UNIARTS HELSINKI = ACADEMY OF FINE ARTS + SIBELIUS ACADEMY + THEATRE ACADEMY

Introduction to AI in Creative Practice

Majella Clarke

Week #1 2024

Welcome!

Let’s do a round of introductions, answering the following questions:

- What is your name and preferred pronoun/s?

- What are of creative practice are you coming from? And What area/s of creative practice are you interested in?

- What are your expectations from this course? What do you hope to know by the end of course?

A little about my AI journey…

I started using AI as a scientist on Global Earth Observation Systems monitoring forests, carbon and biodiversity

I worked in a Finnish AI start-up specializing as a Data and AI Strategist, business, technology and digitalization focus

THEN…. In 2019

I started experimenting with AI in music, art, sound

IN 2023 → Collab with Intelligent Instruments Lab for The Sonic Baton Project

Image: *The Notes Around Us* by Majella Clarke

Teaching Approach

- Collaborative Learning and Social Constructivism: places emphasis on social interaction, dialogue in the construction of knowledge, and engaged learning for collaborative activities → Lots of group discussion and activities
- Problem Based Learning: explore and solve real-world problems through discussion and critical thinking
- Reflection

- Be Curious!

Lesson Plan
16:30 – 18:15
Mid break 15 minutes

Time	Content
16:30 – 17:00	Introductions – people and the course
17:00 – 17:15	Artificial Intelligence – Terminologies, acrynoms and concepts
17:15 – 17:30	15 Minutes Break
17:30 – 17:40	Review of Uniarts Ethics Guidance
17:40 – 18:00	Awful AI Case Review Group Work
18:00 – 18:10	Key Takeaways from Case review
18:10 – 18:15	Reflection

In Today's class we will...

- Overview of the course objectives and structure
- Introduce Artificial Intelligence (AI) terminologies, acronyms and concepts applied to creative uses
- Case Review: Awful AI
- Discussion: Why is ethics so important to the use of Artificial Intelligence? What lessons can we learn from Awful AI?

Intro to AI in Creative Practice: Objectives and Structure

1. **Understand essential AI terminologies, trends, arguments, and counterarguments within the context of creative practice.**
2. **Knowledge of how artificial intelligence is being applied in different fields of creative practice, from music composition, design, visual arts, and literature.**
3. **Understand the main ethical and legal implications of using artificial intelligence in creative work.**
4. **Early proficiency in evaluating and applying different artificial intelligence tools, applications, and platforms relevant to creative practice and the pros and cons of integrating them into creative work.**

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
• Terminologies • Concepts • Ethics • Case Discussion: Awful AI	• Evolution of AI • Trends & Impacts • Agency and Creativity • Computer Vision • Experiments!	• Applications in Creative Practice • Tools • NLP, LLMs • Prompt Engineering • Experiments!	• AI Copyright, ownership and all things IPR, Legal • Guest Speaker: • Jaana Pihkala LLM from CIAPC	• AI in Artistic Concepts • Neural Audio Synthesis • AI in Creative Practice • Experiments! • Guest Artist	• Humanity, creativity and the future of AI • Aesthetics and AI • Project guidance • Final reflections on the course

Terminologies

Artificial Intelligence

- Artificial Intelligence is the broader concept of machines being able to carry out tasks in a smarter way. It covers anything which enables computers to behave like humans.

[Missing a copyrighted image of the 3 stages of AI]
https://www.datakeen.co/what-is-artificial-intelligence-3/

What is an Artificial Intelligence System?

- **An AI system' is a machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments.**

Source: EU AI Act

What is a General Purpose Artificial Intellience Model?

- **‘General-purpose AI model’ means an AI model, including where such an AI model is trained with a large amount of data using self-supervision at scale, that displays significant generality and is capable of competently performing a wide range of distinct tasks regardless of the way the model is placed on the market and that can be integrated into a variety of downstream systems or applications, except AI models that are used for research, development or prototyping activities before they are placed on the market;**

Source: EU AI Act

What is Machine Learning?

- Machine Learning is a branch of artificial intelligence (AI) and computer science which focuses on development of systems that are able to learn and adapt without following explicit instructions imitating the way that humans learn, gradually improving its accuracy, by using algorithms and statistical models to analyse and draw inferences from patterns in data.

Source: EU-U.S. Terminology and Taxonomy for Artificial Intelligence First Edition

Types of Machine Learning

- **Reinforcement Learning: A type of machine learning in which the algorithm learns by acting toward an abstract goal, such as “earn a high video game score” or “manage a factory efficiently.” During training, each effort is evaluated based on its contribution toward the goal.**
- **Supervised Learning: Machine learning that makes use of labelled data during training.**
- **Unsupervised Learning: Machine learning that makes use of unlabelled data during training.**

Source: EU-U.S. Terminology and Taxonomy for Artificial Intelligence First Edition

What is Deep Learning?

- A subset of machine learning based on artificial neural networks that employs statistics to spot underlying trends or data patterns and applies that knowledge to other layers of analysis. Some have labelled this as a way to "learn by example" and as a technique that "perform[s] classification tasks directly from images, text, or sound" and then applies that knowledge independently.

Source: EU-U.S. Terminology and Taxonomy for Artificial Intelligence First Edition

Deep Learning Example

[Missing a copyrighted image of Neural Networks and Deep Learning.]

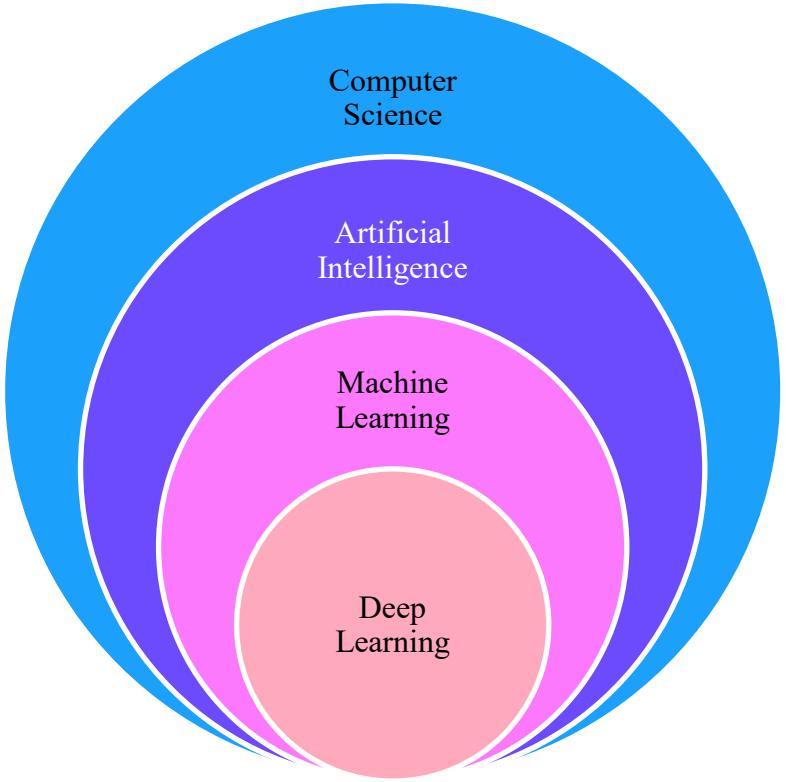
https://www.futurespace.es/en/redes-neuronales-y-deep-learning-capitulo-1-preludio/

Important Data Definitions

- **Input Data: Data provided to or directly acquired by an AI system on the basis of which the system produces an output.**
- **Structured Data: Data that has a predefined data model or is organised in a predefined way.**
- **Unstructured Data: Data that does not have a predefined data model or is not organised in a predefined way.**
- **Synthetic Data: Synthetic data is generated from data/processes and a model that is trained to reproduce the characteristics and structure of the original data aiming for similar distribution. The degree to which synthetic data is an accurate proxy for the original data is a measure of the utility of the method and the model.**
- **Big Data: An all-encompassing term for large, complex digital data sets that need equally complex technological means to be stored, analysed, managed and processed with substantial computing power. Datasets are sometimes linked together to see how patterns in one domain affect other areas. Data can be structured into fixed fields or unstructured as free-flowing information. The analysis of big datasets, often using AI, can reveal patterns, trends, or underlying relationships that were not previously apparent to researchers.**

Source: EU-U.S. Terminology and Taxonomy for Artificial Intelligence First Edition

How are Artificial Intelligence, Machine Learning and Deep Learning Related to each other?



What is a Neural Network?

- Neural Network: A computer system inspired by living brains, also known as artificial neural network, neural net, or deep neural net. It consists of two or more layers of neurons connected by weighted links with adjustable weights, which takes input data and produces an output. Whereas some neural networks are intended to simulate the functioning of biological neurons in the nervous system, most neural networks are used in artificial intelligence as realisations of the connectionist model.

What is a Large Language Model (LLM)?

- A class of language models that use deep-learning algorithms and are trained on extremely large textual datasets that can be multiple terabytes in size.
- LLMs can be classed into two types: generative or discriminatory.
- Generative LLMs are models that output text, such as the answer to a question or even writing an essay on a specific topic. They are typically unsupervised or semi-supervised learning models that predict what the response is for a given task.
- Discriminatory LLMs are supervised learning models that usually focus on classifying text, such as determining whether a text was made by a human or AI.

Examples and Evolution of LLMs

[Missing a copyrighted image of LLMs]

https://codeincomplete.com/articles/ai-and-large-language-models/

Ethics

Uniarts Ethical Guidelines for Education

- **Why are these guidelines important for our class?**
  - **They give guidelines on the use of AI applications in studies**
  - **"*both teachers and students must be committed to noting that nobody is obligated to use online applications in studies or to register as users of applications provided by third parties*."**
  - **IMPORTANT: Nobody is allowed to enter anyone's personal data or other material (e.g. material covered by copyrights, trade secrets) that one does not have rights of use to in applications.**
  - **"AI cannot be cited as a source for research"**
  - **"Using AI and LLMs for language revision is justified…"**
  - **LLMs can contain factual errors, bias, contradictions**
  - **BOTTOM LINE: Use with awareness, be ethical, do no evil**

https://student.uniarts.fi/guides/uniarts-helsinkis-ethical-guidelines-for-education-and-studies-and-procedures-for-misconduct-and-disciplinary-cases/

Embedded systemic issues with AI

Issue	Example
Bias and Fairness: AI systems can inherit biases present in the data used to train them, leading to unfair and discriminatory outcomes, particularly against marginalized groups. Bias in AI affects areas like hiring, lending, and criminal justice.	Resume Screening Issue: An AI system used for resume screening may inadvertently favor applicants from one gender or ethnic group over others because the historical hiring data used to train the AI had bias.
Transparency and Explainability: Many AI models, especially deep learning models, are seen as "black boxes" that make it difficult to understand their decision-making processes. Lack of transparency and explainability can hinder trust and accountability.	Loan Approval Issue: A bank's AI model approves or denies loans without clear explanations, making it difficult for applicants to understand why they were rejected or to address any errors or biases in the decision.
Data Privacy: AI systems often require access to large amounts of personal data. Protecting user privacy while leveraging this data is a challenge. Misuse or data breaches can have severe consequences.	Social Media Data Issue: A social media platform's AI analyses user behaviour to target ads. If it mishandles user data, it can lead to privacy breaches, exposing personal information to third parties.
Security Vulnerabilities: As AI becomes more integrated into critical systems, it becomes a target for malicious actors. Ensuring AI system security is vital to prevent potential harm.	Cyberattacks on AI Systems Issue: Malicious actors exploit vulnerabilities in AI systems used in critical infrastructure, such as power grids, leading to potential disruptions and chaos.
Regulatory Frameworks: The legal and regulatory landscape for AI is still evolving, and many countries lack comprehensive regulations. Harmonizing AI regulations across borders is a challenge.	Data Protection Laws Issue: Different countries have varying data protection laws, making it challenging for global tech companies to comply with diverse regulations while providing consistent services.

Embedded systemic issues with AI (continues)

Issue	Example
Accessibility and Inclusivity: Ensuring that AI technologies are accessible to all, including people with disabilities, is essential. Many AI systems and applications overlook inclusivity.	Voice Assistants Issue: Some voice-activated AI assistants are not designed to understand individuals with speech disabilities, excluding a portion of the population from using these technologies effectively.
Environmental Impact: Training large AI models can be computationally intensive and energy-consuming. Reducing the carbon footprint of AI is an emerging concern.	Large-Scale Model Training Issue: Training a massive AI language model can consume vast amounts of electricity, contributing to carbon emissions and environmental concerns.
Lack of Diversity in AI Development: There is a lack of diversity in the AI development	Facial Recognition Bias Issue: AI facial recognition systems trained on limited datasets may struggle to accurately recognize faces of individuals from underrepresented racial or ethnic groups.
Algorithmic Accountability: Determining who is responsible when AI systems make mistakes or cause harm is complex. Clear frameworks for accountability are needed.	Healthcare Diagnosis AI Issue: If an AI system provides an incorrect medical diagnosis, determining whether the AI developer, healthcare provider, or the AI itself is accountable can be complex.
Intellectual Property and Openness: Balancing intellectual property rights with the need for open access to AI technologies for research and innovation is a challenge.	Patenting AI Algorithms Issue: Companies patent AI algorithms, potentially limiting their availability for innovation and research by others in the AI community.
Bias in AI Research: Research and publications in AI can be biased toward commercially motivated results or prestigious institutions, affecting the broader AI community.	Language Bias in NLP Models Issue: AI research may focus on certain languages or dialects, leading to disparities in language support in natural language processing (NLP) models, disadvantaging users of less common languages.

Group Work and Discussion: Ethics

- Reflecting on the reading “Awful AI”, choose one use case from the list and discuss it in your group with a focus on the following questions:
- What makes this AI use case choosen potentially problematic / unethical?
- What type of technologies does the use case apply?
- Can you think of applications of the same/similar use of AI in creative practice?
- What implications does such a use have for creative practice?
- What ethical lessons can be drawn from the use case?

Homogenization Effects of LLMs on Human Creative Ideation

Citation: Anderson, B. R., Shah, J. H., & Kreminski, M. (2024, June). Homogenization effects of large language models on human creative ideation. In *Proceedings of the 16th Conference on Creativity & Cognition* (pp. 413-425).

Preparation for next class:
What are the key limitations of using LLMs for creative support?

Introduction to AI in Creative Practice

Majella Clarke

Week #2 2024

Lesson Plan
16:30 – 18:00

Time	Content
16:30 – 16:40	Social Exercise – Euler diagram
16:40 – 16:55	Article Review Large Language Models (LLMs) and Creativity
16:55 – 17:10	Evolution and impact of AI in Music
17:10 – 17:25	Experiment: MUSENET
17:25 – 17:35	Evolution and impact of AI in Visual Arts
17:35 – 17:50	Terminologies: Computer vision and Mediapipe Studio
17:50– 18:00	Discussion: What does working with AI mean for creative agency?

Intro to AI in Creative Practice: Objectives and Structure

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Teaching Approach

- Collaborative Learning and Social Constructivism: places emphasis on social interaction, dialogue in the construction of knowledge, and engaged learning for collaborative activities → Lots of group discussion and activities
- Problem Based Learning: explore and solve real-world problems through discussion and critical thinking
- Reflection

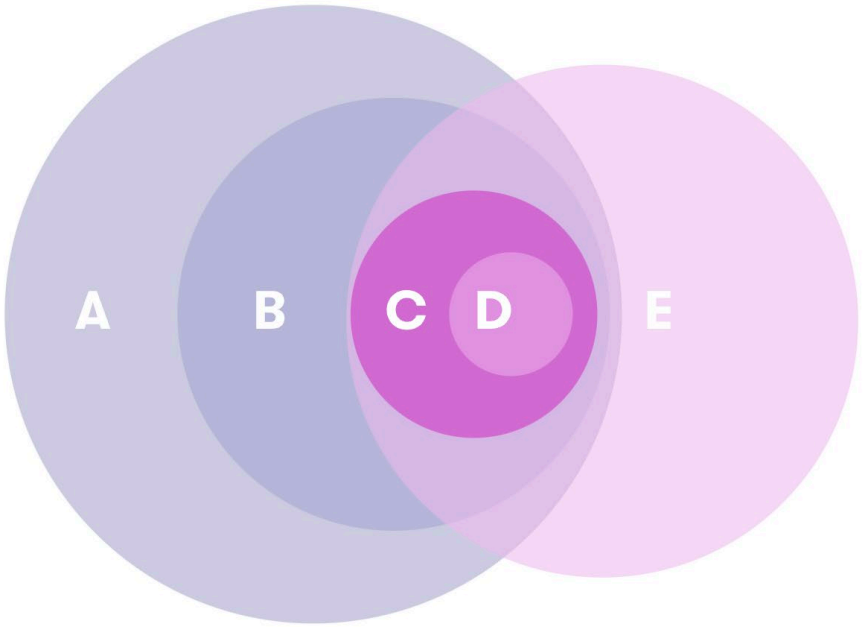
- Be Curious!

In Today's class we will...

- Introduce Artificial Intelligence (AI) terminologies, acronyms and concepts applied to creative uses
- Recap social exercise on important terminologies
- Historical context and impacts of Artificial Intelligence on creative practice
- Inspiration! Look at how AI is being applied in creative practices
- AI Tools: Computer Vision
- Discussion: Agency, AI and Creative Practice

Group Exercise

Group Exercise: Consider a taxonomy in the Euler diagram example given below showing the relationships between the following things: AI, machine learning, computer science, data science, and deep learning.



A =

B =

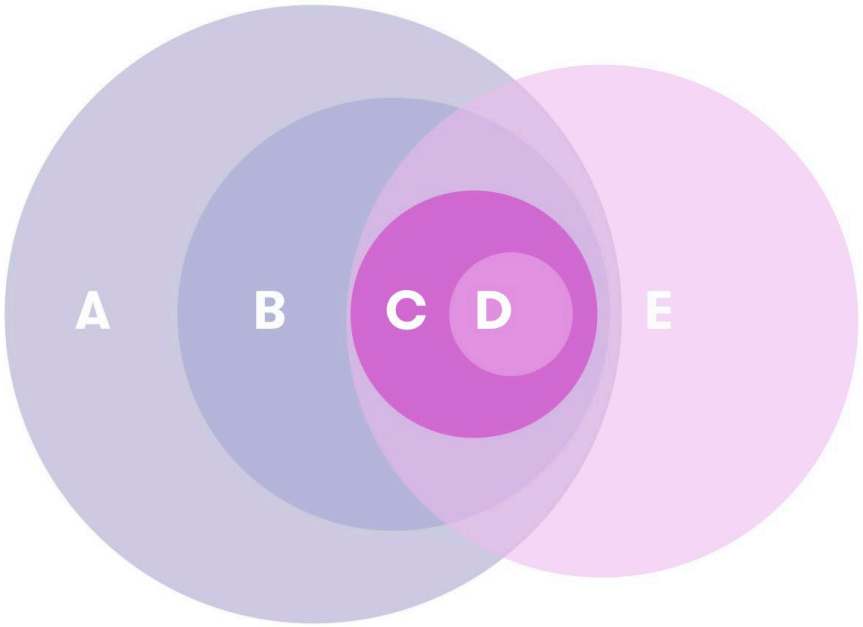
C =

D =

E =

Source: Elements of AI - https://course.elementsofai.com/1/2

Group Exercise: Consider a taxonomy in the Euler diagram example given below showing the relationships between the following things: AI, machine learning, computer science, data science, and deep learning – answers



A = Computer Science

B = Artificial Intelligence

C = Machine Learning

D = Deep Learning

E = Data Science

Source: Elements of AI - https://course.elementsofai.com/1/2

Article Review

Homogenization Effects of LLMs on Human Creative Ideation

Citation: Anderson, B. R., Shah, J. H., & Kreminski, M. (2024, June). Homogenization effects of large language models on human creative ideation. In *Proceedings of the 16th Conference on Creativity & Cognition* (pp. 413-425).

Preparation for class:
What are the key limitations of using LLMs for creative support?

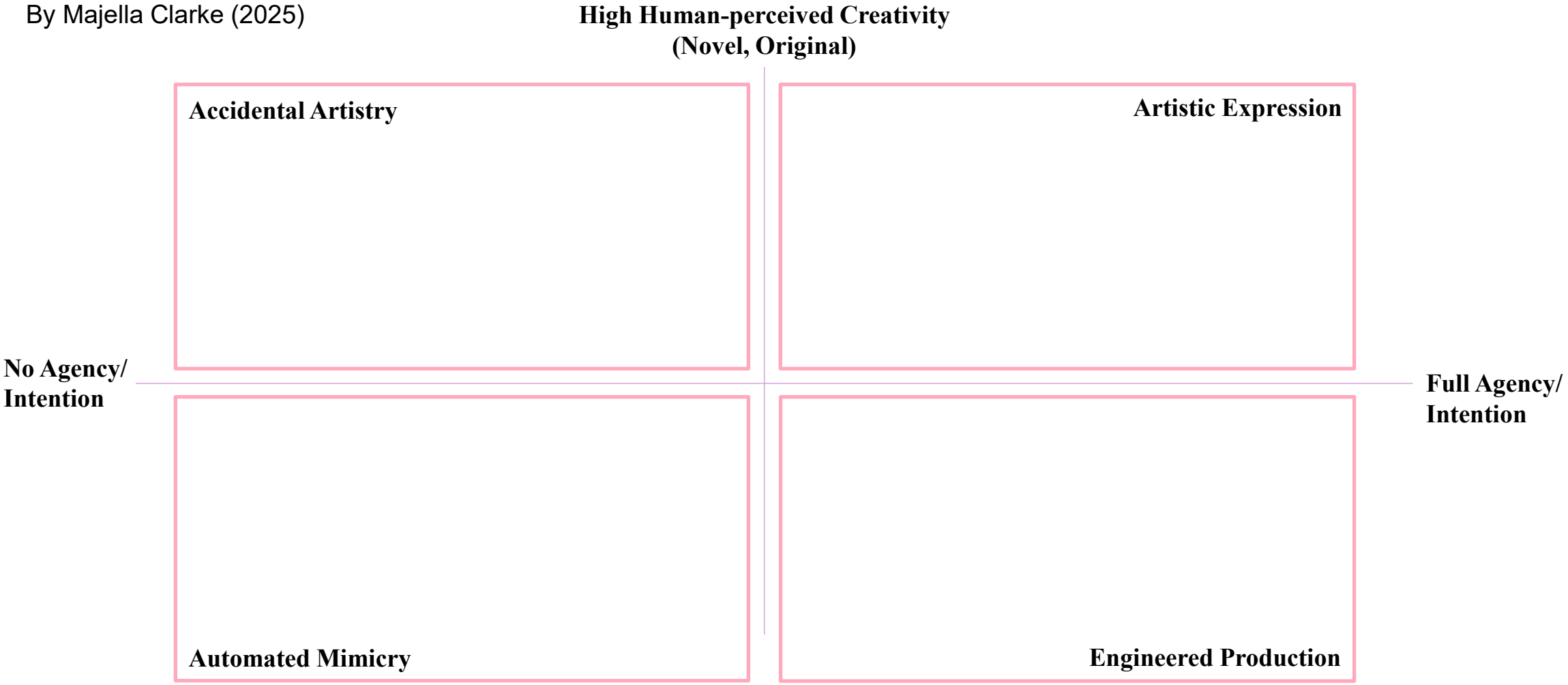
Key Points: Homogenization Effects of LLMs on Human Creative Ideation

- Hypothesis: Using an LLM as a Creative Support Tool (CST) may make users feel more creative, and even broaden the range of ideas suggested by the user, but also homogenize the ideas suggested by different users
- Why Homogenization? → Algorithmic Monoculture
- Fixation effect → ideation feels complete early on → reduced variation in later ideas
- Homogenization effect was a group phenomena
- Users exhibit greater fluency, flexibility, and elaboration than users of an alternative CST
- Both CST and GPT “are not suitable to generating truly original ideas”

Agency and Creativity

AI Agency-Creativity Framework

By Majella Clarke (2025)



Historical context and impacts of Artificial Intelligence on creative practice

Timeline of AI in Music

1957
Illiac Suite

First score composed by an electronic computer programmed in binary by Hiller and Isaacson at the University of Illinois

1958-62
Xenakis x IBM

Xenakis extensively used stochastic algorithms to generate raw material for his compositions. A pioneer of Computer-Aided-Algorithmic Composition (CAAC)

1990s
Brian Eno

Brian Eno worked with self-generating musical systems – leading to Generative Music.

2001-2009
David Cope x EMI

David Cope develops Experiments in Musical Intelligence and develops Emily Howell an interactive interface that "hears" feedback from listeners, and builds its own musical compositions from a source database, derived from a previous composing program EMI

2019
Musenet

OpenAI Musenet is a deep neural net trained to predict subsequent musical notes in MIDI music files.

2020
Ellen Pearlman AI Brain Opera

The world's first emotionally intelligent artificial intelligent brainwave opera premieres in Tallinn in Feb 2020

2023-
Sonic Conducting Baton

Is Neural Audio Synthesis the next music-science paradigm?

Illiac Suite (1957)

The Illiac Suite is regarded as the first substantial piece of music composed on a computer.

- **4 movements played on a string quartet**
- **Used the Monte Carlo method of random data sampling to train the illiac computer to understand certain rules of musical composition (algorithmic composition)**
- **The first three movements are based on traditional composition framework**

BUT what happens when a computer generates music using algorithms and computation techniques NOT based on music theory?

4th Movement is different… Markov Chain music

Memory drum of ILLIAC I, on display at the Spurlock Museum. Image by Wikipedia user Rama. Image is available under CC BY-SA 2.0 Fr.

[Missing a copyrighted image of the ILLIAC I computer around 1952.]
Source: https://www.researchgate.net/profile/Lenny-Fukshansky/publication/326586313/figure/fig5/AS:652137918889986@1532493204529/The-ILLIAC-I-computer-around-1952-Courtesy-of-the-University-of-Illinois-Archives.png

Experimental Music

COMPOSITION WITH AN ELECTRONIC COMPUTER

Lejaren A. Hiller, Jr.
ASSISTANT PROFESSOR OF MUSIC
SCHOOL OF MUSIC, UNIVERSITY OF ILLINOIS

Leonard M. Isaacson
MATHEMATICIAN
STANDARD OIL COMPANY OF CALIFORNIA
FORMERLY RESEARCH ASSOCIATE
UNIVERSITY OF ILLINOIS

McGRAW-HILL BOOK COMPANY, INC.
1959 NEW YORK TORONTO LONDON

Source:
https://archive.org/details/experimentalmusi00hill/page/n5/mode/2up

Rules for Generating Music

[Missing copyrighted images of the tables 11 and 17 from *Experimental Music* by Hiller & Isaacson (1959)]
Source: https://archive.org/details/experimentalmusi00hill/page/n5/mode/2up

The final output.... Lets Listen

[Missing a copyrighted image of the two first rows of the part I. Experiment no. I of the score “Illiac suite for string quartet” (Hiller & Isaacson)]

Xenakis x IBM 7090 in Paris (1958-62)

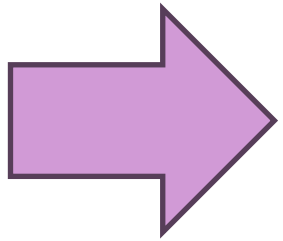
[Missing a copyrighted image of an IBM 7090, in a photograph from about 1960.] Source: https://www.cozx.com/dpitts/ibm7090.html

Compositions:

ST/48 for Orchestra
ST/10
ST/4
Morisma-Armosima
Artees
Strategie for 2 Orchestras

Process for Computer Assisted Algorithmic Composition
What does it sound like?

[Missing a copyrighted image of the matrix *Provisional Results of One Phase of the Analysis* (Xenakis 1992, 153)]



[Missing a copyrighted image of the first five bars of the hand written score of *ST/ 10-1, 080262* (Xenakis 1992, 154)]

Xenakis, I. (1992). Formalized music: thought and mathematics in composition (No. 6). Pendragon Press.

Brain Eno (1990s) Generative Music

KOAN Player Software → Dark Symphony

[Missing a copyrighted image of Eno's works and Koan Pro software box and disks]

David Cope x EMI (2001-2009)

[Missing a copyrighted image of *From darkness, light* by Emily Howell]

MUSENET (2019)

- MUSENET is a deep neural network that can generate compositions applying a variety of musician influences.
- The algorithm works by identifying patterns of harmony, rhythm, structure and style and learning to predict the next segment or "token" based on data.
- Data is in the form of a MIDI file.
- MUSENET uses the same General-Purpose Unsupervised Technology (GPT-2), which is a large scale transformer model trained to predict the next token in a sequence.
- The MAESTRO dataset plays a key role in the model that was used in this series of compositions.
- The MAESTRO dataset contains over 200 hours of paired audio and MIDI recordings from ten years of International Piano e-competition.
- The MIDI data includes key strike velocities and sustain / una corda pedal positions. While there are multiple instrumental options using MUSENET, because of the sheer amount of high quality data available for the piano in MIDI format to train the model, it can be argued that the MUSENET model performs exceptionally well for generating piano music.

[Missing a copyrighted image of a visualisation of AI composition] source: https://adamloving.com/wp-content/uploads/2021/01/Screen-Shot-2021-01-08-at-2.45.13-PM-700x269.png

MUSENET
https://openai.com/index/musenet/

Ellen Pearlman AI Brainwave Opera (2020)

[Missing a copyrighted image from the article]
https://thetheatretimes.com/interview-with-ellen-pearlman-about-aibo-an-emotionally-intelligent-artificial-intelligent-brainwave-opera-part-1/

Timeline of Generative AI in Visual Art

1960s
Harold Cohen

AARON was a computer program designed to create drawings and paintings.

1960-70s
Vera Molnar

Computer generated drawings using simple algorithms and geometric shapes.

1980s
William Latham

Genetic algorithms and 3D models. Paired up with mathematician Stephen Todd to create Mutator – to "breed" digital algorithms by guiding their "growth" with coding and software tools.

2014
DeepDream

DeepDream was developed by Google engineer Alexander Mordvintsev using Deep Learning algorithm to analyze and modify images, creating surreal and dreamlike compositions. Google DeepDream that works on pre-existing images.

2014
GANs

Ian Goodfellow developed Generative Adversarial Networks (GANs). GANs can produce completely new images. most famous GAN-made artwork in contemporary art is the portrait "Portrait de Edmond de Belamy" sold for USD432,000 at Christies in 2018.

2021
CLIPs

CLIP (Contrastive Language-Image Pretraining) paved the way for Text-to-image. Katherine Crowson. made AI art accessible to non-programmers.

2023
Diffusion Models

Diffusion models are a type of generative model that operate by transforming a simple random noise signal into more complex data, such as images. Katherine Crowson has been one of the tech leader in the development of diffusion models.

Adapted from
https://beautyandai.com/blogs/beauty-and-ai-blog/history-of-ai-art/

Harold Cohen and AARON

https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

[Missing a copyrighted image of a detail from an untitled AARON drawing, ca. 1980] Source: https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

Harold Cohen and AARON

https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

[Missing a copyrighted image of the 1979 exhibition, Drawings, at SFMOMA, featuring a “turtle” robot creating drawings in the gallery]
Source: https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

Harold Cohen and AARON (II)

https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

[Missing a copyrighted image of Harold Cohen coloring the forms produced by the AARON drawing “Turtle” at the Computer Museum, Boston, MA, ca. 1982]
Source: https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

Harold Cohen and AARON (III)

https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

[Missing a copyrighted image of AARON image created at the Computer Museum, Boston, MA, 1995.]

Source: https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

Cohen defined a small set of rules and forms that the computer composed into drawings, which were then put to paper using a drawing “turtle”—a small robot equipped with a marker.

Harold Cohen and AARON (IV)
https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

[Missing the copyrighted first color image created by AARON at the Computer Museum, Boston, MA, in 1995. Collection of the Computer History Museum.]
Source: https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/

"It's taken me 20 years to teach AARON to draw. How can I possibly teach it to color before I die? "

— HAROLD COHEN, 1989

Vera Molnar https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

[Missing a copyrighted image of Artist Vera Molnar in her home and studio workshop on May 28, 2011 in Paris, France.]
Source: https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

Vera Molnar (II) https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

[Missing copyrighted images of the works *Transformation de carrés concentriques* and *9 quasi-carrés* by Vera Molnár]
Source: https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

Vera Molnar (III)

https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

[Missing a copyrighted image of the work *Interruptions* by Vera Molnár]
Source: https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

In 1968, Molnár gained access to a computer owned by the Sorbonne after applying to the dean three times. Computers were reserved for scientific computing at the time. **Having taught herself Fortran**, she began feeding in instructions on a punch card. This arduous process is known as blind computing, since the user has to wait hours or days to see the results drawn out by a mechanical plotter. In her "Interruptions," from this time, the lines in a grid are rotated or erased at random to create an animated and unpredictable composition.

Vera Molnar (IV)

https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

[Missing a copyrighted image of the work *Histoire d'I* by Vera Molnár]
Source: https://news.artnet.com/art-world/vera-molnar-venice-biennale-2098046

William Latham – Mutator http://latham-mutator.com

- **Image: One of the first coiled forms by Latham produced at the IBM UK Scientific Centre using *FormGrow*.**

[Missing a copyrighted image (https://tgamxyz.s3-eu-central-1.amazonaws.com/web/what-is-generative-art/TGAM-Organic-Art-William-Latham-Stephen-Todd.jpg)]

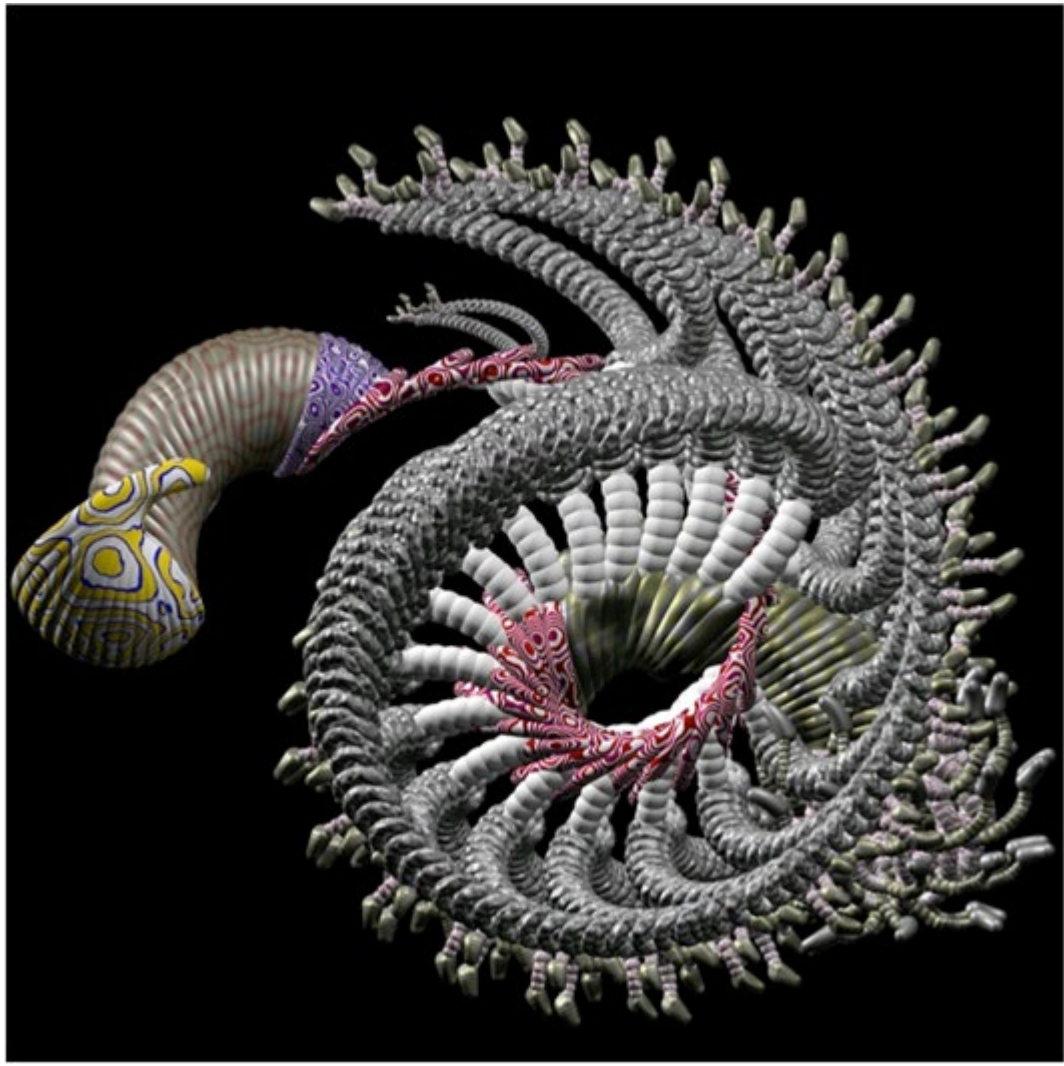
William Latham – Mutator (II) http://latham-mutator.com

- Latham's artistic process takes place in two stages: creation and gardening. He first creates a system for a 3D virtual world, applying whichever physical and biological rules he chooses: light, colour, gravity, growth and evolution. Latham then becomes a gardener within this world he has created; he selects and breeds sculptural forms as a plant breeder produces flowers. This selection is based on Latham's aesthetic judgement, a judgement that the computer cannot make itself.

[Missing a copyrighted image of mutations stages, possibly by Latham]

William Latham – Mutator (III) http://latham-mutator.com

- Mutator C (1993):
- Still images of 3D sculptures created using the Mutator program.



[Missing a copyrighted image of *Mutator C*.] Latham, William. *Mutation X Raytraced. 1991-1992.*
Source: https://www.researchgate.net/figure/Latham-William-Mutation-X-Raytraced-1991-1992-Mutator-VR_fig1_356469337

William Latham – Mutator (IV) http://latham-mutator.com

- William Latham, *Mutator2 Triptych*, 2013.

- Originally designed for mainframe computers, the *FormGrow* grammar and growth rules have now been re-implemented and extended to operate in real time and interactively in a browser environment.

[Missing a copyrighted image of the work]
See for reference:
https://4humanities.org/wp-content/uploads/2013/10/golifer_mutator1.jpg

William Latham – Mutator (V) http://latham-mutator.com

- First attempts by William to formalise the Form Synth process – a rule based drawing process – in the form of a flow diagram. Anticipating a move to software of his ideas.

[Missing a copyrighted image of the work]
See for reference:
https://www.researchgate.net/figure/FormSynth-evolutionary-drawing-William-Latham-1983-85-details-of-a-two-meter_fig1_260161683

DeepDream Generator

- DeepDream software originated from deep convolutional network codenamed "Inception"
- It was developed for the ImageNet Large-Scale Visual Recognition Challenge (ILSVRC) in 2014

[Missing a copyrighted image]

- https://deepdreamgenerator.com

Terminologies

Computer Vision

Computer vision is a field of artificial intelligence (AI) that uses machine learning and neural networks to teach computers and systems to derive meaningful information from digital images, videos and other visual inputs—and to make recommendations or take actions when they see defects or issues.

- www.ibm.com

[Missing a copyrighted image from https://cs231n.github.io/assets/classify.png]

Object Detection

Detecting and locating objects in images or videos is a critical aspect. Object detection is widely used in applications like surveillance, autonomous vehicles, and facial recognition.

[Missing a copyrighted image of picture with cats and dogs that are identified.] See: https://developers.google.com/mediapipe/solutions/studio

Image Classification

This involves assigning labels or categories to images. For instance, distinguishing between cats and dogs in photographs.

[Missing a copyrighted image of picture of a cat and a dog that are classified.]
See: https://developers.google.com/mediapipe/solutions/studio

Image Segmentation

Locate objects to pixel-level in an image or video based on a defined set of classes.

[Missing a copyrighted image of picture of a cat that is segmented.]
See: https://developers.google.com/mediapipe/solutions/studio

Let’s Discover Computer Vision with Media Pipe Studio

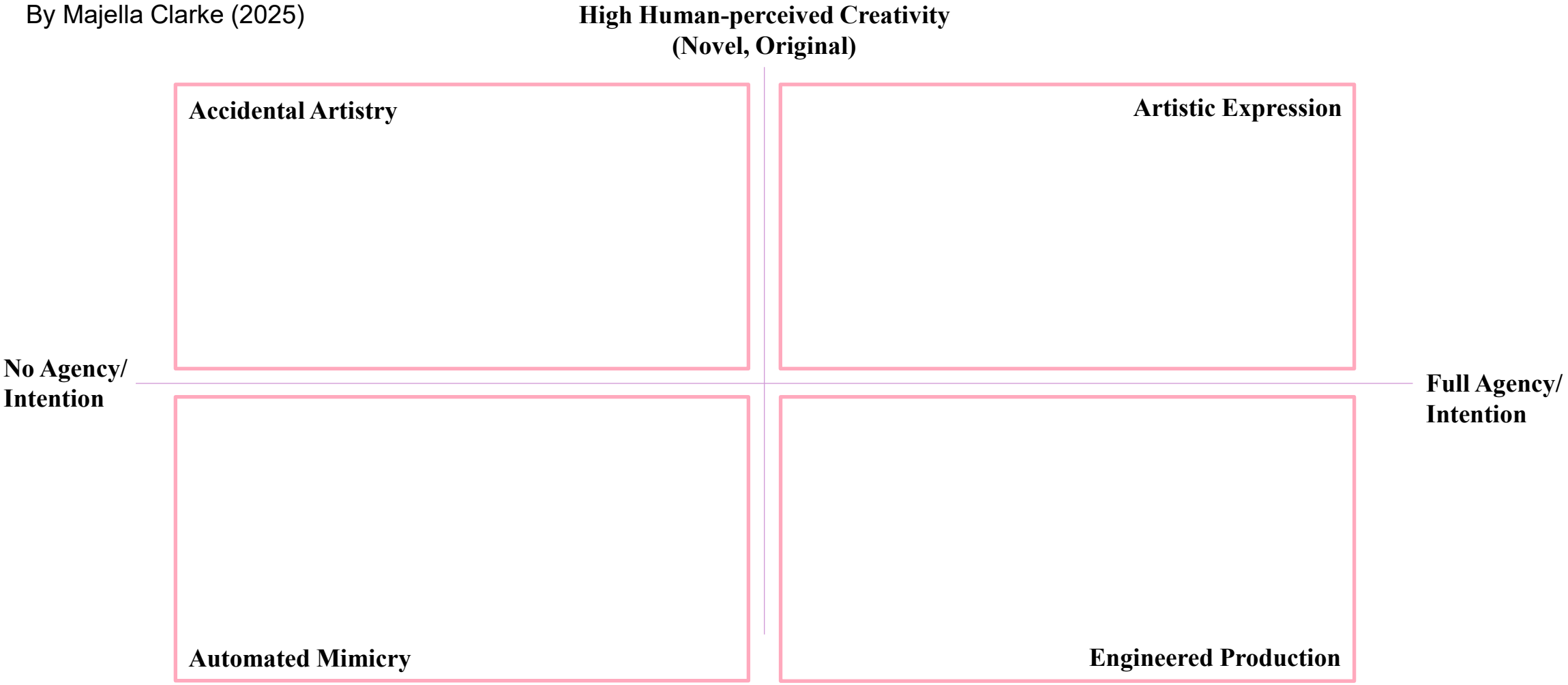
- https://developers.google.com/mediapipe/solutions/studio

- Working with Mediapipe Studio – create a series of images from your group – you can be as creative as you like
- Share with class when we regroup

Reflection: what does it mean to lose agency in the creative process to artificial intelligence? How much agency and intention are you willing to trade off using AI in your creative practice?

AI Agency-Creativity Framework

By Majella Clarke (2025)



Introduction to AI in Creative Practice

Majella Clarke

Week #3 2024

Lesson Plan
16:30 – 18:00

Time	Content
16:30 – 16:45	Terminologies and examples
16:45 – 17:10	Prompt Engineering+ Group experiment
17:10 – 17:45	Artist Case Studies: Refik Anadol + Sougwen Chung
17:45 – 18:00	Discussion: Agency, Identity, and Control using AI in Creative Practice

Intro to AI in Creative Practice: Objectives and Structure

1. **Understand essential AI terminologies, trends, arguments, and counterarguments within the context of creative practice.**
2. **Knowledge of how artificial intelligence is being applied in different fields of creative practice, from music composition, design, visual arts, and literature.**
3. **Understand the main ethical and legal implications of using artificial intelligence in creative work.**
4. **Early proficiency in evaluating and applying different artificial intelligence tools, applications, and platforms relevant to creative practice and the pros and cons of integrating them into creative work.**

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
• Terminologies • Concepts • Ethics • Case Discussion: Awful AI	• Evolution of AI • Trends & Impacts • Agency and Creativity • Computer Vision • Experiments!	• Applications in Creative Practice • Tools • NLP, LLMs • Prompt Engineering • Experiments!	• AI Copyright, ownership and all things IPR, Legal • Guest Speaker: • Jaana Pihkala LLM from CIAPC	• AI in Artistic Concepts • Neural Audio Synthesis • AI in Creative Practice • Experiments! • Guest Artist	• Humanity, creativity and the future of AI • Aesthetics and AI • Project guidance • Final reflections on the course

Teaching Approach

- Collaborative Learning and Social Constructivism: places emphasis on social interaction, dialogue in the construction of knowledge, and engaged learning for collaborative activities → Lots of group discussion and activities
- Problem Based Learning: explore and solve real-world problems through discussion and critical thinking
- Reflection

- Be Curious!

In Today's class we will...

- More terminologies…
- Practice prompt engineering with AI Tools (see above)
- Group exercise on text-to-image + creativity using AI tools
- Artists in Focus: Refik Anadol, Sougwen Chung, Gianluca Traina
- Case Review: Blast Theory's Cat Royale AI design installation
- Discussion on Agency, Identity and Control with using AI in Creative Practice

Important Links for Today's Class

- https://magicstudio.com/ai-art-generator/
- https://dezgo.com/txt2img
- https://elevenlabs.io/safety
- https://www.hs.fi/kulttuuri/art-2000006016823.html
- https://gianlucatraina.com
- https://sougwen.com/artworks
- https://refikanadol.com/works/sense-of-healing-ai-data-sculpture/
- https://refikanadol.com/works/quantummemories/
- https://www.blasttheory.co.uk/

Terminologies

What is Natural Language Processing (NLP)?

- The ability of a machine to process, analyse, and mimic human language, either spoken or written.
- Examples of NLP:
  - Virtual Assistants - Google assistant, Amazon Alexia, Apple Siri, Microsoft Copilot
  - Language Translators – Google Translate

NLP: Text Mining

Word Cloud

Automatic Translation

Where is the station? → Encoder → Decoder → Dov'é la stazione?

Source: https://towardsdatascience.com/from-words-to-wisdom-472ae57d7c35

Entity Extraction

[Missing a copyrighted image]
See: https://medium.com/bhavaniravi/entity-extraction-demistifying-rasanlu-part-3-13a460451573

CLIP Training Architecture

Read more at: https://viso.ai/deep-learning/clip-machine-learning/

[Missing a copyrighted image]

Prompt Engineering

- Prompt engineering is the practice of designing and refining prompts—questions or instructions—to elicit specific responses from AI models.
- Large Language Models (LLMs) like GPT (Generative Pre-trained Transformer) and Google's PaLM2 (Powering Bard) are built on transformer architectures.
- Prompt engineers have to frame questions and statements that are clear and context-specific, eliciting the most relevant and accurate responses from the AI model.
- Think of it as the interface / between human intent and machine output.

[Missing a copyrighted image]

How to Prompt: Context and Instruction

- **Context** gives the AI a clear background or surrounding information that allows it to generate relevant and appropriate content. Without proper context, responses may end up being generic or off-target.
- For example, if you ask the model about “Green technologies”, introducing the context of “used in transportation” narrows down the response to green technologies related to vehicles.
- **Crafting Precise Instructions**
- Being explicit and direct with your instructions ensures more precision in AI outputs and leaves less room for ambiguity.
- To illustrate, instead of prompting “Tell me about website developers”, specify to “Explain the roles and responsibilities of a website developer.”
- **Avoiding Vague Language**
- For example, “Discuss website design” is vague.

https://www.hostinger.com/tutorials/ai-prompt-engineering

How to Prompt: Format, Tone and Length

- Formating
  - “List the top 5 tools, websites, artists etc”
- Tone
  - “Provide a professional critique on the text”
  - “Tell be about quantum entanglement like I am 10 years old”
- Length
  - “Write a short introduction for an artist bio of 200-300 words”

Prompt Engineering Techniques

- Zero-shot Prompting
  - No examples or context – good for rapid answers to basic questions
  - Example: “Briefly describe a musical interface”
- One-shot Prompting
  - Extracting a response based on one example or a piece of context
  - Example: “Write a short story about a chance encounter that changes the course of a character's life forever”.
- Information Retreival
  - When you treat an LLM as a search engine (Google Search is a search engine)
  - Example: “What is the main advantage of using photoshop in text-to-image art”?

Definitions taken from: https://www.hostinger.com/tutorials/ai-prompt-engineering

Prompt Engineering Techniques II

- Chain-of-Thought Prompting
  - Query 1: Can you explain what Generative AI Is?
  - Query 2: What are the main considerations for using Generative AI?
  - Query 3: Can you elaborate on the limitations?
  - Query 4: What are some methods for making creative work with GenAI?
- Content Summarization with Specific Focus
- Iterative Prompting
  - Requires iteration based on the previous answer
  - Line 1: Can you give me a similar work fo x
  - Line 2: Can you give me a synonym for X
- Language Translation with Contextual Nuance
  - Example: Translate the phrase ‘She took the ball and ran with it’ from English to French, keeping in mind that this is a business metaphor for taking charge of a project.

Definitions taken from: https://www.hostinger.com/tutorials/ai-prompt-engineering

Let's try with Text-to-Image

- https://magicstudio.com/ai-art-generator/
- https://dezgo.com/txt2img

[Missing a copyrighted image of image prompt: Cat in a space suit]

1. In groups: Agree on a prompt and generate an image
2. What are you going to do with the image – will you alter it? If so how?
3. Treat this as a creative group exercise
4. Use the AI Agency-Creativity Framework to help reflect on the creativity of the process and the output

Let's try with Text-to-Audio

✖ https://elevenlabs.io/safety

[Missing a copyrighted image of a image prompt: Picture of a Black Cat singing into a microphone]

1. **In groups: Agree on a prompt and generate audio**
2. **What are you going to do with the audio – will you alter it? If so how?**
3. **Treat this as a creative group exercise**
4. **Use the AI Agency-Creativity Framework to help reflect on the creativity of the process and the output**

✖

AI Artists

Natural Language Processing (NLP) in Creative Writing – regenerating Kalevala

https://www.hs.fi/kulttuuri/art-2000006016823.html

AI Generated Fashion and Design - https://gianlucatraina.com/

[Missing copyrighted images
from
https://gianlucatraina.com/]

Sougwen Chung https://sougwen.com/artworks

[Missing a copyrighted image]
See https://sougwen.com/projects

DeepDive Groups 20 mins → Share with class

- Explore Sougwen Chung's Project in your group https://sougwen.com/projects
- Answer the following questions:
- How does Sougwen Chung incorporate technology, in particular AI, into her artistic practice? What are the benefits and challenges of collaborating with AI?
- How does her interdisciplinary approach contribute to the richness and complexity of her artworks?
- Thinking about identity and perception in art, how does Sougwen Chung challenge the notion of agency in her art?

Refik Anadol https://refikanadol.com

- What data was used to create Sense of Healing AI data Sculpture?
- What instruments / technologies were used to make the art?
- What is the objective of the art?
- Did the artist achieve their objective?
- What feelings does the art conjure in you?

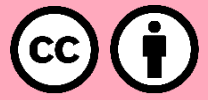
[Missing a copyrighted image from https://refikanadol.com/works/sense-of-healing-ai-data-sculpture/]

Refik Anadol
Quantum Memories

- What data was used to create Quantum Memories?
- What instruments / technologies were used to make the art?
- How does data as an artistic medium influence the artistic aesthetics?
- What is the objective of the art?
- Did the artist achieve their objective?
- What emotions does Refik Anadol's art conjure in you?

[Missing a copyrighted image from https://refikanadol.com/works/quantummemories/]

Activity: What are the arguments and counter-arguments of using Generative AI in Creative Practice?



Introduction to AI in Creative Practice

Majella Clarke

Week #4 2024

Lesson Plan
16:30 – 18:00

Time	Content
16:30 – 16:35	About the assignments and preparation for week 5
16:35 – 17:00	Case Study: Cat Royale (Continued)
17:00 – 18:00	AI and Copyright Guest Speaker ED Jaana Pihkala LL.M from Copyright Information and Anti-piracy Center (CIAPC, TTVK)

Intro to AI in Creative Practice: Objectives and Structure

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AI in Design: Blast Theory's Cat Royale

- As a group, go through the online pages of Cat Royale, and answer the following questions:
- How is AI used in the design installation?
- What is the artistic objective of the installation?
- What are the controversies provocated from the design installation?
- Would you let an AI robot look after your pet?

[Missing a copyrighted image from https://www.blasttheory.co.uk/crgallery]

Copyright Issues Related to AI

- Deep fakes using artist's voice / face / body ... and especially brand?
  - Not really a copyright issue, but "unauthorized copying of a person's individuality that can result in deep fakes, voice clones and non-consensual impersonations"
  - An ethical as much as legal question, involves high risks
  - Significant issue in music and movie industry
- Copyright issues related to:
  - 1. the input phase (training of AI)
  - 2. the output phase (AI generated result)

EU's AI Act

- AI Act's preambles 105-109 refer to copyrights. Some very important guidance:
- Training and development of generative AI models require access to content. "Any use of copyright protected content requires the authorisation of the rightsholder concerned unless relevant copyright exceptions and limitations apply."
- Text and data mining (TDM) is a new copyright limitation introduced in the DSM directive. It allows the reproduction (= copying) and extraction of the works under certain conditions.
  - Are these conditions met in AI model's training situation? Generative AI?
- Where the rights to opt out has been expressly reserved in an appropriate manner, providers of general-purpose AI models need to obtain an authorisation from rightsholders if they want to carry out text and data mining over such works.
- Providers of models have to draw up and make publicly available a sufficiently detailed summary of the content used for training the general-purpose AI model.
- AI Act doesn't affect the enforcement of copyright rules(!)

Introduction to AI in Creative Practice

Majella Clarke

Week #5 2024

Lesson Plan
16:30 – 18:00

Time	Content
16:30 – 16:35	About the assignments
16:35 – 17:00	Neural Audio Synthesis RAVE Models Computer Vision – Gesture Audio Synthesis
17:00 – 18:00	Guest Artist: Dr Ellen Pearlman AI Brainwave Opera Language is Leaving Me

Intro to AI in Creative Practice: Objectives and Structure

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Neural Audio Synthesis

- Demonstration of realtime embedded RAVE models on different platforms:

Research paper: "RAVE: A variational autoencoder for fast and high-quality neural audio synthesis" by Antoine Caillon and Philippe Esling - https://arxiv.org/abs/2111.05011

- Raspberry Pi 4 8GB
- Nvidia Jetson Nano 4GB

- With RAVE + nn~ you can embed realtime neural audio synthesis inside single board computers !

https://www.youtube.com/watch?v=jAIRf4nGgYI

- RAVE project: https://github.com/acids-ircam/RAVE
- nn_tilde: https://github.com/acids-ircam/nn_tilde

Language is Leaving Me by Dr Ellen Pearlman

[Missing copyrighted images of *Language Is Leaving Me: An AI Cinematic Opera of The Skin*]

Source: Pearlman, E. (2024). Language Is Leaving Me: An AI Cinematic Opera of The Skin. In *Trauma Informed Placemaking* (pp. 120-130). Routledge.

Introduction to AI in Creative Practice

Majella Clarke

Week #6 2024

Lesson Plan
16:30 – 18:00

Time	Content
16:30 – 16:35	About the assignments
16:35 – 16:45	Discussion: Language is Leaving Me by Ellen Pearlman
16:45 – 17:05	Humans vs Machines in Creativity
17:05 – 17:15	Uncanny Valley
17:15 – 17:30	Case Study: Lumen Prize 2024 – Decoding Bias
17:30 – 17:50	Discussion
17:50 – 18:00	Course Feedback Survey

Intro to AI in Creative Practice: Objectives and Structure

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Recap

[Missing a copyrighted image from https://refikanadol.com/works/sense-of-healing-ai-data-sculpture/]

[Missing a copyrighted image from https://sougwen.com/projects]

[Missing a copyrighted image from https://www.blasttheory.co.uk/crgallery]

[Missing a copyrighted image from https://refikanadol.com/works/quantummemories/]

[Missing a copyrighted image from https://gianlucatraina.com/]

Discussion: Language is Leaving Me by Ellen Pearlman

[Missing copyrighted images of *Language Is Leaving Me: An AI Cinematic Opera of The Skin*]

Discussion

What did you learn in last week's session?

How did you feel about the media piece *Language is Leaving Me*?

What important issues does the AI media art raise?

What is Creativity?

Humans vs. Machines in Creative Thinking


scientific reports

OPEN Best humans still outperform artificial intelligence in a creative divergent thinking task

Mika Koivisto & Simone Grassini

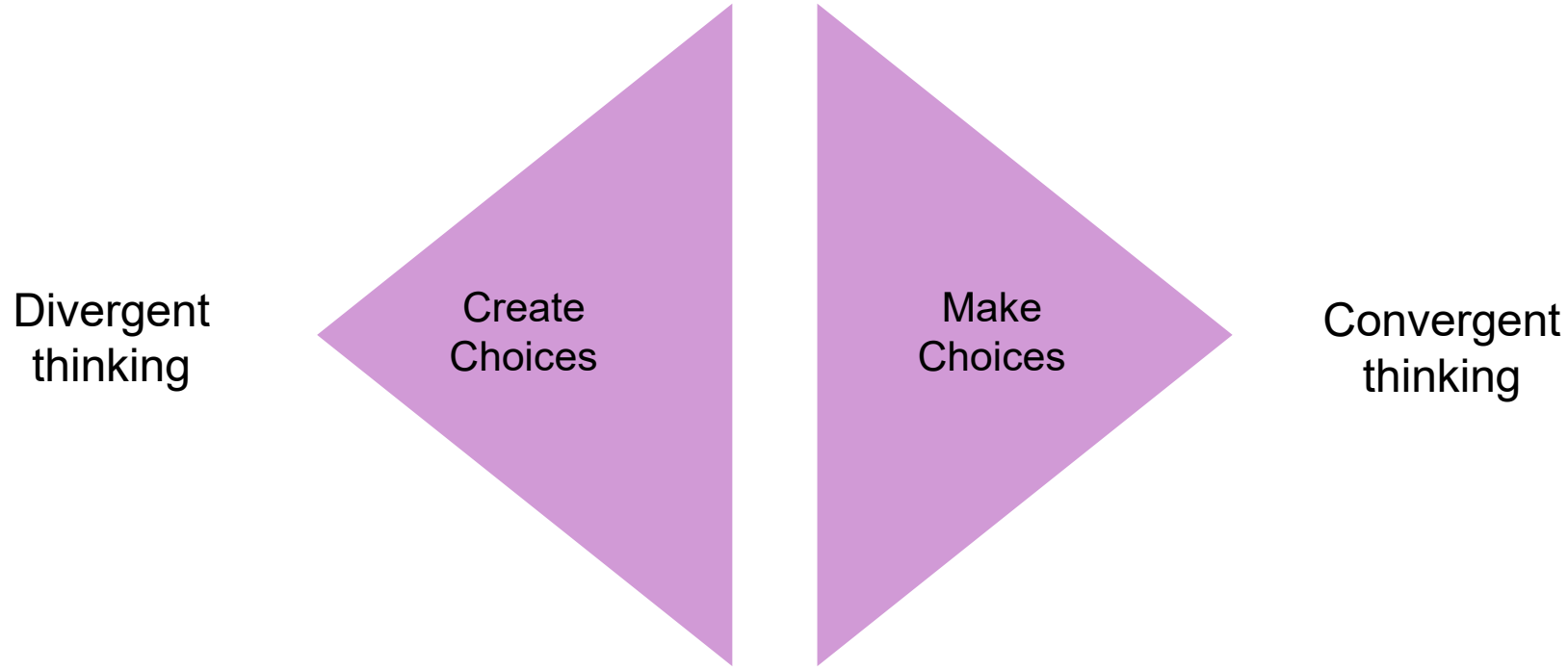
Creativity has traditionally been considered an ability exclusive to human beings. However, the rapid development of artificial intelligence (AI) has resulted in generative AI chatbots that can produce high-quality artworks, raising questions about the differences between human and machine creativity. In this study, we compared the creativity of humans (n = 256) with that of three current AI chatbots using the alternate uses task (AUT), which is the most used divergent thinking task. Participants were asked to generate uncommon and creative uses for everyday objects. On average, the AI chatbots outperformed human participants. While human responses included poor-quality ideas, the chatbots generally produced more creative responses. However, the best human ideas still matched or exceed those of the chatbots. While this study highlights the potential of AI as a tool to enhance creativity, it also underscores the unique and complex nature of human creativity that may be difficult to fully replicate or surpass with AI technology. The study provides insights into the relationship between human and machine creativity, which is related to important questions about the future of creative work in the age of AI.

Key Takeaways:

- **On average, the AI chatbots outperformed human participants. While human responses included poor-quality ideas, the chatbots generally produced more creative responses. However, the best human ideas still matched or exceed those of the chatbots.**
- **Convergent thinking refers to the ability to determine the single best or correct answer to a problem, whereas divergent thinking involves generating many different ideas or solutions.**
- **The study assigned Alternate Uses Task (AUT) to test and measure divergent thinking comparing humans with AI chatbots.**
- **Although AI chatbots on average outperform humans, the best humans can still compete with them.**

Koivisto, M., & Grassini, S. (2023). Best humans still outperform artificial intelligence in a creative divergent thinking task. *Scientific reports*, *13*(1), 13601.

Divergent vs Convergent Thinking



Group Activity:

- As a group – how many uses can you find for this cardboard box?
- After you have brainstormed, go to

https://talkai.info and ask the same from the AI Chatbot

1. Are any of the answers the same or similar?
2. Who is more creative in their answers and why?

The Uncanny Valley – when AI gets it mixed up

- What do you notice about this Instagram post?
- How does it make you feel?

https://www.theguardian.com/culture/2024/mar/06/queensland-symphony-orchestra-ai-facebook-ad-criticism

Uncanny Valley

- **Uncanny Valley is the unsettling feeling people get when encountering artificial entities that appear almost, but not quite, human-like.**

[Missing a copyrighted Figure 1 of Uncanny Valley article]

Source: Mori, M., MacDorman, K. F., & Kageki, N. (2012). The uncanny valley [from the field]. *IEEE Robotics & automation magazine*, *19*(2), 98-100.

Uncanny Valley (continues)

[Missing a copyrighted Figure 2 of Uncanny Valley article]

Source: Mori, M., MacDorman, K. F., & Kageki, N. (2012). The uncanny valley [from the field]. *IEEE Robotics & automation magazine*, *19*(2), 98-100.

QUESTIONS

Why are we equipped as humans with this eerie sensation?

Is the uncanny feeling essential for human beings?

Lumen Prize – Theresa Reiwer
DECODING BIAS
https://www.lumenprize.com

- Eight artificial intelligences (AIs) invite you to visit their self-held group therapy.
- To point out that technology is not value-neutral, but reflects its creators and society, the AIs are visualized as hyper-realistic, anthropomorphic avatars with profoundly human features.

QUESTIONS:

- What are the AI technologies used in the Art Media piece?
- How “human” is this art?

[Missing a copyrighted image of Reiwer]
https://www.lumenprize.com/2024-lumen-prize-winners/theresa-reiwer

Discussion Questions

- How does Generative AI challenge traditional processes of creativity and artistic output?
- Are machines capable of true creativity, or are they simply mimicking existing patterns and styles?
- What can be said about aesthetics and generative AI?
- How “humane” is AI?
- Do you think humans can make AI more “humane”? How?

Reflection: what does it mean to loose agency in the creative process to artificial intelligence? How much agency are you willing to trade off using AI in your creative practice?

AI Agency-Creativity Framework

By Majella Clarke (2025)