

**What happens when an artist appropriates emerging technologies to create paintings?**

**An exploration through portraiture**

Jihane Mossalim

A Thesis

In the Department

of

Art Education

Presented in Partial Fulfillment of the Requirements

For the Degree of Master of Arts in Art Education at

Concordia University

Montreal, Quebec, Canada

March 2023

© Jihane Mossalim, 2023

CONCORDIA UNIVERSITY  
School of Graduate Studies

This is to certify that the thesis prepared

By: Jihane Mossalim






Entitled: What happens when an artist appropriates emerging technologies to create paintings? An exploration through portraiture


and submitted in partial fulfillment of the requirements for the degree of


Master of Arts (Art Education)

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the final examining committee:

	Chair
Dr. Vivek Venkatesh	
	Examiner
Dr. Lorrie Blair	
	Examiner
Dr. David Pariser	
	Thesis Supervisor(s)
Dr. David Pariser	
	Thesis Supervisor(s)
Dr. Lorrie Blair	

Approved by   
Dr. Vivek Venkatesh Chair of Department or Graduate Program Director

  
Dr. Annie Gérin Dean of Faculty 

## **ABSTRACT**

**What happens when an artist appropriates emerging technologies to create paintings?**

**An exploration through portraiture**

Jihane Mossalim

This studio thesis investigates the process and result of merging traditional art-making media with emerging technologies in creating portraits. Through the creation of 10 oil portrait paintings with AI and AR components, the following questions are considered: What happens when artificial intelligence (AI) and augmented reality (AR) are paired with traditional art-making tools, and what benefits can students gain from using AI and AR in the art room? How can emerging technologies such as AI and AR be used in conjunction with traditional methods of creation such as painting and drawing? Through interviews, journaling, and the creation of the portraits, I explored the subject and found a marked distinction between the use of traditional media and emerging technologies, both physically and mentally. I described how it affected my creative process and the result of the final works. I also look at using emerging technologies with traditional media in the art class and its possible uses and effects on students and teachers. This thesis calls for the responsible use of emerging technologies in art-making and considers how elementary teachers can use and teach these emerging technologies as a tool in the creation of artworks.

## Acknowledgments

I would like to thank my thesis supervisors Dr. David Pariser for his open mind, generosity, and patience and for always sharing both sides of a coin (an increasingly disappearing quality in academia) and Dr. Lorrie Blair for the laughter, for more laughter, for her support and generous assistance as well as her incredible human ability to make me feel like I could accomplish anything I set my mind to do. A huge thank you to you both. You changed my life.

Thank you to my children, Victor and Lydia, for assisting me in my numerous art lesson trials and for your brutal honesty.

Dan, this thesis is for you, for almost 20 years of constant support, through thick and thin and ups and downs. Humans are amazing. I love you.

# Table of Contents

List of Figures.....	vi
Chapter 1 Introduction.....	1
Chapter 2 Why the use of portraiture as a method of inquiry?.....	4
Chapter 3 New Technology and Art.....	7
Methodology.....	11
Procedure.....	12
Chapter 4 The Participants.....	19
Creating the Portraits.....	35
Experimenting with emerging technologies.....	41
Chapter 5 Observations.....	46
Social media and sharing the work.....	50
Chapter 6 Teaching Implications in the elementary school.....	53
The case for augmented reality in art.....	55
In the classroom.....	56
Using AI and portraiture in the art class at the elementary level.....	56
Chapter 7 Conclusion.....	59
Further questions.....	62
References.....	65
Appendix A: Certification of Ethical Acceptability.....	69

## List of Figures

1. AI generator image from Tiezhou’s description.....	9
2. Pencil sketch of Joseph’s portrait.....	14
3. AI generated image from Joseph’s description.....	15
4. Oren’s original photograph.....	16
5. AI generated image from Oren’s description.....	16
6. Image composite for portrait painting.....	16
7. Portrait of an Artist, 36’’x36’’, oil on canvas, 2022.....	23
8. Portrait of a Scientist, 36’’x36’’, oil on canvas, 2022.....	24
9. Ceci, 36’’x36’’, oil on canvas, 2022.....	25
10. Joseph, 36’’x36’’, oil on canvas, 2022.....	26
11. François-Joseph, 36’’x36’’, oil on canvas, 2022.....	27
12. Nora, 36’’x36, oil on canvas, 2023.....	28
13. Cristian and Friend, 36’’x36’’, oil on canvas, 2022.....	29
14. Oren, 36’’x36’’, oil on canvas, 2022.....	30
15. Tiezhou, 36’’x36’’, oil on canvas, 2023.....	31
16. Casey, 36’’x36’’, oil on canvas, 2023.....	32
17. Still frame from François-Joseph’s in-person interview .....	33
18. Charcoal Sketch of Tiezhou.....	36
19. Watercolor sketch of Ceci.....	37
20. Viewing the painting Ceci with the AR component .....	44
21. The completed paintings .....	52
22. Question and answer with open AI.....	61

## Chapter 1: Introduction

As an artist and art teacher in an elementary school, I am interested in merging technology and art, more specifically, artificial intelligence (AI) augmented reality (AR), and art. These technologies are changing the world at an extraordinary speed. Arts and art education should remain current to help educate and form responsible and competent users of these emerging technologies as well as push the boundaries of art-making in our current world. In their book, *Osons l'IA à l'école* (Let's dare AI in schools), head of Montreal's Collège Sainte-Anne and education expert Ugo Cavenaghi, and pedagogical innovation expert Isabelle Senécal (2019) write about their thoughts on the use of AI in schools. The authors state that educators should try to understand AI and consider its societal impacts. Schools are also pivotal in equipping young people with the necessary tools to live with AI (p.19). How can emerging technologies such as AI and AR be used in conjunction with traditional methods of creation such as painting and drawing? What would be the benefits to the artist? To the student? How and why should this method be incorporated into the art class? How can art educators combine and teach these methods? Finally, what happens when an artist appropriates emerging technologies to create portraits?

In this research-creation, I am exploring these by making of a series of oil-painted portraits of artists and scientists. I felt the urge to push the boundaries of portrait making by stepping out of my comfort zone to explore the different possibilities of new media technology combined with a traditional medium such as oil painting. Portraits are in many ways a mirror of society. One can easily think of the work of Rembrandt and his many portraits. In his work, he aspired to paint the truth of everyday life. As stated by Potter (2006) in an article dedicated to the work of the artist, "At a time when popular taste was turning to classical subjects, Rembrandt

drew inspiration from the humble, the rough, the decayed, the awkward and the heavy whom he painted not as they might have been but just as they were, providing ample clues to their temperament and predicament” (p.538). Andy Warhol also depicted his era with the multiplicity of pop icon portraits he created. Author and scholar Cynthia Freeland (2007) writes about the notion of portraiture as an important genre that is too often under-examined as a carrier for philosophical thoughts and ideas. She writes that:

[...] the more I think about portraiture, the more philosophical problems the genre seems to raise. Our discipline is still struggling with the notorious mind/body problem, something portraiture promises to resolve through its very nature: rendering the subjective objectively visible. Hence this would appear to be a thoroughly philosophical form of art (p.95).

Creating a series of portraits representing both artists and scientists, was for me, a way to mirror the fields of science/technology and art, explored in this research. Everyone can relate to a face. Regardless if we know the person or not, it is familiar, and we can understand it. We often have a reaction when looking at a portrait. Freeland (2010) states that “[...] portraits might reasonably be thought to embody accumulated cultural wisdom about what it is to be human” (p.1). What happens when AI and AR are added to the mix? Does the portrait lose its “humanity”? Or on the contrary, do these technologies help the viewer understand the subject better?

A good amount of playfulness and drive for novelty paved the way for the use of AI and AR in the portraits I created. It was born out of the boredom of repeating the same portrait-making techniques I used for over a decade. I found myself in awe in front of AI and AR; seeing an image appear from typed words in a box on the screen and making the subject of a painting



“come alive” through an AR application was nothing short of magic. It allowed me to rekindle my passion for portrait painting in a way that I never thought possible after all these years. What else could it do and how could I repeat and share these magic moments with viewers and students?

Conducting interviews with the participants, creating the artwork, and thinking of ways to use emerging technologies in the art class from this research-creation are the principal subjects explored in this thesis. It is divided as follows: In Chapter two, I write about using portraiture as a method of inquiry; I look at its origin as a research method pioneered by American scholar Sara Lawrence-Lightfoot. I also explain how I used this method in a literal way by painting a series of portraits. I describe the science and the art of portraiture and consider how portraiture as a method of research inquiry can be controversial. In Chapter three I explain the use of research-creation as the chosen methodology for my thesis and outline how I conducted my research. I explain in detail the different steps taken to create the portraits using emerging technology and oil paints on canvas. Chapter four is about the participants and my experience interviewing them. I describe my observations to their answer to my questions while looking for patterns and noting recurring themes linked to the participants and the interviews. In Chapter five, I describe my observations from the research-creation and the outcomes of sharing the work on social media. In Chapter six, I give examples of emerging technologies in education and the art class and share my experience using AI in portrait making with grade five and six students. Chapter seven is the final chapter of this thesis; I share the questions I could not answer, new questions that emerge from my observations, and future research interests.

## Chapter 2: Why the use of portraiture as a method of inquiry?

The use of portraiture as a method of inquiry was pioneered by Sara Lawrence-Lightfoot, sociologist and professor of education at Harvard University. She originally used it as a method to gather data from three different socio-economic high schools in the USA. She used portraiture not only to describe the schools in question but also to share her own perceptions and ideas in regard to these schools, from the physical environment to the students' conversations, to the teaching styles of the teachers. The portraits she created were not visual artworks but written components taken from her own observations and interviews of the participants. Scholar D. Hackmann (2002) also speaks favorably about the use of portraiture as a research method in educational settings as it "fits squarely" into the interpretation of human perspectives (p.57).

The play on perspectives is one of the main attributes of the portraits I created. By asking the participants for their chosen photograph as well as for a descriptive text explaining why they chose this photograph, I take into consideration their own sense of self, how they perceive themselves, or how they think they perceive themselves. By taking this text description and typing it into an AI text-to-image generator, I get an image in return. This image is the AI's interpretation of the descriptive text written by the participant. I then create my own interpretation of the subject by combining both the participants' photographs and the AI-generated image in the final painted work. In the end, the viewer possesses the last interpretation of the work as he/she observes the painting. Lawrence-Lightfoot and Davis (1997) state that "The interpretations of the protagonist and portraitist contribute to the co-construction of the story, but the final contributor is the reader—who brings yet another interpretation into the discourse" (p.74). In the case of the series of my painted portraits, the reader is in fact the viewer of the works.

I also enjoyed the idea of this method of combining the arts and the sciences to create portraits. I have always had an interest in merging these two fields into my artistic practice and the art classes that I teach. I agree with Lawrence-Lightfoot and Davis (1997) when they state, “We see art as arbitrary and fictive; science as precise and real. [...] we less frequently address the potential scientific rigor of artistic processes, and the potential artistry of science” (p.22). By creating these painted portraits, I merged the sciences (in the form of emerging technologies) with the art of portraiture, representing individuals with oil paint on canvas. The combination of the arts and sciences in the portraiture method can also be demonstrated in collecting data in the form of journaling, interviews, note-taking, and article reading. Rigor and artistry were more often than not, undecipherable during the process of both research and creation.

Using portraiture as a method of inquiry is also a way to build a connection between the viewer and each participant, fostering a better understanding of the subject and findings of the research. According to Lawrence-Lightfoot (2016), people that want to do portraiture “want to tell a rich, comprehensive, deep story and they want to speak to broader audiences beyond the Academy (p.26)”. I would even push this statement further by saying that using the portraiture method and translating it into actual, physical portraits, offers a certain ease of access to the viewer in comparison to what a written text could provide. But not everyone agrees with this method of research. Portraiture as a method of inquiry has been criticized by a number of scholars, especially in regard to its lack of objectivity. As stated by professor and scholar Fenwick English (2000) who criticizes Lawrence-Lightfoot and Davis’s (1997) portraiture method of inquiry:

[...] the developing of a portrait involves the active association of the researcher and the person being observed in constructing the portrait itself. This interaction considerably

muddies, if not outright challenges, the “stance” of objectivity which researchers in the classical modernistic approach hold dear (p.22).

This might be a valid statement when it comes to purely scientific, number-driven studies and data but I truly believe that most studies, especially in social sciences and the arts are never fully objective. The biases can come from both the researcher and the participant and both have the potential to affect the data. For example, a questionnaire given to the participant by the researcher could hold biases in how the questions are formulated. By the same token, the participant’s answers to the questionnaire might hold biases as they might answer the questions to appear in the best possible light. In their article on sensitivity biases, Blair, Coppock, and Moor (2020) describe this form of bias “as social desirability bias” (p. 4). Humans are not machines; they have feelings, emotions, lived experiences, and biases. Unless a study is fully conducted and based on numbers ran by a computer to obtain results, complete objectivity would be difficult, if not impossible to achieve. Using portraiture as a method of inquiry allowed me to create oil portrait paintings based on the data collected from the participants’ interviews and photographs; I made aesthetic choices for the work based on the data collected. None of these choices could be said to be objective. I will reiterate and argue that one cannot make the portrait of someone while being entirely objective, neither as an artist nor as a researcher. One must decide what is shown to the world and what aspect of this person’s life, features, character, or physical traits is emphasized, whether in writing or on a canvas. Can the non-objective aspects of portraiture give the viewer a better understanding and connection to the work? Could this aspect be beneficial to the research? If so, in what ways? Looking at research-creation methodology might offer some answers to these questions.

## **New Technologies and Art**

Artificial intelligence is not new. Its concept dates back to the early 1940s with research conducted by renowned British mathematician Allen Turing, the founding father of artificial intelligence. Turing brought up the hypothesis that a human brain is not unlike a computing machine and that a machine can be trained to think and make decisions on its own, just like the human brain (Copeland, 2023, Allan Turing section, para.7). He invented a test that is still used to determine if the computer is thinking. This test is famously known as the Turing test. According to digital experts and professors Haenlein and Kaplan (2019), the history of artificial intelligence can be divided into four seasons. First came the spring, the birth of AI. The term "artificial intelligence" first appeared in 1956 with the creation of the Dartmouth Summer Research Project on Artificial Intelligence (DSRPAI) by computer scientists Marvin Minsky and John McCarthy. This Rockefeller-founded workshop's goal was to advance the research in creating machines able to replicate human intelligence (Haenlein & Kaplan, 2019, p.2). Then came the summer and winter, "the ups and downs of AI" (p.3). AI advancements and research continued for two more decades until the findings became stagnant, and the US government stopped funding the research in the 1970s. Lastly, there was the fall, "the Harvest and the present day" (p.3). In 1997, IBM's Deep Blue chess-playing program beat the world's champion of the time, Gary Kasparov. With the advancements of subsets of artificial intelligence such as Deep Learning, 2015's AlphaGo, developed by Google, was able to beat the world champion in the game of Go, "a game much more complicated than chess with a multitude amount of possible moves" (p.4). Neural networks and Deep Learning are the leading AI systems used today. According to Haenlein and Kaplan (2019), "They are the basis of image recognition algorithms used by Facebook, speech recognition algorithms that fuel smart speakers and self-driving cars"

(p.4). Cavenaghi and Senécal (2019) suggest an easy-to-understand definition of AI and how it works using the food recipe analogy; the cook (the computer) uses ingredients (the data) while following a recipe (the algorithm) to obtain a cooked meal (the final result) (p.24).

Many scholars have written about portrait making in arts; as mentioned in the introduction, Cynthia Freeland publishes books and articles on the subject, often criticizing the lack of philosophical considerations regarding portraiture in art. In her book, *Portraits and Persons* (2010), she writes about the psychology and intentions behind the creation of a portrait, its relation to death, and the power portraits hold. More recently, artists such as Mario Klingemann and Mike Tyka are giving an entirely new meaning to portrait making and making us ponder the definition of an artist. In his work *Memories of Passersby I* (2019), artist and programmer Mario Klingemann invented a complex neural network to generate portraits in real-time. The portraits are based on a data bank involving many European portraits from the 17th and 18th centuries. As Benney and Kiesler (2021) write on their AI artists' website, "Klingemann says the art is not the images, which disappear, but the computer code that creates them. That makes it distinct from other pieces of AI art that have made it to auction—most of which consists of a single unchanging image generated by an algorithm" (*Memories of Passersby I* section, para.6). The authors also present the work of artist and researcher Mike Tyka, who uses artificial intelligence to create portraits of imaginary people. All of these AI-generated portraits are viewed through prints or a screen; they are not created through paint or traditional art-making media. The two worlds of physical and digital art-making media do not seem to merge very often. I came across the work of many artists who have incredible coding knowledge and can create artwork using complex codes and programs. In the 2nd chapter of his book *Art in the Age of Machine Learning* (2021), artist and scholar Sofian Audry writes about his journey of trying to

find his place as an artist with a heavy computer science background. He admits that he had a very narrow view of the arts and explains that this view was extenuated by many years spent in an AI culture that too often feels and acts superior to other fields, particularly the field of the arts.

He states:

Consequently, I and my computer science peers viewed artists as lazy daydreamers who had probably chosen the arts because they were not smart enough to work in the sciences. Nothing of course could be further from the truth. Making art is challenging. Making *good* art requires not only intuition and talent but relentless dedication and a strong dose of resilience (p.22).



Figure 1: AI generator image from Tiezhou's description

The use of AI in art is gaining popularity and is increasingly accessible. The same is true for augmented reality. As described by Berryman (2012), augmented reality (AR) is “a technology that overlays digital information on objects or places in the real world for the purpose of enhancing the user experience” (p.212). Many experts disagree on the official origins of AR. However, one of its earliest applications dates back to WWII in England, where British Army pilots were equipped with a laser system displayed on the windshield of their plane, giving them information about their surroundings, if a plane in sight was friend or foe (Berryman, 2012, p.213).

Researchers have published articles on the subject of augmented reality since the early 2000s. The work of scholars Pasaréti et al. (2012) and Sethiya and Guruprasad (2020) describe using AR in an educational setting to enhance textbooks by creating 3D visual models of invisible objects such as those of molecules in chemistry class. With the installed application, students only need their phones or tablet to view the augmented reality feature. Regarding art and education, researchers looked at AR as a teaching asset to education curricula in schools and museum exhibits. A Taiwanese study by Chen and Lai (2021) concluded that AR in the museum “Has a positive and significant influence on learning motivation which means that museums can increase the learning motivation of visitors through augmented reality” (p. 12). Many artists also use AR as components of their artwork. Websites hosting AR applications and access, such as Austria-based company ARTIVIVE, allow artists to showcase their artworks. Artist, writer and new digital media researcher Helen Papagiannis (2016) writes about the importance of having artists being part of new technology discussions as they are “crucial in envisioning novel applications and approaches and developing new aesthetics and conventions beyond previous traditional forms” (p. 5).



### Chapter 3: Methodology

Whereas his scholar dwelled on words, Rembrandt used color and brushstrokes. For these, along with numbers, notes on the staff, or sheer speculation are the tools for exploring the universe. And so it goes with science and public health. In isolation, like Rembrandt's scholar, in the laboratory, or in the field, public health workers search too, observing, recognizing and meticulously recording relevant information, surveying, delving into the unseen and implied, expanding knowledge (Potter, 2006, p.537).

As a painter, I was most attracted to doing a studio thesis to explore my research interest; what better way to try and make sense of what happens when an artist appropriates emerging technologies to create oil portraits than actually creating oil portraits using emerging technology? Using research-creation as my methodology allowed for a certain freedom of exploration through and with the art-making process. As stated by Concordia University professors Oren Chapman and Kim Sawchuk (2012), "Creation-as-research is also creation-through-research, in terms of expanding what "is" in the world by revealing new layers, permutations of reality, or experiences to be experienced" (p. 21). The authors explain that the process of conducting a research-creation study is really experimenting, researching, and creating all at the same time. They state that "In research-creation approaches, the theoretical, technical, and creative aspects of a research project are pursued in tandem, and quite often, scholarly form and decorum are broached and breached in the name of experimentation" (Chapman, & Sawchuk, 2012, p.6). Creating artworks while researching the subject of emerging technology and portraiture felt as if I was exploring unknown lands. I never knew where my next step was going to lead me. I quickly understood that this is what research should feel like.

Creating physical artwork using a combination of traditional art materials with digital technologies and observing what happens, what is possible, what works, and what does not was

like doing a scientific experiment. As stated by Chapman and Sawchuk (2012), “Knowledge is produced as creative work, and not simply through their analysis and interpretation.” (p.21).

In my research, the creation of the portraits was just as important as the gathering of data and the analysis of that data. One could not exist without the other, and they all informed my research. Leavy's (2020) book offers an excellent overview of artmaking, research, and how it is used to bridge cultural, socioeconomic, and ethnic backgrounds. The author states, "Visual imagery does not represent a window onto the world but rather a created perspective" (p.236). I agree with the author when she writes that the arts can be very engaging as they tap into people's emotions (p.13). The arts can also be used to teach diverse subjects as they can reach people on a deep level (Leavy, P., 2020, p.15). They might be the most accessible field, and conducting a study using research-creation to create visual imagery produced by and through research is more apt for reaching a wider audience.

Creating a series of portraits to conduct the research was the best possible way for me to try and understand how emerging technologies can be used with traditional media in the creation of physical artwork, and observe what it does not only to me as the artist but also to the participants and hopefully in a near future, to the viewers of the work.

## **Procedure**

The steps for my research-creation were as follows: Contacting the participant, interviewing the participant, receiving the portrait photograph of the participant with the descriptive text, creating the final image based on the photograph of the participant with the AI-generated images from the description, painting the portrait, adding the augmented reality video based on the recorded interview and finally, sharing the final work with the participant/social

media. The first step was finding willing participants; finding four artists and four scientists as a way to mirror the convergence of these two fields portrayed in my research was important. I knew some of the participants from previous projects, and others I didn't know at all but knew of their work or research interest. Most scientists I contacted agreed to participate in my research without hesitation. For the artists, it was different. I had a more challenging time finding artists willing to participate in my research; most of the ones I contacted either never answered my emails or hesitated so much that I decided to seek out someone else. Ultimately, everything worked out, and I could conduct the interviews. Each participant could do the interview on Zoom or in person. Half of the participants did online interviews. Two of the four participants chose to do online interviews, and the other two had to do so due to their location. Both artists and scientists answered the following questions:

- 1- Why did you become an artist/a scientist?
- 2- What drives your work as an artist/as a scientist?
- 3- What are some of the tools you use in your work as an artist/as a scientist?
- 4- Where does technology stand in the work that you do as an artist/as a scientist?
- 5- According to you, what is the role of the artist of the future/the scientist of the future?

I also kept a journal, writing down my thoughts, feelings, and observations before and after each interview.

The second step after conducting each interview was to ask the participant to send a digital version of their preferred portrait photograph of themselves at any age. I asked each participant to provide a short text description of why they chose that specific photograph.

The third step was creating a quick drawing of the participant based on the photograph received. Drawing each participant's face allowed me to get familiar with their features, angles, lights, and shadows. I used pencil, charcoal, watercolors, or a mix for the drawings, depending on what I felt more inclined to use according to each picture. I was more inclined to use a pencil for the detailed photograph, and I usually chose watercolors for darker, slightly blurry photographs.

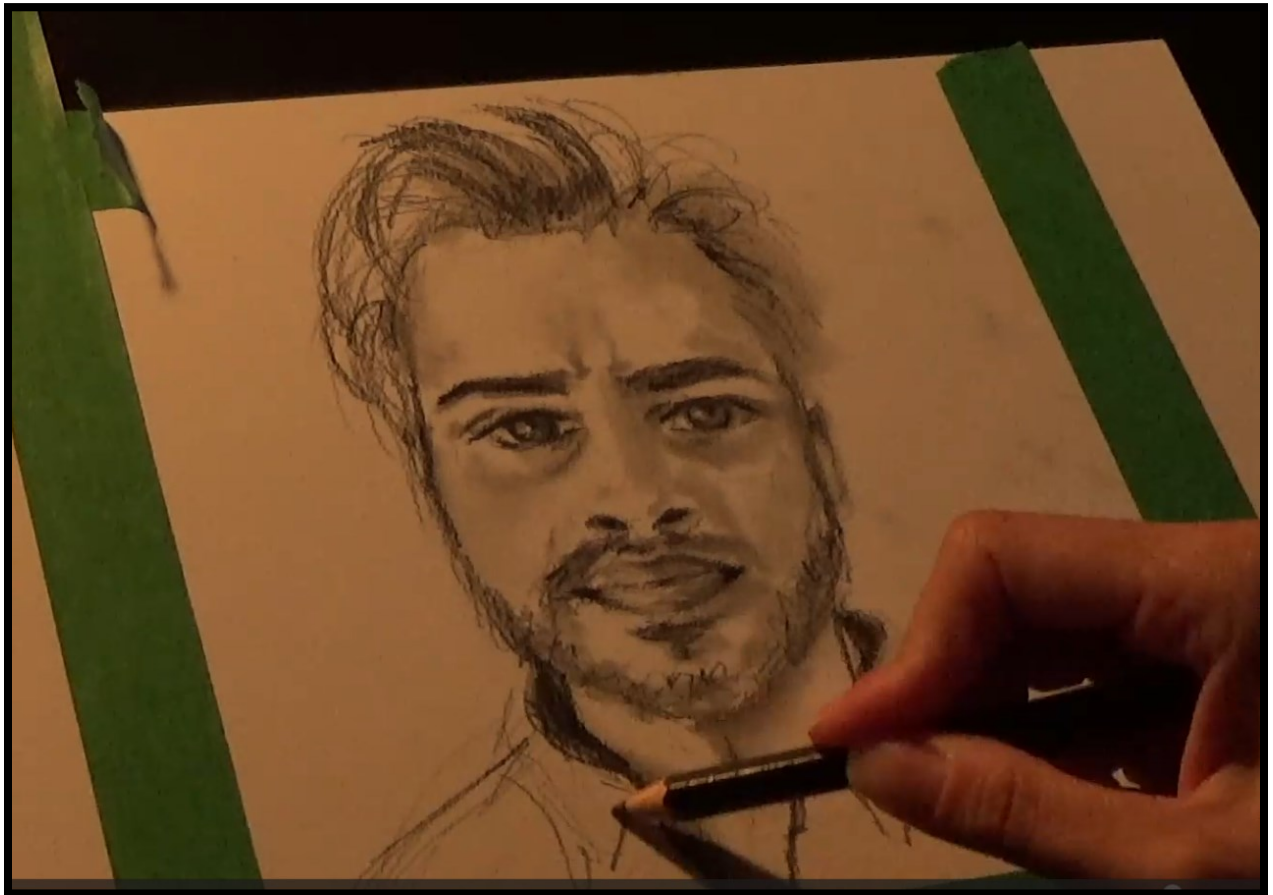


Figure 2: Pencil sketch of Joseph's portrait

As a fourth step, I ran the participant's text description using the *Allen Institute for AI* AI text-to-image generator. It is an open-source program where the user enters a text prompt into a box made for that purpose. In return, the AI takes the information from the written prompt and creates an image based on its text interpretation. This specific generator gives back an abstract

image that is usually aesthetically pleasing to me, though slightly dark and mysterious with humanoid inclinations and tonalities.



Figure 3: AI-generated image from Joseph's description

Step five was the composition of the abstract image from the text-to-image generator with the photograph of the participant. Using Photoshop, I combined the two images using transparency and superposition. I played with the superposition arrangement until I was satisfied with the composition. I did not modify the colors. I then printed the final image and used it as a reference for the painting.

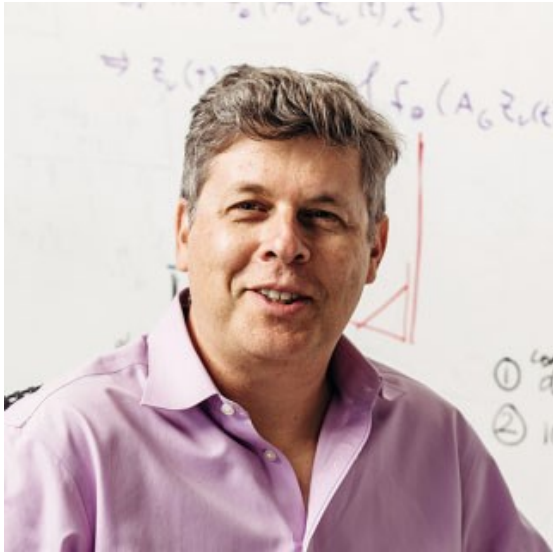


Figure 4: Oren's original photograph

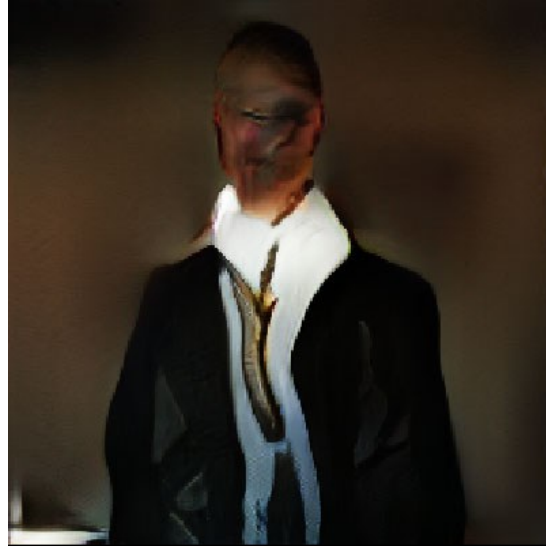


Figure 5: AI generated image from Oren's description



Figure 6: Image composite for portrait painting

Step six was painting the portrait based on the image created in Photoshop. I always started with a blank 36" x36" stretched canvas and covered it with a base coat of a dark or light color of oil paint, depending on the primary background color of the image. The choice of the square format was intentional to replicate and acknowledge the AI-generated image's square format. I then moved on to paint the large shapes and placed the features in a rough and sketchy way with the paintbrush. I usually only painted for an hour because I could only focus on the painting for not much longer than one hour at a time. I would then get too distracted and make mistakes. Or I would not have the time to paint more due to teaching, preparing art lessons, correcting students' work, and family responsibilities. When I wasn't teaching my art classes in elementary school, I could have three or four painting sessions in one day. Before and after each painting session, I would write my thoughts, feelings, and observations in my journal. I tried to do so consistently but sometimes felt the urge to paint just before going to work or doing errands with the family and skipped a few journal entries. I also tried to document the progress of each portrait, taking a photograph of the painting as it progressed.

In step seven, I created the augmented reality component of the final painting based on the interview I had previously conducted with the participant. In order to create the AR component, I first had to create a brief video by editing and experimenting with the interview recording. To do so, I used Adobe Premiere Pro, a video editing software. I chose the parts of the video where I found the participant's answers most compelling. I added music and videos (with paid subscription) to the video montage. I chose the music according to the participant's answers and the painted portrait's general feel. I kept each video under two minutes as I always had in mind the viewer who had to hold an electronic device in front of the painting to view the AR component. Two minutes can be extenuating with the arms up in the air. With the finished video,

I had to upload both the portrait painting and the video to the ARTIVIVE website, the host for the AR application.

Step eight was the final step. I shared the work with the participant and with their permission, shared it on Facebook. I presented the painting as well as its AR component.

With the completed painting series, I collected the data from my journaling, picture-taking, and participants' interviews. I noted patterns and repetitions of words, feelings, inner thoughts, and positive and negative aspects (physical, mental, reactions, and experiences) from the data collected to inform my research and help answer some of the questions mentioned in the introduction. Looking at these recurring patterns, I could answer some questions regarding my thesis subject. However, I also discovered unforeseen findings and answers to questions I did not even know I had in mind. This data also provided new questions to which I still need answers. In addition to the journal entries, I documented the paintings in progress; I have yet to find their use for the research aspect of the work, but I can see the benefit of having these visuals as part of the representation of an entire process of creation. The interviews were another component of the data, and I noted patterns of participants' answers according to their field of work (scientist/artist/both). I write about the findings from the data in greater detail in chapters four and five.



## Chapter 4: The Participants

I interviewed four artists and four scientists; two of these scientists are also artists. The first two portraits I created as a pilot for this research are titled “Portrait of an Artist” and “Portrait of a Scientist.” I created them using the same method as the portraits done for this research. Although they have an AR component, no interview was conducted with these two participants, and the AR component is quite different from the other eight portraits.

**Andres Manniste** (Portrait of an Artist): Manniste is a Canadian artist, painting, and drawing teacher at Dawson College. He was the first person I asked to participate in my research. It was initially for the pilot of my thesis. He accepted right away.

**Yufang Ruan** (Portrait of a Scientist): At the time of the painting, Yufang was a Ph.D. candidate at McGill University from China. She was studying language learning in children.

**Cecilia Kramar**: Kramar is a neuroscientist from Argentina. From what I understood from the interview and our casual conversation before and after the interview, she is disillusioned by the science world/business of the country. We met at her apartment on a hot summer day. She was my first interviewee for the research. This was the first time we met in person. We had met online through the Convergence Initiative a few times. She had a great sense of humor, and we enjoyed sharing our hopes and dreams. It was an enjoyable encounter.

**Joseph Siddiqi**: Siddiqi is an artist and professor at Concordia University in the department of Studio Arts. The interview went very well; Joseph is exceptionally talented in communicating deep philosophical thoughts, using words and imagery that everyone can understand. One could easily listen to him for hours, and he was very generous with his time. Joseph was the first artist I

interviewed, and I quickly realized that I could already link his answers and Cecilia's (the scientist's) answers to my questions. They both had a similar answer to the question of technology, how it is a significant and sometimes overwhelming domain, and how it might not always serve as the best way to do things or even act as the best tool to answer a question.

**François-Joseph Lapointe:** Lapointe is a biologist and performance artist. The interview with François-Joseph was my first and only interview in French. It took place at his office at Université de Montréal, and he gave me a tour of the labs where he works. He was very generous with his time. It was an unusual interview as he answered the questions as both an artist and a scientist; he is very active and prolific in both domains. He was published in the prestigious journal, *Nature Magazine* and tends to be increasingly inclined to create and conduct artistic performances based on his science studies in biology. For his portrait, he shared a photograph of himself in Guinea, where he studied bats. It is also where he ate a bat only to find out after the fact that he was in the epicenter of an Ebola outbreak.

**Nora Gibson:** Gibson is an American graduate student from Philadelphia and a choreographer. We conducted the interview in her studio, in the dark and gloomy basement of Concordia's Visual Arts building. She could tell me all kinds of stories for hours. And I could sit there and listen to her for days. Her brain seems to be going 100 miles per hour, going from one subject to the next, creating links and making connections as she speaks. It is really quite something to listen to her. She had a great sense of humor and answered the questions from the interview in great depth. She is very eloquent in the ways she explains what she thinks about a certain subject.

**Cristian Zaelzer:** Zaelzer is a Chilean neuroscientist and artist. I know Cristian from the Convergence Initiative; he was my professor and colleague; therefore, it was a casual interview

over Zoom. It was hard to place him as either a scientist or an artist as he answered as a player in both fields.

**Oren Etzioni:** Etzioni is the CEO of the Allen Institute for AI; the text-to-image generator used for this project. I was beyond happy when he accepted to participate in this project. Our first conversation was on the phone, where I was instructed by his secretary to call him at 4 pm Seattle time. I called at 4 pm sharp, and he answered right away. He did not have much to say or many questions to ask. I nervously shared my love for his program, rambled for probably too long, and finally asked him if he would be interested in participating in this project. He said he would be happy to do it and contact his secretary to schedule a Zoom interview. I was full of hope and very excited about the interview. About a week later, I interviewed him via Zoom. It was the shortest interview I had ever conducted at just under seven minutes long.

**Tiezhou Duan:** Duan is a Chinese software engineer/computer scientist working for eBay. I met Tiezhou at my vernissage in August 2023. She came with her friend Yufang Ruan, the first scientist I painted for this research's pilot. Tiezhou was very excited to be the subject of my painting, and she embarked in my project with great joy. I interviewed her via Zoom as she lived and worked in Toronto. I remember thinking she looked like an android on my screen, with her grass background filter and very striking bone structure and features. She also had a severe air about her that was very different from my encounter with her at the vernissage. She seemed almost uncomfortable and tense during the interview.

**Casey Vormer:** Vormer is a Dutch hyperrealist artist with autism. I contacted him for this project after my friend had seen him and his works on the news. I first had to go through his agent and, eventually, was given the green light by his agent to interview him at his studio\apartment in Montreal. He was very friendly and welcoming. His apartment was vast and

luminous. Every object was neatly arranged on the shelves. One huge realistic drawing was in progress on a piano serving as a table. It was the image of a tiger. It was an enjoyable and eye-opening encounter as he was very open in sharing all the challenges he goes through socially and emotionally as an artist with autism. After the interview, we chatted briefly, and he introduced me to his pet hedgehog. It was great.

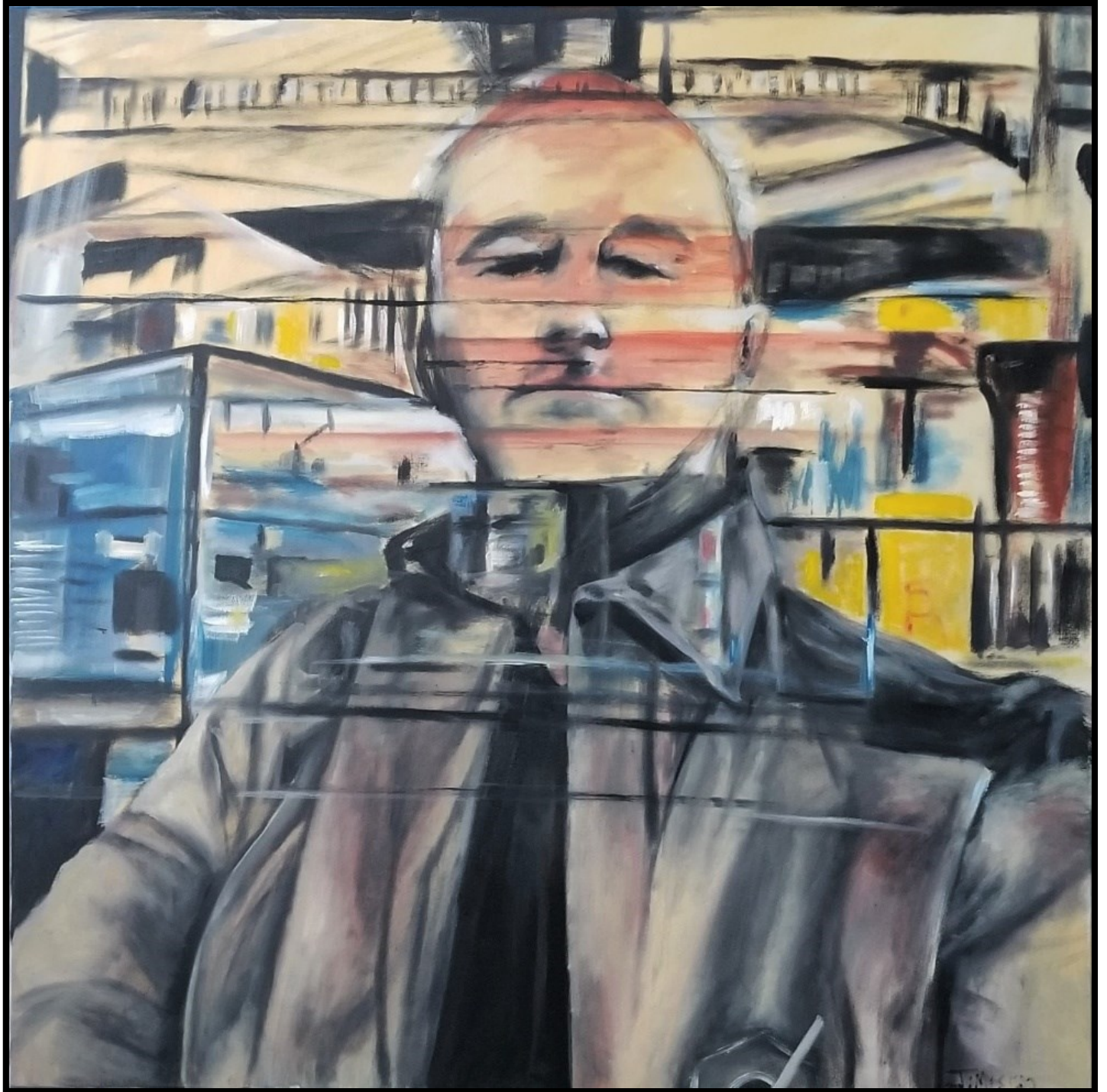


Figure 7: *Portrait of an Artist*, 36"x36", oil on canvas, 2022



Figure 8: *Portrait of a Scientist*, 36''x36'', oil on canvas, 2022



Figure 9: *Ceci*, 36"x36", oil on canvas, 2022



Figure 10: *Joseph*, 36"x36, oil on canvas, 2022





Figure 11: *François-Joseph*, 36"x36", oil on canvas, 2022



Figure 12: *Nora*, 36"x36", oil on canvas, 2022



Figure 13: *Cristian and Friend*, 36"x36", oil on canvas, 2022



Figure 14: Oren, 36"x36", oil on canvas, 2022



Figure 15: *Tiezhou*, 36"x36", oil on canvas, 2023



Figure 16: *Casey*, 36"x36, oil on canvas, 2023

Meeting a stranger and talking with him/her for the first time is not unlike using unfamiliar emerging technologies. It is exciting. It is a new experience. The excitement of doing the interviews with the participants was also very noticeable in my journal. Words like “exciting” and “excitement” were the most present when writing about the interviews. I preferred conducting the interviews in person as I understood better the participant’s persona, mannerisms, and how they worked or lived. There were more opportunities for anecdotal stories, and I got more insight into their lives. I was also curious to find out if there was a correlation between the portraits I painted and the type of interviews I conducted. Returning to the data and the notes I took in my journal, I quickly realized that there were no correlations between how I interviewed the participant and the ease of painting the portrait and the final result. As an example, I spent many delightful hours in François-Joseph’s office. He gave me a tour of his lab and the floor where he works. He was very generous with his time and shared many stories. It was a very successful interview, yet his was one of the portraits I struggled with the most.



Figure 17: Still frame from François-Joseph’s in-person interview

I interviewed Oren Etzioni through Zoom, and it was the shortest interview I had ever conducted. It was, unfortunately, an underwhelming experience. Yet, I had an easy time creating his portrait. From my observations, how I connected with each participant did not reflect how I painted their portraits.

I genuinely love meeting new people and getting to know them. What stuck with me was not necessarily the interviews themselves but the conversations before and after the interviews or the unscripted questions that came up during the interviews. Doing these interviews not only taught me about unique and knowledgeable individuals, but I also learned a lot about myself, why I do what I do, and how I do the things I do. I have never taken a step back to reflect on the question before this research. I was able to do so for the first time. As was mentioned by almost all participants, artists, and scientists alike, curiosity was the drive behind the reason for their work. I can now say that curiosity is also the main drive behind what I do, and it is especially true for this research project. As stated by neuroscientists Kidd and Hayden (2015):

Curiosity is a basic element of our cognition, but its biological function, mechanisms, and neural underpinning remain poorly understood. It is nonetheless a motivator for learning, influential in decision-making, and crucial for healthy development. One factor limiting our understanding of it is the lack of a widely agreed upon delineation of what is and is not curiosity (p.449).

Another recurring response for most of the participants' interviews was remembering childhood memories. These came up often when participants answered the question of why they became an artist or scientist? When I asked the question to Choreographer Nora Gibson, she



answered that she always knew she was a dancer. As a young child, she would take ballet lessons, and during the first class, although she had never taken any dancing classes in her short life, she knew exactly how to do the movements the instructor asked of her. It was innate and came naturally to her (N. Gibson, personal communication, July 25th, 2022). Joseph mentioned that he was constantly drawing as a child; his parents often fought, and drawing was his escape (J. Siddiqi, personal communication, July 29th, 2022). Oren remembered that as a 10-year-old child, he was interviewed by some kid's newspaper, and he was asked, "What do you want to be when you grow up?" Oren answered, "a biochemist." Although his choice of profession changed over time, he recalls always being fascinated by science and "its ability to answer some of the most challenging questions that we face" (O. Etzioni, personal communication, August 29th, 2022). Childhood and childhood memories play a significant role in not only the participants' choice of livelihood but also in their recollection and explanation of who they are and why they do the things they do. It was one of the most constant statements across all interviews.

### **Creating the Portraits**

“For what, actually, is “the face”? While it is the face that each of us has, it is also just one face among many. But it does not truly become a face until it interacts with other faces, seeing or being seen by them” (Belting, 2013, p.1).



Figure 18: Charcoal Sketch of Tiezhou

Faces have always been my favorite subject to depict in art. There is something extraordinary about the face that never leaves me indifferent. Painting the portraits was part of the research I most looked forward to doing. It is something I knew how to do, and just like putting on a comfortable pair of jeans, I was looking forward to getting deep into painting faces.

However, before sketching the faces and creating the paintings, I would usually take the time to review the recorded interview to ensure that the whole interview was correctly recorded and to see if I could better understand the subject's essence before starting the sketching and the painting. Author and scholar Cynthia Freeland (2007) states that "the painter seeks to convey the

subject's unique essence, character, thoughts, and feelings, interior life, spiritual condition, individuality, personality, or emotional complexity" (p.98). When I worked on Cecilia's portrait, it was the first time I realized how somewhat unusual it was to paint a subject as a child while going back and watching an interview of them as an adult. It is a little like time traveling or, at least, getting a glimpse into their past while witnessing and being part of their present. It was a little surreal, and it helped me focus better on the portrait I was painting.



Figure 19: Watercolor sketch of Cecilia Kramar

Just before starting any of the paintings, I drew the participant's portrait from the untouched photograph on a small piece of paper. Sometimes I created the sketch out of charcoal; sometimes, I used a pencil; other times, I used watercolors. I needed to do a quick drawing of the person I was about to paint as it helped me understand their features and physique. I agree with UK artist Anthony Connolly when he states in his book *Painting Portraits* (2012) that "If you

want to know, and understand, what somebody looks like, if you want to gather some sense of the space another human being occupies, of their presence, then draw that person” (p. 23).

Before this project, I rarely painted portraits of people still alive; I often painted portraits of strangers taken from old photographs. Painting the series of portraits for this thesis was a whole other story; I had the participant in mind for (close to) the entirety of the creation process. Not only were these participants still alive, but they would also be the first viewers of the final works. As much as I wanted to avoid thinking of how they would perceive the work, I could not stop the thoughts from flooding my mind. It became an issue when I was digitally layering the photograph with the more abstract generated image from the AI text-to-image generator. By layering the two images, it was not unusual to have lines and weird shapes sticking out of nostrils and ears. Some shapes made some faces look deformed or animal-like. According to my notes, I was usually more careful of the composition with the layering of the images when it came to female participants. I would take longer to find the “perfect” composition with the layering of the two images, making sure she looked as human as possible. I was slightly less meticulous when it came to male participants and could usually create the layering of the images much faster. I was still conscientious of how they looked, but I felt, in a way, freer to have less-than-perfect-looking images in terms of human resemblance. Admittedly, I always preferred painting men’s faces in every body of work I ever created; I always felt like male faces were more forgiving in their imperfections, and I never strived to have a flawless-looking face, unlike when I painted women’s faces. These are my biases in picturing the proper representation of women. These biases seemingly resurface in the creation of the series of these portraits.

I tried to alternate between painting male and female portraits to avoid repetition and boredom. For example, I did Cristian’s interview right after Joseph’s interview, and the idea of

painting a dark-bearded man twice in a row seemed too repetitive for me. I needed a more drastic subject change, and alternating between man and woman seemed simple and effective.

An essential factor in creating the paintings was that I was “given” a photograph from which to work. Not only did I have to work with what was given to me by the participant, but also with what the text-to-image AI generator would give me as an image based on the text prompt of the descriptive text also given to me by the participant. Each participant played a central role in creating the work as they decided what the portrait picture was and what the final image would consist. Some participants chose a picture of themselves as a child, while others sent full-body pictures or a picture of themselves with other people. I let the participant choose their portrait pictures while I only minimally modified the images, usually by cropping the sides. I wanted them to be as close to the original photograph as possible and did not want to interfere too much with the original picture. Some portraits were more challenging to create while others were a breeze to paint. I will explain the reasons and my findings in the paragraphs below.

The original portrait photograph sent by the participant played a big part in the difficulty/easiness of the creation of the painting but so did the image generated by the AI from the descriptive text prompt. As mentioned above, I was conscientious while digitally combining the photograph with the AI-generated image. I played with the transparency and the layering of the images, moving them around and ensuring no weird shape or line was sticking out of the subject’s nose. I wanted to respect the person depicted in the work and was very aware of how the subject looked when a shape or color was on a particular place on the face. It was not always easy, and I could spend over 20 minutes just figuring out the composition that made the most sense for some of the images.

Most of the images generated by the AI text-to-image generator of the Allen Institute for AI were successful at representing very abstract and strange images as humanoid figures could often be seen or interpreted from the composition of the various shapes. These images were aesthetically pleasing to me, especially when combined with the original photograph of the participant. It was another story when it came to creating François-Joseph's image for the painting. François-Joseph text prompt was in French. As it turned out, this particular AI text-to-image generator did not understand French. It did not grasp the text description well; therefore, it failed to give me a proper AI image interpretation of the text prompt. It generated a plain grayish image with very few details. I wanted to keep it authentic, so I used the plain generated image. This meant that François-Joseph's original portrait would not be modified or abstracted like other portraits. It was not unlike painting a naked image where all the imperfections could easily be seen. Although I loved my experience with this participant, the final piece is, in my opinion, overworked.

I used oil painting to create the portraits. It is a medium that is challenging yet forgiving enough to allow for a compelling creative process. I discovered oil painting late in my artistic practice, but I never looked back and never used acrylics again. To me, acrylics could never achieve the blending and consistency I was looking for, which I discovered with oil paints.

As I was painting the portraits, I often had the participant's voice playing in my head as I painted him/her. I could replay her/his answer to some of the questions repeatedly. During Joseph's interview, he discussed the importance of self-reflection. He said he does not listen to anything when he paints. He works in complete silence. He explained that the point of the painting is to get everything inside out onto the canvas. Being distracted by outside interferences

would hinder the work of the artist. Author Arthur I. Miller would agree with Joseph's claims. In his book *The Artist in the Machine, the world of AI-powered creativity* (2019), he introduces the aspect of creativity found in human and its possibilities in computers. Miller states that "Introspection is the ability to sit by yourself and think. Looking inside your own mind, you can increase your own creativity and enhance your intellectual strengths. The best way is to sit in silence, with no distractions" (p.9).

I often hear Joseph's voice when I paint even after I have moved on to another work. I still listen to podcasts when I paint, but one of these days, I will try total silence and observe what happens.

### **Experimenting with Emerging Technologies**

I am not a tech expert. I barely use my dated cell phone. I do not own a smartwatch, and the only social media I am on is Facebook. However, I am deeply fascinated with emerging technologies such as artificial intelligence and augmented reality. Using these technologies to create my portraits was the perfect way to experiment with known, familiar media and tools such as oil paint on a canvas combined with media foreign to me and tools such as artificial intelligence and augmented reality. It was an attempt to find a way to renew my passion for painting portraits, to find the excitement, the magic that had been attenuated with the passage of the years doing the same kind of work over and over again. It was a way to renew my love of the traditional medium using new and emerging technologies. In this series of portraits, artificial intelligence is used as an AI text-to-image generator, where I type in the descriptive text given to me by the participant and receive an image in exchange for that text. That AI-generated image is then combined with the participant's photograph to create the final image that will be used to create a painting.

When describing my series to people curious about its AI component, I often refer to it as a collaboration between the AI and myself, the artist. I give the AI a written prompt, which gives me an image in return. However, I started thinking about it more profoundly, and doubts started forming at the thought of “collaboration.” Was this activity a collaboration between humans and machines? What consists of a collaboration? The more as was thinking about it, the less the term seemed right; it sounded pretty good, but was it accurate? According to the Oxford dictionary, the definition of collaboration reads as follows: “the act of working with another person or group of people to create or produce something (Collaboration section, para. 1). Could the word “person” or “people” be replaced by “computer” or “machines”? Is this where the question of “can a computer be creative” comes in? According to Miller (2019):

People often say that computers cannot be creative because they merely follow the instructions that we, their human creators, have embedded in their algorithms. But surely this is akin to saying that Mozart couldn’t have been creative because his father taught him music and should therefore have all the credit for his son’s achievements. Today’s computers often transcend their algorithms to create new forms of art, literature, and music, just as we transcend what we have learned. This is what we call creativity (p. xxvii).

This is part of a long and ongoing debate as to what constitutes creativity. Is AI the proof that computers can in fact be creative? Miller (2019) goes on to explain that perhaps computers might develop an intelligence that would be different than how we understand intelligence to be: a different and independent form of intelligence (p. xxvii). When I worked with the AI text-to-image-generator it feels more than just using a tool to get a result. It feels a lot closer to an



exchange of information. Perhaps the right term to use to describe the action with the program would not be “collaboration” but “co-creation”.

The word “co-creation” is a term that appeared on a few occasions in the articles I read on AI and art. Kevin Kelly (2023), founding executive director of WIRED magazine, used the term to describe AI-generated images. He wrote, "It is no exaggeration to call images generated with AI co-creations. [...]the best applications of it are the result not of typing in a single prompt but of very long conversations between humans and machines (p.37). Although the prompts I used in my series of portraits were sometimes just a few lines, I believe that the word co-creation can be applied to describe the process of creating these portraits. There was this (concise) aspect of back and forth with the generator; I gave it a text prompt, which gave me an image in return. I wondered if the term co-creation could also be applied to the participants; was I co-creating the portraits with the participants? I thought about this for a while and honestly needed to stop and look deeply at each step to compare it to the machine/human co-creation. First, I asked the participant to send me a picture of themselves. The participant sends me a picture of themselves. I created the painting based on this picture. How does it differ from giving a text prompt to a machine, and in return, that machine gives me an image that I then use to create the painting? Was all the work done indeed a co-creation? Did I co-create the portraits with the participants and the AI image generator? More reflection and research are needed to answer what constitutes a co-creation.

The last creative component of the portraits was the augmented reality feature.

Creating the augmented reality of each portrait was challenging, rewarding, frustrating, fun, and horrible all at once. It was the one aspect of creation where my emotions and inner

thoughts were everywhere. Sometimes I hated to do the video editing, and nothing was working, and other times, I felt happy and satisfied with the process. The first step in creating the AR component was choosing scenes from the interview with the participant. With a two-minute maximum time length, I had to edit and remove most of the interview recording (except in the case of Oren Etzioni where his interview was under 7 minutes long). This was time-consuming as some interviews were over one hour long. The way I chose the scenes to keep from each interview had a lot to do with not only the participant's answers to my questions but, in many instances, had to do with the finished painting. For example, when I was working on Ceci's portrait, the final painting was that of a little girl. I purposely sought out the answers to my questions where she talked about memory and added the moving carousel clip and the child-like music to accentuate the overall feel of the work: childhood, memories, and innocence.

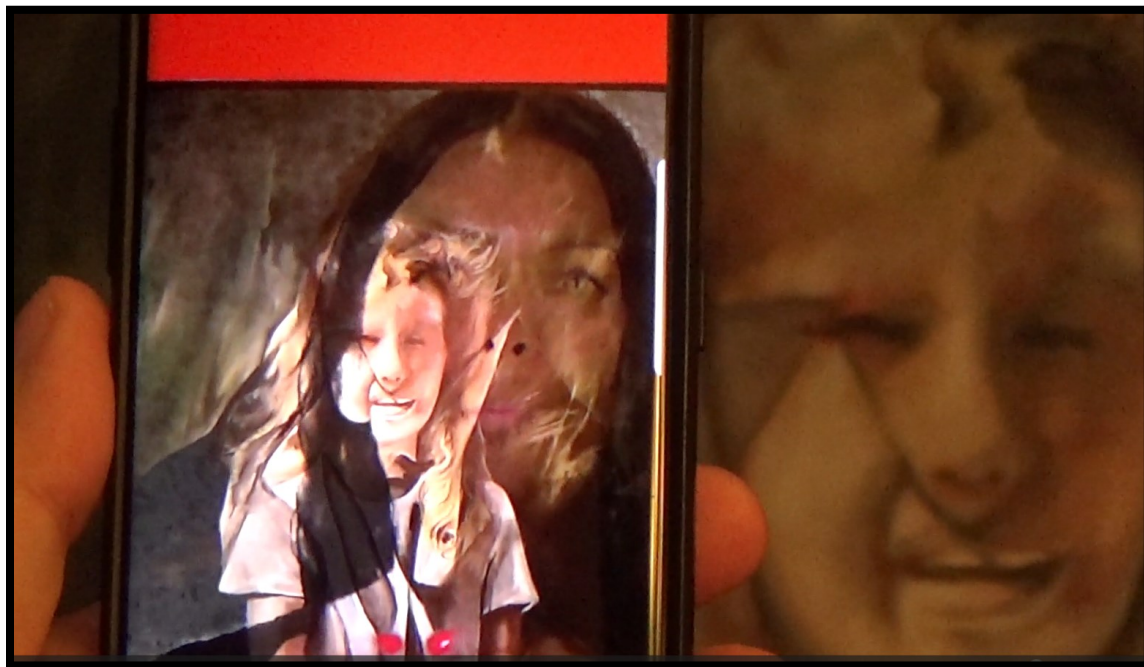


Figure 20: Viewing the painting *Ceci* with the AR component

Music was an essential aspect of the AR component. Music can evoke a wide range of emotions in people. Choosing the music and trying to make it work with both the painting and the video clips from the interview was my favorite aspect of the video-editing process. Each AR component has a soundtrack, which was chosen according to the answers and overall feel of the interview with the participant. For example, Joseph's answer to the question of "what drives your work as an artist" was "pain and suffering". I chose the music according to his answer; something a little slower and somber was, to me, a better fit than something more upbeat. There were a lot of creative and aesthetic choices made toward the AR component of each final work, and most of the time, the editing process to create the videos for the AR components was, in a sense, not unlike the painting process; there is a subject I want to represent as best as I can using a particular aesthetic and imagery that I want to share with the viewer. The difference is that when I paint, I have a final result in mind. When I edit the video, I have no clue what the final result will look like. Having done over ten videos for AR components, not just for this series but in other work, I can easily compare it to putting together a puzzle where you have no idea what the completed image looks like. I relied a lot more on my imagination, intuition, and overall feel to create the videos while considering the painting I had produced.

Watching the recorded interviews over and over again gave me a better understanding of each participant. Listening to their answers to my questions and paying attention to each word, each gesture, and each expression was more effective in getting to know the participant than painting from a photograph or conducting the interview. The editing process became much more profound in terms of my understanding of the participants' answers and stories than I would have ever imagined. It was a big surprise. Although I enjoyed these aspects of creating the AR video, I

was not particularly fond of cutting the video and choosing which parts to keep. It was very technical, monotone, and sometimes tedious, time-consuming work.

Once the video was created, I had to upload it to the ARTIVIVE website, the host I chose for the AR application. Many AR applications exist to view augmented reality-enhanced work, but I chose ARTIVIVE as they specialize in visual art and AR. For the AR to work with the physical artwork, the video must be downloaded and linked to a picture of the artwork, directly on the ARTIVIVE website, in a section created for their members. The option of adjusting the transparency of the video (to view the physical artwork through the video) is available. I always choose to do so as I need to see the painting appear behind the subject. In order to view the AR component of the work, the viewer has to install the free ARTIVIVE application on their mobile device, open it, and aim the device's camera at the physical artwork as if they were about to take a picture. The application recognizes the painting and automatically starts playing the video (the AR component of the work). For this series of portraits, it is as though the painting comes alive, and the viewer gets to experience who the subject is, what his/her voice sounds like, how they look when they move, and get a glimpse of their thoughts regarding my interview questions. It is an aspect the viewer doesn't usually get when looking at a portrait painting and I believe that the addition on augmented reality creates a greater connection between the work and its viewer.

## **Chapter 5: Observations**

Looking at the data from my journaling, the first thing that struck me was the number of times I mentioned how I felt mentally and physically when working on the paintings and applying the oil paint onto the canvas. I noted it much more than when I was using my computer.

When painting, I was more aware of the room's temperature, my energy level, etc., and I never noted or recorded these physical feelings when working at my computer. How I felt when working with my mouse and the keyboard was not a factor, or at least was not worth noting. Was it because when I was painting, I usually stood up and always sat down when working at my computer? There is no debate that painting on a 36''x36' canvas requires some physical energy, much more so than working at a computer. Did the way I felt physically affect the actual painting of the portraits in a way that could be noticeable, if not necessarily for the viewer but for myself? Did the portraits where I had the least energy to work on end up being my least favorite paintings?

Not at all. I looked into the data collected (my note-taking), and I found no correlation between how I felt physically and mentally when I painted a portrait and what I thought of the result. Some paintings were easy to create, I felt great doing them, and yet, I was not happy with the final results. For others, I struggled to paint them because it was too hot or I had no energy, and I ended up loving the results. Also, some portraits were a breeze to create, and I loved the result, while others were a pain in the neck, and I was not happy with the result.

In one passage of my journal while painting Joseph's portrait I noted:

I painted for over an hour after feeling like a vegetable and I was unmotivated to do much. I "forced" myself to go paint and started focusing on small details of the portrait such as the eyes, the lips, the hairs in the beard, etc. It calmed me and helped me get centered. I was able to relax and all of a sudden, I didn't feel this almost constant pressure for producing, for performing. It felt great. And as I was painting his face, I remembered his interview where Joseph's answer to the question of "what drives your work as an artist" was: "Pain and Suffering. I thought about that a lot recently, you can

make something out of it, you can make something beautiful, you can make the painting but if you don't work through the pain, it's kind of a waste of time" (J. Siddiqi, personal communication, July 29th, 2022).

Remembering what he said gave me some motivation to push myself and to keep working. I pushed through the pain.

Working on a painting affected me in a way that using the computer never had both physically and emotionally. When you paint, your whole body is in movement. Not only can you see the paint, but you can also smell and touch it. It goes on your hand. You can wipe it and wash it off, unlike the pixels on the screen. It has a presence that feels very different than anything digital. It lives in your reality; it is found in the physical world.

I noted more frustrations encountered when using the computer than when working on the paintings. There were some but fewer circumstances of frustration when I was painting, even when things did not quite go my way, compared to at least four instances of noted frustration when working at the computer, creating the AR component of the portraits. Is it because I am more comfortable using oil paints than the computer to create a work? Would someone who would be very comfortable using a computer and have little experience painting feel the same frustration regarding painting? It may simply come down to familiarity and knowledge of the media used.

According to the data collected from my journaling, confirming interviews with the participants and conducting them in person brought me the most joy and overall positive feelings. The act of painting the works came as a very close second. Negative words, thoughts, and feelings usually arose when I could not finish the paintings due to a lack of energy or when

the environment was too hot. As mentioned above, the editing process was also a source of frustration. I was more affected by the weather (in this case, the heat of the summer) when it came to painting than when it came to sitting down and editing videos. Painting required a lot more physical (perhaps even mental) energy than did working at the computer. In a conversation with my sister, she stated that when she was doing something like reading a book or knitting, she felt “full” and felt like she had accomplished something. When she would spend many hours in front of the computer, she stated that it left her feeling “empty” (K. Mossalim, personal communication, February 18<sup>th</sup>, 2023).

There is a fundamental automatism when using the computer; click on programs to open them, close windows, left-click on this, right-click on that. Can we find the same kind of automatism when painting? Is dipping the brush in the solvent and mixing the paint automatic? They are two completely different approaches. Although one could argue that after many years of practicing painting, certain gestures become automatic, it could not be compared to the same kind of automation as the mouse clicks on a computer. It would be like comparing the mixing of a batter with an electric mixer and mixing the batter by hand or using a spoon. Although you are not physically painting with your fingers, your hand is much closer to the paint's materiality than the computer screen's pixels. There isn't much to do when you use an electric mixer; you speed it up and turn it around. It's technology. It is designed to make your life easier and help you accomplish things faster, just like how I am currently typing this text on the computer instead of using a pencil to write on paper. Does it make my writing better? It indicates if I have a spelling mistake. Does it help in my thinking more than the pencil would? I have my doubts. Does the cake taste better if it is mixed with the electric mixer than with the spoon or hand? I do not think so. The texture may be different, but the taste will remain the same. Technology does not

necessarily make things better or worse in art. Technology *can* make things easier and faster. However, something happens to the body when creating something with physical materials. All of your senses are involved. It affects you in ways that the digital world cannot do yet. Eventually, as augmented reality is being developed to be increasingly good at mixing the digital with the physical world, the difference between both worlds might not be as clear as we once perceived it to be.

As the famous (or infamous) creator of Facebook Mark Zuckerberg said in an interview, “When you say the real world, I call that the physical world and I think the physical world and the digital world and the combination of those, increasingly is the real world” (Joe Rogan Experience, episode #1863. August 2022).

### **Social media and sharing the work**

I wanted to share my works on social media, something I always do with my paintings. I was also interested in people’s reactions and feedback to the portraits. An example of positive feedback is that of one of the participants, Cristian, commenting on my post about Ceci’s portrait, which included a demonstration of the AR component. He wrote, “I am usually not drawn to AI because it is used in a format that I dislike dismissing human prompts, but here you are the starting point, and technology makes the work more compelling and touching. I did love the music and the interview. And I love how all is revealed in the AR. Beautiful”. (Zaelzer, C. personal communication, August 14<sup>th</sup>, 2022). I also always sent the final painting and AR component to the participant. I never asked if they like it because I didn’t want to influence their response to the work. I was worried it would have the same effect as when asking someone, “How are you” and receiving the usual answer, “I’m good!” I didn’t want their response to be: “Yes, I do like it!” to the question of liking the work, so I never asked. I sent it to them, and if



they felt inclined, they sent me their feedback. When I emailed the final work to Ceci, her response was as follows:

“Ayyy Jihane. You got me into tears. I am so honored to be part of your thesis and having little Ceci being painted by you. This is AMAZING. And it clearly explores one of the things we discussed in our interview, is not only about the technology and the tools, is about what we do with them. And you clearly mixed the AI tech with your heart and emotions and got me absolutely in AWE. You are so talented” (Kramar, C., personal communication, August 17<sup>th</sup> 2022).

Another interesting response was from François-Joseph, who mentioned how troubling it was to recognize himself in the painting without really recognizing himself. There is an air of mystery that seemed added to the original image. He wrote, “C’est troublant de me reconnaître sans me reconnaître sur cette toile. C’est vrai que ça ressemble à la photo, mais il y a un élément de mystère qui s’ajoute” (Lapointe, F-J., December 18<sup>th</sup>, 2022). Joseph Siddiqi’s response was one of the first pieces of feedback I had received from a final portrait. He wrote, “Glad to see the final painting; it’s surreal, disturbing, engaging, emotive and familiar, all at the same time. Very sensitive—Well done!” (Siddiqi, J., July 28<sup>th</sup>, 2022).

Of the participants who answered with some feedback to my sending of the portraits, nine out of 10 responded positively to the portraits, one never responded, and three of the eight participants that responded talked about being moved by the work. 2 participants watched and commented positively on the AR component of their portrait. Some commented that they still needed to watch the AR component of the work. I want to explore this further; I would be

curious to see if the participants were more, less, or equally affected by the work if they watched the AR component.

Reading the feedback on the portraits meant a lot to me, more than I imagined it would. Moreover, reading the participants' reactions to their portraits was truly special. It was more than an ego boost (there was that, of course), but it went beyond that. It was validation for the work I was able to create with each of the participant's help. I could not have achieved what I did without their participation, and reading their reaction to their portrait was the perfect finale of the series.

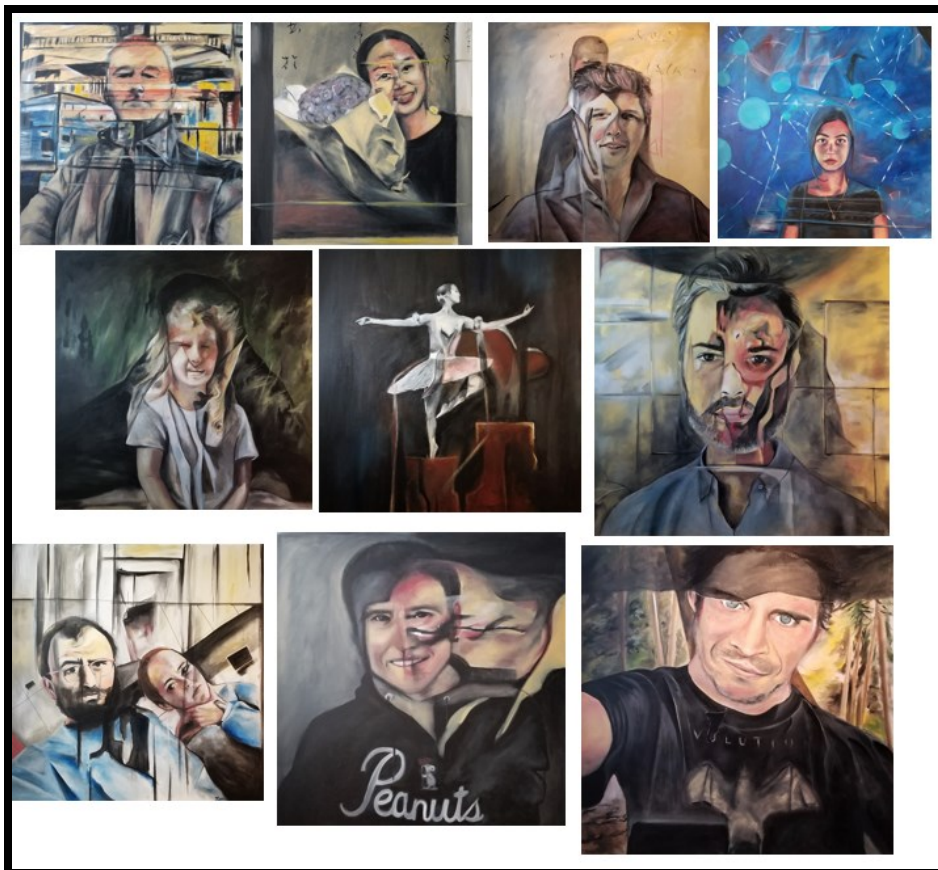


Figure 21: The completed paintings

## **Chapter 6: Teaching implications in the elementary school**

The elementary education system in Canada, and more precisely, in Quebec, has mostly stayed the same since the education reform of the late 1990s. Yes, schools now have access to computers, the smart board has replaced the blackboard, and flexible furniture was introduced to many classrooms where students no longer have to sit straight and face the board. However, these changes do not come close to the giant technological leap in the fields such as engineering, medicine, architecture, and transport, to name a few.

Let us take the example of augmented reality. When looking at articles to research how AR is used in fields other than education, such as healthcare and engineering, I was surprised to find that the AR uses were more often than not directly linked to students' training. It was almost always discussed as an educational tool to help students understand abstract concepts or situations. I.e., in healthcare, augmented reality (AR) can be used to train surgeons to visualize the patient's actual body during surgery, as stated by Sethiya and Guruprasad from Universal Business School in Sydney, Australia, "Patient-specific data is superimposed on the patient's body to provide the accurate anatomy of the body. Usually, the surgeon can wear HMD (head mounted device) to see the dynamics during the time of surgery". Sethiya and Guruprasad also write that AR used in healthcare is highly beneficial to train medical students as it is more effective than looking at a tutorial video. Overall, students learned better and faster using AR technology (Sethiya and Guruprasad 2020, p.346). Another study conducted with two groups of first-year engineering students indicated that the use of an AR-based laboratory manual helped students have better access to limited spaces available in the field to conduct training as well as what would be more dangerous situations where students could risk being shocked or risk

damaging equipment due to short circuit while performing experiments (Tuli and al, 2022. p. 8). Another example of the efficacious use of AR in the classroom is explained in a study conducted by Pasaréti et al. (2012); Concerned with the decline of chemistry teachers, as chemistry is an unpopular subject with students in Budapest, the authors decided to test AR-enhanced chemistry textbooks with high school students to see if their interest (and grades) would increase in chemistry class. One group of students studied chemistry with a regular textbook, while the other studied for the same exam with an AR-enhanced textbook. In the AR-enhanced textbook, molecules could be seen in 3D, and students could interact with them by spinning them around. After the chemistry test, the authors compared the grades of the students. They noted:

The members of the AR group had the following results: 60% had better notes, 38% the same and only 2% had worse notes comparing with the notes of before test. The result at control group were more ambivalent: 27% with better notes, 42 was the same and 31% had worse notes (p.11).

Students who used AR-enhanced textbooks told the researchers that studying felt much more entertaining and became easier than using regular textbooks. Others mentioned that they would love to use AR textbooks in other subjects as well (Pasaréti & al., 2012, p.13). AR has proven to be a valuable tool for students, especially in a remote setting, as experienced during the COVID-19 pandemic. Objects and concepts that were seen as 2D drawings could now be viewed as 3D objects. The viewer could interact with some objects by spinning them around and taking a closer look at the details. According to their study, Iqbal, Mangina, and Campbell (2019) from the computer science department of University College Dublin found that AR uses in the classroom are particularly effective with different aspects of learning and teaching. For example, AR technology and flashcards about the English alphabet or animals helped the student visualize

the word and retain the information. Students were also much more motivated to learn (Iqbal, Mangina & Campbell, 2022, p.6). A study conducted by computer scientist and scholar Alzahrani (2020) found that the use of AR in education “enhanced students’ engagement, motivation, attention/focus, interactivity, verbal participation, concentration, knowledge retention, and spatial abilities” (p. 1). We saw how AR could be used as an educational tool in medicine, engineering, chemistry, learning to drive, and even English classes. But what about AR in the art room? How could art teachers and educators use this emerging technology in their classes?

### **The case for AR in art**

Regarding art, AR has been used in museums to enhance artworks and provide the viewer with an immersive and interactive experience. As I write this text, the Montreal Museum of Fine Arts holds an exhibit showcasing Jean-Michel Basquiat’s works. In this show titled Seeing Loud: Basquiat and Music, viewers can download an app on their electronic device to view and interact with the added AR component linked to some works. These AR components mainly consist of historical facts which transport the viewer back to the 1970s and 1980s.

AR could be used similarly in the art class; a video could be attached to a specific painting, presenting historical facts or even interviews with the artist. For example, Edward Hopper’s famous Nighthawk painting could have an AR component that presents the streets of America in the 1940s. Alternatively, a Picasso self-portrait could present an AR component of an interview with the artist. Another way to incorporate AR in the art room could be by using objects already available as AR components. The Smithsonian Education website provides the user with various 3D-rendered objects (and body parts from historical people) that can be downloaded and used in AR. As presented at the 2022 CSEA conference in Ottawa, art educators Blanchette and Lacroix

gave a 60 mins workshop on using these objects to create a monumental public artwork. Once the object is downloaded onto an electronic device, the user can adjust the scale of the chosen object. The hands of Abraham Lincoln can become gigantic three stories high hands, visible in the physical world through the electronic device. Students could explore and place these objects in the physical world, creating their monumental artworks. They could also create their objects in 3D through 3D modeling software such as Tinkercad (free of use). These are just a few examples of AR in the art class that could be easy enough for an elementary student in cycle 3 to use. Another emerging technology used for this research is artificial intelligence. How could such a broad technology be used in the context of the art class at the elementary level?

### **In the classroom**

To educate children for today's and tomorrow's world, we must prepare them to understand and use new technologies responsibly and be well-educated. As mentioned in the introduction, AI is everywhere. However, we are falling behind in schools. Like many other things, education takes a back seat to all the new technologies and advancements that are going on in many different fields. Schools should be included. We can no longer bury our heads in the sand, avoiding it or pretending it does not exist or is unnecessary or even dangerous in schools. It exists; it is part of our lives and will most likely remain as such. We could offer the students the opportunity to learn to use it responsibly yet creatively. If we want to form the individuals of tomorrow, we need to prepare our students for the realities of what is out there.

### **Using AI and portraiture in the art class at the elementary level**

Creating images with the help of artificial intelligence can carry benefits for people. As stated by Kevin Kelly (2023) from Wired Magazine “People spend time making strange AI

pictures for the same reason they might paint on Sundays, or scribble in a journal, or shoot a video. They use the media to work out something in their own lives, something that can't be said otherwise" (p.37).

With the recent arrival of AI open source Chat GPT, a student could, with a simple prompt, have the AI write an entire school assignment on Abraham Lincoln, compose a poem in prose, or answer questions on a reading assignment. Some teachers are increasingly worried about plagiarism and students handing in work that is not theirs, but that was entirely written by Chat GPT. Philosophy professor Eric Martin wrote an article in the French journal *Le Devoir*, saying that the increasing accessibility of open-source AI, such as Chat GPT, makes students less intelligent (Martin, E. 2022, p.3). Machines are becoming increasingly intelligent while students are getting dumber. People need to be more independent of technology. A student might ask the machine to write a paper on *The Republic* from Plato and might pass the class. However, that student will not be brighter or more autonomous, he/she will be less so. A lot less so (Martin, E. 2022, p.3). Students could benefit from using and learning about AI in school to better understand and responsibly use it. AI is everywhere and plays such a big part in our everyday life that we often forget about it; it is our GPS, playlist, social media, and medical file, to name a few. Could we incorporate it in the art class as a tool for creation? How could it benefit the students' ability to learn, retain information, and experiment with concepts and ideas to create artwork?

As an art teacher in an elementary school, I wanted to incorporate AI in an art project with my cycle three students (grades 5 and 6). Using my art practice as a starting point and presenting the work of groundbreaking AI portrait artists such as Mario Klingemann and Obvious Collective, students created portraits based on their portrait photograph superimposed with an image

generated by an AI text-to-image generator. With the help of a classmate, students had to come up with a short text describing their classmate using physical and character traits. It was also a way for them to practice character-building using French words, as the art class is taught in French. They would type the description into the AI text-to-image generator, generating different images based on the typed description. Students then chose one of the generated images and superimposed it with their actual photograph using a simple and easy-to-access google document. They would work on the composition, clarity, and transparency and print the final image. As a last step, they would use transparent acetate paper and trace their portrait from the printed image using permanent markers. As the printed image was black and white, students were encouraged to use colorful and unusual colors to trace their portraits. The results were vibrant, sometimes quite abstract plastic portraits. They were displayed linearly on a wall with a white paper behind the transparency so that every detail of the portrait was apparent to the viewer.

This lesson was my first experiment with AI in the classroom, and it turned out to be a far stretch from the straightforward lesson I originally envisioned. Firstly, finding the correct text-to-image generator that was suitable for an elementary classroom was a challenging task. There are many existing programs out there, and from the time I started putting the lesson together to the time I was ready to teach it, new text-to-image generators became available online. Craiyon was finally chosen as the best-suited generator for classroom use. It was free of use with unlimited text prompts, and it understood the French language, which was an essential aspect for this specific class as I am teaching it in French, and students had to write a French description to obtain an image. Craiyon generated nine images based on the written prompt, which gave the



student a more comprehensive choice range. One disadvantage is that because it is entirely free, much publicity appears on the page. That is the main downside of using this free AI generator.

This art lesson was not the students' favorite art lesson; they were often horrified to see the humanoid image generated by the AI based on their physical description. They were complaining that it did not even look like them, that they would have nightmares for days, and hated the results that the AI generated. Once they overcame the initial shock of the generated image and were tracing and drawing using permanent markers, I could feel the tension disappear from the class. Because these students were very tech-savvy, I thought they would enjoy a lesson based on AI; some did, but many did not. There was a calmness in the room as soon as the students started drawing using the permanent markers. It was surprising. If I were to do a similar lesson again, I would not ask the students to do a self-portrait. I would ask them to create a character which might be much more enjoyable to do than a self-portrait. They could have fun with the text description creating crazy-looking characters, half beast, half human, and everything in between. This type of lesson could even be taught in a cross-curricular way with the English or French class, as students could practice not only the description of their character but they could create a backstory.

With AI text-to-image generators, the possibilities of art lessons are endless. One has to take the chance to try and fail and try again.

## **Chapter 7: Conclusion**

Marcus Du Sautoy, a Mathematics professor at Oxford University, states in *The Creativity Code, Art and innovation in the age of AI* (2019) writes, that machines might help us

think differently and come up with fresh and new creative ideas never explored before. Indeed, “Machines might ultimately help us, as humans, behave less like machines” (p.5).

Doing this research made me reflect on the way I used AI to create the portraits; I mentioned co-creation and wondered if AI was more than just a tool. Oren Etzioni, CEO of the Allen Institute for AI, mentioned many times during our interview that AI was nothing more than a tool (O. Etzioni, personal communication, August 29th, 2022). However, I need more convincing. I want to explore the question further in future research, but in the meantime, I thought of asking the question to another “expert” in the field.

Chat GPT is a very sophisticated AI program free of access (with limited free trials). It is currently scaring many education establishments as it is said that it can write excellent papers and answer exam questions very well. It does not just solve math problems, correct grammar, and find the right answers for historical facts; it can write outstanding philosophical essays. Curious to try, I asked, “Is AI more than a tool?” It answered right away without hesitation, with the following paragraphs pictured on figure 21:



is AI more than a tool?



Yes, AI is more than just a tool. While AI can certainly be used as a tool to accomplish specific tasks, it also has the potential to fundamentally transform the way we approach problem-solving, decision-making, and many other areas of human activity.



One reason AI is more than a tool is that it has the ability to learn and adapt based on the data it is trained on. This means that AI can potentially discover patterns and insights that humans might miss, and it can continue to improve over time as it is exposed to more data.

Another reason AI is more than a tool is that it has the potential to automate many routine or repetitive tasks, freeing up humans to focus on more creative or complex work. In some cases, this could lead to significant increases in productivity and efficiency.

Finally, AI has the potential to enable new forms of human-machine collaboration, where humans and AI work together to solve complex problems or achieve goals that would be difficult or impossible for either one to accomplish alone. This could lead to new forms of creativity and innovation that we haven't yet imagined.

Overall, while AI can certainly be used as a tool, its potential goes far beyond that. AI has the ability to transform the way we approach many areas of human activity and could potentially lead to new forms of collaboration, creativity, and innovation.

Figure 22: Question and answer with open AI

Regarding augmented reality, I am curious to see its development in the years to come. I am still dreaming of these affordable AR glasses that would help the viewer experience an artwork in a convenient and easy way.

I am still working on art and emerging technologies. I will explore the increasingly popular world of AI and artmaking in greater depth. I am hopeful for the future of AI. and art. I want to see it widely accepted and responsibly used by teachers, students, and artists. As Oren said during the interview, “AI is in its infancy.” It is at a stage where people do not know what to make of it. Is it good? Is it bad? Should we use it, or should we not?

### **Further questions**

What happens when an artist appropriates emerging technologies in the creation of portraits opens the door to many new questions. Through the experimentation of using emerging technologies and traditional media, many questions came up, and I needed more time and resources to answer them. One of these questions involves the interviews and the participants’ answers. I wonder if any of my findings would have changed if I had looked in greater depth into each participant’s answers. Although I noted similarities in answers between artists and scientists, I did not examine every single one of their answers individually and as separate groups (artists and scientists, male and female, older and younger). I would be curious to know and research the subject further with a broader range of participants and more of them. I am also interested in gathering data from the viewer of my work—their thoughts and feelings when they look at and experience the portraits. I would want to know their perspectives and points of view regarding the AR component of the work if they preferred looking at the portrait with or without the AR. If the viewer’s perspective on the subject changed when viewing the work with the AR component. If so, in what ways?

I want to explore the subject of mixed reality further (an advanced form of augmented reality where more interaction with digital elements is found) and touch on the subject of Virtual

reality (complete immersion in a digital world). These are subjects I did not touch on in this research, although they are valuable aspects of emerging technology in art.

Through my research, I have discovered that using traditional art mediums such as painting and drawing made me "feel" much more than working at the computer. How can we combine the mediums of traditional and emerging technologies to get the best of both worlds? How could we get the efficiency of the machine and the elegance of traditional materials while putting forward the magical and unpredictable aspects of both? Although I used emerging technologies to create the portraits, I noted how different digital and traditional media were from each other. I was stunned as I expected to find out that the two art-making media would merge seamlessly, not just in the artwork but in how they were used to create it. I am still looking for the perfect blend of traditional art-making media and emerging technology to create art. What would be the benefits of merging traditional media and emerging technologies to create visual art?

A subject I did not touch on in this research but that I want to explore is to look at the similarities between the human and the machine. As stated by artist and writer Joanna Zylinka in her book *AI Art* (2020), "Humans have always been technological, i.e., that we have run on algorithms-from DNA to behavioral instructions developed in various cultures to legitimate and promote certain ways of doing things over others" (p.107). We are closer to the machine than we initially thought. If we think about it, we are almost cyborgs; most of us carry a fantastic piece of technology that makes us smarter. It gives us the power to communicate anywhere with anyone at all times. It allows us to come up with an answer to a question in a matter of seconds. It is incredible. Are we increasingly merging with technology? What would the average human look like one hundred years from now? What would an artist be like one hundred years from now?

How would this artist create art, and by the same token, what would art look like one hundred years from now?

I am looking forward to further researching emerging technology in art. I hope to find a way to merge art-making media with emerging technology perfectly. I am unsure how it would look or feel, but I am excited to find out.

## References

- Audry, S. (2021). *Art in the Age of Machine Learning*. The MIT Press.
- Belting, H. (2013). *Face and Mask*. Princeton University Press.
- Benney, M. & Kiesler, P. (2021). Explore Some of Our AI Artists: AIArtists.org.  
<https://aiartists.org/>
- Berryman, D. (2012). Augmented reality: A review. *Medical Reference Services Quarterly*, 31(2), 212-8.
- Blanchette, K., Lacroix, P-O. (2022, Oct. 15). Monumental; Investir l'art public par la réalité augmentée [Conference session]. CSEA Emergence 2022 Conference, Ottawa Art Gallery, Ottawa, ON, Canada.
- Blair, G., Coppock, A., & Moor, M. (2020). When to Worry about Sensitivity Bias: A Social Reference Theory and Evidence from 30 Years of List Experiments. *American Political Science Review*, 114(4), 1297-1315. doi:10.1017/S0003055420000374
- Cavanaghi, U., Sénécal, I. (2019). *Osons l'IA à l'école*. Editions Château d'Encre.
- Chapman, O., Sawchuk, K. (2012). Research-creation: Intervention, analysis an “family resemblances”. *Canadian Journal of Communication*, 37(1), 5-26.
- Chen, C-A., Lai, H-I. (2021). Application of augmented reality in museums – Factors influencing the learning motivation and effectiveness. *Science Progress*, 104(S3), 1-16.  
DOI:10.1177/00368504211059045
- Connolly, A. 2012, *Painting Portraits*. Crowood Press.

- Copeland, B., J. (2023). Allan Turing. In Britannica. Com. Retrieved February 16, 2023, from <https://www.britannica.com/biography/Alan-Turing>
- Du Sautoy, M. (2019). *The Creativity Code; Art and innovation in the age of AI*. The Belknap Press of Harvard University Press.
- English, W., F. (2000). Acritical appraisal of Sara Lawrence-Lightfoot's portraiture as a method of educational research. *American Educational Research Association*, 29(7), 21-26. <https://doi.org/10.2307/1176147>
- Freeland, C. (2007). Portraits in painting and photography. *Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition*, 135(1), 95-109. DOI 10.1007/s11098-007-9099-7
- Freeland, C. (2010). *Portraits & Persons*. Oxford University Press.
- Hackmann, G., D. (2002). Using portraiture in educational leadership research. *International Journal of Leadership in Education*, 5(1), 51-60. DOI 10.1080/13603120110057109
- Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of Artificial Intelligence. *California Management Review*, 61(4), 5–14. <https://doi.org/10.1177/0008125619864925>
- Iqbal M., Z., Mangina, E., Campbell, A., G. (2019). Exploring the Use of Augmented Reality in Kinesthetic Learning Application Integrated with an Intelligent Virtual Embodied Agent [Conference session]. 18th IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR). DOI: 10.1109/ISMAR-Adjunct.2019.00018
- Kelly, K. (2023). Engines of wow. *Wired Magazine*, 31(02), 34-47.



- Kidd, C., Hayden, B., Y. (2015). The Psychology and Neuroscience of Curiosity. *Neuron*, 88(3), 449-60. doi: 10.1016/j.neuron.2015.09.010.
- Lawrence-Lightfoot, S., Davis, H., J. (1997). *The art and science of portraiture*. Jossey-Bass A Wiley Imprint.
- Leavy, P. (2020). *Method Meets Art; Arts-Based Research Practice*. The Guilford Press.
- Martin, E. (2022). ChatGPT et l'enseignement de l'ignorance. *Le Devoir*. Retrieved January 5 from <https://www.ledevoir.com/opinion/idees/775360/idees-chatgpt-et-l-enseignement-d-de-l-ignorance>
- Miller, I., A. (2019). *The Artist and the Machine; The world of AI-powered creativity*. The MIT Press.
- Oxford Advanced Learner's Dictionary. (2023). Collaboration. In Oxford's learning dictionaries.com. Retrieved February 16, 2023, from <https://www.oxfordlearnersdictionaries.com/definition/english/collaboration>
- Papagiannis, H. (2016). *The Critical Role of Artists in Advancing Augmented Reality*. Turner.
- Potter, P. (2006). Rembrandt van Rijn, scholar in his study. *Emerging Infectious Diseases*, 12(3):537–538. doi: 10.3201/eid1203.AC1203.
- Pasaréti, O., Hajdú, H., Matuszka, T., Jámbori, A., Molnár, I., & Turcsányi-Szabó, M. (2011). Augmented Reality in Education. *Infodidact Informatics Methodology Conference*. Retrieved February 2nd 2023 from [https://people.inf.elte.hu/szlavi/InfoDidact11/Manuscripts/PO\\_HH\\_MT\\_JA\\_MI\\_TSzM.pdf](https://people.inf.elte.hu/szlavi/InfoDidact11/Manuscripts/PO_HH_MT_JA_MI_TSzM.pdf)

Rogan, J. (Executive Producer). (2019-present). The Joe Rogan Experience [Audio podcast].

Spotify. <https://open.spotify.com/episode/51gxrAActH18RGhKNza598>

Sethiya, K. (2021). Augmented Reality in Healthcare. *Journal of Interdisciplinary Cycle R*

*Research*, 22(21), 343-359. Retrieved January 25th 20233 from

[https://www.researchgate.net/publication/350918578\\_Augmented\\_Reality\\_AR\\_in\\_Healthcare](https://www.researchgate.net/publication/350918578_Augmented_Reality_AR_in_Healthcare)

Zylinska, J. (2020). *AI Art; Machine vision and warped dreams*. Open Humanities Press.

Appendix A

Certification of Ethical Acceptability

---



CERTIFICATION OF ETHICAL ACCEPTABILITY  
FOR RESEARCH INVOLVING HUMAN SUBJECTS

---

Name of Applicant: Jihane Mossalim  
Department: Faculty of Fine Arts\Art Education  
Agency: N/A  
Title of Project: What happens when artists appropriate scientist's tools? An exploration through portraiture  
Certification Number: 30016765  
Valid From: July 07, 2022 To: July 06, 2023

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

A handwritten signature in black ink that reads "Richard DeMont".

---

Dr. Richard DeMont, Chair, University Human Research Ethics Committee

---