisenstein, 2012), (Gartner, 2024), (Meggs &

		Purvis, 2016), (Sichel, 1997), (Walker, 2005)
Artificial Intelligence	-	(Brynjolfsson, 2022), (Burgess, 2018), (French et al., 2021), (McCarthy et al. 2006), (Russell & Norvig, 2016)
	Machine Learning	(Expert.ai, 2022), (French et al., 2021), (Russell & Norvig, 2016), (Mirsky et al., 2023)
	Generative AI	(Benbya et al., 2024), (Feuerriegel et al., 2024), (Kaswan et al., 2023)
AI in Graphic Design	Image-Recognition	(Deng et al., 2009), (Krishevsky, et al., 2017), (LeCun et al., 1990), (Somaini, 2023)
	Image-Generation	(Arikan et al., 2022), (Benbya et al., 2024), (Feuerriegel et al., 2024), (Hook, 2023), (Kaswan et al., 2023), (Midjourney, 2024), (OpenAI, 2022), (Sasaki et al., 2024), (Riemer & Peter, 2023), (Roose, 2022)
	Creativity & AI	(Fabri et al., 2022), (Joshi, 2023), (Mollick, 2024), (Siemon et al., 2022)
	Co-Intelligence	Brynjolfsson (2022), (Fabri et al., 2022), Fügner et al. (2022), (Maurya et al., 2024), (Mollick, 2023), (Mollick, 2024), (Siemon et al., 2022)

3 Methodology

This chapter will cover the reasoning behind the selected research philosophy, research approach and data collection methods. Additionally, it contains an in-depth description of the data collection and analysis used for this research. Starting with the planning phase, and continuing with the collection phase and the analysis phase. It also covers a few ethical dilemmas which need to be taken into consideration while conducting this type of research as well as discussing the scientific quality of the research.

3.1 Research Philosophy

Adapting a suitable research philosophy is key to successful research, as it dictates every step of the research process and provides it with flow. Lee (1991) states that physical and social artifacts created by people, examined in a social science such as information systems, are fundamentally different from the artifacts studied in natural sciences, and that they should be studied differently. The reason for this is that “the same physical artifact ... can have different meanings for different human subjects” (Lee, 1991). Due to the research aims of this specific study being directed at understanding individual perceptions and evaluations regarding GenAI tools within graphical design, interpretivism is a suitable option for research philosophy in this study. Interpretive research aims to understand phenomena through the meanings that people assign to them. Understanding subjective interpretations of the target audience is essential in interpretivist research (Recker, 2013), and that is exactly what the proposed research aims to do. Interpretive methods use an inductive approach, beginning with collected data with the aim of developing a theory about the studied phenomenon by analyzing the data (Bhattacharjee, 2012). Because the research question is of an interpretivist nature, being significantly open-ended and evolving (Venkatesh, Brown & Sullivan, 2016), an interpretivist research philosophy allows it to be answered by interpreting subjective data.

3.2 Choice of Methodology

Traditionally, an interpretive research philosophy has been accompanied by qualitative research methods (Recker, 2013; Goldkhul, 2012). Given the aim of the research is to explore subjective opinions and attitudes towards AI-driven tools, the research will deploy a qualitative approach. As the use of AI-driven tools within graphic design is a relatively new, and constantly changing concept, the current landscape of graphical design must be analyzed, to gain an understanding of the present situation. Recker’s (2013) view of qualitative approaches being suitable for new and unexplored phenomena provides support for the choice of research approach for this research. Venkatesh, Brown & Sullivan (2016) describes a qualitative research question as questions that “generally tend to seek, discover, and explore a process, or describe experiences” (Venkatesh, Brown & Sullivan, 2016, p.12). The description provided by the authors in their article strengthens the choice of adapting a qualitative research approach for this study, as it very well describes the nature of the specific research question. As the research aims to understand personal opinions and valuations of actual graphic designers on the use of AI-driven tools within their profession, qualitative, semi-structured interviews were selected to be the primary data collection method. According to Patton (2015),

interviews can provide the researcher with nuanced and detailed opinions and valuations from the respondents. Oates et al. (2022) also promotes interviews when researchers are trying to explore specific experiences or emotions. It is therefore deemed the most suitable data collection method for the research.

3.3 Data Collection

This chapter focuses on the data collection method, for this research, the selected data collection method is semi-structured interviews. The chapter describes the interview process as well as how the interview guide was formulated. Additionally, it covers the strategy deployed while collecting literature for the research.

3.3.1 Literature Review

In order to explore the topic of how graphic designers perceive the impact of AI a literary review on both graphic design and AI was conducted. The purpose of the literature review, in line with what Oates et al. (2022) describes, was to broaden our understanding of the research topic and identify key themes and research gaps within the existing literature. For this research, the literature was collected from the LubSearch, the AIS eLibrary and Google Scholar databases and includes numerous articles, e-books and conference papers from various journals and conferences. Additionally, finding landmark papers relative to our field of study that have been authored by pioneers in their respective domain. These include early contributions by Yan LeCun et al. (1990) in image recognition, and contributions from Russell and Norvig (2016), as well as Brynjolfsson (2022). Even though information systems are the main area of interest for this research, the literature review was complemented with findings from other fields such as graphic design, whenever deemed necessary. In order to ensure the quality of the articles, the literature search was limited to only peer reviewed articles whenever possible. While using LubSearch and the AIS eLibrary it is possible to filter the results to only include peer reviewed articles, however, it is not possible while using Google Scholar. Books used in the literature review were provided by the Lund University School of Economics and Management (LUSEM) library and are frequently used as course- and method literature. The main keywords used for collecting literature along with supporting words are displayed in table 3.1.

Table 3.1: Keywords for Literature Review

Keyword	In Combination With
<ul style="list-style-type: none"> • Graphic Design • Artificial Intelligence • Generative AI • Creativity • Image-Generation 	<ul style="list-style-type: none"> • “in” • “and” • “impact • “on”

3.3.2 Respondent Selection

Since the aim of the research is to understand the perceptions of graphic designers, individuals working within the profession were identified as the main target group for the interviews. Additionally, it would be beneficial for a potential respondent to have some experience of working with GenAI within the field. During the research, a goal-driven selection process was conducted by reaching out to a number of graphic designers via email and telephone. In the case of a positive response from a possible respondent, further contact was made where a more detailed description of the research, along with potential times and dates for the interview was included. Negative responses, in combination with lack of any response at all, limited the list of potential respondents suitable for the research.

In total, six respondents were identified for interviews. All selected respondents have experience in working with graphic design and have some experience of interacting with AI tools. After a time and date had been set, the interview was conducted via Microsoft Teams. We offered to conduct the interview in Swedish or in English and made sure to go with the language most comfortable for the respondent. Any result presented from an interview conducted in Swedish, have been manually translated by the authors themselves. Table 3.2 contains a detailed summary of the conducted interviews and respondents. As can be seen in the table, all respondents preferred an online interview.

Table 3.2: Interview Details

Respondent	Duration (min)	Date (DD/MM/YY)	Location	Language	Appendix
R1	47 min	18/04/24	Microsoft Teams	Swedish	A
R2	28 min	22/04/24	Microsoft Teams	English	B
R3	27 min	24/04/24	Microsoft Teams	Swedish	C
R4	35 min	25/04/24	Microsoft Teams	Swedish	D
R5	25 min	26/04/24	Microsoft Teams	Swedish	E
R6	31 min	13/05/24	Microsoft Teams	Swedish	F

3.3.3 Formulating an Interview Guide

An interview guide was formulated in order to standardize the interviews and consists of the key themes that make up the main body of the interview. The interview guide contains themes to be explored during the interview, this is necessary to ensure that no theme, or question, is forgotten during the interview (Patton, 2015). The full interview guide is displayed in table 3.3. However, the semi-structured nature of the interviews will allow for new questions and thoughts to be brought up during the interview. This provides an opportunity for the respondent to elaborate on interesting answers and bidirectional discussion between the two parties (Recker, 2013; Patton, 2015). Semi-structured interviews allow the respondent to fully

elaborate on how they personally feel and even add new and interesting themes to the conversation, which can be useful for the research (Oates et al, 2022).

Although semi-structured interviews are considered the most suitable data collection method for this type of research (Patton, 2015), there are possible risks with conducting such interviews as well. Recker, (2013) mentions the issue of reflexivity, which is “when the interviewee responds with what he or she thinks the interviewer would like to hear” (Recker, 2013). To combat this, the interview guide, and the interviews themselves, will aim to be well structured and unbiased throughout every interview. Additionally, no subsequent changes will be made to the interview guide in between interviews.

Table 3.3: Interview Guide

Overarching Theme	Questions
Introduction/General questions	<ul style="list-style-type: none"> • Can you briefly describe your background/experience with/in graphic design? • What types of projects do you typically work on?
Awareness and Understanding of Generative AI	<ul style="list-style-type: none"> • What is your understanding of generative artificial intelligence? • How did you first learn about AI technologies in graphic design?
Usage of Generative AI in Professional Work	<ul style="list-style-type: none"> • What digital tools do you use in your work? • Have you used any generative AI tools in your projects? Can you describe your experiences? • What kinds of tasks do you use AI for? • In what ways has AI impacted the efficiency or the creative process?
Perceived Benefits of Generative AI	<ul style="list-style-type: none"> • What do you consider as the primary benefits of using generative AI in graphic design? • Can you give examples where AI has significantly enhanced your work?

Perceived Challenges and Concerns	<ul style="list-style-type: none"> • What concerns do you have about the integration of AI in graphic design? • Have you experienced any drawbacks or limitations in using AI tools? • How do you perceive the impact of AI on job security within the graphic design community?
Future Prospects and Adaptations	<ul style="list-style-type: none"> • How do you see the role of AI evolving in graphic design in the next five years? • What skills do you think will be important for graphic designers to stay relevant in an AI-influenced industry? • How are you preparing or planning to adapt to these changes?
Closing Questions	<ul style="list-style-type: none"> • Is there anything else you would like to add that we haven't covered? • What advice would you give to new designers about using AI in their work?

3.4 Data Analysis

During the data collection phase, the audio from the interviews was recorded to be transcribed. This is to minimize lost information from the interview process (Patton, 2015). To facilitate the process of transcribing multiple interviews from audio to text, the digital transcription tool Whisper was used. Whisper is OpenAI's automatic speech recognition model that transcribes audio-files locally on a computer, thus ensuring that no sensitive information from the interviews were uploaded to the cloud or were misplaced (OpenAI, 2024).

After Whisper completed the initial transcription, the preliminary result was thoroughly checked and complemented manually to minimize errors and lost information from the initial transcription. The transcribing took place continuously as the interviews were conducted, no later than two days after the interview itself was conducted. This ensured that the interview remained fresh in memory and increased the accuracy of the transcript. Interviews were not transcribed in a verbatim way, sentences were corrected, and spoken language was omitted in cases that destroyed the context of certain sentences. Oates et al. (2022) argues that this

approach can be used provided that all sentences have the same meaning as they had before the correction. Only if, for example, the tone of voice or the length of a pauses in the interview are important details for the aim of the study should they be kept the same.

3.4.1 Coding the Transcripts

After the interviews had been transcribed, the coding process started. This includes examining patterns in the collected data and relating them to the research question. This process also involves analyzing the findings from the interview and drawing generalizations about how graphic designers perceive the impact of AI on their profession. This insight is valuable both for graphic designers seeking to stay up to date with new technology to evolve professionally and for educators seeking ways to keep their education relevant. As “qualitative analysis is heavily dependent on the researcher’s analytic and integrative skills and personal knowledge of the social context where the data is collected” (Bhattacharjee, 2012 p.113), the data collected during the previous phase will be analyzed mainly by deductive coding, with the themes derived from the interview guide. These themes are *Awareness and Understanding of Generative AI*, *Usage of Generative AI in Professional Work*, *Perceived Benefits, Challenges and Concerns* (of using GenAI), and *Future Prospects and Adaptations*.

Awareness and Understanding of Generative AI: This theme covers the respondent’s overall awareness and understanding of generative AI, exploring their knowledge around the subject and how they first encountered it.

Usage of Generative AI in Professional Work: This theme explores what digital tools, AI driven or not, the respondents use daily, as well as what tasks the tools are used for. This provides insight into how much AI-driven tools have been integrated to their work.

Perceived Benefits, Challenges and Concerns: This theme is divided into three subthemes, each diving into either perceived benefits, challenges, or concerns the respondents have regarding the use of GenAI tools.

Future Prospects and Adaptations: This theme captures respondents’ thoughts about the future of GenAI in graphic design, as well as what skills they think might be needed to thrive in an AI dominated landscape.

Qualitative deductive analysis can be defined as “Determining the extent to which qualitative data in a particular study support existing general conceptualization, explanations, results and/or theories” (Patton, 2015). Coding is very useful for reducing massive amounts of data into relevant information (Recker, 2013), as is necessary in the case of this research. The transcripts were coded by manually analyzing each transcript and highlighting interesting parts of the respondents replies. Depending on what theme the highlighted text belonged to, it was annotated with the appropriate code in the far-right column of the transcript. The themes and their respective code can be found in table 3.4. To increase the accuracy of the coding, the transcripts were first analyzed by each author independently. The results of the initial coding were then compared to each other, and a final result was forged by combining the two.

Table 3.4: Themes and subthemes derived from the interview guide.

Theme	Subtheme	Code
Awareness and Understanding of Generative AI	-	AU
Usage of Generative AI in Professional Work	Tools	UTo
	Tasks	UTa
Perceived Benefits, Challenges and Concerns	Benefits	PB
	Challenges	PCh
	Concerns	PCo
Future Prospects and Adaptations	Skills	Fs
	Adapting	Fa

3.5 Ethical Considerations

All behaviors in research are subject to ethical consideration, especially those related to human interactions (Recker, 2013), such as interviews. Firstly, it is important to be transparent towards the respondent about the purpose of the study, but also to maintain confidentiality and anonymity. When conducting interviews, all of these principles must be considered. This is due to the fact that interviews are a very personal form of data collection, gaining insights into respondent's personal life, opinions, and values (Patton, 2015).

Confidentiality and anonymity will be ensured by also informing the respondent that any names of respondents, names of companies or specific positions will not be mentioned in the research paper. Additionally, all respondents have voluntarily chosen to participate in the study and have the right to withdraw consent at any point in time (Bhattacharjee, 2012). As previously mentioned, the interviews were recorded when conducted, this is also something that the respondent had to consent to (Patton, 2015). To combat the issues of invasion of privacy and deception, the interviews will aim to be professional and neutral. The interview guide will be constructed to facilitate this process by making sure that the interview follows the structured guidelines of the guide. Additionally, the respondents were informed when and how the data collected during the interviews will be used, as is their right (Recker, 2013).

Recker (2013) emphasizes that all research behaviors are subject to ethical considerations, which extend beyond data collection to include the data analysis phase. Researchers must fully disclose the results of data analysis, even if they do not align with expectations (Recker, 2013). Given that this research seeks to explore and understand the use of AI-driven tools in

graphic design, it will fully disclose any findings to maintain transparency and uphold ethical standards.

3.6 Scientific Quality

In order to ensure scientific quality, Recker (2013) emphasizes on the importance of choosing variables that truly represent the research area and being able to replicate the study and get the same results (Recker, 2013). Both Recker (2013) and Bhattacharjee (2012) agree on the importance of reliability and validity in maintaining the scientific quality of research. For instance, Bhattacharjee (2012) describes reliability as the “degree to which the measure of a construct is consistent or dependable” (Bhattacharjee, 2012) and explains that for research to be reliable, it needs to be both consistent and credible. The author also mentions that reliability does not equal accuracy. Validity is an important aspect in assuring the quality of any research project. It is important to critically examine the data collection methods in order to assess the drawn conclusions (Jacobsen, 2017). As the proposed research project plans to conduct a relatively small number of interviews, there is no way of confirming whether the conclusions drawn from the interpreted data is applicable to the greater pool of graphic design professionals. This upset in research validity is however offset by the quality of research participants. The interviewees are knowledgeable, professional, and have great insight into working with AI-driven tools within graphic design. quality of research participants. The interviewees are knowledgeable, professional, and have great insight into working with AI-driven tools within graphic design.

The authors conducting this study made it a top priority to identify an existing gap in knowledge within the research field of information. It was also crucial that the chosen area aligned with Reckers (2013) claim that the problem that is addressed should be relevant. Additionally, selecting a research question that was achievable to answer (Recker, 2013). When doing our literary review, the authors of this thesis made it a priority to include papers from journals that according to Oates and colleagues are highly respected in the field of Information systems and computing (Oates et al., 2022). These include ACM Computing Surveys and European Journal of Information Systems. Additionally, choosing authors that are eminent in the field was vital to ensure the scientific quality of the research (Oates et al., 2022).

4 Results

In this chapter, the findings from the data collection and data analysis phases will be presented. The structure of the chapter is derived from the structure used in the interview guide with each theme in the interview guide being represented by its own heading.

4.1 Awareness and Understanding of Generative AI

The awareness and understanding of GenAI among the respondents varies. For instance, all of (R2), (R3), and (R6) have a good understanding of the subject and seem to be very interested in experimenting with and integrating the tools into their work. On the other hand, (R4: L4) takes a neutral stance and does not really feel affected by the emergence of GenAI at this moment in time.

“We are quite neutral. Not in the know, but neither afraid of it nor very enthusiastic. We went into everything, and it hasn't affected us. We have come into contact with it a little bit but otherwise it has not come into our work that much.” (R4: L4)

When discussing the impact of GenAI on the work of graphic designers, respondents emphasize on the importance of ethical consideration when using GenAI as a tool. (R2: L10) works both as a freelance graphic designer and as a university professor in visual communication and digital imaging. There, they frequently engage their students in discussions about the ethical dilemmas that emerge when using GenAI in their future work. In these discussions, they focus on issues like who owns the images created using AI, concerns about copyright violations, and how the datasets used influence the images produced.

“But because all of our students are in the Adobe system, we have access to Firefly. You know, it's included in the bundle. We've kind of turned our focus on that. It's not the greatest one either so that's good for talking about the limitations, but also the ethical concerns, because Adobe's Firefly is trained on an ethical data set. So they will lead us to believe. So that's something that we discuss with the students. Like, who owns the image? Where does it come from? Is it copying? Is it copyright infringement? Is it ethical? You know, we have a lot of reflection. And how should we use it in our work? Is it okay to use it in our work?” (R2: L10)

(R6) also speaks about copyright infringement and laws applicable to AI generated content, highlighting the current differences in regulations between different countries.

“It will be more difficult ethically and in terms of copyright, quite simply. It's probably still a bit in limbo in Sweden. It's still possible to copyright stuff that has AI elements in it. It's not possible in the US, as I understand it. But in Sweden it's still possible.” (R6: L12)

(R5: L42) adds an interesting insight about giving AI access to training data, questioning whether AI should be given access to certain data. Furthermore, they explain that by restricting the amount of data to train on, the output will undoubtedly be worse.

What restrictions should we put in place? Should AI have access to all data? What data should it have access to in order to learn? And of course, if the database that it has to pick from gets smaller, the result will come out and be poorer too.” (R5: L42)

On the other hand, some graphic designers do not consider GenAI as an ethical dilemma, but rather as an extension of longstanding digital tools. GenAI is viewed more as a means to accelerate their workflow. However, there is acknowledgement of the ongoing debate surrounding AI's potential to automate aspects of their work (R1: L7).

“But then it has happened a lot and developed a lot. And there are those who scream for fear that it will take over. The robot will take over. Or those who think it's great. That you can get lots of new smart help and... What is it called? Make everything much faster or something like that. I guess that's what I think of when I think of AI, maybe.” (R1: L7)

4.2 Usage of Generative AI in Professional Work

When discussing the tools available that utilize GenAI, the graphic designers gravitate more towards the tools that are integrated into design software, rather than more standalone text-to-image tools, such as Midjourney and Dall-E 2. One tool that is perceived as being particularly useful for all respondents is generative filling, embedded into Adobe Photoshop. (R1: L14, R4: L10). (R4: L10) highlights generative filling as an effective tool, particularly in scenarios where the background is not overly complex and consists of a lot of various objects (R4: L10). According to (R1: L14), the generative filling function operates by allowing the user to indicate areas where they wish to alter the picture size and presents different options for selection. It appears that (R1) finds this function valuable, as it accelerates the workflow of image manipulation without significant effort (R1: L14).

“...then you can use this generative filling in Photoshop. Where you mark and then you just go on. And then it usually turns out pretty good and there are like 3-4 different choices you can choose from. But honestly, that's it. I've already been doing that for ten years really, but by hand.” (R1: L14)

Similarly to the generative filling function, which (R6) also uses, they also mention a generative recolor function in Adobe Illustrator, where it is possible to alter the color vectors of a project.

“...there is a variant in Illustrator called generative recoloring. If you've done an illustration in a certain color scale and you feel like you want it in a different one, say it shouldn't be yellow, it should be red or blue. Then it can also help you to feel the colors and then get them all right. You don't have to do it manually. That's a function that I also use.” (R6: L10)

Furthermore (R1: L16) highlights retouching features within Photoshop, where GenAI is used to remove an object in the image or modify backgrounds based on the user's input. (R1) emphasizes that while he possesses the capability to perform these tasks manually, the integration of GenAI within Photoshop can accelerate the workflow process. (R1: L16). All

respondents have mentioned at least one feature integrated into the Adobe-suite and mostly described them as being successfully implemented into the software.

“A good example of when you can use AI again. That does something you might have already done but it just speeds up the process, it helps you. So you might have taken the picture, but you might want to remove a lake in the background or add a rainbow or something. But right now it's more like removing the background or creating an ingredient in the background instead. So you know, simple things but I'm the one who has the idea of what it is I really want to do. I can do it but I can also ask a robot to do it or the program (R1: L16).

(R2: L18) mentions similar functionalities as (R1: L16) found in Adobe products, however (R2) uses it mostly within video editing. Such features include removing an object, as well as altering the background. However, (R2) expresses less enthusiasm about these features and highlights that there is yet to see an AI feature that is integrated in an effective way and is truly useful (R2: L18). (R3: L16) utilizes a lot of various AI tools for different purposes, including the already mentioned generative filling functionality in the Adobe-suite. They feel like GenAI tools made for specific purposes, such as the generative filling function, works well. Although in their opinion, tools designed for comprehensive solutions do not work as well in their current state.

“Adobe has had Sensei, I think it's called their AI engine that's been under the surface, it doesn't really scream Hello, I'm an AI, but it is based on AI things in Premiere, for example, for rotoscoping, if you know what that is cutting someone out of the video and removing the background, if you didn't, if you didn't shoot on a green screen, for example, so this is like, you know, it's a depth estimation, and it's a lot of technologies like that, that I'm using. And then there's the neural filters inside of Photoshop that are so, so, so I'm yet to see a commercial product that has implemented AI in a really effective, useful way that we're using at least.” (R2: L18)

“All the functions that are built into these big apps, I think they work pretty well on just the one thing you want to solve. It's not usually a solution that covers everything, but I think that's also a good thing about AI, that it helps with many steps so far.” (R3: L16)

While a lot of respondents find these integrated functions useful, (R5: L12) finds them annoying and disturbing at times. Even though they agree with the other respondents when it comes to using the generative filling function in Photoshop, they find that many other integrated functions are keeping them from maintaining a good flow in their work.

“No, I find them mostly annoying actually. I discovered that InDesign just in the latest update has come a little feature where you can generate text to image. Illustrator has had that before and got it up. No, I find it more annoying. It's so pushy” (R5: L12)

Instead (R5: L30) finds text-to-text GenAI to be more useful in their work as it facilitates a more iterative workflow process.

“It's hard to get a generated image, so it's hard to break away from it in a different way than with text. With text, it can be easier to cut up and take parts of it. I find it more difficult with the visual, with images.” (R5: L30)

4.3 Perceived Benefits, Challenges and Concerns

This chapter covers the findings regarding the respondents' perceived benefits, challenges and concerns of using GenAI in their work.

4.3.1 Benefits

Even though (R1) has not experimented with text-to-image tools such as Midjourney or Dall-E 2 to a large extent, they realize and explain the possibility of using the tools for gaining inspiration. (R3: L9) agrees, stating that the small AI features added to the Adobe suite, such as generative filling, have increased efficiency and saves several hours while working on projects. (R6: L6) agrees with (R3: L9) and also states that generative filling can reduce the amount of time spent working on backgrounds. However, (R6: L8) also supports the statement made by (R4: L10) that generative filling is the most effective when the background is not overly complex.

“But Midjourney and things like that, I haven't had any need yet because it's very seldom I work with... I could imagine that if you're completely off in your head and can't think of anything, you can go and get inspiration.” (R1: L14)

“That you just try, but there's a picture that's square but we have to have it standing for some story or something, then you pick up the picture and you have more grass. Like it's such a simple thing that saves hours, so it's good.” (R3: L9)

Additionally, (R6: L24) believes that once you have the material and own it, GenAI can accelerate the process of generating pictures in the same style. However, (R6: L24) also states that the technology is not fully developed yet. (R1: L48) shares this view and states that GenAI could be useful once a concept is established, as it can then apply that concept to various products.

“That you only use your own images, just assume this, I have the copyright on it. No problem. Create a new image in the same style. It could be something in the future. We are not fully there yet but it could definitely come” (R6: L24).

Nonetheless, while (R4: L14), (R5: L30), and (R6:40) all describe the content created by text-to-image tools as overly generic, (R2: L29) offers a different perspective. (R2) shares a unique experience where (R2) entered an art exhibition alongside physical, traditional, visual artists with graphics created by AI. Notably (R2: L29) was the only participant at the exhibition to sell out all the displayed work.

“I was sharing the exhibition with a ton of, you know, physical, traditional, and visual artists. And for me, it was more of an experiment to see how they

would respond. Would they see me as the imposter in the corner? I didn't make any secret that this was AI-assisted, and I did it just really to provoke a reaction... Nobody else really kind of understood or got what was going on and to my surprise, I was the only one to sell all my work.” (R2: L29).

4.3.2 Challenges

When discussing AI's current capabilities in idea generation, (R4: L22) expressed skepticism about its usefulness. They noted that the model struggled to create images with the desired expression and emotion. Although AI-generated ideas could serve as a starting point in certain scenarios, (R4: L22) found that the final product often differed significantly from the initial concept. Additionally, they highlighted the absence of personal style in AI-generated work as another area of concern.

“The expression was far from what would work and what it ended up being. There were no similarities anywhere. It didn't fulfill any function. And with illustration, it also becomes... where I have more of a style. This was a style that they know I don't do. It's also a clash.” (R4: L22)

To further strengthen this point, (R4: L20) shared their experience from the first time presented with an AI generated image and asked to use it as a starting point:

“The first time that... Okay, what should we do there? I think it sets a concept too early. You usually want to work with other parts first (R4: L20)

Additionally, (R1: L22) shared an example of a challenging case where creating an image from a text prompt was difficult, even though it did not happen directly to them. Achieving a satisfactory result required iterating the prompt for the GenAI model multiple times, while making small adjustments as you go. This process of trial and error was time-consuming and (R1: L22) argued that in that case, it would have been just as quick to create the image without the help of AI.

“I have a record here actually that they have completely generated with AI, like the cover. But they only did that because they can't design or thought it was fun to be part of the times. But then I know that they talk about how they had to develop that search 200 times, to kind of design it themselves anyway.” (R1: L22)

On the other hand, (R3: L9) finds that using GenAI tools for idea generation works very well. According to (R3: L9) working together with AI, using it as a colleague to bounce ideas off of, works well if you know how to prompt it. It is especially beneficial for (R3) who works alone on a lot of projects.

“And then also just for ideas, because like if you make a reel for an event, you can say, this event is about this and this. Make the movies like this, and then they come up with ten ideas. In the past, you'd just come up with that and think for yourself with your brain. You have to have a meeting with three or five people. Okay, how do we do this? And then now you come up with it yourself in half an hour instead of four hours.” (R3: L9)

However, (R5: L32) offers a different viewpoint, and states that the material generated by AI-tools is often too complete to serve as a first draft that can be improved (R5: L32).

“It comes out so complete material anyway. It's difficult to get this level of abstraction that can be built on.” (R5: L32)

A few respondents, including (R1: L14), (R3: L18), (R5: L6) and (R6: L16), have briefly tested text-to-image tools such as Midjourney, Dall-E 2, as well as Adobe Firefly but not been very enthusiastic. The main reason seems to be that in its current state, it is clearly visible what is generated by an AI model and what is created by hand. According to (R5: L24), generated images have a very distinct style, and it is still a bit too uncanny for their liking. This, added to the fact that you are given a complete image from the AI model, makes it very hard to work with. To add their own personal touches and style. (R1: L42) also perceives a clear line between what is generated and what is not generated. They add that instead of generating an image with AI, AI should be used to enhance the image instead, to keep it from being perceived as uncanny. Similarly (R4: L14) also recognizes the specific aesthetic style of AI generated images, even in works from other creators. (R6: L40) adds that because the content created by GenAI tends to be too generic, people may perceive it as dull (R6: L40).

“Because there are also, for example, on the web front, there are lots of just generic pictures that real photographers have taken. Which are nice and good, but it's also something. It feels kind of plastic. It's not at that restaurant, or it's not that car, or it doesn't look like that. So quickly when people want something, which is this. Now we're going to sell this hotel, then you want a picture of the hotel and then maybe it's more for the retouching, or light it up nicely or I don't know, maybe you can use AI for that” (R1: L42).

“There will also be some kind of, not specific Adobe features, but we're talking a little bit about AI images that we haven't worked with ourselves even as you can see. There will be some kind of aesthetic almost, which you can recognize, even if it is very well done. So you can almost, in many cases, look at it in some way, that it is when AI is mixed in.” (R4: L14)

4.3.3 Concerns

Overall, the respondents express various levels of concern towards further integration of GenAI tools in their profession, however the general consensus seems to be that it is a natural step in the progression and that it will be mostly beneficial. When asked directly about any perceived concerns about integrating AI into graphic design, (R1: L29) expresses no immediate concerns (R1: L29), he instead argues that people will continue to hire him because of his unique ideas and style (R1: 34).

“Well, no, not really in a way. Because I think that, well, it's obvious that... I think like this. I think it all depends on what kind of person you are and what your ambitions are.” (R1: L29)

“I think I'm hired more for my ideas and my design or my experience than for what I actually, exactly what it will become.” (R1: L34)

Similarly, (R5: L38) predicts no immediate automation or replacement of graphic designers, instead a new and improved way of working in collaboration with AI. (R6: L40) also predicts no immediate automation, however acknowledges that certain tasks may be replaced by AI. Nonetheless (R6: L34) is more concerned that some customers may be interested in using AI for simpler tasks, such as designing a logo, due to it being cheaper than hiring a graphic designer. They then continue to explain how this has a higher risk of infringing on someone else's copyright.

“No, but not very much. As I said, I think it works best when there is an interaction between the human hand and AI. And I don't see it replacing any work in the foreseeable future. Rather, it will be a new, slightly more efficient way of working together with an AI colleague.” (R5: L38)

However, (R2: L29) offers a different perspective, and states that professionals working within the industry should be more concerned about the potential of being replaced by AI.

“They should be sweating more than I'm seeing. I did a little experiment last year. I actually generated some graphics that I put into an exhibition. I was sharing the exhibition with a ton of, you know, physical, traditional, visual artists... So I stood there with my art and I think one person approached me who was an illustrator and said, should I be worried about my job? And I said, yes, you should.” (R2: L29)

Another concern raised by (R1: L44) on the integration of AI is its lack of emotion. Creators and designers, as well as some of their customers, value the process itself when creating something. Even though the use of AI tools may increase efficiency and speed, the feeling that creators are after, is lost. (R5: L50) adds to this, stating that so much creative work derives from our experiences and our interpretation of the world around us. Even though it might be able to in the future, AI currently lacks the ability to understand such complexity.

“It pretty much requires having an experience of the world around us. We are getting there with being able to connect video and video analytics with AI. It's this interpretation of the world and what's going on around us that I think is a bit harder to translate.” (R5: L50)

(R1: L40) also highlights that reputation plays a significant role in the graphic design industry. (R1) discusses a scenario where individuals may prefer to hire professionals known for their past work, even if these professionals eventually utilize AI to generate content in the future (R1: L40). However (R1: L29) states that he perceives that professionals working within generic advertisement could be replaced. Similar to what (R2: L24) states about stock photography.

“And then it's terrible, but in our world, so much is based on elitism and celebrity and etc... If Beyonce were to do something, she might want a certain photographer who is known for his previous work. And to some extent, on our small scale, that there are people who know, yes, but I want help from that person. Then, whether I use AI or not, it may not really care. As long as everyone is happy, sort of.” (R1: L40)

“...there is a fear already particularly with photography that stock photography is dead. That was killed overnight and I think Adobe helped to pull

the trigger on that one when they introduced firefly which ironically is trained on their own stock photography database.” (R2: L24)

As already mentioned, respondents are concerned about the use of GenAI from an ethical point of view, (R5: L42) speaks about the accessibility of data and raises the question about what data AI models should be allowed to train on. Additionally, they go on to explain that with less data to train on, the output will undoubtedly be worse. In line with this, (R3: L35) believes that clear laws and regulations on AI usage is important to avoid as many negative consequences as possible.

“But as new inventions come along, so do their consequences. Which are then also usually bad. But if you set clear laws and stuff... Then I think it will be good for everyone.” (R3: L35)

4.4 Future Prospects and Adaptations

This chapter covers findings concerning respondents’ perception of the future of GenAI in graphic design. What skills may be necessary, and how to adapt successfully.

4.4.1 Skills

(R2: L12) suggests that even without making direct predictions about the future, having knowledge in graphic design remains valuable. (R2: L12) uses the understanding of lighting as an example on how to make the content created by GenAI stand out.

“So the more you understand photography, the better you can prompt. So rather than, you know, a picture of a cat, if you wrote, you know, a picture of a cat using cinematic lighting, three-point lighting or whatever thing shot on Kodak, you know, stock, film, blah, blah, you can really start to tailor that response. And I think that that's what stands out from, you know, someone that just prompts, you know, really basic stuff compared to someone that understands the field” (R2: L12)

In this quote, (R2: L12) also highlights the importance of a good prompt, something that (R6: L46) also perceives as important. Additionally, (R1: L22) had an experience where the generated result was insufficient, and the model had to be prompted numerous times. (R5: L32) also agrees that the lack of desired result may be derived from an insufficient prompt on their part, and that that is something they can work on.

“I think that there is currently a lot of emphasis on these prompts. It becomes a bit like a language of your own that you understand the importance of expressing yourself in a way that AI understands. I think that you have to step up your game so that you learn exactly what expression to use to get a desired result without having to experiment for a couple of hours, but it has to go fast because that's the idea anyway.” (R6: L44)

“Maybe it's something where I need to be smarter because I'm sure I can prompt it out too” (R5: L32)

(R1: L40) believes that the current generation of GenAI has a significant drawback: its ability to produce ideas. In its present state, humans maintain a creative edge in this area, which remains a crucial skill even as AI rapidly advances. (R1: L40) continues to explain that the capacity to generate ideas creatively will remain a key reason to hire graphic designers in the future, as their human touch can make a notable difference in the quality and impact of creative work. However, (R2: L20) has a more optimistic view regarding the potential of GenAI to create ideas. (R2) see using GenAI as a way to accelerate the workflow process and quickly getting a foundation to build upon.

“So that what is important as a human is better so far, it is not certain that it is so long before the robot beats it, but it is ideas that remain important, I think. Artistic ideas as well. And you'll be doing that for a few more years, always hiring people to do it” (R1: L40)

(R2: L35) then continues to highlight what skills will be important when working with AI. They mention AI will not be perfect straight away, and that understanding how to make best use of the AI model and guide it in the desired direction will be necessary for its users to succeed.

“The AI isn't going to just knock it out of the park right away. It's going to have that AI feel. So that's where you come in. Like you have to be educated to know what you want to change. What can I change? What tools can I use to change it and control it and push it in the direction that's more desired rather than prompt and I'm done. You'll still need skills.” (R2: L35)

(R3: L48) argues that as AI technology advances, the ability to effectively use available tools and resources will become increasingly important. They draw an interesting comparison between the future of AI tools and the evolution of the internet, suggesting that AI will play a central role in shaping our future. To stay competitive and successful, individuals and organizations need to embrace AI and integrate it into their work, using its abilities to navigate the changing technological landscape.

I think you have to be able to use AI. It's like the internet or something. If you don't use the internet now, you can't survive either. It will come eventually, as they say, with AI, I think. Maybe not yet or so. In ten years or sooner, I don't know when it will happen. But it will be a must. (R3: L48)

4.4.2 Adaptations

According to (R1: L51), constantly adapting is the key to survival, and that graphic designers must find a way to use the tools available for them in order to increase efficiency (R1: L51).

“The ones who have done best are the ones who have adapted all the time to keep up. And it's the same with AI, perhaps, that it's a matter of finding a way to use the tools so that you can perhaps be even more effective.” (R1: L51)

(R3: L55) highlights the importance of learning how to use AI effectively because large companies have not yet fully adopted AI. They believe that blending human skills with AI can lead to greater productivity than relying solely on AI. They also stress the need to use AI carefully and thoughtfully, instead of being entirely dependent on it. Finally, they also emphasize

the ongoing value of human skills and new ideas, pointing to the need for innovative thinking in an AI-driven world. Similarly, (R6: L42) perceives that welcoming evolution is key, rather than trying to stop it.

“And that you learn this new AI stuff. Because the big companies are not really updated yet to work with AI so much. So that their production will be higher than if you do everything with AI...So that you learn how to use AI in a good way. So that you can't just have one leg to stand on...I think human skills will always be needed. And new ideas will be needed. It's also that you can think in new ways” (R3: L55).

“It's hard to stop and I don't think you should completely stop it, but it's a way to generate ideas, new ideas and I think you should try to use AI for what is the benefit.” (R6: L42)

(R5: L48) agrees with (R3: L35), their best advice for up-and-coming graphic designers is to find ways of working with AI to enhance their workflow, and if you don't, you will struggle. According to (R3: L35) it is necessary to treat AI as just another coworker, to find what works best and how you can complement each other.

I think it's being quick at collaboration with AI. That means finding ways to work together. It will be very difficult for those who are very negative about using the tools. Instead, I think you have to get even better at finding ways forward together. Just as you do with your other colleagues. (R5: L48)

5 Discussion

This chapter aims to present the interpretations of the collected data, highlighting any major findings that might have significant impact on the research. It also aims to connect the findings to the existing literature, both by comparing results and opinions, as well as contrasting them to the literature.

5.1 Awareness and Understanding of Generative AI

Even though it varies among individual respondents. The overall awareness and understanding of GenAI seem to be relatively good. Respondents (R2), (R3) and (R6) all possess a good understanding of what GenAI is, and what it can be used for. Similarly, both (R1) and (R5) have experimented enough with AI tools to gain a decent understanding of how it may be useful for them. Of all participating respondents (R4) have the least developed awareness of GenAI. This is most likely due to the limited amount of interest shown towards the emerging technologies on the respondent's part. This limited interest shown could also be the reason why they do not find it useful. Siemon et al. (2022) mentions that to increase the chance of successfully solving a problem with the help of AI, AI needs to actively interact with humans. Not wanting to engage oneself fully, and to interact with the tools, may be the main obstacle in gaining an understanding in how the tools operate.

Most respondents seem to be aware that you must consider a lot of ethical implications when using GenAI. For instance, (R2) and (R6) speaks about copyright infringement and about who owns the generated image, but also how the datasets used influence the images produced. This coincides with what Feuerriegel et al. (2024) and Benbya et al. (2024) present in their respective articles, with both sets of authors specifically naming copyright infringement as an ethical concern. Furthermore, Feuerriegel et al. (2024) also mention incorrect outputs, bias and fairness, and environmental concerns as important ethical aspects. The quality of a GenAI model is derived from the quality of training data, something that both Feuerriegel et al. and (R5) highlights. (R5) specifically notes that with less training data, the output will undoubtedly be worse, but states that this is a question about data accessibility and allowance.

Although aware that one must be careful when using GenAI tools, respondents (R1, R2, R3, and R6) perceives it as an evolution of the already existing digital tools and as a mean to increase efficiency. This perspective stems from a technological progression, where artificial intelligence increasingly influences daily life. GenAI is seen as by these respondents as a logical progression in the evolution of their profession. Out of all respondents partaking in this study (R4) seem to be the only one that holds a more skeptical view on the integration of AI.

5.2 Usage of Generative AI in Professional Work

The GenAI tools primarily used by all respondents are those integrated within software programs and are perceived as more useful compared to more standalone tools like Midjourney and Dall-E 2. We found this discovery to be contradictory to our initial assumption about the impact of GenAI on the profession of graphic design. According to (Midjourney, 2024) and

(OpenAI, 2022b) recent advancements in both Midjourney and Dall-E 2 have been significant which was viewed by the authors of this paper as a key motivation for conducting research within graphical design. The technical advancements in GenAI tools, as described by Roose (2022), enable individuals with limited graphic design experience to create professional-level work simply by entering text into a designated textbox. Nonetheless, all respondents perceive that in their current state, these tools are not suitable for professional work in meeting the expectations of their clients.

However, a consistent finding across the research is the widespread use of Adobe products among all respondents in their daily work. According to Gartner's Magic Quadrant assessment in 2024, Adobe has solidified its longstanding position as the industry leader (Gartner, 2024). Within the library of Adobe products, it becomes clear that generative filling is the most used GenAI function among all respondents. Generative filling is described by Adobe (2024) as a tool that analyzes surrounding pixels, textures, and colors to understand context. It then generates a matching pattern or texture to fill the selected region (Adobe, 2024). Generative filling, as mentioned by most respondents, is described by (R1), not as a standalone tool. Instead, according to (R1) it is an integrated function within Photoshop where the user marks areas where generative filling is required and are presented with a few options. The user then relies on their experience in graphic design to choose the alternative that best fits the context. This is a function described by Mollick (2024) as co-intelligence where the importance of being the human-in-the-loop is emphasized and the collaboration between humans and AI is highlighted (Mollick, 2024). Additionally, this is also similar to what is mentioned by Siemon (2022) where AI can act as a mediator to fix issues or work alongside humans to evaluate ideas.

Nonetheless, another function that is described (R1) is the retouching features within Photoshop. This tool is described more as a standalone tool where GenAI is used to remove an object in the image based on the user's input. (R1) emphasizes that while he possesses the capability to perform these tasks manually, the integration of GenAI within Photoshop can accelerate the workflow process. This tool that retouches features can be viewed by Brynjolfsson (2022) and Ågerfalk (2022) as an AI tool that automates human ability rather than augment it (Brynjolfsson, 2022; Ågerfalk, 2022). According to Brynjolfsson (2022) and Ågerfalk (2022), the focus within the AI community should be on developing AI tools that enhance human capabilities, rather than replacing them.

5.3 Perceived Benefits, Challenges and Concerns

Respondents (R1, R3, and R6) all state that using GenAI in their work has increased efficiency and saves time. They no longer have to spend time in boring, repetitive and tedious tasks. This aligns very well with what Fabri et al. (2022) presents in his paper, that humans instead can focus on adding creative and emotional value to projects while working with AI. In theory, this gives them the opportunity to incorporate their own personal style onto the work. However, a few respondents, (R4) and (R5), perceive AI generated images as too complete to begin with and that it is difficult to continue to build upon. Specifically (R4) has noticed that the aesthetic style used by tools such as Dall-E 2, does not match their own personal style. This may be due to the generated images being based on the aesthetic styles incorporated into their training data, as mentioned by Arikan et al. (2022). This inability to add a personal touch may cause creative frustration, as well as a frustration towards the technology itself and act as an obstacle in integrating AI tools into their work.

According to Mollick (2024) recent advancement in AI generating images, art, video, and music, may lead to creative tasks becoming the ones most affected by the new wave of GenAI. Respondents participating in this study have highlighted some of their own perceived benefits, challenges, and concerns about integrating AI tools into their creative process. Another perceived benefits of using GenAI, according to (R1, R2, R3, R6), is to leverage text-to-image tools to gain inspiration or generate a preliminary draft that can then be further developed. This approach enables the respondents to kickstart their creative process by providing visual prompts or rough drafts that serve as a foundation for refinement and progress.

However, while (R1, R2, R3) see potential areas where text-to-image generators can be used to gain creative inspiration, (R5) perceives the content created by tools such as Dall-E 2 and Midjourney as too complete to serve as a first draft that can be improved. This perspective is also shared by (R4) that was presented by AI generated content from a client. However, (R4) stated that establishing a concrete example like Dall-E 2 and Midjourney does as the first step is not a natural way for a graphic designer to work. However, while (R5) expresses skepticism regarding the usefulness of text-to-image generators, (R5) has a more positive stance towards leveraging text-to-text AI models like OpenAI's ChatGPT. Notably, (R1, R3, R5) all use ChatGPT as a resource for generating project ideas. (R1, R3, R5) values ChatGPT for its capacity to facilitate an iterative workflow and provide initial drafts that can be refined.

Feuerriegel et al. (2024) argues that GenAI enables collaboration between humans and AI, where users give prompts for content creation. Initially, the AI appears to follow orders, interpreting human prompts and giving feedback. However, Feuerriegel et al. (2024) suggest it evolves into co-creation, with AI's output shaping human prompts. This fosters collaborative design, resulting in a jointly crafted outcome. Based on the insights provided by (R1, R3, R5) It can be argued that the statement by (Feuerriegel et al., 2024) is valid for text-to-text AI models like ChatGPT, yet it may not necessarily apply to text-to-image generators such as Dall-E 2 and Midjourney.

Nonetheless, it is clear that the most perceived benefit from using GenAI comes from the tools being integrated within the software program rather than text-to-image generators such as Dall-E 2 and Midjourney. Integrated functions within graphic design software tools, such as generative filling in Adobe Photoshop, requires a higher level of human-computer interaction described by Mollick (2023) as the Cyborg approach. Here, the desired outcome is more dependent on human-computer collaboration. Even though some level of human-computer interaction is necessary when generating images, it can be argued to be more similar to the Centaur approach, also mentioned by Mollick (2023). Instead, the centaur approach defines a clear line between human tasks and AI tasks.

The respondents all mention that the generative filling function that is integrated into Adobe products accelerate their workflow. (R3) even states that it saves hours of time working. However, it is mentioned by (R4) that this function works best when the background of the picture is not overly complex. This finding can be connected to Joshi (2023), Brynjolfsson (2022), Mollick (2024) and Ågerfalk (2022), who argue that the best results when using AI tools are often derived from an iterative process combined with human intuition and experience (Joshi, 2023; Brynjolfsson, 2022; Mollick, 2024; Ågerfalk, 2022). It can be argued that the more human interaction there is in the AI-tool provided, the more useful it is perceived by all respondents.

Text-to-image tools like Dall-E 2 and Midjourney that can be argued to be more standalone tools are perceived as not very useful by (R1, R4, R5) because they find the content these tools generate as being too generic, and it's evident that it's AI-created. (R1) particularly, emphasize that the content being generated by Dall-E 2 and Midjourney isn't real, which reduces its usefulness in real-world applications. For (R1)'s clients it's vital to showcase content of products that is authentic in order to provide an accurate representation of what is actually being sold. This can be connected to the argument by Mollick (2024) that states that AI's greatest strength, to make things up, is also its biggest weakness (Mollick, 2024). However, (R6) describes a task involving creating a cover for a book set in a fantasy world. Here, (R6) presents a different perspective from (R1) and states that using text-to-image generators enhanced the quality of the work. This suggests that when graphic designers are working on content intended to represent the real world, text-to-image generators may not be perceived as that useful. However, when working on fictional content, which is also a part of the profession, text-to-image generators are perceived as being useful.

However, evidence supporting Sasaki's (2024) statement regarding the impressive advancements in generating images from prompted text by Dall-E 2 and OpenAI can be found in our results. Although (R1, R4, R5) all describe the content created by text-to-image generators as overly generic, and not being applicable in the real-world (R2) offers a different perspective. (R2) entered an art exhibition alongside physical, traditional, visual artists, with content created by AI. (R2) being the sole participant of the art exhibition to sell out all of the displayed work can be seen as an argument to back up the statement made by Sasaki (2024) that the content being created is of high quality. Since this is the only data collected where image-to-text generators were applied in the real world and the outcome being viewed as successful, it could be argued that text-to image generators when used correctly might be more applicable to real-world tasks than perceived by the respondents. This supports Mollick's (2024) statement that creative professions, including graphic design, will indeed be highly affected by GenAI.

5.4 Future Prospects and Adaptations

Most of the respondents (R1, R2, R3, R5) agree that the key to successful adaptation is to stay up to date with the latest advancements in AI and learn how to effectively incorporate the tools into their work. Specific skills highlighted by the respondents include coming up with original ideas (R1) and understanding the field of graphic design (R2). This means that having an understanding of what works and what does not work will remain important. Without that understanding, it will be difficult to successfully use AI tools to generate precise content. Specifically, (R2) spoke about the knowledge of how to manipulate light in order to generate the desired image. This is the type of knowledge that will continue to be important even after further integration of AI tools, as Meggs & Purvis (2016) mentioned that light manipulation has been part of art since the renaissance. It is a skill that has survived endless waves of new technology and still has its place in graphic design to this day.

This type of knowledge and understanding of the world that designers have will stay important, even as AI becomes more integrated into their work. While AI tools can help speed up tasks and offer new creative options, they can't replace a designer's unique perspective and deep insight into the human experience. This includes an awareness of cultural contexts,

trends, and audience preference, which are factors that may impact the perception of the design. This way of working with AI, coincides with Mollick's (2023) Centaur approach, with a clear distinction between what tasks are designated for humans and tasks designated for AI. As technology evolves, designers will guide AI tools with their expertise. They will still need to oversee the creative process, to make sure that the final product aligns with the intended vision and meets high standards of quality, as mentioned by Fabri et al. (2022). This means that the designer's knowledge and understanding of the world will stay valuable and co-exist with AI's capabilities.

Included in this type of knowledge is also the ability to perceive the world around us, to capture the feelings and emotions of our environment and the people around us. This is something that both (R1) and (R5) find valuable. Additionally, both (R1) and (R4) discuss the importance of personal style for graphic designers, even as artificial intelligence becomes better in the future. (R4) suggests that clients might place even greater value in the future on hiring designers with a distinctive personal style. (R1) argues that despite content being generated by AI, some individuals may still prefer to hire specific designers based on their reputation and previous work.

6 Conclusion

The purpose of this study was to explore the perceived impact of emerging AI tools on the profession of graphic design. To achieve this, interviews were conducted with professionals working within the field of graphic design. The study aimed to address the following research question:

RQ: *How do graphic designers perceive the impact of generative artificial intelligence on their profession?*

The understanding and awareness of AI among the responding graphic designers varied. However, most respondents seem to be aware of the current evolution of GenAI models and its potential impact on their profession.

The study concludes that graphic designers perceive the major benefits of GenAI is in generating ideas and using integrated functions in software programs such as Adobe Photoshop. Additionally, it suggests that the level of human interaction needed to successfully operate AI tools influences their perceived usefulness. Tools that allow for more interaction are viewed as more beneficial. Text-to-text tools like ChatGPT, where the human-computer interaction is more iterative, are perceived as more useful compared to text-to-image generators such as Midjourney and Dall-E 2. However, graphic designers acknowledge text-to-image generators' usefulness in creating ideas.

Furthermore, the study highlights some of the challenges of using GenAI in graphic design. The challenges found include the perception of the created content as overly generic or overly complete. Content being overly complete may hinder its potential use as a first draft that later can be refined. Moreover, the content generated by GenAI is fictional, which reduces its perceived usefulness for companies hiring graphic designers, as it doesn't align with the real-world products they're selling. However, when creating content that is fictional there is some evidence that GenAI could be perceived as useful to enhance the quality of the work.

Lastly, a perspective on the future of the profession was provided, highlighting the significance of adapting and evolving alongside the tools as they continue to advance. Additionally, graphic designers perceive those skills considered important today, such as understanding lighting and the perception of real-world surroundings, will remain relevant in the future. However, although mentioned by some respondents, the emergence of AI was not perceived as a significant threat regarding future job loss.

In conclusion, the perception of GenAI is that it can accelerate the workflow and, in some instances, enhance the quality of the work. However, its perceived usefulness largely depends on the specific task that needs to be done. Nonetheless, despite being viewed as a valuable tool, GenAI is far from being perceived as a replacement for human creativity and expertise.

6.1 Further Research

As mentioned in the delimitations of this study, it only explores the perception of Swedish graphic designers regarding the integration of GenAI tools in their profession. To further build upon this research, it would be beneficial to study the perception of graphic designers from other countries, especially countries which differ from Sweden in a cultural sense or in its level of digitization. This would place the findings from this study in a greater context that would bring further clarification on how accurate the findings may be.

Additionally, it would be interesting to dive deeper into the ethical implications of integrating AI tools into graphic design, which was just briefly touched upon in this study. As the evolution of AI tools continues, their perceived usefulness may change. Therefore, it is important to further investigate the impact of GenAI on traditional roles and perspectives

Appendix A – AI Contribution Statement

1. AI tools: ChatGPT, Whisper
2. Degree of usage:
 - ChatGPT used was to enhance the flow of the text without altering the context. Additionally, it was used to generate ideas and themes for the interview guide.
 - Whisper was used for the initial transcription of the collected data from audio to text. The transcription was then manually checked to ensure high quality and accuracy using the original audio file.

References

- Adobe. (2024a). Photoshop. Available Online: https://www.adobe.com/se/products/photoshop/landpa.html?gclid=CjwKCAjw0YGyBhByEiwAQ-mBEWmx_2twb9SF35WnroniyBsdp0iMMWWFfzIl4shIrS8fApzKPxh4hrRoC6-0QAvD_BwE&mv=search&mv=search&mv2=paidsearch&sdid=2XBSBWBF&ef_id=CjwKCAjw0YGyBhByEiwAQmBEWmx_2twb9SF35WnroniyBsdp0iM-MWWFfzIl4shIrS8fApzKPxh4hrRoC6-0QAvD_BwE:G:s&s_kwcid=AL!3085!3!597384934920!e!!g!!adobe%20photoshop!1469952956!58520335113&gad_source=1. [Accessed April 15, 2024].
- Adobe. (2024b). Adobe Firefly. Available online: https://www.adobe.com/se/products/firefly.html?gclid=CjwKCAjw88yxBhBWEiwA7cm6pVtuSv0RETgmx0-GhhdW_cZ1BtQpm9rqPavfNm8mq70R9enERNjTYBoCVwkQAvD_BwE&mv=search&mv=search&mv2=paidsearch&sdid=VPM4K3RR&ef_id=CjwKCAjw88yxBhBWEiwA7cm6pVtuSv0RETgmx0-GhhdW_cZ1BtQpm9rqPavfNm8mq70R9enERNjTYBoCVwkQAvD_BwE:G:s&s_kwcid=AL!3085!3!697425709409!e!!g!!adobe%20firefly!20403492925!151740916476&gad_source=1 [Accessed 2 May 2024]
- Arbetsförmedlingen. (2024). Prognos: Grafiska Formgivare. Available Online: <https://arbetsformedlingen.se/for-arbetssokande/yrken-och-framtid/hitta-yrkesprognoser/prognoser/prognos/50> [Accessed 10 January 2024].
- Arikan, E., & Aram, S., (2022). Qualitative Study of Text-to-Image AI Generators and their Relationship with NFTs. *International Conference on Computational Science and Computational Intelligence (CSCI)*, pp. 240-245, doi: 10.1109/CSCI58124.2022.00046.
- Benbya, H., Strich, F., & Tamm, T. (2024). Navigating Generative Artificial Intelligence Promises and Perils for Knowledge and Creative Work. *Journal of the Association for Information Systems*, 25(1), 23-36. DOI: 10.17705/1jais.00861
- Bhattacharjee, A. (2012). *Social Science Research: Principles, Methods and Practices*, [e-book] Global Text Project, https://digitalcommons.usf.edu/oa_textbooks/3
- Brynjolfsson, E. (2022). The Turing Trap: The Promise & Peril of Human-Like Artificial Intelligence. *Daedalus*, 151(2), 272–287. DOI: https://doi.org/10.1162/daed_a_01915
- Burgess, A. (2018). *The Executive Guide to Artificial Intelligence*, [e-book] London: AJBurgess Ltd , <https://link.springer.com/book/10.1007/978-3-319-63820-1>

- Deng, J., Dong, W., Socher, R., Li, L.-J., Li, K., & Fei-Fei, L. (2009). ImageNet: A large-scale hierarchical image database. *2009 IEEE Conference on Computer Vision and Pattern Recognition*, 248-255 doi: 10.1109/CVPR.2009.5206848.
- Dodhia, Z. (2021). Will The Demand For Graphic Designers Diminish In The Near Future?. Forbes Business Council. Available online: <https://www.forbes.com/sites/forbesbusinesscouncil/2021/10/26/will-the-demand-for-graphic-designers-diminish-in-the-near-future/?sh=51e28ed51e28> [Accessed 9 January 2024]
- Eisenstein, E. L. (2012). *The Printing Revolution in Early Modern Europe*. 2nd ed., [e-book] Cambridge: Cambridge University Press. <https://www.cambridge.org/core/books/printing-revolution-in-early-modern-europe/85AE910ACCCFCE8C068DDA911990AEFC>
- European Commission (2021). Hur går det med EU:s digitala konkurrenskraft?. Available Online: https://sweden.representation.ec.europa.eu/news/hur-gar-det-med-eus-digitala-konkurrenskraft-2021-11-15_sv [Accessed 8 May 2024]
- Expert.ai (2022). What is machine learning? A definition. Available Online: <https://www.expert.ai/blog/machine-learning-definition/> [Accessed 28 April 2024]
- Fabri, L., Häckel, B., Human-AI Hybrids. *Bus Inf Syst Eng*, 623–641 <https://doi.org/10.1007/s12599-023-00810-1>
- French, A., Shim, J., Risius, M., Larsen, K. R., & Jain, H. (2021). The 4th Industrial Revolution Powered by the Integration of AI, Blockchain, and 5G. *Communications of the Association for Information Systems*, 49 <https://doi.org/10.17705/1CAIS.04910>
- Frolov, S., Hinz, T., Raue, F., Hees, J., & Dengel, A. (2021). Adversarial text-to-image synthesis: A review. *Elsevier*. <https://doi.org/10.1016/j.neunet.2021.07.019>.
- Gartner. (2023). Gartner Places Generative AI on the Peak of Inflated Expectations on the 2023 Hype Cycle for Emerging Technologies. Available online: <https://www.gartner.com/en/newsroom/press-releases/2023-08-16-gartner-places-generative-ai-on-the-peak-of-inflated-expectations-on-the-2023-hype-cycle-for-emerging-technologies> [Accessed 2 May 2024]
- Gartner. (2024). Digital Experience Platforms. Available Online: <https://www.gartner.com/reviews/market/digital-experience-platforms>. [Accessed April 15, 2024].
- Goldkuhl, G., (2012). Pragmatism vs interpretivism in qualitative information systems research. *European journal of information systems*, 21(2), pp.135-146.
- Higgins, M. (2021). The Future Of Accounting: How Will Digital Transformation Impact Accountants? Forbes. Available Online: <https://www.forbes.com/sites/forbestechcouncil/2021/05/19/the-future-of-accounting-how-will-digital-transformation-impact-accountants/>. [Accessed April 5, 2024].
- Hook, D., (2023). The Lone Banana Problem. Available Online: <https://www.digital-science.com/tldr/article/the-lone-banana-problem-or-the-new-programming-speaking-ai/> [Accessed May 5, 2024]

- IBM. (2024). What is artificial intelligence. Available Online: <https://www.ibm.com/topics/artificial-intelligence>. [Accessed May 12, 2024].
- Kaswan, K. S., Dhatteval, J. S., Malik, K., & Baliyan, A. (2023). Generative AI: A Review on Models and Applications, *International Conference on Communication, Security and Artificial Intelligence (ICCSAI)*, 699-704, doi: 10.1109/ICCSAI59793.2023.10421601.
- Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2017). ImageNet classification with deep convolutional neural networks. *Communications of the ACM*, 60(6), 84–90. doi: 10.1145/3065386
- Lee, A.S. (1991). Integrating positivist and interpretive approaches to organizational research. *Organization Science*, 2(4) pp. 342-365.
- LeCun, Y., Boser, B., Denker, J. S., Henderson, D., Howard, R. E., Hubbard, W., & Jackel, L. D. (1990). Handwritten digit recognition with a back-propagation network. *Advances in Neural Information Processing Systems (NIPS 1989)*.
- Li, S., "Exploration on the application of artificial intelligence elements in Graphic Design," *2021 2nd International Conference on Intelligent Design (ICID)*, Xi'an, China, 2021, pp. 143-146, doi: 10.1109/ICID54526.2021.00036.
- Maurer, M. (2023). The Accountant Shortage Is Showing Up in Financial Statements. The Wall Street Journal. Available Online: <https://www.wsj.com/articles/the-accountant-shortage-is-showing-up-in-financial-statements-b14a6b94>. [Accessed April 6, 2024].
- Meggs, P. B., & Purvis, A. W. (2016). *Meggs' history of graphic design* (6th ed.), [e-book] Hoboken: NJ: Wiley, <https://lubcat.lub.lu.se/cgi-bin/koha/opac-detail.pl?biblionumber=4946358>
- Merriam-Webster.com. (2024). Graphic design. In Merriam-Webster.com dictionary, <https://www.merriam-webster.com/dictionary/graphic%20design>. [Accessed May 12, 2024].
- McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (2006). A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence, August 31, 1955. *AI Magazine*, 27(4), 12. <https://doi.org/10.1609/aimag.v27i4.1904>
- Midjourney. (2023). "Midjourney AI" Available Online: <https://Midjourney.co/> [Accessed 16 April 2024].
- Maurya, H., Agrahari, A., & Kumar, A. (2024). Human-AI Collaboration: Cognitive Challenges in Interacting with Generative AI Agents. Indian Institute of Management. *Association for Information Systems. AIS Electronic Library (AISeL)*, <https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1005&context=sighci2023>.
- McKinsey & Company. (2024). What is AI? Available Online: <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-ai>. [Accessed May 12, 2024]

- Mirsky, Y., Demontis, A., Kotak, J., Shankar, R., Gelei, D., Yang, L., Zhang, X., Pintor, M., Lee, W., Elovici, Y., & Biggio, B. (2023) The Threat of Offensive AI to Organizations. *Computers & Security*, 124, <https://doi.org/10.1016/j.cose.2022.103006>.
- Mollick, E. (2023) Centaurs & Cyborgs on the Jagged Frontier. One useful thing. Available Online: https://www.oneusefulthing.org/p/centaurs-and-cyborgs-on-the-jagged?utm_source=publication-search [Accessed 23 April 2024]
- Mollick E. (2024) Co-Intelligence: Living and Working with AI, W H Allen
- Oates, B. J., Griffiths, M., McLean, R. (2022) Researching information systems and computing. 2nd ed. Sage, Thousand Oaks
- OpenAI. (2022). DALL-E 2. Available Online: <https://openai.com/dall-e-2> [Accessed 15 April 2024].
- Patton, M. Q. (2015). Qualitative Evaluation and Research Methods. 4th ed. SAGE, Thousand Oaks (CA), ISBN 9781412972123
- Purohit, A. (2023). AI, ML, DL, and Generative AI Face Off: A comparative analysis. Synoptek. Available Online: <https://synoptek.com/insights/it-blogs/data-insights/ai-ml-dl-and-generative-ai-face-off-a-comparative-analysis/> [Accessed 15 May 2024]
- Roose, K. (2022). An A.I.-Generated Picture Won an Art Prize. Artists Aren't Happy. The New York Times. Available Online: <https://www.nytimes.com/2022/09/02/technology/ai-artificial-intelligence-artists.html>. [Accessed March 13, 2024].
- Recker, J., (2013). Scientific Research in Information Systems: A Beginner's Guide, Berlin, Heidelberg: Springer Berlin Heidelberg, Imprint: Springer.
- Riemer, K., Peter, S., (2023). What the Lone Banana Problem reveals about the Nature of Generative AI. *ACIS 2023 Proceedings*. 86. <https://aisel.aisnet.org/acis2023/86>
- Russel, S. & Norvig, P. (2022) Artificial Intelligence: A Modern Approach, 4th Ed, Pearson Education
- Sasaki, S., Nishida, K., Sawai, K., Ushiyama, T., Lyric-Based Image Generation for Individual Songs with Text2Image Model. *2024 18th International Conference on Ubiquitous Information Management and Communication (IMCOM)* 1-7, doi: 10.1109/IMCOM60618.2024.10418410.
- Sichel, D. E. (1997). The Computer Revolution: An Economic Perspective. Brookings Institution Press. ISBN 9780815723530
- Siemon, D., Strohmman, T., & Michalke, S. (2022). Creative Potential through Artificial Intelligence: Recommendations for Improving Corporate and Entrepreneurial Innovation Activities. *Communications of the Association for Information Systems*, 50, <https://doi.org/10.17705/1CAIS.05009>
- Somainsi, A. (2023). Algorithmic Images: Artificial Intelligence and Visual Culture. *Grey Room*, (93), 74–115. https://doi.org/10.1162/grey_a_00383

- U.S. Bureau of Labor Statistics. (2022). Occupational Employment and Wage Statistics: Graphic Designers. Available Online: <https://www.bls.gov/oes/current/oes271024.htm> [Accessed 12 January 2024].
- Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186-204, https://www.researchgate.net/publication/227447282_A_Theoretical_Extension_of_the_Technology_Acceptance_Model_Four_Longitudinal_Field_Studies
- Venkatesh, V., Brown, S.A. & Sullivan, Y.W. (2016). Guidelines for Conducting Mixed Methods Research: An Extension and Illustration. *Journal of the Association of Information Systems* 17(7) pp. 435-495. <https://doi.org/10.17705/1jais.00433>
- Ågerfalk, P. J., Conboy, K., Crowston, K., Eriksson Lundström, J. S., Jarvenpaa, S., Ram, S., & Mikalef, P. (2022). Artificial Intelligence in Information Systems: State of the Art and Research Roadmap. *Communications of the Association for Information Systems*, 50, <https://doi.org/10.17705/1CAIS.05017>