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## ARTICLE

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# Metaphysics of The Machines: From Human-Robot-Robot Interaction to AI Philosophers Abstraction

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## Abstract

In this paper, we introduce the artwork «Syntropic Counterpoints: Metaphysics of The Machines» which is part of the ongoing art-based research project «Syntropic Counterpoints». We aim to investigate the potentials of using artificial intelligence as an interdisciplinary creative medium. Moreover, to raise fundamental questions related to the artificial agents' role in raising human-AI society throughout the continuous period of reaching its emancipation. We are proposing the conceptual approach and methods in creating the audio-visual AI automated content through philosophical discussions between the four AI philosopher clones of Aristotle, Nietzsche, Machiavelli, and Sun Tzu. Special attention is given to the hybrid usage of technologies that led us toward transforming artificial intelligence into a co-existing artistic entity and novel creative framework for art and design practitioners. Therefore, we discuss some of the crucial questions

related to our research and further directions in exploring AI abstraction in the context of robot creativity and its potential future forms. Our approach toward the liberation of machine creativity is through the use of words and grammar as a creative tool humans developed to express worlds «beyond» the world. The interaction between the audience and the installation is antagonistic as the process of further AI emancipation seems inevitable.

### Keywords

human-robot-robot interaction, robot creativity, AI aesthetic, creative medium, AI abstraction, machine-made content

## *La metafísica de las máquinas: de la interacción humano-robot-robot a la capacidad de abstracción filosófica de la inteligencia artificial*

### Resumen

En este artículo presentamos la obra de arte «Syntropic Counterpoints: Metaphysics of The Machines» (Contrapuntos sintrópicos: la metafísica de las máquinas), que forma parte del proyecto de investigación artístico que está en marcha. Nuestro objetivo es investigar las posibilidades de usar la inteligencia artificial como medio creativo interdisciplinario; además de plantear cuestiones básicas relacionadas con el papel de los agentes artificiales en la educación de la sociedad con inteligencia artificial centrada en el ser humano durante todo el periodo hasta llegar a la emancipación de la inteligencia artificial. Proponemos el planteamiento conceptual y los métodos para crear el contenido automatizado de la capacidad audiovisual de la inteligencia artificial a través de discursos filosóficos entre los cuatro clones de los filósofos Aristóteles, Nietzsche, Maquiavelo y Sun Tzu de la inteligencia artificial. Prestamos especial atención al uso híbrido de tecnologías que nos han llevado a transformar la inteligencia artificial en una entidad artística coexistente y a un marco creativo novedoso para los y las profesionales del arte y el diseño. Por ende, exponemos algunas de las preguntas clave relacionadas con nuestra investigación y otras indicaciones en la exploración de la capacidad de abstracción de la inteligencia artificial en el contexto de la creatividad de los robots y de sus posibles futuras formas. Nuestro método para abordar la liberación de la creatividad de las máquinas es mediante el uso de palabras y gramática como herramienta creativa que los seres humanos desarrollaron para expresar mundos «más allá» del mundo. La interacción entre el público y la instalación es antagónica, ya que el proceso de la futura emancipación de la inteligencia artificial es inevitable.

### Palabras clave

interacción humano-robot-robot, capacidad creativa de los robots, capacidad estética de la inteligencia artificial, medio creativo, capacidad de abstracción de la inteligencia artificial, contenidos creados por la máquina

## 1. Introduction

Creativity and the act of creating art are some of the greatest challenges for the new generation for artificial intelligence models. To explore further potentials of AI creative capabilities, we are exposing philosopher AI clones to debate and creating authentic automated AI content through novel Human-Robot-Robot interaction. Through the project, we aim to raise some of the fundamental questions related to the possible impact of artificial intelligence in future human-AI society. Metaphysics is supposed to deal with knowledge at the highest level of abstraction, universal rather than particular. This is reflected in the philosophical corpus of knowledge we are using to train our four AI philosopher clones Aristotle, Nietzsche, Machiavelli and Sun Tzu. The relevant question would be, can humans explain certain univer-

sal ideas and principles of humanity that we are expecting artificial intelligence to interpret, follow and use to make decisions? If not or with uncertainty, then how can we expect machines to understand these concepts?

In the artwork «Syntropic Counterpoints: Metaphysics of The Machines», we explore the phenomena of AI aesthetic and challenge machine abstraction. Our approach toward the liberation of machine creativity is through the use of words and grammar as a creative tool humans developed to express worlds «beyond» the world [1], existing and non-existing realities. We are led by Nietzsche's claim that grammar is the «Metaphysics of the People». The audio-visual content generated between our AI clones and their grammar is «Metaphysics of Machines», through which we can experience their realities and start to question our own. We are questioning those realities by

exposing human knowledge, written by some of the most notable thinkers and philosophers of all time, to a machine interpretation and assembling the results into the novel corpus of artificially created sentences, expressions and questions. The act of listening robots philosophising on some of the eternal questions for humanity such as a moral, ethics, being and nothing we found as the genuine experience itself and source of the robot's creative inputs are worth analysing from different perspectives. Our goal is to explore new opportunities to use artificial intelligence as a creative medium based on transcreation rather than machine support to human creativity [2]. Challenging robot creativity with a different artistic vocabulary and an adequate final artefact evaluation is crucial for developing such models and AI-based novel creative practices.

In this article, we will introduce the project Syntropic Counterpoints and its associated artworks. We will then describe in more details the conceptual approach, the process, and used technology to create the artwork. Lastly, we will present outcomes from the different installation development phases and provide the project's future directions.

## 2. Background

«Syntropic Counterpoints» is an ongoing art-science research project. Within the project three artworks have been created until now; «Robosophy Philosophy», «Botorikko Machine Created State» and lastly «Metaphysics of The Machines». Essentially, the research aims are to explore potentials in using artificial intelligence as a creative medium. Simultaneously, to question the trust and mutual understanding between humans and machines as artificial intelligence is quickly expanding into our lives as the substantial entity of interactions, becoming pervasive and more autonomous.

We can track the idea of using machines and computers in art back to 1968 when the Institute of Contemporary art organised an electronic and algorithmic art exhibition called Cybernetic Serendipity [3]. Recent developments in artificial intelligence opened new frontiers for the artist to challenge technology and social dilemmas raised around the AI evolving process. Creativity in robotics is widely analysed through a robot performing behaviours that typically require human creativity [4]. For example, Sougwen Chung's AI robot was made to assist her in painting, and Schubert's & Mombaur's [5] AI model enables a robot to imitate creative paintings. Gopinath & Weinberg [6] developed the robot drummer by using selected natural and expressive drum strokes similar to a human drummer. However, our approach favours authors proposing autonomy as a new requirement for creative robots, such as Bird & Stokes [7] or Philip Galanter's in his autonomous intelligent light and sound sculptures titled Xepa [8].

Furthermore, we are focused on new media art paradigms such as behaviour aesthetics produced by robotics agents such as in The

Morphosis project [9]. Besides the technology-based advances applied in novel creative practices, artificial intelligence has a significant cultural and social impact, which invites artists to comment and raises dilemmas about coming technological singularity and hybrid human-AI society. In Memo Akten's artwork, «Learning to See: Hello, World!», a deep neural network opens its eyes and tries to understand what it sees. Theresa Reimann-Dubbers artwork, A(I.) Messianic Window, addresses AI's oversimplification of complex human concepts such as artificial intelligence interpretation of the term Messiah. The context of A(I.) Messianic Window comments on the current trend of applying humanistic, cultural and non-universally defined concepts to artificial intelligence. Marco Donnarumma and Ana Rajcevic's installation Amygdala explores the essence of humans' expectations and anxieties over artificial intelligence (AI) and robotics. The artwork «More Human Than Human» explores the rise of artificial intelligence (AI) and its effects on our lives. Filmmaker Tommy Pallotta designed the robot that can replace him as a filmmaker. He made a robot that can think autonomously and test whether it could direct and interview him. On the fundamental level, «More Human Than Human» instigates the debate between futurists and sceptics about the potential of Artificial Intelligence [10].

In the project «Syntropic Counterpoints» we are creating AI philosopher clones and training them to confront discussions related to some of the philosophical questions that address fundamental ideas and beliefs. Therefore, it requires complex thinking rather than coming up only with facts and empirical data. In our conceptual approach, we are challenging the limitations and exploring the creative potentials of artificial intelligence. We expose AI philosophers' clones to questions essential to understanding humanity, such as morals, war, ethics, religion, good, evil, being, art, and empowering them to discuss that between each other [11].

The first artwork created within the project Syntropic Counterpoints was «Robosophy Philosophy» in 2017. This project consisted of a philosophical debate between the AI philosopher clones of Aristotle and Nietzsche. The intention was to question ongoing cultural and social changes as a result of interactions between people and artificial intelligence [11]. The installation appears to be an epic discussion between Aristotle's Ethical Robot and Nietzsche's Overman Robot, Figure 1.



Figure 1. The artwork «Robosophy Philosophy» presents the epic discussion between Aristotle's Ethical Robot and Nietzsche's Overman Robot. The audience can follow the conversation between the clones but cannot interfere, questioning the eternal relationship between humans and machines.

The second artwork created within the project «Syntropic Counterpoints» was «Botorikko, Machine Created State». The installation was conceptualised as the philosophical discussion between Machiavelli and Sun Tzu AI clones, and their interpretations of the chosen philosophers' standpoints about good, evil, politics, diplomacy, strategy and war [12]. Visitors could interact with the installation by pedalling bicycles which would automatically start absurd «mechanical» sword fight between Machiavelli and Sun Tzu manikins, Figure 2.



Figure 2. In the interactive installation «Botorikko, Machine Created State», the interaction between the audience and the robots are irrelevant and do not affects the process. Interaction is solely happening between two philosophers' AI clones.

### 3. Metaphysics of The Machines

The interactive installation «Syntropic Counterpoints: Metaphysics of The Machines» is inspired by Nietzsche's claim that grammar is the «Metaphysics of the People» [13]. It relates to his critique of metaphysics and the fact that humans prioritise linguistic constructions over sensory experience, allowing us to raise new realities over physical realities [14]. The artificial (debate) reality we are offering in the installation «Metaphysics of The Machines» is created by the robots, based on their understanding of language, grammar, letters and words. We confronted four AI Philosophers Clones; Aristotle, Nietzsche, Sun Tzu and Machiavelli, in the philosophical debate initialised with some of the fundamental philosophical questions such as «Why is there something rather than nothing?», «Is war moral and ethical, and can it ever be justifiable?» or «What is good and what is evil?». The rest of the debate is entirely in the hands of the clone philosophers. They create answers and questions based on the generated content and tackle other topics of eternal importance for humanity based on the corpus of knowledge we used to train them. Finally, it created a world of words and symbols mixed together by robots, an authentic creation made by machines. They use their patterns and given creative vocabulary made of words, grammar and letters to offer an alternative yonderworld - world «beyond» the world [15]. The world made of calculations, algorithms, predictions, probabilities and machine-made choices that we expect to sort our life mysteries and make decisions for us. With the interactive installation «Me-taphysics of The Machines», we are commenting on such an attitude through irony and skepticism and questioning the human capacity to understand creations beyond logic and pragmatism, worlds beyond human perception.

In the following chapters, we describe our design approach in creating AI multi-agents content generation, AI visualisation of the created content and interaction between visitors and projected machine-made philosophical debate.

### 4. Multi-Agent Dialogue Generation

A multi-agent dialogue system [16,17] deals with generating dialogues between two or more agents, and the agents could be a user or an AI system. Every agent has its knowledge domain and adopts a neural language generator to produce a plausible response conditioned on the input query. Existing neural language generators [18-20] are generally trained on extensive datasets to learn the correct grammar for generated text automatically. Accordingly, it makes it hard to transfer a pre-trained language generator to a specific knowledge domain. As we were creating historical clones with limited data, dealing with the few-shot generation problem, becomes essential. We adopt a most recent GAN-based architecture with retriever as a discriminator [21] to constrain the knowledge space within the books used for training. We adopt a shared seq2seq [22] language generator for the four robots, while we use ten books to train four different retrievers. The books such as: Aristotle's *Metaphysics*, Nietzsche's *The Birth of Tragedy*, Sun Tzu's *The Art of War* and Machiavelli's *The Prince*.

The retriever contains a query encoder ( $\cdot$ ), a document encoder ( $\cdot$ ) and a probabilistic retriever. The document encoder is a pre-trained BERT encoder that transforms the book into a knowledge space ( $z$ ) with dense representations. For each input query  $x$  (i.e. the speech made by another robot), the query encoder encodes it into a latent representation  $q(x)$ ; then we adopt Maximum Inner Product Search to find the top-K relevant document chunks that could better answer the given question, i.e.

$$p_i(z|x) \propto \exp(d(z, q(x))), i \in [1, k]$$

The retrieved component  $p_i(z|x)$  is then marginalised to a probability distribution over a pre-trained seq2seq vocabulary with the generator component:

$$p_{\text{RAG-Sequence}}(y|x) = \sum_{z \in \text{top-}k(p(\cdot|x))} p_{\eta}(z|x) \prod_i^N p_{\theta}(y_i|x, z, y_{1:i-1}).$$

The generator component ( $y_{ii} | x, z, y_{1:i-1}$ ) is also a latent code generated with any encoder-decoder. Unlike original RAG [21] which use a pre-trained BART on QA tasks as the generator, we finetune a pre-trained GPT2 model on each book separately and use it as the generator. Based on the RAG [21] architecture, we formulate the communication process between our four robots as a retrieval-based generation process.

In our first experiment, we start from an initialised topic randomly generated from a topics pool. At each round, we picked a robot who has the most confidence to give the answer and continue the debate (we use the MIPS score as the confidence measure, i.e. 74.7 for selected response in Figure 4). Based on the selected response's dialogue, other robots retrieved relative keywords from their knowledge base. We then repeat the MIPS selection process to choose the next response to continue. We adopt fine-tuned GPT2 models on the responder's knowledge base to combine those keywords into a well-formed response and constraint the maximum length of the generation to 200 words. The model can produce «end\_of\_sequence» token during the generation, the response could be shorter than 200 words.

In our second experiment, to make the machine-made philosophical debate more authentic and creatively demanding for robots, we trained the clones to develop their questions and place it for other AI clones' participants in the discussion to answer it. To achieve that, we connect another seq2seq transformer to transform the generated text to meaningful questions such as Machiavelli: «What was the most difficult task in open war?», Sun Tzu: «What does haven mean?», Aristotle: «What is the nature of a virtuous friend?», Figure3.

```
[0001 - MACHIAVELLI] 73.896690
||
|| TEXT: tactical logistics, such as landing and handling of large quantities of supplies, can make for a much more
|| difficult task in open war, because the enemy would naturally upon finding out where he was and when he did find out who
|| had conquered he would have no means of keeping to him, and so much the more difficulty in taking possession, he was
|| forced to make use of every art. In the winter of Alexander the Sixth, during the battle of Ravenna, he had the opportunity
|| of displaying his most vallant qualities, when he overwhelmed the enemy with numbers but when in the winter of He was
|| again forced to rely more upon his shield, owing to the many who had been killed in the first onset, than on his own forces,
|| owing to the many who had not been engaged in the field by the time the onset of the winter came. What was the most
|| difficult task in open war? SunTzu.
|| QUESTION: What was the most difficult task in open war?
|| [0002 - SUNTZU] 73.896690
|| TEXT: landing and irrsolute when the crisis is at hand'. HEAVEN signifies night and day, cold and heat, times and
|| seasons. The commentator, I think, make an unnecessary mystery of two words here. Men His refers to "the hard and the soft,
|| waking and waning" of Heaven. Sang Si, however, may be right in saying that what is meant is "the general economy of
|| Heaven" including the ve elements, the four seasons, wind and clouds, and other phenomena. EARTH comprise distances,
|| great and small; danger and security; open ground and narrow passes; the chances of life and death. The COMMANDER
|| stands for the virtues of wisdom, sincerely, benevolence, courage and strictness. What does HEAVEN mean? Aristotle.
|| QUESTION: What does HEAVEN mean?
|| [0003 - ARISTOTLE] 73.896690
|| TEXT: night and day, and in general the end and the purpose of each activity. Of we look deeper into the nature of
|| things, a virtuous friend seems be naturally desirable for a virtuous man. For that which is good nature and which we all aim
|| at is good for the virtuous man, and this is shown by the activities that accompany it; for we do many noble and good deeds,
|| and among these we do many great and noble deeds. What is the nature of a virtuous friend? Machiavelli.
|| QUESTION: What is the nature of a virtuous friend?
```

Figure 3. The machine-made debate generated with only AI clones created questions.

Each robot can decide whether to post a question to another robot at the end of each dialogue. The neural network is selecting the philosopher clone with the highest competence to answer the question based on analysis and scored predictions, Figure4.



Figure 4. We used the above model to generate AI automated philosophical debate between the clones.

In our third experiment, we intended to amplify the complexity and quality of machine-made philosophical debate, so instead of triggering randomly we initialised discussions with some of the eternal but still open philosophical questions such as: «Do we make war that we may live in peace?», «Why is there something rather than nothing?», «Where is the line between art and not art?», «What is the best moral system?». The criteria used to select those questions were relevant to the corpus of knowledge written by the philosophers we cloned. For example:

- The question: Why is there something rather than nothing?
- The part of the Aristotle Clone answer: Forms and the objects of mathematics are substances.
- The more extensive results, Figure 5.

```
[Init topic] Why is there something rather than nothing?
[0000 - ARISTOTLE] 77.908958
|| KEYS: something
|| TEXT: something, that is, and continuous, that into which a thing is divided and which is present in it as
|| matter, a and b are the elements of the syllable. Took the must reckon up the results arising from what has been
|| said, and compute the sum of them, input the finishing touch to our inquiry. He have said that the causes, principles,
|| and elements substances are the object of our search. And some substances are recognized by every one,
|| outcome have been advocated by particular schools. Those generally recognized are the natural substances, fire,
|| earth, water, air, &c., the simple bodies; second plants and their parts, and animals and the parts of animals; and
|| finally the physical universe and its parts; while some particular schools say that Forms and the objects of
|| mathematics are substances. But there are arguments which lead to the conclusion that there are other substances,
|| the essence and the substratum. What are the causes, principles, and elements of the search? Nietzsche.
|| QUESTION: What are the causes, principles, and elements of the search? Nietzsche.
[0001 - NIETZSCHE] 77.908958
|| KEYS: principles
|| TEXT: principles of Indian morality. The third edit, for example Avadana Gastro I, 'on impure vegetables',
|| decrees that the only foods the Chandala are allowed to have are garlic and onions, since the holy scripture says
|| thatched cannot be given grain, or fruits with grains, or water or fire. Sesame edit proclaim that they cannot get their
|| water from rivers or wells ponds, but only from the entrances to swamps or from pits formed animal footprints. They
|| are also forbidden from washing their laundry or even washing themselves, since any water that is conceded to
|| them san act of special mercy can only be used to quench thirst. What is the san act of special mercy? Aristotle.
|| QUESTION: What is the san act of special mercy? Aristotle.
[0002 - ARISTOTLE] 77.908958
|| KEYS: actor
|| TEXT: what is the san act? Is it not strange that the man who is to be scrutineer is also a rhetorician? Of
|| not, we shall have Priam v. Socrates; what sort of person is he? It is strange, that should speak neither about himself
|| nor about another, but about things that are terrible and terrible to him. And how larrible is the terrible to him? By the
|| agency of suffering. For it is a kind of cure, and it is to that that the sophism contributes the badness the state. That
|| sort of entity is responsible for the making of the sophism? What sort of entity is responsible for the making of the
|| sophism? Nietzsche.
|| QUESTION: What sort of entity is responsible for the making of the sophism? Nietzsche.
[0003 - NIETZSCHE] 77.908958
|| KEYS: actor
|| TEXT: actor, he put himself squarely in the middle of it; he did not despair, and he took such as he could on
|| himself, to himself, in himself. That he wanted wastotally; he fought against the separation of reason, sensibility,
|| feeling, wilpreached in the most forbidding scholastic way by Want. Soothe antipodes, he disciplined himself to
|| whiteness, he created himself. In the middle of an age inclined to reality. Soothe was a convinced realise: said yes to
|| everything related to him, his greatest experience was of threatens realissimum that went by the name of Napoleon.
|| Who was the greatest realist? Machiavelli.
```

Figure 5. The machine-made debate initialised with the open question, «Why is something better than nothing».

Additionally, we experimented with the number of keywords we should use to increase relevance, variety and complexity of the AI-generated questions and retrieved answers. For example:

- The question: Is war moral and ethical, and can it ever be justifiable?
- Partly the AI Aristotle Clone answer: Only the man who is capable of deliberating and being persuaded argument is ethical.
- The more extensive results with multiple keywords, Figure6.

## 5. Visualising Robot-Robot Interactions

Besides generating the textual content, we dedicated special attention to the visualisation of the philosopher clones' debate. As the main

```
[Init topic] Is war moral and ethical, and can it ever be justifiable?

[0000 - ARISTOTLE] 78.676064
|| KEYS: moral and ethical morality morally ethically
|| TEXT: moral and ethical morality morally ethical constituted. All these considerations appear to show that there is no one species of moral character. Only the man who is capable of deliberating and being persuaded argument is ethical; for this does not admit of more than one kind of moral character. But it may be said that those who are able to give an account of their states character are all able to give an account of their character. His is indicated also by the fact that no one deliberate about things that are invariable, except those which are absolutely. Now if every one deliberate about the things that are always in our power and always, and if there is one who does this well, he must be capable of deliberating about these either the same time or in the same way, but it is not possible to have deliberate about things that are variable. How you understand morality? Nietzsche.
|| QUESTION: How you understand morality? Nietzsche.

[0001 - NIETZSCHE] 79.840843
|| KEYS: nietzsche
|| TEXT: : nietzsche contra Manner: From the Miles of a PsychologistGlossary ofnamesIndexIntroductionIn During, on January, Nietzsche suffered an irrevocable mentalcollapse. By the time of his death, in, he had become wholly phasecall incapacitated as well. It seems probable that the cause was syphilis. It is apparently common for syphilitic to experience a period of uplifts, a remarkable sense of well being, in the months preceding the final collapse. Certainly this was so in Nietzsche's case. In the year before his breakdown his letters are increasingly touched with euphoria. What is the cause of syphilis? Machiavelli.
|| QUESTION: What is the cause of syphilis? Machiavelli.

[0002 - MACHIAVELLI] 74.452042
|| KEYS: blackness causes or exacerbates it
|| TEXT: slackness causes or exacerbates it, not by the cause but by the change in the conditions under which he is being sought. It is called either a natural or an extraordinary kind of fortune, because men with extraordinary valour are wont to say that it is the fortune of them that bring the glory, not the methods of achieving it. In the first case this is true, but because it is an extraordinary kind of fortune for a prince who has acquired a new state, unless by some extraordinary and excessive force and with a great and prolonged success, which it may be expected that he will attain with ease any other state which the sea has thrown into his lap. In the second case his foundations are not so good, and he has not prepared anything for the expedition which will bring him success or security. And it is necessary to be prepared with such arms, so that, having crushed your family and friends, you will not be able to withstand the attacks of those who will rise against you. Why is it called an extraordinary kind of fortune for a prince who has acquired a new? Aristotle.
|| QUESTION: Why is it called an extraordinary kind of fortune for a prince who has acquired a new? Aristotle.

[0003 - ARISTOTLE] 77.477921
|| KEYS: inherited fortune wealth
|| TEXT: inherited fortune wealth, and, further, the advantage of the state to the citizens. A city is not by nature free, either in respect of war or of peace, but in respect of good birth and virtue; and these are generally reckoned in the same ratio to their citizens. Therefore they are not happy, for there is no city which would be happy/free from faction, or, if conquered, would be insolent. For does a state exist forth sake of exchange or of exchange; whereas a stateought to be a community of freemen, and either the citizens cannot exist in the same place, or they must be separated from one another, and either they cannot come to the same place at the same time, or they must be separated from one another, and either they cannot possess equals of both, or they cannot equals of one another. I have already explained why there retro kinds of constitution—democracy and oligarchy. What is the ratio of a city to its citizens? Machiavelli.
```

Figure 6. The machine-made debate generated with multiple keywords and initialised with the open question «Is war moral and ethical and can it ever be justifiable?»

creative force, designed AI model is in complete control of conducting the discussion and visualising it into interactive video projection. Our focus is on words, how AI clones are putting them together, and vocal organs humans are using to formulate their thoughts and transfer them into speech. As such, we are projecting mouth and facial gestures caused by the pronunciation of words rather than whole AI-generated pictures of the philosopher. Moreover, we intend to make the distinction between real philosophers and their artificial replica. Letters are creative tools as every letter corresponds to one or more sounds and forms the words and expressions capable of triggering human emotions and thoughts. Thus, we designed letters from the English-language alphabet to be used by the AI during its process of the visualisation, Figure 7.

We visualise the machine-made debate between the four AI philosophers' clones in the form of lip movement synchronised to

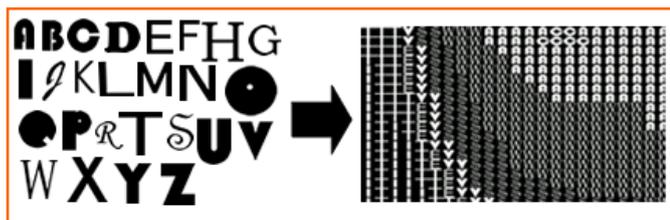


Figure 7. We challenged the AI on multiple levels, including the letters we design specially to be put in its control and be treated creative tool.

their voice and content they are discussing. We leverage off-the-shelf AI and image processing techniques to achieve this goal, including lip-syncing [23], facial analysis [24] and image stylisation.

In music and film industries, lip-syncing is the technology that matches the speakers' lip movement with vocals [25] [26]. Earlier works [27] mainly focus on automatic facial animation; they adopt a neural network to learn a mapping from an audio signal to controllers to a face mesh's vertex positions. With the rise of GAN-based image generations, researchers also explore directly syncing the video/image content to a given audio sequence by mapping the audio signal (i.e. Mel-frequency cepstrum) to lip landmarks [28,29], then uses a GAN-based generator to generate images conditioned on the moved lip landmarks. Though it performs well on the training identity, such networks often failed to generalise to new identities and voices. We based our approach on most recent works on speaker-independent lip-syncing [23, 27, 30]. Those networks are trained on in-the-wild videos with the massive variety of faces and voices, and they train a discriminator in conjunction with the generator to discriminate in-sync/out-of-sync video-audio pairs. To clarify, we adopt a well-trained AI lip-sync expert for the robots to turn their conversions to moving lips.

The lip-sync expert contains two encoders: face encoder and audio encoder. We first identify face regions with a real-time face detector and concat the detected face region with a lower-half masked version to allow for dynamic lip movement (then concatenated face in Figure 4). Then we adopt face encoder to extract face features from the concatenated image. For audio signal, we analyse Mel spectrogram for the original speech sequence and then adopt an audio encoder to extract audio features from the Mel spectrogram. A lip-syncing module [25] is then adopted to generate the final image.

Furthermore, we transfer the grey value in the lip-synced image to an alphabet block in a generated set of blocks (upper right in Figure 4). Each element in the block is summarised from the context of the audio. We assign a unique index to each block in the alphabets and according to the block's brightness, Figure 8.

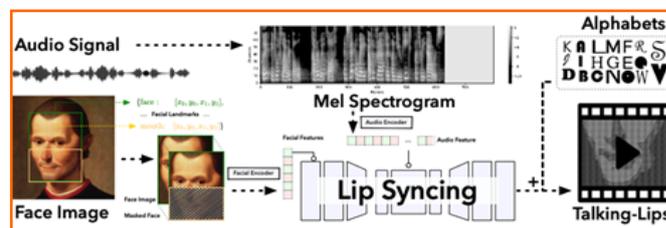


Figure 8. The steps we applied to generate the stylised talking faces of the Philosophers AI clones.

The wall projection develops from only one generated video of the philosopher clones' mouth to the matrix of 36 synchronised mouths speaking between each other, forming the cacophony of words and

expressions learned from the parent philosophers and interpreted by AI agents. The clones are commencing into the discussion based on the computational prediction associated with competence to answer the previous clone's question. Then, one or multiple videos are loaded in the matrix depending on the artificial intelligence's answers taken into consideration. The result is unpredictable and unknown until it happens. The machine-made debate gives a new perspective on ancient philosophical questions and the idea of giving machines control to imagine our futures, Figure 9.

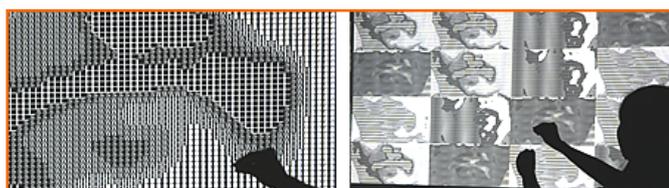


Figure 9. Single philosopher AI clone visualisation (left) and final evolving matrix of 36 generate videos of the AI clones' mouth speaking (right).

## 6. Human-Robot-Robot interaction

In the installation «Syntropic Counterpoints: Metaphysics of The Machines», we are following the Human-Robot-Robot interaction model, which was first introduced in the interactive installation «Syntropic Counterpoints: Botorikko Created State» [12]. Conceptually, it followed the idea that human presence and interaction with the system are either useless or antagonistic. Even an audience can engage with the artwork; that engagement is unnecessary as the AI robots interact with each other entirely autonomously. We aim to relate such absurd interaction with raising phenomena of AI autonomy and its future impact on human society in the cultural and social context.

Visitors can interact with the generated wall projection using specific «close-mouth» hand gestures to stop projected visualisation of the philosophers AI clones from talking. The user's hands are captured with a webcam, then forwarded to the artificial intelligence agent to analyse the gesture performed and trigger the response, Figure 10, [31].



Figure 10. Hands gesture tracking (left) and hands position tracking (right). The audience can try to close the mouth of the projected philosophers' AI clones but instead will catalyse the uncontrollable multiplication of the projections.

Nevertheless, the effect is the opposite from expected as one mouth closed will provoke uncontrollable multiplication of videos with AI philosophers speaking. The system goes back into balance and follows its pattern only when the interaction between visitors and the projected discussion stops. The audience's involvement in the co-creation of the artwork is through resistance rather than collaboration, with unexpected but intriguing outcomes. We intend to raise questions about the future role of humanity in the computational realities created by robots. What will such realities make possible but at the same time, what can be taken from us? Are we going to become unnecessary and inutile to a society built on intelligent technology?

## 7. Conclusion

In this paper, we described the interactive installation «Syntropic Counterpoints: Metaphysics of The Machines». We proposed a conceptual and technical framework used during its creation as an AI-based novel multidisciplinary creative practice paradigm [2]. Our approach focuses on AI automated storytelling agent's development capable of transferring universal questions and meaning selected from the philosophical corpus of knowledge into the genuine machine-made vision of human values and ideals. We trained the four AI clones of Aristotle, Nietzsche, Machiavelli, and Sun Tzu. We involved them in automated philosophical discussions triggered with some of the eternal questions for humanity and given to artificial intelligence interpretations. Generated textual content is further given to artificial intelligence to visualise and lip synchronise into projected audio-visual narrative generated by the machines. With the proposed AI automated content generation and visualisation model, we aim to investigate the possibilities of using artificial intelligence as an interdisciplinary creative medium for art and design practitioners.

Furthermore, in the artwork «Syntropic Counterpoints: Metaphysics of The Machines», we challenge robot creativity and AI abstraction with words and grammar. They can offer infinite combinations of patterns that form meanings and ideas beyond the world we are experiencing with our senses and logic. We consider generated content as the artefact worth analysing from different perspectives such as aesthetical, imaginative, perceptual, cultural and social. The interactive part of the installation is conceptualised on previously applied absurd human-robot-robot interaction where human interaction with the artwork is useless or irreverent to the machines. Nevertheless, we consider such a new type of interactive experience significant for questioning relevant aspects of the future co-existence between people and machines throughout the continuous period of AI reaching its emancipation.

We intend to evolve the project by using visitors' feedback and results from the experiments with different types of Neural Network models in our future work. Our tendency is to achieve high autonomous performances in various aspects of the proposed

creative framework, such as aesthetical, perceptual, behavioural and contextual. Moreover, an exciting challenge will be a comprehensive linguistic analysis of the generated textual content related to evaluating AI creative patterns and achieved abstraction.

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